Proceedings Book

2nd ECOP (European Conference of Oncology Pharmacy)

26–28 June 2014, Krakow, Poland

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Table of Contents

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European Journal of Oncology Pharmacy (EJOP) is the official Journal of the European Society of Oncology Pharmacy (ESOP).

SCOPE

The *European Journal of Oncology Pharmacy* (EJOP), published quarterly, sets out to offer a professional communication platform to European oncology pharmacy practitioners. As the official journal of ESOP, the scope of EJOP is to satisfy ESOP members' needs in terms of improvement on professional standard, setting guidelines, further education and sharing practice experience. EJOP offers ESOP members an insight into the differences and commonalities of oncology pharmacy standards and training, as well as the opportunities to learn the unique benefits and advantages from the different oncology pharmacy practitioners.

EJOP carries an editorial focus for providing information on current development in oncology treatment, sharing practice-related experiences as well as offering an educational platform via conference/meeting reports. The editorial content includes papers in the area of scientific, clinical, therapeutic, economic and social aspects. Prominent experts and eminent professionals support EJOP by sharing their original and qualitative knowledge and insight via high quality review papers covering drug breakthroughs, developments in oncology treatment along with practice guidelines and educational topics which fall within the scope of oncology pharmacy practice.

EJOP is published quarterly and distributed to more than 3,500 oncology pharmacists, pharmacy technicians, subscribers and key opinion leaders in 33 countries and at major international and national conferences. EJOP is available online (www.ejop.eu).

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Letter of Welcome

On behalf of the European Society of Oncology Pharmacy (ESOP) and the Organizing Committee, we warmly welcome you to the second European Conference of Oncology Pharmacy (ECOP), in the time-honoured city of Krakow, Poland, 26–28 June 2014.

Close cooperation between oncology physicians and oncology pharmacists is essential for optimal patient care. ECOP 2014 offers a tremendous opportunity for exchange and debate between its 2,500 members, colleagues and partners worldwide.

The primary focus of this unique European Conference is to promote the highest standards of pharmaceutical care in the management and support of patients with tumours. The latest advances in research, patient management and practice are being showcased in keynote lectures, scientific symposia and poster sessions in two distinct tracks, clinical and practical.

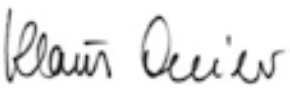
We know that a multi-professional, multidisciplinary approach in oncology will not only ensure economic use of resources but also significantly improve patient safety.

We would like to take this opportunity to invite you to the Opening Event which will be held in the exhibition area of the Conference venue on Thursday 26 June 2014 from 18:30, providing you with the opportunity to meet colleagues from around the world, to network in a convivial setting and forge new links for future collaboration.

Lastly, but by no means least, our host city will match the exciting promise of the Conference itself. Speakers, participants, guests and friends should make time to discover the wonderful city that is Krakow with its wealth of historical buildings.

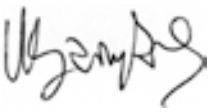
We trust that you will return from the Conference inspired by colleagues from around the world and that you will have made new friends and scientific contacts that will support you in your essential work.

We are delighted to welcome you to what promises to be a highly educational, collaborative and successful Conference.



Klaus Meier

ECOP Conference Chair



Mikael Daouphars

ECOP Scientific Chair

Welcome from EU Commissioner Tonio Borg

Cancer causes great suffering to patients and their families, and also exerts an enormous burden on European societies and on healthcare systems. In 2012 alone, 2.6 million European Union (EU) citizens were newly diagnosed with cancer. It is estimated that, in the EU, 1 in 3 men and 1 in 4 women will be affected by cancer before reaching 75 years of age.

This is why cancer is, and must remain, a high priority at all levels. For over 20 years, the European Commission has contributed towards addressing the cancer challenge.

The European Commission is committed to contributing to the constant improvement of care for cancer patients.

This year, the Commission launched a Joint Action with the EU Member States on Comprehensive Cancer Control. This Joint Action pursues two objectives: to identify quality standards for cancer control in Europe towards reducing disparities and inequalities; and to facilitate cooperation and exchange of best practice among Member States. A key requirement for successful cancer management is the development of national cancer control plans. Twenty-four Member States have adopted such a plan by mid-2014.

During the last decade, diagnosis and treatment of cancer have become increasingly costly, inter alia as a result of rapid advances in technology and drug development. The oncology drug market is expected to grow steadily as a result of the ageing population, the development of new treatments and advances in cancer genetics.

Developments in molecular pathology, imaging, radiotherapy and surgery are equally important in the management of cancer. Member States need to examine the cost-effectiveness of new technologies alongside the efficacy of the drugs. A robust health technology assessment system is essential, as well as a rational approach in the distribution of treatment resources. This is why the Commission has helped to set up a health technology assessment network in Europe, to facilitate the efficient use of resources, create a sustainable system of knowledge sharing and promote good practice in methods and processes.

Finally, the EU contributes to cancer research through Horizon 2020, the EU Framework Programme for Research and Innovation (2014–2020). Adapting to an ageing population, pursuing the path to more personalized medicine, encouraging private sector capability, coordinating national efforts, and expanding global cooperation are some of the features that EU health research will need to embrace to deliver its full potential in this decade.

The primary focus of this European Conference of Oncology Pharmacy (ECOP) in Krakow is to promote high standards of pharmaceutical care in the management and support of patients.

Events such as ECOP are particularly important to foster cooperation across health professionals and across countries to pursue our shared aim of providing the best possible care to cancer patients. I wish you a very successful Congress.

Tonio Borg
European Commissioner for Health
European Commission
Brussels, Belgium

Conference Committees

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Teresa Pociecha (Poland), Organizing Committee Co-Chair
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Sherif Kamal (Egypt)	

Acknowledgements

The European Society of Oncology Pharmacy wishes to thank the following companies and organizations for their support of the Conference by taking part in the exhibition.

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Accord Healthcare	B6
Actavis plc	A7
Baxter Deutschland GmbH	B2
BD Medical Surgical Systems	B3
Biochem Polska Sp. z o. o.	B7
CIS Healthcare Deutschland	A1
CODAN	A8
DuPont de Nemours (Luxembourg) Sàrl	A3
Equashield Medical Ltd	A10
European Society of Oncology Pharmacy (ESOP)	A2
Fresenius Kabi Deutschland GmbH	B4
GlaxoSmithKline	A4
medac GmbH	B1
OncoDNA	A9
Paxxo	A5
Sandoz Biopharmaceuticals & Oncology Injectables	B5
Teva Pharmaceuticals	A6

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Baxter Deutschland GmbH
BD Medical Surgical Systems

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Bayer HealthCare
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and to our **Satellite Symposia sponsors**:

Celgene, GlaxoSmithKline, prIME Oncology and **Teva Pharmaceuticals** for providing an industry-sponsored satellite symposium.

Additional sponsors
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Official Media Partner

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www.ejop.eu

General Information

The second European Conference of Oncology Pharmacy (ECOP) is organized by the European Society of Oncology Pharmacy (ESOP) and the Faculty of Pharmacy Collegium Medicum Jagiellonian University.

Conference Secretariat

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Fax: + 48 12 663 2361
Email: cbin@adm.uj.edu.pl
www.ecop2014.eu

Conference Venue

Auditorium Maximum
Jagiellonian University
33 Krupnicza
PL-31126 Krakow
Poland
(GPS coordinates N: 50° 3′ 46″ E: 19° 55′ 31″)

Auditorium Maximum is a lecture theatre complex of Jagiellonian University, located in the centre city, 10 minutes walk from Market Square. It offers various conference rooms and space ideal for exhibition and catering.

Poland

Poland is a beautiful country situated in the very heart of Europe. Its population is estimated at 38 million, total area is 312,685 sq. km. Poland became part of NATO in 1991, from 2004 it is part of the European Union, and became part of the Schengen Area in 2007.

Poland is on Central European Time zone.

Krakow

Krakow is a place with a historical past, dating as far back as a millennium, a city of kings, national heroes and artists. Krakow is Poland's historic capital with over 1,000 years of history. It is the seat of Poland's oldest university. At present, Krakow boasts over 20 institutions of higher education. It is a city of more than a hundred churches and scores of other priceless relics of history. It is also Poland's second largest agglomeration in terms of area and population after Warsaw. Krakow is featured on the UNESCO World Heritage List. In 2000, it was designated as one of the European Capitals of Culture. In 2007, Orbitz, an American Internet agency, proclaimed Krakow the most fashionable city of the world.

In Krakow, you can find many national symbols:

WAWEL – Krakow's splendid hilltop castle, UNESCO World Heritage Site since 1978. Wawel is dominated by two immense edifices: the Gothic Royal Cathedral with royal tombs and famous Sigismund Bell Tower, and the Castle – former Royal Residence with the arcaded courtyard of rare beauty.

RYNEK GŁÓWNY (Market Square) – world's largest medieval square situated in the very heart of the city. Home to the Mariacka Basilica (St Mary's Church) and Sukiennice (Cloth Hall).

Museum PODZIEMIA RYNKU (Underground Market Square) - a very interesting exhibition exploits the potential of today's technology. Audio visual and touch screens containing descriptions presented a fragment of the exhibition (in several languages) more attractive exhibition and changing visit to the museum in an interesting adventure during which we will see not only the history of the city, but sometimes we move back in time and feel like the then inhabitants of Krakow. Audiovisual presentations showing the old city life, weight and theater for children are wonderful and interesting form of presentation of the history.

The BARBICAN, part of the city's fortifications is one of the very few surviving structures of its kind in Europe. Built in 1489–1499 as an additional protection of the Florian Gate.

Krakow prides itself on the oldest university in Poland. It is called the JAGIELLONIAN UNIVERSITY (JU) and was founded by King Casimir the Great in 1364.The old university district is one of the must see spots in the Old Town – you will have a chance to visit the picturesque courtyard of Collegium Maius and see the statue of Nicolas Copernicus, the famous astronomer.

JEWISH DISTRICT IN KAZIMIERZ. You will visit the synagogues and Jewish cemeteries; learn about colourful, fascinating and touching history of Krakow's Jews.

PLANTY is a city park which surrounds the Old Town. The park is dotted with numerous monuments and fountains, and is one of the favourite outdoor venues for Krakovians and tourists alike.

ROYAL ROUTE is one of the most beautiful and famous routes in Poland. It retraces the path followed by Polish kings heading for their residence on the Wawel Hill. It runs across the most magnificent sites of Krakow's Old Town.

The MOUNDS of Krakow are inscribed in the landscape of the city and its environs and are a tourist attraction themselves. There are four mounds in Krakow, and in this respect the city holds the Polish record. The oldest are the Krakus and Wanda Mounds, younger and most popular

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P.9

is the Tadeusz Kościuszko Mound, and the youngest and largest is the Józef Piłsudski Mound.

Krakow is currently weighing in with 11 major theatres, over 40 museums, Krakow Opera and Krakow Philharmonic – Poland's epicentre of cultural and artistic life.

Founded in 1946, JU Museum of Pharmacy is the greatest in Poland and one of few similar museums in the world.

The unique, magical atmosphere is created by the bugle played from St Mary's Church Tower every hour, Krakow's florists, pigeons flying over the Market Square, traditional pretzels and magic cabs.

Krakow is an eating, drinking and partying paradise – the Old Town is tightly packed with pubs, bars and cafes (300 of them). Recently, also the Jewish district of Kazimierz has become a lively place, especially during the evening.

Krakow is the most popular tourist destination, attracting over seven million tourists a year. Ideal starting point to visit is the region's top sights.

Transportation

John Paul II International Airport Krakow-Balice Krakow Airport is situated about 11 km west of Krakow's centre. Its location is in the immediate vicinity of the regional roads and the A4 motorway facilitates access from various parts of the region and Poland.(GPS coordinates N: 50° 4′ 21″ E: 19° 48′ 21″)

Katowice International Airport (Pyrzowice) is situated about 1 hour 15 min (100 km) from the centre of Krakow.

Transport from John Paul II International Airport Krakow-Balice to the centre

Bus

The best way to get from the airport to Auditorium Maximum is by the public transport. Krakow Airport is served by two regular bus lines: 208 and 292 and one night line: 902. The best line for the conference venue is 292. Buses arrive at the bus stop near terminal T1, turn right after leaving terminal T1. Tickets can be bought from the vending machine in the bus or at the kiosk of the passenger terminal (PLN 4 - regular ticket) or the driver (with an additional charge PLN 0.50). Remember to validate the ticket, no extra pay for carry-on baggage. Bus line 292 runs from 04:57 am to around 11:00 every 20 minutes. The night bus line 902 runs from 23:25 to 04:00 every hour and it is last bus stop is the Main Station. If you go to Auditorium Maximum get off the bus 292 at the stop named: AGH. The journey takes about 35 to 40 minutes. Details can be found on www.krakowaiport.pl (transport and parking) or http://rozklady.mpk.krakow.pl/aktualne/0292/0292r033.htm or http://rozklady.mpk.krakow.pl/aktualne/0208/0208rw02.htmorhttp://rozklady.mpk.krakow.pl/aktualne/0902/0902rw02.htm

Taxi

iCar (Tel: +48 12 653 5555) from airport to centre, PLN 32, other taxis - around PLN 50–60 from 6 am to 10 pm, during the night around PLN 60–80. The taxi rank is located next to the passenger terminal or by the services of radio-taxi.

Car

The airport is easily accessible by car from the city centre (20–30 minutes). The airport also has a direct exit from the A4 motorway. In front of the passenger terminal is parking for over 750 vehicles.

Parking payment - Available from: www.krakowairport-parking.pl

Train

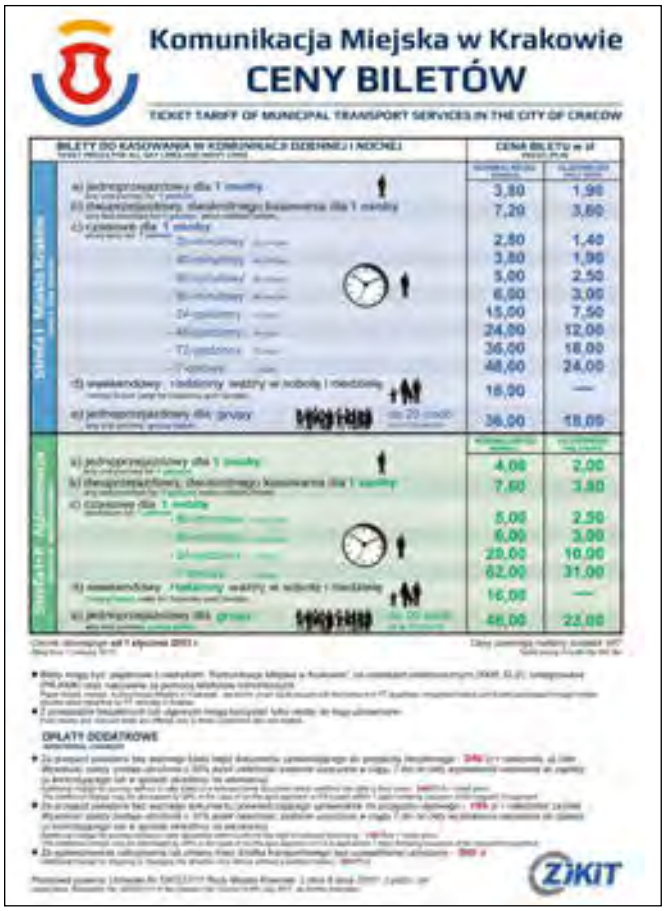
Krakow Main Railway Station (Dworzec Główny) is situated on the edge of the Old Town. Besides domestic communication there are also direct connections with European cities like: Berlin, Budapest, Hamburg, Prague and Vienna.

www.pkp.pl

www.rozklad-pkp.pl

Public transport in the city

Public transport in Krakow includes trams and buses, no subway. www.mpk.krakow.pl



EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 10

Badge

For security reasons, participants are requested to wear their badges at all times during the Conference.

Participants who lose their badges can obtain a replacement badge at the registration desk. A replacement fee of Euros 100 will be charged.

Catering

Lunch

Friday 27 June 2014 from 13:00 to 14:30

A complimentary lunch will be served in the exhibition area – Garage Level -1

Coffee Breaks

Complimentary coffee breaks are served in the exhibition area – Garage Level -1:

Thursday 26 June 2014 from 16:00 to 16:30

Friday 27 June 2014 from 11:00 to 11:30 and 16:00 to 16:30

Saturday 28 June 2014 from 10:30 to 11:00

Certificate of Attendance

Certificates of attendance will be available at the registration area as of Friday 27 June 2014 from 15:00 onwards. Participants will be requested to complete a Conference evaluation form in exchange for their certificate.

The Conference Secretariat will not mail Certificates of Attendance to participants after the Conference.

Cloakroom

Cloakroom is located on the ground floor near the entrance to the building.

Opening hours:

Thursday 26 June 2014 from 08:00 to 20:00

Friday 27 June 2014 from 08:00 to 20:00

Saturday 28 June 2014 from 08:00 to 20:00

Currency

The official currency is Polish Zloty (PLN).

Currencies can be exchanged in banks, hotels or exchange offices. International credit cards are accepted in most hotels, restaurants and shops.

Exhibition

The exhibition is held in the Garage Level -1.

Exhibition opening hours:

Thursday 26 June 2014 from 12:00 to 19:45

Friday 27 June 2014 from 09:00 to 18:00

Saturday 28 June 2014 from 08:30 to 11:00

For a list of exhibitors, see pages 14–16.

First Aid

The conference venue is located within a short walking distance to hospital – Szpital Specjalistyczny im. Józefa Dietla, Skarbowa 4, PL-31121 Krakow, Poland.

Insurance

The organizers of ECOP 2014 do not accept liability for individual medical, travel or personal insurance. Participants are strongly recommended to obtain their own personal insurance coverage. The organizers disclaim all responsibility for loss due to theft or negligence.

WiFi and Internet Access

Free WiFi is available throughout the Conference venue.

Username: ECOP 2014

Password: Krakow

Internet cafe (1st floor) - there will be work desks and 10 computers available with access to the Internet to use with your own laptop.

Language

The official language of the Conference is English. No simultaneous translation is offered during the Conference.

Lost and Found

All enquiries should be directed to the reception desk of the Auditorium Maximum. Participants are advised to mark their Conference bag and materials with their name. The organizers disclaim all responsibility for loss due to theft or negligence.

Non-smoking

There will be a strict non-smoking policy within all areas of the facilities used by the Conference.

Opening Lecture

The Opening Lecture access is free for all registered participants. Please refer to the Scientific Programme for further details.

Poster Sessions

Posters are displayed in the Garage level-1. Posters will be on display in the dedicated poster area for the entire duration of the conference and during all poster sessions. On Thursday 26 June 2014 starting at 11:00, poster presenters will be allowed access to the poster area to mount their poster on the poster board displaying their assigned poster number. For assistance, please check with the ECOP staff onsite. Posters must be removed on Saturday 28 June 2014 by 13:30. Please note that any posters remaining after this time will be removed by

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 11

the organizers and cannot be reclaimed. Presenting authors are kindly requested to be present at their poster for poster defense during assigned poster viewing and coffee breaks.

Best Poster Award recognises outstanding posters presented at ECOP 2014. All posters will be evaluated by a committee and the winner will be notified during the conference. The award will be presented at the Closing Session. The winner must reconfirm his/her presence at the conference and at the ceremony.

Registration

The Conference is open to all registered participants. For security reasons, participants are requested to wear their badges at all times.

Registration opening hours:

Thursday 26 June 2014 from 08:00 to 19:45

Friday 27 June 2014 from 07:30 to 18:00

Saturday 28 June 2014 from 08:00 to 14:00

The registration package includes: entry to all scientific sessions and exhibition; entry to all Satellite Symposia organized during the conference; Proceedings book; official lunch and coffee breaks during the Conference; conference bag; attendance at the Welcome Reception on Thursday 26 June 2014 at 18:30 in the Exhibition Room.

Speaker Preview Room

The Speaker Preview Room is located in the room under the stairs on the ground floor. It will be available during the hours of the Conference, half an hour before the start of the session and half an hour after the end of the session. In this room, there will be some desktop computers. Speakers will be able to view and upload their presentations.

Industry-sponsored Symposia

Industry-sponsored Satellite Symposia are taking place during ECOP 2014. For schedules and more information, see the section 'Industry-sponsored Satellite Symposia' on pages 69 to 72.

Networking Events

Opening Event

All delegates are invited to join the Organizing Committee and ESOP Board at the Opening Event in the Exhibition Room of the Conference venue on Thursday 26 June 2014 from 18:30 to 19:45. This is your chance to meet colleagues from around the world, to network in a convivial setting and forge new links for future collaboration.

Social event on Friday, 27 June 2014 – Folwark Zalesie

FOLWARK ZALESIE (The Zalesie Manor Complex)

The Zalesie Manor Complex is located outside the city, on a hill with a view of all the Beskids Mountains, with beautiful Babia Góra, Dobczycki Reservoir and the Tatras Mountains in the background. The buildings are surrounded by forests, fields and meadows – 30hectares of area is perfect for meeting and outdoor event.

The Zalesie Manor Complex has 200 year long history and is a place where buildings were erected subsequently to form interesting rural architecture. In 2001 the buildings were adapted for a comfortable accommodation base and a farm restaurant where traditional Polish and European dishes are serve.

The attraction of the evening will be a folk music band.

Great food, beautiful surroundings and wonderful atmosphere will allow you to transfer into the realm of relaxation.

Date – Friday, 27 June 2014

Time – 20:15 at Folwark Zalesie

Departure from the Auditorium Maximum – 19:30

The approximate distance from center of Krakow is 25 km - 30-40 min by coach

European Society of Oncology Pharmacy (ESOP) Profile

The European Society of Oncology Pharmacy (ESOP), founded in 2000 in Prague, Czech Republic, is the largest organization of oncology pharmacists in the world with 3,137 members from 52 countries.

Aim and Objectives

ESOP supports optimal treatment for cancer patients with objectives to develop and promote clinical and oncology pharmacy practice through:

1. Education and training
2. Safe handling and administration of drugs
3. Quality management
4. Research and development
5. Pharmaceutical care

The Oncology Team – Co-operation

The pharmacy as coordinator of Centre of Cytotoxic Therapy implements quality management of oncology pharmacy services and takes responsibility in patient care and personnel protection regarding all areas of cytotoxic therapy. The pharmacy collects and processes all medical and toxicological data relevant to cytotoxics, as well as supportive measures. Focusing on cytotoxic treatment alone is not enough. We also need to focus on appropriate diet, adequate analgesic medication and correct anti-emetic scheme, and we cannot ignore the social and psychological needs of the patient.

Financial resources have become limited, and it is necessary to intensify our services to increase cost-effectiveness, to ensure adequate treatment and to prevent quality loss.

Ljubljana Declaration 2006

'The close co-operation between oncology physicians and oncology pharmacists is vital for optimal patient care. The multi-professional approach will deliver best practice to patients within a clinical governance framework. Professional, close and timely collaboration will ensure economic use of resources and improve patient safety.'

Our Goals: Quality Standards, Continuous Education and Certification

The fourth edition of *Quality Standards for the Oncology Pharmacy Service* (QuapoS) – translated into 24 languages – presents changes with respect to the position of our service. They are used for standardisation of national principles and to speak with one voice in Europe. The beneficiary of these efforts will always be the patient.

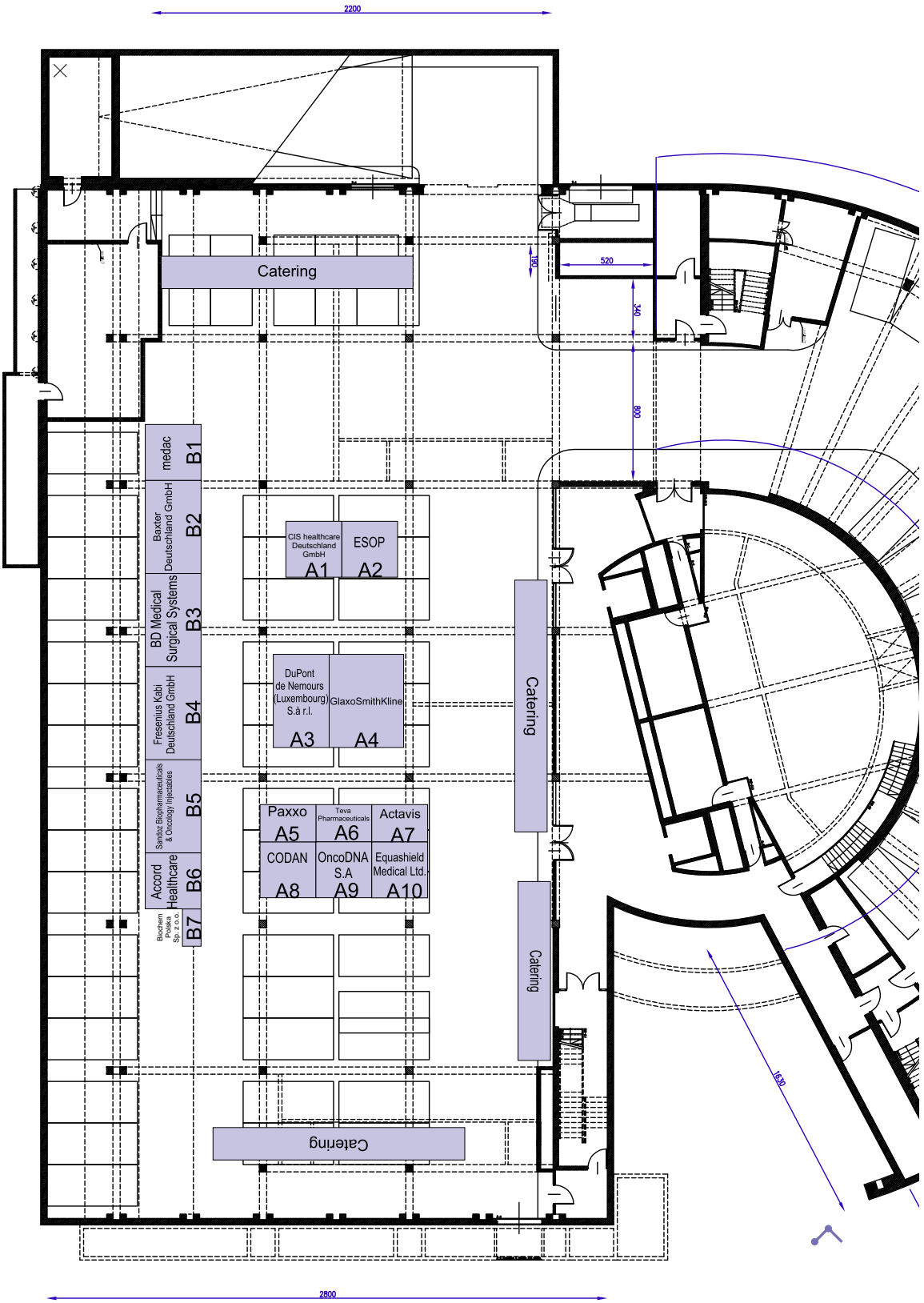
Specific Activities

The ESOP Masterclass in oncology pharmacy practice is an event providing continuing education in oncology for hospital pharmacists, whose duties require expertise on cytotoxic drug preparation, handling and administration (including risk management). It is also for clinical pharmacists, so they can give patients the best possible care and support. The *European Journal of Oncology Pharmacy* (EJOP) has been launched to satisfy these needs.

www.esop.eu

Floor Plan

Venue and Exhibition Floor Plan



List of Exhibitors and Exhibitor Profiles

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CIS Healthcare Deutschland	A1
CODAN	A8
DuPont de Nemours (Luxembourg) Sàrl	A3
Equashield Medical Ltd	A10
European Society of Oncology Pharmacy (ESOP)	A2
Fresenius Kabi Deutschland GmbH	B4
GlaxoSmithKline	A4
medac GmbH	B1
OncoDNA	A9
Paxxo	A5
Sandoz Biopharmaceuticals & Oncology Injectables	B5
Teva Pharmaceuticals	A6

Accord Healthcare — B6

Accord Healthcare is a young and dynamic pharmaceutical company. By being vertically integrated and owning all steps of pharmaceutical development and production process, Accord can bring high quality medicines to patients faster, more economically and with greater innovation than our rivals. Since beginning our commercial activities in Europe in 2008, Accord has demonstrated dramatic growth and evolution of our product range.

Actavis plc — A7

Actavis plc (NYSE: ACT) is a global, integrated specialty pharmaceutical company focused on developing, manufacturing and distributing generic, brand and biosimilar products. Every day, customers in more than 60 markets around the world trust our Company to provide high-quality pharmaceutical products. To ensure we consistently deliver on that trust, Quality is a hallmark of all that we do throughout our Company. In Poland, Actavis established since 2004. Now, we are the fastest growing companies in our market. The company has a wide range of prescription drugs, applicable to the treatment of diseases of therapeutic areas such as cardiology, urology, neurology, oncology and dermatology. In addition, we offer OTC products and dietary supplements. Our portfolio includes over 250 formulas.

Baxter Deutschland GmbH — B2

Baxter International Inc, through its subsidiaries, develops, manufactures and markets products that save and sustain the lives of people with haemophilia, immune disorders, infectious diseases, kidney disease, trauma, and other chronic and acute medical conditions.

As a global, diversified healthcare company, Baxter applies a unique combination of expertise in medical devices, pharmaceuticals and biotechnology to create products that advance patient care worldwide.

BD Medical Surgical Systems — B3

BD is a leading global medical technology company that develops, manufactures and sells medical devices, instrument systems and reagents. The Company is dedicated to improving people's health throughout the world. BD is focused on improving drug delivery, enhancing the quality and speed of diagnosing infectious diseases and cancers, and advancing research, discovery and production of new drugs and vaccines. BD's capabilities are instrumental in combating many of the world's most pressing diseases. Founded in 1897 and headquartered in Franklin Lakes, New Jersey, USA, BD employs approximately 29,000 associates in more than 50 countries throughout the world. The Company serves healthcare institutions, life science researchers, clinical laboratories, the pharmaceutical industry and the general public.

http://www.bd.com/

Biochem Polska Sp. z o. o. — B7

Biochem Poland Sp. z o. o., founded in 1996, distributes disposable medical equipment and pharmaceutical substances for the production of concentrates for dialysis.

In 2000, Biochem began cooperating with Icu Medical in the USA - a leading manufacturer of equipment for the safe preparation and administration of drugs, cytostatics, and other preparations.

www.biochempolska.pl

CIS Healthcare Deutschland — A1

CIS Heathcare is the company behind the number one selling chemotherapy system called ChemoCare and the cytostatic production tool called Cypro.

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 15

We are proud of our track record in developing expert systems for clinical users working in the specialised area of chemotherapy and we believe that our product's success is down to our unique approach to product design and implementation.

Our expert programming team works closely with both healthcare services and experts in the field of oncology to design and test the functionality of our software to ensures that the right solution is delivered to you that makes caring for your patients more consistent, safer, successful and cost-effective than ever before.

We believe in building strong relationships with our customers.

CODAN - the decisive connection **A8**

CODAN is one of the market leading companies within the field of infusion management. With over 50 years of experience we know what it takes to produce and sell products of high quality. CODAN is a family owned company with sales companies on all major European markets and production in Europe.

Our product portfolio contains disposables for IV-therapy, transfusion therapy, urology flushing devices, pressure monitoring and infusion pumps. Safety for user and patient is important for CODAN, we therefore have a special focus on safety devices for handling cytotoxic drugs. We were one of the first to develop products for safe preparation and administrating cytotoxic drugs. A method used in the major part of Europe. Welcome to visit us at our booth at ECOP 2014!

DuPont de Nemours (Luxembourg) Sàrl **A3**

Reducing the risks: protective clothing from DuPont

Personnel working with cytostatics must be provided with effective protection from these drugs, many of which are carcinogenic, mutagenic and reprotoxic. At the same time, it is important to protect the product against contamination by people. Wearing appropriate personal protective equipment is one of the ways of achieving this. DuPont™ Tyvek® and DuPont™ Tychem® garments offer solutions for protective clothing, depending on chemical toxicity and exposure levels, in applications where cytostatic contamination protection is required.

www.safespec.dupont.co.uk

Equashield Medical Ltd **A10**

Equashield is a provider of the world's safest Closed System Transfer Devices (CSTD), clinically proven to protect healthcare professionals from hazardous drug and vapour exposure. The company's flagship device, EQUASHIELD® II, is the fastest CSTD to deploy and easiest to use. It is also the only truly closed device on the market, covering more routes of exposure than alternative systems and protecting against exposure to hazardous drug residue on contaminated syringe plungers.

www.equashield.com

Fresenius Kabi Deutschland GmbH **B4**

Fresenius Kabi is a global healthcare company that specializes in lifesaving medicines and technologies for infusion, transfusion and clinical nutrition. The company's products and services are used to help care for critically and chronically ill patients. The portfolio comprises IV generic drugs, infusion therapies, clinical nutrition and the medical devices for administering these products. Within transfusion technologies, the company offers products for whole blood and blood components collection and processing as well as for transfusion medicine and cell therapies.

With our corporate philosophy of 'caring for life', we are committed to putting essential medicines and technologies in the hands of people who help patients and finding the best answers to the challenges they face.

GlaxoSmithKline **A4**

GSK is dedicated to the patients, physicians and communities pursuing the fight against cancer. At GSK, what defines us is our pledge to engage and work in concert with our communities. At GSK, our portfolio of medicines represents a heritage spanning more than five decades. Whether you are a physician, researcher, or patient, we aspire to know how GSK might engage with you in fighting the global pandemic known as cancer.

medac **B1**

medac is specialised in the treatment of malignant diseases since its foundation in 1970. Now, medac is one of

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 16

the leading manufacturers of oncology products not only in Germany, but in many international markets.

medac offers both, innovative and well proven, therapeutic options in the fields of Oncology, Haematology, Urology, Autoimmune diseases and Fibrinolysis and is one of a handful of companies which is also specialised in the field of diagnostics.

www.medac.de

OncoDNA **A9**

OncoDNA, The Cancer Theranostic Company, is a European leading service company developing services to enable better choices of drug therapy and better cancer monitoring by Oncologists. OncoDEEP is integrating sequencing of actionable genes in tumour (from 50 to 400 genes, using NGS) with classical anatomopathology (IHCs, FISH, ...) tests used to validate the impact of mutations at gene/pathways level. Report is available through a unique web interface called OncoSHARE which provides the list of molecular alterations, a list of drugs/compounds for which the patient might or might not get clinical benefit and a list of clinical trials available for the patient. Beside OncoDEEP reporting, OncoSHARE allows interactivity for physician who can share/discuss the report with colleagues or experts.

Paxxo **A5**

Paxxo is Sweden-based packaging company with a 35-year history. Our business concept is to manufacture the sustainable and unique bagging system Longopac that, thanks to innovative, smarter waste management and packaging solutions, creates a better working environment for professionals. Our success comes from the efficient handling, a better work environment and low environmental impact. Our bagging system is based on a strong, 3-layer polyethylene bag material which is folded into compact cassettes that are sold by certified partners in more than 35 countries.

Our main product for hazardous waste handling is Pactosafe. It is a waste sealing unit for safe airtight sealing of cytotoxic waste and toxic laboratory waste. We are now selling the fourth generation of Pactosafe.

www.pactosafe.com

Sandoz Biopharmaceuticals & Oncology Injectables **B5**

Sandoz, the generic pharmaceuticals division of Novartis, is a global leader in the rapidly growing generics industry. Sandoz employs over 26,000 employees in more than 140 countries, offering broad range of over 1,000 high-quality, affordable products that are no longer protected by patents. With US$8.7 billion in sales in 2012, Sandoz holds the #1 position globally in biosimilars as well as generic injectables, ophthalmics, dermatology and antibiotics.

Teva Pharmaceuticals **A6**

Teva Pharmaceutical Industries Ltd (NYSE: TEVA) is a leading global pharmaceutical company, committed to increasing access to high-quality health care by developing, producing and marketing affordable generic drugs as well as innovative and specialty pharmaceuticals and active pharmaceutical ingredients. Headquartered in Israel, Teva is the world's leading generic drugmaker, with a global product portfolio of more than 1,000 molecules and a direct presence in approximately 60 countries. Teva's branded businesses focus on CNS, oncology, pain, respiratory and women's health therapeutic areas as well as biologics. Teva currently employs approximately 45,000 people around the world and reached US$20.3 billion in net revenues in 2013.

Programme Overview: ECOP 2014

Thursday, 26 June 2014

Aula Big Half A	Aula Big Half B
Industry-sponsored Symposia 10:00 - 12:15 Exhibition Hall	Industry-sponsored Symposia 10:45 - 12:15 Aula Small
Industry-sponsored Sympoia 12:15 - 13:45 Exhibition Hall	Industry-sponsored Sympoia 12:15 - 13:45 Aula Small
Opening 14.00 - 15.00	
Keynote Lecture 15.00 - 16.00	
Coffee Break 16:00 - 16:30	
Clinical Interactive Session 16:30 - 17:30	New Horizons Practical 16:30 - 17:30
New Horizons Clinical 17:30 - 18:30	Practical Interactive Session 17:30 - 18:30
RECEPTION 18:30 - 19:45	

Poster Viewing 15:00 - 19:45

Exhibition 12:00 - 19:45

Friday, 27 June 2014

Aula Big Half A	Aula Big Half B	Aula Middle
Roundtable 08.00 - 09.30		
Symposium - Clinical 09:30 - 11:00	Proffered Papers - Mixed 09:30 - 11:00	ESOP Activities 09:30 - 11:00
Coffee break 11:00 - 11:30		
Proffered Papers - Clinical 11:30 - 13:00	Symposium - Practical 11:30 - 13:00	German-Polish Conference 11:30-13:00
Lunch Break	Industry-sponsored Symposia 13:20 - 14:50 Aula Big Half B	Lunch Break
Debate Clinical / Practical 14:50 - 16:20		International Relationships 14:50-15:50
Coffee Break 16:20 - 16:35		
Interactive - Clinical 16:35 - 18:05	Interactive - Practical 16:35- 18:05	

Poster Viewing 11:00 - 18:00

Exhibition 09:00 - 18:00

Saturday, 28 June 2014

Aula Big Half A	Aula Big Half B
Keynote Lecture 08:30-09:00	
Poster Discussion - Clinical 09:00 - 10:30	Challenge the Expert: Pharmaceutical Care 09:00 - 10:30
Coffee Break 10:30 - 11:00	
European Contamination Project 11:00 - 12:30	Poster Discussion Practical 11:00 - 12:30
Roundtable on Oral Chemotherapy 12:30-13:30	
Closing Session / Awards 13:30 - 14:00	

Poster Viewing 08:30 - 12:00

Exhibition 08:30 - 11:00

Thursday 26 June 2014

10:00 - 13:45 **Industry-sponsored Symposia** Exhibition Hall
10:45 - 12:15 **Industry-sponsored Symposia** Aula Small
12:15 - 13:45 **Industry-sponsored Symposia** Aula Small

Opening Session

14:00 - 15:00 **Aula Big Half A**

14:00 **Welcome Message from the City and the University of Krakow**
14:15 **Welcome Message from the President of ESOP**
K Meier (Germany)
14:30 **Welcome Message from the Chair of ECOP Scientific Committee**
M Daouphars (France)

Keynote Lecture

15:00 - 16:00 **Aula Big Half A**

Abstract Nr

Chair: M Daouphars (France)
15:00 **Challenges in Cancer Care**
R Sullivan (United Kingdom) L1

Clinical Interactive Session

Tailoring Therapy for Cancer Patients

16:30 - 17:30 **Aula Big Half A**

Abstract Nr

Chair: MP Trojniak (Italy)
16:30 **Cost Explosion of Anticancer Drugs**
A Palozzo (Italy) L2
16:50 **Overview of ESMO Survey on the Availability of Antineoplastic Medicines**
M Saar (Estonia)
17:00 **Shortages of essential Cytotoxic Drugs in Europe: A Call for Action**
G Wiedemann (Germany) L3

Practical Session: New Horizons – Evidence-Based Medicine Implementation in Oncology Setting: Role of the Clinical Pharmacist

16:30 - 17:30 **Aula Big Half B**

Abstract Nr

Chair: F Fenech (Malta)
16:30 **Evidence-Based Medicine Implementation in Oncology Setting: Translating Theory into Practice**
S Kamal (Egypt) L4
17:00 **From the Lab to the Clinic – Practical Solutions to Implementation of New Medicines**
F MacLean (United Kingdom) L5

Clinical Session: New Horizons – Cancer Treatment: Great Views from the Top Papers

17:30 - 18:30 **Aula Big Half A**

Abstract Nr

Chair: I Netikova (Czech Republic)
17:30 **Dual HER2 blockade for Breast Cancer Therapy**
A Munilla Das (Spain) L6
18:00 **New Melanoma Treatments**
L Hardy (United Kingdom) L7

Practical Interactive Session: Do Cancer Inpatients Benefit from Oncology Pharmacy

17:30 - 18:30 **Aula Big Half B**

Abstract Nr

Chair: M Crul (The Netherlands)
17:30 **Pharmaceutical Care Provision for Cancer Patients – Experiences in Germany**
S Simons (Germany) L8
17:50 **Development of Clinical Pharmacy Services for Oncology Inpatients in Malta**
F Fenech (Malta) L9
18:10 **Challenge to Change: Timely Ward-based Pharmaceutical Intervention is now Available**
S Suzuki (Japan) L10

Friday 27 June 2014

Roundtable: Drug Shortages

08:00 - 09:30 **Aula Big Half A**

Chair: K Meier (Germany)
G Cessak (Office for Registration of Medicinal Products, Medical Devices and Biocidal Products, Poland)
F Houÿez (EURORDIS, France)
AL De Lima Marçal, (EMA, United Kingdom)
A Vulto (The Netherlands)

Symposium – Clinical Session: Does one Size fit All? The Importance of Pharmacogenetics

09:30 - 11:00 **Aula Big Half A**

Abstract Nr

Chair: P Hartvig-Honoré (Denmark)
09:30 **Pharmacogenetics in Oncology, where are we?**
H-J Guchelaar (The Netherlands) L11
10:00 **Pharmacogenomics and Colorectal Carcinoma**
I Kirac (Croatia) L12
10:30 **Where we are and where we go: Oncology Pharmacy Challenge!**
M García Gil (Spain) L13

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 19

Proffered Papers – Mixed Session

09:30 - 11:00 **Aula Big Half B**

Abstract Nr

Chairs: A van Treeck (Austria), A Bosnak (Turkey)

09:30 **New Applications of Registered Drugs**
W Placha, K Kocemba, J Zagajewski, T Pociecha, T Sacha, M Zawada, S Czekalska, M Grabacka (Poland) P2

09:45 **A New Preclinical Human Cancer Model demonstrates successful Growth of Human Solid Tumours of diverse Tissue Origins in unfertilized Avian Eggs**
S Crawford, B Hayward, P Mrowiec, L Juchniewich, A Ayer-Alcorace, S Skrabl, L Grant, M Robert (USA) P3

10:00 **CAM Use by Patients receiving Curative Intent Chemotherapy**
PJ Smith, A Clavarino, J Long, KJ Steadman (Australia) P39

10:15 **Why do we need more Therapeutic Drug Monitoring in Oncology?**
C Bardin, J Beijnen, A Paci, N Widmer, E Chatelut, G Veal, D Leveque, A Astier (France) P40

10:30 **Peripheral Neuropathy in Patients receiving Paclitaxel and Oxaliplatin containing Chemotherapy: Prevalence and Handling**
M Saar, BM Heido, J Jaal (Estonia) P87

Additional Track – ESOP Activities: What ESOP is offering its Members to show up their Strengths?

09:30 - 11:00 **Aula Middle**

Chair: K Meier (Germany), Y Hafidi (Morocco)

09:30 **Clean Working**
K Kongi (Estonia)

10:00 **Centres of Exchange**
C Bardin (France)

10:30 **Spill Kit**
N Luczak (Denmark)

Proffered Papers – Clinical Session

11:30 - 13:00 **Aula Big Half A**

Abstract Nr

Chair: L Horváth (Hungary)

11:30 **The Need for Monitoring of hypoglycemic Effect of Sunitinib in Normoglycemia and Hyperglycemia**
K Sobanska, E Szarek, A Karbownik, M Lewandowska, E Grzeskowiak (Poland) P4

11:45 **Low Dose Intensity in elderly Patients treated with Chemotherapy for Colorectal Cancer**
M Soussan-Dahan, B Glaser, Z Ramjaun, S Perriat, A Grand, JM Canonge (France) P48

12:00 **The Role of Clinical Pharmacists in a multidisciplinary enteral Nutrition Support Team (NST) in the Care of Cancer Patients**
P Lechner, A Freidank, R Radziwill (Germany) P49

12:15 **Impact of multidisciplinary Cancer Conferences (MCCs) on Cancer Therapy Management**
C Kowal, A Razurel, P Faure, I Madelaine (France) P50

12:30 **Clinical Trials in Cancer Care: How to increase Patient Enrolment?**
E Kasper, J Rouvet, O Rigal, F Basuyau, R Varin, M Daouphars (France) P51

Symposium – Practical Session: Is my Mother safe in Hospital Cancer Care?

11:30 - 13:00 **Aula Big Half B**

Abstract Nr

Chair: S Theophanous-Kitiri (Cyprus)

11:30 **Computerized Order Process – Influence on Prescription Errors**
T Schöning (Germany) L14

11:50 **Medical Errors in Clinical Practice**
I Netikova (Czech Republic) L15

12:10 **Pharmacovigilance: Monitoring of Adverse Drug Reactions**
M Sonc (Slovenia) L16

12:30 **Patient Safety in a paperless Hospital**
MJ Tames (Spain) L17

Additional Track – 10th German-Polish Conference Oncology Pharmacy – From Theory to Practice

11:30 - 13:00 **Aula Middle**

Chair: J Lazowski (Poland) and K Meier (Germany)

11:30 **Pharmacokinetic–Pharmacodynamic Modelling in Cancer Chemotherapy**
E Wyska (Poland)

11:50 **Official Quality Control of cytotoxic Preparations**
M Heuermann (Germany)

12:10 **Off-Label Use of Medicinal Products. Pharmaceutical and Legal Aspects**
A Zimmermann (Poland)

12:30 **'Oralia-Initiative' - A Program to support Pharmacists in counselling Cancer Patients**
A Freidank (Germany)

13:20 - 14:50 Industry-Sponsored Symposia **Aula Big Half B**

Debate – Clinical/Practical: This House believes in of Biosimilars – This House does not substitute with Biosimilars

14:50 - 16:20 **Aula Big Half A**

Chair: K Meier (Germany)
In Favour: A Astier (France), A Vulto (The Netherlands)
Against: I Krämer (Germany), A Johnston (United Kingdom)

Additional Track – International Relationships

14:50 - 15:50 **Aula Middle**

Abstract Nr

Chair: M Daouphars (France)

14:50 **Education and Training of Oncology Pharmacists in the USA**
GC Yee (USA) L18

15:20 **A new Opportunity for Clinical Pharmacists: A Pharmacist initiated Clinical Trial**
H Hashimoto (Japan) L19

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P.20

Clinical Interactive Session: Pain Management in Cancer Patients

16:35 - 18:05 **Aula Big Half A**

Abstract Nr

Chair: K Simons-Sanders (The Netherlands)

16:35 **Pain Management for Cancer Patients - Choosing and Dosing of Analgesics**
S Theophanous-Kitiri (Cyprus) L20

17:05 **Pain Treatment in Cancer - old and new Venues**
P Hartvig-Honoré (Denmark) L21

17:35 **Management of Cancer Pain: ESMO Clinical Practice Guidelines**
D Santini (Italy) L22

Practical Interactive Session: Talking to the Patient, the Role of the Oncology Pharmacist

16:35 - 18:05 **Aula Big Half B**

Abstract Nr

Chair: S Kamal (Egypt)

16:35 **The Role of the Oncology Pharmacist in Counselling the oncology Patient and his Family his Family**
V Pavlica (Croatia) L23

17:05 **Talking to the Juvenile Cancer Patient**
H El-Nokoudy (Egypt) L24

17:35 **Talking to the Elderly Cancer Patient**
M Höckel (Germany) L25

Saturday 28 June 2014

Keynote Lecture

08:30 - 09:00 **Aula Big Half A**

Abstract Nr

Chair: T Pociecha (Poland)

08:30 **Quo Vadis Regenerative Medicine? - of Stem Cells, Regeneration, Ageing and Cancer**
M Ratajczak (USA) L26

Poster Discussion – Clinical

09:00 - 10:30 **Aula Big Half A**

Abstract Nr

Chair: F Fenech (Malta) and BJ Sokowiak (Poland)

09:00 **Management of Mucositis in Paediatric Oncology in Low Income Countries**
S Kamal, S Mohamed, D Ramadan Abbas (Egypt) P41

09:10 **The Project Oncology Competence Pharmacy: Improvement of Quality in German Oncology Pharmacies**
K Meier, K Ohlinger, S-O Nissen, E-M Schöning (Germany) P42

09:20 **Pemetrexed off-label Use Improvement after Oncology Pharmacist Survey**
N Etienne-Selloum, P Coliat, E Petit-Jean, D Exinger, D Prebay (France) P43

09:30 **Metastatic Breast Cancer: Cost Analysis and Sustainability of Treatment with Eribulin in Patients multi-treated**
G Bellavia, C Scorsone, V Cascone, G Rizza (Italy) P46

09:40 **Pharmacists' Knowledge and Practice toward Oral Anticancer Agents: A Cross Sectional Study**
M Zaitoun, A Alnijadi, I Moustafa (Saudi Arabia) P47

09:50 **Retrospective Cost/Effectiveness (C/E) Analysis of Prophylaxis of Febrile Neutropenia (FN) in Breast Cancer Patients treated with Epirubicin/Adriamycin and Cyclophosphamide in Dense Dose Schedule (DD EC/AC)**
AR Rubio Salvador, JI Chacón, A San Juan, JM Martinez, S Alonso, C Esteban, L Fernández, P Moya, MA Cruz P80

10:00 **Clinical Guidelines on the Use of Antiemetic Agents to prevent chemotherapy induced Nausea and Vomiting and Attitudes of Healthcare Professionals towards the Guidelines**
TK Gudmundsdottir, EM Thorhalldottir, S Reykdal, T Saevardottir, AI Gunnarsdottir P95

10:10 **Monitoring of therapeutic Plasma 5-Fluorouracil Levels in Clinical Oncology**
V Di Iorio, C Masini, R Gaggeri, M Minguzzi (Italy) P112

Challenge the Expert – Pharmaceutical Care

09:00 - 10:30 **Aula Big Half B**

L Hardy (United Kingdom), I Netikova (Czech Republic) and C Bardin (France)

11:00 - 12:30 European Contamination Project **Aula Big Half A**

Chair: P Hartvig-Honoré (Denmark)

11:00 **ESOP Pilot Study – Contamination with Cytotoxic Drugs in the Workplace**
E Korczowska (Poland), J Türk (Germany) L27

Poster Discussion – Practical

11:00 - 12:30 **Aula Big Half B**

Abstract Nr

Chair: K Kongi (Estonia), E Hartvig-Honoré (Denmark)

11:00 **A simulation-based-learning Programme to improve Medication Safety in Oncology**
L Sarfati, F Ranchon, N Vantard, V Schwiertz, S Hé, MG Guédat, C Alloux, AG Caffin, C Rioufol (France) P7

11:10 **Proper Handling of Protein Biopharmaceuticals in the Pharmacy Setting**
WJ Galush (USA) P15

11:20 **Stability of 2 mg/mL Melphalan in 0.9% Sodium Chloride under sequential Storage Conditions**
J Vigneron, H Zenier, I May, A Nicolas (France) P16

11:30 **Efficiency of the Cleaning Protocol for Chemical Contamination on external Surface of Cytotoxic Vials**
L Lé, E Caudron, P Prognon (France) P17

11:40 **New subcutaneous Formulation of Bortezomib: Stability Assessment of reconstituted Solutions**
C Masini, R Gaggeri, V Di Iorio, S Antaridi, M Minguzzi (Italy) P18

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 21

11:50 **Chemotherapy IV Compounding: Comparison between robotic and manual Preparations in the routine Activity of an Hospital Pharmacy**
C Bufarini, A Marinozzi, S Guglielmi, E Bartoli, D Paolucci, V Rosini (Italy) P19

12:00 **Oncology Pharmacy Practice in Tikur Anbessa Specialized Hospital (TASH): The Ethiopian Experience**
T Mekonnen Semre (Ethiopia) P99

Roundtable: Oral Chemotherapy

12:30 - 13:30 **Aula Big Half A**

Chair: M Daouphars (France)
Panel: D Dartsch (DGOP, Germany), C van der Merwe (South Africa), S Stricker (ISOPP America, USA), S Suzuki (ISOPP Asia, Japan)

Closing Session: Farewell Message and Awards

13:30-14:00 **Aula Big Half A**

Poster Sessions (Thursday 26 June – Saturday 28 June 2014)

Poster Session	Abstract Nr
Basic research in oncology	P1-P6
Cytotoxic drug preparation	P7-P14
Quality assurance/microbiology/analytics/stability in oncology pharmacy	P15-P18; P22-P34
Automation/robotics in oncology pharmacy	P19-P21
Computer and software in oncology pharmacy	P35-P38
Clinical pharmacy/pharmaceutical care in oncology pharmacy	P39-P86
Managing side effects in oncology pharmacy/oncology pharmacist intervention	P87-P98
Organisation and management	P99-P104
Palliative care in oncology pharmacy	P105
Other	P106-P111
Treatment/regimen	P112-P128

Thursday, 26 June 2014

Keynote Lecture

L1 Challenges in Cancer Care

R Sullivan[1]

[1]*Kings College London, UK*

The costs associated with new cancer cases alone in 2009 have been estimated at around US$286 billion of which medical care makes up more than half this economic burden and productivity costs account for about one-quarter of the total. Cancer is and will be one of the most important economic diseases. This is not simply about absolute numbers but also the rate of increase of expenditure on cancer. What are the drivers and solutions to the 'cancer cost curve' in developed countries? How are we going to afford to deliver high quality and equitable care? Expert opinion drawn from cancer patients, healthcare professionals and policymakers has been gathered to address the barriers and solutions to delivering affordable cancer care. Whilst a number of drivers and themes are specific to a particular field, for example, the huge development costs for cancer medicines, there is strong concordance running through each contribution. Multiple drivers of cost such as the over-utilization, rapid expansion and shortening 'life cycles' of cancer technologies, e.g. medicines, imaging modalities; the lack of suitable clinical research and integrated health economic studies, to name but a few, have converged with more defensive medical practice, a less informed regulatory system, a lack of evidence-based socio-political debate and a declining ethos of fairness for all cancer patients. Urgent solutions to this state of affairs range from the re-engineering of the macroeconomic basis of cancer costs, e.g. coverage with evidence development and value-based approaches to 'bend the cost curve' and allow cost saving technologies to actually gain traction, greater education of policymakers, and an informed and transparent regulatory system. A radical shift in cancer group think is also required. Political acceptance that unfairness in access to affordable cancer treatment is unacceptable, as well as a need for the cancer profession and industry to take responsibility and not to accept substandard evidence base, an ethos of minimal benefit at whatever cost, and the delivery of fair prices and real value from new technologies

Clinical Interactive Session

Tailoring Therapy for Cancer Patients

L2 Cost Explosion of Anticancer Drugs

A Palozzo[1]

[1]*Instituto Oncologico Veneto IRCCS Padova, Italy*

The high cost of cancer drug treatments is related to numerous factors: 1) It is very expensive to move findings from bench to bedside and to perform all the regulatory studies to gain approval; 2) Because most cancers are incurable, patients are treated with each approved agent, because the use of one drug does not automatically mean that the others are no longer needed; 3) When a new branded product arrives, the older (and by now generic or biosimilar) drug tends to be viewed as substandard treatment; and 4) The seriousness of the cancer diagnosis plays a role in that patients and physicians are often willing to pay the high price of treatment even for marginal improvements in outcome. Finally, there are legal barriers that prevent agencies such as EMA or FDA from taking economic and cost-effectiveness considerations into account when approving new drugs. National agencies try to fill the gap through different negotiation methods (PVA, PAS, PBM, risk sharing) and, in a local basis, pharmacists seek for efficiency in handling IV drugs (waste reduction). Even the oncologists are now more aware of drug costs and they ask for more trials to determine the optimal dose, schedule of administration and duration of therapy, and to identify biomarkers to select responder patients. Indeed, primary prevention has the greatest economic return. For instance, it could be easily demonstrated that 'stop smoking' is a worthwhile intervention since smoking alone accounts for about one-third of cancer deaths.

L3 Shortages of Essential Cytotoxic Drugs in Europe: A Call for Action

GJ Wiedemann[1,2], A Astier[1], M Daouphars[1], W-D Ludwig[2], K Meier[1], AG Vulto[3]

[1]*European Society for Oncology Pharmacy (ESOP)*
[2]*Drug Commission of the German Medical Association*
[3]*Erasmus University Medical Center Rotterdam, The Netherlands*

The increasing worldwide demand for generic oncology drugs unfortunately coincides with the short supply and contamination of raw materials as well as production problems and quality issues. In addition, limited profit margins for generic drugs reduced productive capacity, which then resulted in market concentration, gray markets, stockpiling, price gouging and presently drug shortages. This also promoted an increasing use of costly, not sufficiently established, innovative treatments instead of well-tried generic drugs.

From 2005 to today, patients and caregivers in the US have faced an increasing number of drug shortages, predominantly of generic injectable agents. Recently, shortages of cytarabine, daunorubicin, methotrexate, and mechlorethamine, which are essential for curing childhood leukaemia and Hodgkin`s lymphoma, have forced oncologists to use assumed 'equivalent' agents with a disastrous outcome. American survey data show that cancer drug shortages persist and how oncologists adapt.

In 2013, our survey of 85 European hospital pharmacists from 20 European countries found a significant cancer drug shortage in 96% of the studied cases. The drugs that were most commonly reported in shortage were doxorubicin, 5-floururacil, carboplatin, cisplatin, methotrexate, and etoposide. Pharmacists and oncologists adapted to such shortages in different ways, including switching treatment regimens, substituting alternate drugs part way through therapy, delaying treatment, omitting doses, and reducing doses.

Quality cancer care also means providing patients with the right treatments at the right times, and we are learning today that cancer drug shortages are still interfering with that mission. This ongoing crisis must not be forgotten –it demands urgent solutions from regulators, policymakers and manufacturers today.

Practical Session: New Horizons

Evidence-Based Medicine Implementation in Oncology Setting: Role of the Clinical Pharmacist

L4 Evidence-Based Medicine Implementation in Oncology Setting: Translating Theory into Practice

S Kamal[1]

[1]*Children Cancer Hospital, Cairo, Egypt*

Oncology Pharmacists are required in their practices to lead the initiatives in performance improvement and efficiency.

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 23

The unique dimension in the successful oncology clinical pharmacist is that he/she is practising based on evidence-based medicine. It is from where all the standards of practice and the concepts and philosophy of work should be based.

The successful pharmacist is the one who is always asking questions, and the unique one is the one asking the right questions using the PICO model of the evidence-based medicine.

We will discuss together in this session:

1. What is the meaning of EBM for the oncology pharmacy practice
2. Role of the pharmacist in translating evidence into practise (case studies):
   a. Antiemetic guidelines
   b. Infectious disease guidelines
   c. Supportive care guidelines
   d. Early detection and screening
3. Evidence-based design
4. Guideline implementation initiatives

We will hopefully conclude that the major role of the pharmacist in oncology setting is to translate evidence in guidelines and trials into practice and make sure that violation to evidence and protocol are at minimum. We should also agree on that evidence-based guidelines could be effectively implemented in oncology setting by empowering pharmacists that will carefully design and manage pharmacy intervention programme.

We will also conclude that the value of translating evidence into practice by pharmacists can be realized by the oncology organizations and authorities as safer, cost-effective treatment (reduced drug costs) and, more importantly, the potential for improving the survival rate and the quality of life of our cancer patient.

L5 From the Lab to the Clinic – Practical Solutions to Implementation of New Medicines

F Maclean[1]

[1]*NHS Greater Glasgow & Clyde, Scotland, UK*

Introduction: There are many hundreds of pipeline products in development. Many will not reach the market place but some will become the next big blockbuster anticancer drug. Advance notification of drugs in development is essential to allow health authorities time to prepare for a seamless introduction into clinical practice.

Role of the clinical pharmacist: There are multiple aspects to the clinical pharmacist's role in implementation of evidence-based medicines. At the early stages of drug development is horizon scanning, engagement with the pharmaceutical industry and financial planning. Pharmacists will be instrumental in writing treatment protocols ensuring that the evidence supports drug inclusion into treatment pathways.

Pharmacists are key to financial planning as drug procurement and contracting will rest with pharmacists, either at local hospital level or as a national approach. There are strengths in both approaches and health systems should consider which offers the greatest benefit to patient care.

Conclusion: Pharmacists are experts in medicines and ideally placed to lead the implementation of new medicines into clinical practice. Critical appraisal skills applied across the entire patient journey ensures that clinical practice within cancer care is evidence based.

Clinical Session: New Horizons

Cancer Treatment: Great Views from the TOP Papers

L6 Dual HER2 blockade for Breast Cancer Therapy

A Munilla Das[1]

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HER2-positive breast cancer constitutes a molecular subtype of the disease with an aggressive biological behaviour, resulting in a greater risk for disease progression and death. Trastuzumab, a humanized HER2 antibody that binds domain IV of the HER2 extracellular domain, has had a major impact in the treatment of this disease, changing its natural history. However, its clinical benefit can be limited because of the novo or acquired resistance to anti-HER2 agents, occurring in both early-stage and advanced disease. Targeting HER2 with multiple HER2-directed therapies (monoclonal antibodies, small molecule inhibitors, and antibody drug conjugates) represents a promising area of treatment for HER2-positive cancers. Combination regimens of dual HER2 blockade have already reached clinical practice in the metastatic setting and have generated promising results in the neoadjuvant one, with higher rates of pathologic complete response. The aim of this speech is to present an overview of the clinical data of the HER2-targeted treatments, so that oncology pharmacists could better know their place in therapy and optimize their use by providing timely interventions and information to health providers as well as counselling to patients.

L7 New Melanoma Treatments

L Hardy[1]

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After years of false hope in drug trials to treat malignant melanoma, there have been some truly exciting advances, now making their way to the market for this deadly form of cancer. There are 2 distinct approaches that are demonstrating a clinical difference and enhancing survival; these are immunomodulation with CTLA4 monoclonal antibodies and targeted therapies with BRAF inhibitors and MEK inhibitors. Despite impressive responses, nearly all patients relapse due to the emergence of resistance to these drugs. It is, however, probable that they could produce cures in the future if used in an adjuvant setting.

The new class of emerging drugs are the anti-PD-1 and anti-PDL-1 antibodies, which are demonstrating high response rates with long durability. Biomarkers that have predictive indication of response to these very expensive drugs remain elusive, but the new understanding of the biology of malignant melanoma promises to deliver continuing improvements in the management of this tumour.

Practical Interactive Session

Do Cancer Inpatients Benefit from Oncology Pharmacy?

L8 Pharmaceutical Care Provision for Cancer Patients – Experiences in Germany

S Simons[1]

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Introduction: Since 15 years the Department of Clinical Pharmacy at the University of Bonn (Head: Professor Dr Ulrich Jaehde) investigates the impact of professionalized and practicable pharmaceutical care provision to cancer patients on various endpoints. Studies are conducted in cooperation with relevant organizations, scientific networks, oncology clinics, oncologist clinics and pharmacists.

Material and method: Studies with various patient settings and corresponding study designs have concentrated on the effects of pharmaceutical care provision (including intensive patient counselling and optimization of supportive medication) on objective and subjective outcomes such as prevention, detection and solution of drug-related-problems, tolerability of treatment, adherence, quality of life and patient satisfaction.

Results and discussion and conclusion: Pharmaceutical care provision to cancer patients leads to a significant improvement of

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 24

www.ejop.eu

endpoints in cancer therapy. Integration of clinical pharmacists in multi-professional cancer medication management is generally accepted in Germany by all professions. Conducting research can help implement multi-professional pharmaceutical care.

L9 Development of Clinical Pharmacy Services for Oncology Inpatients in Malta

F Fenech[1], S Brincat[1], N Refalo[1], D Metaraku[1], M Gauci[1], A Camilleri[1], AE Weidmann[1]

[1]*Sir Paul Boffa Hospital, Floriana, Malta*

Background: Scientific evidence exists on integration of pharmacists within the oncology team and their positive influence on patient care. Investigation into the effect of pharmacist involvement for oncology inpatients at Sir Paul Boffa Hospital, Malta, is required to initiate clinical pharmacy services.

Purpose: The study aimed to determine the effect of pharmacist involvement in the treatment of oncology inpatients at Sir Paul Boffa Hospital, Malta, in terms of clinical significance on patient care.

Material and methods: Study design followed non-randomized purposive sampling including all patients at two oncology inpatient wards at Sir Paul Boffa Hospital, Malta. Data was collected prospectively over a period of nine weeks through drug reviews and drug chart checking, using a modified French Society of Clinical Pharmacy documentation tool. A multidisciplinary panel independently and retrospectively assessed the pharmacist's interventions in terms of clinical significance on patient care using a 4-point Likert scale. Group differences were analysed using the Kruskal-Wallis test at a 0.05 level of significance. Strengths of relationships were measured using the Spearman's correlation coefficient.

Results: For 72 patients reviewed, 80 drug-related problems (DRPs) and pharmacist interventions were documented. In line with published data for oncology settings, the majority of interventions were related to comorbidities and concomitant medications (63.8%). The most common DRPs (adverse drug reactions, untreated indications, subtherapeutic dosage, drug monitoring) and pharmacist's interventions (dose adjustment, drug switch, addition of a new drug, drug discontinuation) identified were in agreement with studies for oncology inpatients conducted elsewhere. More than half of the pharmacist's interventions were rated as having a major or moderate clinical significance on patient care (68.8%).

Conclusion: Pharmacist involvement for oncology inpatients at Sir Paul Boffa Hospital, Malta, has improved patient care by enhancing patient safety and ensuring treatment optimization. Thus, high-quality cancer services are provided when pharmacists are involved within a multidisciplinary team.

L10 Challenge to Change: Timely ward-based pharmaceutical Intervention is now available

S Suzuki[1]

[1]*National Cancer Center Hospital East, Division of Pharmacy, Kashiwa, Japan*

There is no pharmacy technician system in Japan; therefore, pharmacists have both a dispensing and clinical role. In 2011, we evaluated the benefit of a team-based ward's pharmacist in cancer chemotherapy. A retrospective study was performed using both patient records and medical fee receipts. A team-based ward's pharmacist could contribute to reducing total medical cost except anticancer medicine and clinical examination (Yen 51,950 ± 22,820 vs Yen 55,200 ± 54,070, $p < 0.001$) and increase pharmacist interventions per chemotherapy (1.7 vs 0.06). Journal of Japanese Society of Hospital Pharmacists. 2012;48(2),211-5.

In April 2012, the Japanese Government implemented a newly revised fee schedule for medical services, which was the administration fee of the inpatient pharmaceutical services. In the Division of Pharmacy at the National Cancer Center Hospital East, we have assigned six pharmacists to all wards (10 wards) since May 2013, and we have started implementing the reimbursement of medical fees since September 2013. Pharmacists' duty time correlated with number of interventions statistically. ($r^2 = 0.28$, $p < 0.001$) Iryo. 2014 (In press). Since we started the ward pharmacy services, pharmacy interventions have been increased. We have continued to challenge to develop new clinical services to change ourselves.

Friday, 27 June 2014

Symposium – Clinical Session

Does one Size fit All? The Importance of Pharmacogenetics

L11 Pharmacogenetics in Oncology, where are we?

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Although in recent years, chemotherapeutic options for treatment of cancer have expanded; overall benefit – both with respect to efficacy and toxicity – could be improved. Pharmacogenetics studies the association between heritable genetic variants in DNA (genotype) with outcome of therapy (phenotype). Pharmacogenetics in oncology will ideally allow oncologists to individualize therapy based on a genetic test result. Severe toxicity and clinically significant underdosing may be avoided, whereas predicted non responders can be offered alternative therapy. However, despite emerging evidence, pharmacogenetic testing has not yet fully found its way to routine patient care.

In this presentation the state of the art of pharmacogenetics in oncology will be given. In addition, barriers for implementation in clinical practice will be discussed.

L12 Pharmacogenomics and Colorectal Carcinoma

I Kirac[1], T Žigman[1], B Šarčević[1], T Silovski[1], V Ramljak[1], DV Vrdoljak[1]

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Personalized and individualizes therapies are terms used with increased frequency with regards to chronic diseases, one of which is cancer. Advances in genetics, proteomics and glycomics have questioned the organ of origin as the most important variable in biological behaviour of cancer.

Furthermore, dynamic immune status of the patient and individual susceptibility to side effects of drugs complicate the use of these newly acquired data in clinical practice. In fact, the accumulation of days with very small individual impact on outcome did not so far prove clinically useful. Refinement of algorithms and statistical methods is expected to accelerate this.

Herein, we would like to give an overview of impact of biomarkers in colorectal carcinoma on colorectal cancer diagnosis, treatment and prognosis.

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 25

www.ejop.eu

L13 Where we are and where we go: Oncology Pharmacy Challenge!

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Pharmacogenetics and pharmacogenomics consensus definitions adopted by international regulatory agencies in 2007 allows us to predict the genetic basis of different patient responses to the same drug as well as the identification of new therapeutic targets and compounds by genomic analysis tools using biomarkers.

These disciplines have generated a flow of information that requires a knowledge management and training with the goal of developing personalized medicine.

In Oncology Pharmacy Hospital Units with appropriate electronic resources we need to manage this information and training to gradually incorporate the advances in this field and accommodate them in our routines with the aim of managing pathologies by processes and generate efficiency and clinical benefit for our patients.

Our local experience has focused on three types of tumours: Breast Cancer, Colorectal Cancer and Metastatic Lung Cancer. These tumours have as biomarkers HER2, KRAS or ALK with the goal of making an efficient management of pharmacotherapy. We are also involved in a regional project called Practice Management Electronic Health Breast Cancer where we can include biomarkers and that may be extended to other tumours in the future.

Symposium – Practical Session

Is my Mother safe in Hospital Cancer Care?

L14 Computerized Order Process – Influence on Prescription Errors

T Schöning[1]

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At the Heidelberg University Hospital preparations of antineoplastic drugs are ordered electronically with support of the prescription software developed by the hospital pharmacy (Computerized Physician Order Entry; CPOE). We analysed positive and negative impact on prescription errors compared to a paper-based order process. Within a timeframe of 5,5 months 8,463 software-based and 3,101 paper-based prescriptions were collected and analysed.

Main categories of errors were 'dosage', 'medication', 'date and period of time', 'patient data' and 'administration'. These were assigned to 4 different degrees of severity according to the definition of the National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP). Results will be presented.

CPOEs help to reduce prescription errors compared to the paper-based order process, but are these really the errors with a high impact on drug therapy safety? The key elements that help to avoid errors of clinical relevance will be discussed.

L15 Medical Errors in Clinical Practice

I Netíková[1]

[1]*General University Hospital Prague, Czech Republic*

The term 'medical error' means an inaccurate or incomplete diagnosis or treatment of a disease or syndrome in healthcare system. Medical errors are often described as human errors in healthcare. They can be evident and harmful to the patient or not. Many of them have delayed manifestations. There are many types of medical errors and causality is often poorly determined, but in general they are mostly preventable.

According to literature data, independent review of doctors' treatment plans suggests that decision-making could be improved in 14% of admissions.

Medical errors are associated with inexperienced physicians and nurses, new procedures, poor communication, improper documentation, illegible handwriting and similarly named or looked medications (look-alike sound-alike; LASA). Also patients can contribute significantly, for example, with incomplete information.

Practitioner risk factors include fatigue, depression and burn out. Factors related to the clinical setting include diverse patients, unfamiliar settings and time pressures.

Human error has been implicated in nearly 80 per cent of adverse events that occur in complex healthcare systems. The vast majority of medical errors result from faulty systems and poorly designed processes versus poor practices or incompetent practitioners.

Literature

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L16 Pharmacovigilance: Monitoring of Adverse Drug Reactions

M Sonc[1]

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At the Institute of Oncology Ljubljana monitoring, recording and reporting of adverse drug reactions is particularly important because a lot of new drugs are used in cancer treatment. Even after the drug receives marketing authorization and can be used in hospitals or doctors may prescribe it, we have to monitor the safety of medicines. These activities, which are related to the detection, assessment, understanding and prevention of adverse effects, are known as pharmacovigilance. By collecting and analysing the information on adverse drug reactions we may help to complement the leaflets and thereby improve the safety of the treatment. It is particularly important to record and collect reports of serious adverse drug reactions, which is obligatory for all healthcare professionals.

Hospital pharmacists, who operate under the auspices of the Slovene Chamber of Pharmacy, took the initiative to prepare the web application that facilitates the collection of data on adverse drug reactions and provides comparable data. We are monitoring especially adverse drug reactions of anticancer drugs, which are used to treat the patients in our hospital. The therapy of cancer patients requires continuously supervision of the progress of treatment by the physician and pharmacist, since a patient often gets his/her oral medication at the community pharmacy.

L17 Patient Safety in a paperless Hospital

MJ Tames[1]

[1]*Onkologikoa, San Sebastian, Spain*

The aim of this presentation is to explain how we have organized 'patient safety' in **chemotherapy** in a paperless hospital.

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 26

www.ejop.eu

Onkologikoa is a paperless hospital since 2008. Technological development has always been a top priority in the hospital and the pharmacy department has always been deeply involved in this commitment.

Considering the chemotherapy chain, the **different steps** will be described showing the different approaches that have been taken. All the process is integrated and performed electronically:

1. **Prescription** is performed electronically since the year 2000 when we implemented our CPOE programme. Our experience is quite large and positive. It is based on protocols according to diagnosis.
2. **Validation:** both physicians and pharmacists have access to the patient records so to the same information before to perform the prescription and the pharmaceutical validation.
3. **Preparation and dispensing:** considering these steps, the most pharmaceutical phases of the process there is much less experience in implementing new developments.

There are three critical issues in the preparation:

   * **Asepsis** as in any other parenteral preparation
   * **Right drug**: we have implemented a 'product identification' system based on location management
   * **Right dose:** through gravimetric control.

4. **Administration:** through a bar-code system that was implemented in December 2008. The sequence for that includes: identification of the nurse, identification of the preparation and identification of the patient. At the moment we are involved in a programme for the integration of smart pumps technology in the chemotherapy process.
5. **Toxicity monitoring:** considering the chemotherapy process we like to end it not in the administration to the patient but or extend it to the toxicity monitoring. The physician needs to introduce the toxicity of the previous cycle in order to be able to prescribe the next cycle.

As a result of our experience we can conclude that: Oncology is a crucial area for patient safety. Technologies play a key role and institutions should consider their implementation.

Additional track – International Relationships

L18 Education and Training of Oncology Pharmacists in the USA

GC Yee[1]

[1]*University of Nebraska Medical Center, Omaha, USA*

Specialization in pharmacy has occurred over the last few decades, and oncology pharmacy is an example of a specialty. The education and training of oncology pharmacists have evolved in response to changes in entry-level degree requirements, availability of advanced training programmes, recognition of oncology pharmacy by the Board of Pharmacy Specialties (BPS), and demand for board-certified oncology specialists. The first specialized oncology pharmacy residencies or fellowship were offered in the early 1980s. The approval of pharmacotherapy by the BPS in 1988 lead to increased interest in specialization, and oncology pharmacy was approved by BPS in 1996. Over 1,600 pharmacists are currently board-certified in oncology, making it the second most common specialty recognized by BPS. The current education and training pathway for oncology pharmacists in the United States is completion of a PharmD degree followed by completion of a postgraduate year 1 (PGY1) pharmacy practice residency and a PGY2 specialized oncology residency. Individuals interested in clinical and translational research usually obtain a PhD degree or complete a 2–3 year fellowship after completion of their PharmD degree. Board certification is preferred or required for most oncology pharmacist positions in the United States.

L19 A new Opportunity for Clinical Pharmacists: A Pharmacist initiated Clinical Trial

H Hashimoto[1], Y Hayashi1

[1]*Department of Pharmacy, National Cancer Center Hospital, Japan*

The goal of oncology pharmacists' activities is to improve safety and efficacy of chemotherapy, to attain better QoL (quality of life), to prevent ADRs **(adverse drug reactions),** and to decrease the number of medication errors. To this end, they check doses, dosing rates, administration routes, drug interactions, and contraindications, and tell these things to patients (as part of patient education). My goal as a clinical pharmacist is to improve and ensure safety and efficacy of chemotherapy. To achieve this goal, in particular, to get a better control of nausea and vomiting, I, in collaboration with other Japanese oncology pharmacists, planned and initiated the multicentre phase III trial, which has been an important opportunity for Japanese oncology pharmacists. I believe it is one of oncology pharmacist's new crucial roles to conduct pharmacist initiated clinical trials and to contribute to improving the safety of chemotherapy. We are going to develop a further clinical trial in the field of supportive care.

Clinical Interactive Session

Pain Management in Cancer Patients

L20 Pain Management for Cancer Patients – Choosing and Dosing of Analgesics

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Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, is always subjective and is what the patient says it is. Today more than 50% of cancer patients experience pain symptoms; 60–90% of patients with advanced cancer experience moderate to severe pain; 12% of all deaths worldwide are due to cancer. Most pain due to cancer **could** be relieved if we implement **existing** medical knowledge and treatments. The mainstay medication for the treatment of moderate to severe pain is morphine. Due to the potential for its abuse, morphine is a controlled medication, meaning that its manufacture, distribution and dispensing is strictly controlled both at the international and national levels. The WHO Pain Relief Ladder is the basis for modern pain management. The ladder recommends the administration of analgesics, according to the severity assessment scales (0–10). Approximately 80% of the world population has either no, or insufficient, access to treatment for moderate to severe pain. About 89% of the total world consumption of morphine occurs in countries in North America and Europe. Low- and middle-income countries consume only 6% of the morphine used worldwide – while having about half of all cancer patients. Even in the United States between 70–80% of advanced cancer patients experience pain. Lack of access to pain medication in pharmacies and fear of addition on the part of both patients and providers are significant limiting factors. In general analgesia with opioids has a success rate up to 90%. In this workshop case studies will be discussed about the assessment of pain based on the scale 0–10, the titration of opioids, dosing based on pharmacokinetics, conversion tables when switching from one opiod to another.

Conclusions: Most if not all, pain due to cancer could be relieved if we implemented existing medical knowledge and treatments. A multidisciplinary team with doctors, clinical pharmacists, nurses and spiritual counsellors is a must in every oncology hospital.

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 27

www.ejop.eu

L21 Pain Treatment in Cancer – old and new Venues

P Hartvig-Honoré[1]

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Cancer induced pain has a broad variety of treatment alternatives when used in an adequate manner they may supply a substantial pain relief to most patients. The armentarium includes oral analgesics, nerve blocks and spinal stimulation, spinal administration of opioids and other drugs, acupuncture, low doses of radiotherapy or chemotherapy as well as physiotherapy. Drug treatment stands on the basis of acetaminophen and opioids supplemented with steroids and NSAIDS, e.g. New Sort of Aspirin In Disguise, with an inflammatory component in the pain state and gabapentin/pregabalin or tricyclic antidepressants for neuropathic pain.

Continuously new treatment paradigms appear as alternative pain treatment. In preclinical use, several remarkable old drugs with well-established indications are introduced as analgesics for instance: the antibiotic ceftriaxone, (which increases glutamate uptake), other antibiotics belonging to the tetracycline family and methylene blue (being a nitrous oxide inhibitor). In the clinical setting ketamine in low dose has found a use in severe pain. Cannabis inhibiting ascending spinal pathways has been given substantial analgesia in cancer patients and combination of substances with different mechanisms of action has been revived.

The patient is the expert on his pain and treatment. Nevertheless, there are requirements for better diagnosis and understanding of pain signalling over time. Genetic involvements have been shown in pain, which requires better knowledge on gene expression and phenotypes in pain. Biomarkers are highly wanted to diagnose and choose pain treatment, although the findings are still limited. Imaging has improved diagnosis of the inflammatory component in pain and can be uses as a treatment outcome marker.

Finally, much research efforts are still demanded to understand pain origin, cause and plasticity development. Though the basic principles still prevail and the fundamental knowledge is still a mainstay in a successful treatment, the clinical oncology pharmacist has an important role to plan the pain treatment that should be at hand for every single cancer patient.

L22 Management of Cancer Pain: ESMO Clinical Practice Guidelines

D Santini

No abstract submitted.

Practical Interactive Session

Talking to the Patient, the Role of the Oncology Pharmacist

L23 The Role of the Oncology Pharmacist in Counselling the oncology Patient and his Family

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[6]*University Hospital Centre Zagreb, Department of Oncology, Zagreb, Croatia*

Introduction: Multidisciplinary approach to the treatment of oncology patients is the recognized treatment of cancer patients, while the multidisciplinary team (MDT) is a mean of cooperation between the different types of professionals and institutionalized form of everyday communication. The degree of organization and the type of cooperation have a direct impact on the outcome of the treatment and care of oncology patients. MDT treatment approach results in better medical decisions in the selection of treatment and improved quality of patient's life. The final result of the discussions and decisions of the MDT, which is used in the treatment of oncology patients, is more effective than each individual decision and choice.

Furthermore, through active discussion and retrospective review of medical treatment, experts gain valuable experience on how individual treatment protocols are applied with supportive therapy, therapy-related chronic diseases and old age. In this way they consistently optimize therapy, treatment outcome and ensure the application of standards [1-4].

In collaboration with oncologists, clinical pharmacists spend prescribed medical surveillance provisions related to each individual patient. They check the basic diagnosis of patients, type of chemotherapy protocols and the time period between the applications of the individual cycles. Drug doses are accurately calculated based on body surface area and body weight. During hospitalization, special attention is given to the supportive therapy, which involves the treatment of constipation and diarrhoea, pain, nausea and vomiting, fatigue and malaise, mucositis and OTC (over-the-counter) drugs and dietary supplements. In addition, they further analyse the drugs that are administered to the patient in chronic therapy. Based on the above approach the conversation with the oncology patient and his consultation regarding the use of drugs is crucial.

Goal: Through case studies we will show the way in which oncology pharmacist affects the optimization of therapy, working in MDT, and consultation and discussion with the oncology patient.

Case report: In a 49-year-old woman with palpable nodule changes to 3 cm in the left breast FNAC (**fine needle aspiration cytology**) are proven cancer cells. Additional treatment is not proven due to systemic dissemination. In July 2007, they operationally removed the left breast and axillary lymph nodes, and 17 days later started with the application of adjuvant chemotherapy by AC (doxorubicin, cyclophosphamide) protocol and with the active participation of clinical pharmacists (medication history, analysis of therapy and intervention).

Methods: The medical records of the patient for a period from 23/05/2007 to 28/02/2014 were analysed. In this period we were following the prescribed drug therapy, or justification of the use of drugs, their doses and dosing intervals, drug interactions, intervals cycles of certain chemotherapy regimens and analysed medication errors. We used available literature [5] and databases Lexi-Comp Online [6]. For discussion and consultation we used a standardized form for a structured interview with the oncological patient [7].

Results: After analysis of pharmacotherapy drafted proposal therapeutic interventions that are agreed with the doctors on the basis of which it makes a final decision on further treatment. Therefore oncology pharmacist accessed to the interview and counselling patients and their families.

Conclusion: Interventions by pharmacists significantly influenced the further treatment decisions immediately (avoiding drug interactions X and D), and the safety and quality of life of patients. The interview and counselling monitored compliance and effectiveness of the recommended pharmacotherapy. In this way, the daily work within a multidisciplinary team proves the justification of labour of oncology pharmacists.

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 28

www.ejop.eu

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L24 Talking to the Juvenile Cancer Patient

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Standards on Patient and Family Education define a systematic approach to meeting the educational needs of each patient.

Documentation is the key to coordinating and defining the education provided to the patient, providing training to the clinical pharmacists, and making an Arabic patient education resource for each disease and each medication.

The Arabic Pediatric Oncology Education Materials (APOEM) is an educational resource that provides an overview of the diagnosis, staging, and treatment paediatric of common tumours and how to overcome from its side effect by simple and fun way for the children and their families.

There are other important principles taken into consideration:

- Specially designed multidisciplinary medication education programmes with repeated written and verbal reinforcement for patients may improve patients' knowledge about their medications.
- The importance of drug information should be stressed and the counselling role of the pharmacist should be activated, especially for newly diagnosed patients.
- Cooperation of the medical team should be intensified for the benefit of patients.
- Assessment of the learner, selection of appropriate teaching methods, and problems with the selection process are addressed.

Quality of care depends a lot on good communication with families.

Good communication depends a lot on listening to our patients.

Good listening means good care.

Parents are not looking for how much you know but how much do you care.

L25 Talking to the Elderly Cancer Patient

M Höckel[1]

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The over-65 population grows in most countries; cancer is an illness of older people. The median age to get cancer diagnosis is 68 years. The elderly are disproportionately affected by cancer and its associated problems [1].

There is an age-related change in different processes with consequence of chemotherapy for example slow repair of DNA damage with prolonged toxicity of chemotherapy, reduced stem-cell reserve with slow recovery of blood and mucosa, decreased liver mass with reduced drug metabolism and decreased nephron mass with reduced drug excretion [2].

The changes in physiology and organ function lead to pharmacokinetic shifts like change in fat distribution, in total body water and in kidney and hepatic function [3]. Polypharmacy and inappropriate drug use are risk factors for adverse drug reactions, therefore, it is useful if pharmacists take responsibility for geriatric medication management [4].

Possible interventions of a pharmacist to work in a multidisciplinary team for senior adult oncology are as follows:

1. Patient education for current prescriptions/drug interactions
2. Counselling for adherence/avoidance
3. Verification of immunization therapy
4. Use of complementary medications
5. Minimization of inappropriate medications
6. Identification potential chemotherapeutic toxicities/drug interactions [5].

We will discuss specific issues related to the medication management of cancer in older individuals in respect of, for example, the NCCN (National Comprehensive Cancer Network) Guideline of Senior Adult Oncology [6].

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Saturday, 28 June 2014

Keynote Lecture

L26 Quo Vadis Regenerative Medicine? – of Stem Cells, Regeneration, Ageing and Cancer

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Regenerative medicine is searching for a reliable source of stem cells with the potential to give rise to cells from all three germ layers. For almost 20 years there have been attempts to harness controversial embryonic stem cells isolated from embryos. A promising source is induced pluripotent stem cells generated by genetic modification of adult cells, but this strategy is still under development and bears, e.g. the risk of tumour formation by injected cells. In the meantime evidence accumulates that adult tissues harbour a population of very rare stem cells with broad dif-

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 29

www.ejop.eu

ferentiation potential. These dormant, early-development cells described as very small embryonic-like stem cells (VSELs) most likely overlap with similar populations of stem cells that have been identified in adult tissues by other investigators as the result of various experimental strategies and have been given various names. VSELs display several epiblast/germline markers that suggest their embryonic origin and developmental deposition in adult tissues. Moreover, at the molecular level, changes in expression of parentally imprinted genes, e.g. Igf2-H19, regulate their quiescent state. In several emergency situations related to organ damage, VSELs can be activated and mobilized into peripheral blood and in appropriate animal models contribute to tissue organ/regeneration. Interestingly, their number correlates with life span in mice, and they may also be involved in some malignancies.

L27 ESOP Pilot Study – Contamination with Cytotoxic Drugs in the Workplace

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Introduction: Safe-handling procedures should be closely monitored in all areas where antineoplastic drugs are delivered, stored, prepared, administered and disposed of in order to reduce exposure of healthcare workers. Current knowledge levels on surface contamination with antineoplastic drugs in European hospitals in areas where these drugs are handled, is limited. A preliminary investigation was conducted to evaluate and compare surface contamination with antineoplastic drugs at various sites, including preparation (pharmacy) and administration (ward) areas in European hospitals.

Objectives: The main goal of the project is to obtain an overview of the current situation in Europe concerning cytotoxic contamination in the workplace. Additionally, the project will help to develop additional steps and programmes to improve working conditions and quality control.

Materials and methods: The study was conducted, in nineteen European hospitals where antineoplastic drugs are prepared and administered according to national guidelines. Assessment of surface contamination with antineoplastic drugs was performed using wipe sampling. The study consisted of two parts: evaluation of surface contamination in preparation and administration areas (Part I) and after implementation of cleaning recommendations (Part II). Wipe samples were collected twice, during the first part and second part of the study. In each hospital wipe samples were taken from 10 comparable surfaces: 5 in preparation areas (work surface of biological safety cabinets/isolators, floors, checking counters, storage surfaces and refrigerator doors) and 5 in administration areas (checking counters, floors, cytotoxic waste containers, patients' armchairs and phones). A Pharma Monitor kit, containing standardized supplies for sampling and wipe procedures, was used. The samples were analysed using LC-MS/MS on cyclophosphamide, docetaxel, doxorubicine, etoposide, epirubicin, 5-fluorouracil, gemcitabine, ifosfamide, irinotecan, methotrexate, paclitaxel and topotecan.

Results and discussion: The pilot study demonstrates the presence of surface contamination in preparation and administration areas in all investigated hospitals. The level of contamination was different in each hospital; however, measurable amounts of at least one agent were detected on sampled surfaces in each hospital. This suggests that reviewing and implementation of new cleaning procedures may help to eliminate the presence of contamination in the workplace. The first results of the ongoing study will be presented and discussed.

Poster Sessions (Thursday 26 June – Saturday 28 June 2014)

Poster Session	Abstract Number
Basic research in oncology	P 1 – P 6
Cytotoxic drug preparation	P 7 – P 14
Quality assurance/microbiology/analytics/stability in oncology pharmacy	P 15 – P 18; P 22 – P 34
Automation/robotics in oncology pharmacy	P 19 – P 21
Computer and software in oncology pharmacy	P 35 – P 38
Clinical pharmacy/pharmaceutical care y in oncology pharmac	P 39 – P 86
Managing side effects in oncology pharmacy/ oncology pharmacist intervention	P 87 – P 98
Organisation and management	P 99 – P 104
Palliative care in oncology pharmacy	P 105
Treatment/regimen	P 112 – P 128
Other	P 106 – P 111

Poster Presentations

Poster Session: Basic research in oncology

P2 New applications of registered drugs

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Introduction: Peroxisome proliferator-activated receptors (PPAR) belong to a superfamily of nuclear transcription factors involved in the regulation of gene expression by direct interaction with DNA. Among synthetic ligands of nuclear receptors, glitazones (thiazolidinediones) such as rosiglitazone and pioglitazone are strong agonists of PPAR. They are a class of medications used in the treatment of diabetes mellitus type 2.

In the face of demonstrated antiproliferative and pro-apoptotic activity of some PPAR receptor ligands towards cancers, it seems essential to better understand their mechanisms of action at the molecular level since they might influence cancer cells behavior in combination with traditional chemotherapy.

Method: 1. Cultures and drug administration.

Stabilized human melanoma cell lines from different stages of cancer progression (A375P, WM239A, WM35) were grown in standard RPMI medium with 10% FSC plasma in a classic monolayer to reach a confluency of 40%. Then, the PPAR ligands (troglitazone and pioglitazone) were added in combination with chemiotherapy agents (cisplatine, taxol, melphalan) according to drug administration patterns.

2. Absorption and drug concentration monitoring was measured by HPLC.

3. To estimate the effectiveness of chosen therapeutic combinations the cells ability to proliferate *in vitro* was tested with the use of the crystal violet assay and as a complementary method MTT test.

Results and discussion: The aim of this study was to determine whether PPAR ligands influence the response of melanoma cells in combination with commonly used chemotherapy agents. Effects of pioglitazone application used independently are reversible. However, pioglitazone used in combination with chemotherapeutics, such as cisplatine, taxol, melphalan, effectively modulates the melanoma cell response to these compunds. Our initial results have shown the strong synergism between pioglitazone and cytostatics in relation to inhibition of proliferation of the melanoma cells.

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 30

www.ejop.eu

It warrants the research over the new application of a very well-known drug, which has been administered for years for other indications.

The project was supported by the Polish National Science Centre (NCN) number: 2011/01/D/NZ4/03401

P3 A new preclinical human cancer model demonstrates successful growth of human solid tumours of diverse tissue origins in unfertilized avian eggs

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Introduction: The quest for more relevant preclinical models for testing cancer drug efficacy is a primary focus of current cancer research. The poor correlation between preclinical drug assays and patient clinical trial results is evidence that current *in vitro* protocols are inadequate representations of cancer chemosensitivity parameters *in vivo*. A novel preclinical approach developed in this laboratory for the first time demonstrates the successful growth of human solid tumours of the brain, breast, colon and pancreas in unfertilized chick eggs*. This research suggests that the avian system is a suitable and in many ways more advantageous culture system for the growth of human tumours than current *in vitro* and mouse model systems.

Material and method: Tumour cells grown as spheroids or monolayers at a concentration of 5 x 105 cells/mL were inoculated into the albumin portion of the egg using a sterile glass pipette or alternatively, injected into the vitelline membrane through a partial opening of the shell. The shell is replaced and sealed and inoculated eggs are cultured at 37°C for up to two weeks. Tumour growth assays involve careful removal of the vitelline membrane or extraction of the albumen compartment followed by tissue fixation, staining and photomicroscopy.

Results and discussion:

- High success transfer rate (at least 80%) and rapid tumour establishment in avian culture.
- Broad spectrum application to tumours of diverse types.
- Long-term cultivation not possible in fertilized chick eggs by serial transfer.

Research data show successful growth of tumour cells in both albumen and vitelline membrane compartments of the unfertilized chick egg. Tumour growth in avian eggs displays heterogeneous growth parameters more similar to *in vivo* growth than spheroid cultures, including clear distinctions between necrotic tumour centres and active growth zones, increased invasiveness compared to traditional spheroid growth models and histological heterogeneity similar to that observed in human tumour specimens observed surgically and histologically.

Conclusion: Avian embryonic environment affords biochemical, biophysical parameters and determinants of growth properties difficult to achieve in adult animal models or *in vitro* systems.

*Provisional patent application, Sarah Crawford, 2014.

P4 The need for monitoring of hypoglycemic effect of sunitinib in normoglycemia and hyperglycemia

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Introduction: Sunitinib is an oral multikinase inhibitor, indicated for the treatment of gastrointestinal stromal tumours (GIST), advanced renal cell carcinoma (RCC) and pancreatic neuroendocrine tumours (pNET). Few recent studies proved the hypoglycemic side effect of this drug. The precise mechanism of this effect remains unclear, but inhibition of c-Kit and PDGFR is probably involved. Our study investigated the influence of diabetes on the pharmacokinetics of sunitinib as well as the hypoglycemic effect of the drug in diabetic and non-diabetic conditions.

Material and method: The study was conducted on animal model. Rabbits were subjected to 1 of 2 groups: diabetic group (n = 6) and control (healthy) group (n = 6). The rabbits were treated with sunitinib in the one oral dose of 25 mg. The blood glucose concentrations were measured at each blood collection. Plasma concentrations of sunitinib were evaluated with validated HPLC method with UV detection.

Results and discussion: In diabetic rabbits sunitinib plasma exposure was significantly greater than in non-diabetic rabbits. The mean sunitinib C_{max} and $AUC_{0-\infty}$ for the diabetic group were 62% and 93.8% higher than for the control group. The decrease in blood glucose concentrations for the diabetic group was 77–238 mg/dL (14.4–69.6%) and for the control group was 20–51 mg/dL (15.4–33.6%). The highest declines in blood glucose levels in the diabetic group were observed between 6h and 12h after the administration of the drug.

Conclusion: The study revealed a significant influence of diabetes on the pharmacokinetics of sunitinib. Moreover, it confirmed the hypoglycemic effect of this drug in diabetic rabbits as well as in rabbits with normoglycemia. These results suggest that, due to the risk of hypoglycemia, it is necessary to carefully monitor blood glucose concentrations during therapy with sunitinib. In some diabetic patients modifications or even discontinuation of anti-diabetic drugs should be considered. Taking into account the fact that the highest declines were observed near the Cmax, monitoring of blood glucose around the time of Cmax seems to be the most appropriate to assess the value of antidiabetic effect of sunitinib and to adjust doses of hypoglycemic drugs.

P5 Targeting the EGFR/mTOR/HIF-1 signalling pathway by pharmacological approach sensitizes head and neck squamous cell carcinoma (HNSCC) cell lines to ionizing radiations.

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Background: Therapeutic management of HNSCC are mainly based on surgery and radiotherapy, and in some cases on chemotherapy with/or therapies that target the Epidermal Growth Factor Receptor (EGFR). However, the overall survival is poor, with less than 50% of the patients being alive 5 years after treatment. The resistance of these tumours to treatment may involve tumour hypoxia. Indeed, it has been shown that the stabilization of Hypoxia Inducible Factors (HIF), that are key regulators of the cell adaptation to hypoxia, correlates with tumour resistance to ionizing radiations and adverse prognosis.

Although pharmacological approaches using targeted agent therapies that inhibit the EGFR/mTOR pathway have shown efficacy in some solid tumours such as lung and colorectal cancers, only few studies showed that in HNSCC, mTOR inhibitors sensitize radio-resistant cells and anti-EGFR resistant cells. Thus, the combination of rapamycin and cetuximab has been evaluated to radio-sensitize HNSCC cells.

Method: We have used low dose rapamycin (mTOR inhibitor, 5nM) and cetuximab (anti-EGFR antibody, 2.5µM/mL, 20nM) to sensitize HNSCC cell lines (SQ20B and CAL27) to irradiation, and have evaluated the molecular impact of these treatments on HIF-1 inhibition with western blot and on survival with clonogenic assay. Immunofluorescence of Pγ HAX was also performed to quantify DNA double strand breaks induced by the irradiation and/or drugs. Xenografts were used to assess the efficacy of the combination without irradiation.

Results: A reduction of more than 50% of the cell survival fraction, as measured with clonogenic assays, was observed when cells were irradiated after a treatment combining low doses of both rapamycin and cetuximab. Interestingly, the use of chemotherapy alone did not reduce

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 31

the cell survival fraction and could even be deleterious. The combination of drugs and irradiation clearly induces an increase of DNA double strand breaks. *In vivo*, the drugs have additive effects leading to a complete reduction of the tumour volume.

Discussion: These preliminary results suggest that targeting the EGFR/mTOR signaling pathway with rapamycin and cetuximab sensitizes HNSCC cells to irradiation. Given these results, we plan to evaluate the efficacy of this combination to radio-sensitize tumour cells in *in vivo* approaches using xenografts in nude mice.

P6 Neutropenia incidence of epirubicin-cyclophosphamide/docetaxel for the treatment of breast cancer

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Introduction: New chemotherapy regimen combinations omit important data on febrile neutropenia incidence and neutropenia-related hospitalization, infection-related mortality, or chemotherapy delays/interruptions or dose reductions. The reporting of myelotoxicity of the new regimens would enable more timely and appropriate guidelines to be developed with regard to the need for supportive measures, such as colony stimulating factors (CSF), and would better equip clinicians to utilize these treatments safely and more effectively for their patients.

Aim of the present study was to assess the risk of neutropenia caused by epirubicin-cyclophosphamide (EC) followed by docetaxel for the treatment of breast tumours.

Material and method: A prospective study in a third level hospital during 7 months (from March to October of 2013). We included patients with breast cancer (stage I, II or III) who began treatment with four cycles of epirubicin (90 mg/m²)-cyclophosphamide (600 mg/m²), followed by four cycles of docetaxel (100 mg/m²) administered every 3 weeks during the study period. Patients with HER2-positive or prior chemotherapy or radiotherapy, were excluded. We studied myelotoxicity data from medical records.

Results and discussion: After 7 months of follow-up a total of 28 patients were evaluated in this study. Chemotherapy was administered in adjuvant and neoadjuvant setting. The average age was 53 (only 3 patients under 40). A total of 12 neutropenia episodes were detected (43%), 8 (28.6%) were febrile neutropenia and 4 neutropenia grade IV (14.3%) requiring dose reduction in 2 patients. 4 of neutropenia episodes were in the first four cycles of chemotherapy with EC and 8 during the therapy with docetaxel. No primary prophylaxis with CSF was given in this study but all the patients were hospitalized, received antibiotic treatment (100%) and secondary CSF support (66%).

Conclusion: The results of this study showed that epirubicin-cyclophosphamide followed by docetaxel have a high incidence of neutropenia episodes. That is a common reason for treatment delays and dose reductions, which can lead to suboptimal treatment delivery and inferior patient outcomes. Clinical guidelines recommend the use of CSF when the risk of febrile neutropenia is above 20%. By identifying risk factors for neutropenia episodes CSF prophylaxis may be appropriately targeted to prevent reduction of relative dose intensity in patients treated with curative intent.

Poster Session: Cytotoxic drug preparation

P7 A simulation-based-learning programme to improve medication safety in oncology

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Introduction: Although preparation of injectable anticancer agents is now centralized in pharmacy units, preparation remains a particularly risky step of the medication use process. Preparation error rate ranges from 0.01% to 6.66%. Severe consequences of Medication Errors (ME) have already been described due to the high toxicity of antineoplastic drugs, narrow therapeutic index, and poor health status of cancer patients. This study focuses on assessing the effectiveness of a simulation-based learning programme in preventing ME during the preparation of injectable antineoplastic agents.

Material and method: This prospective study was conducted in the Clinical Oncology Pharmacy Department of the Lyon University Hospital (Hospices Civils de Lyon, France) and took place in three phases, from May to September 2013. 25 instruction sheets containing 1 simulated error each were intentionally inserted among the various instruction sheets provided to the pharmacy technicians. The primary endpoint was the rate of undetected ME. The second phase consisted in raising pharmacy technicians' awareness of the ME risks associated with antineoplastic drugs during a debriefing with discussion of the results. The impact of the campaign was measured in a second simulation phase. Potential ME seriousness was assessed on the NCC MERP index*.

Results and discussion: In the 1st phase, 12 of the 25 intentionally erroneous instruction sheets (48%) were not detected by the pharmacy technicians. Three errors could have led to fatal issue (i.e. intrathecal administration of bortezomib, vincristine and vinblastine). In the 2nd simulation phase, 20 out of 25 errors were detected by the pharmacy technicians. None of the 5 undetected errors would have resulted in the patient's death if the preparation had been administered. The rate of non-detected ME decreased from 48% to 20% after the awareness campaign (p = 0.04).

Conclusion: This study is the first simulation-based learning tool that has been proved to be effective in reducing preparation errors in preparation of injectable anticancer drugs. Awareness of iatrogenic risk through error simulation allowed pharmacy technicians to improve their detection ability. This validated original programme should be included in an ongoing process of continuous quality improvement, concerning all steps in the medication use process, and including other healthcare workers.

*http://www.nccmerp.org

P8 Influence of personnel activities

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Introduction: In order to lower energy consumption and noise, biological safety cabinets (BSCs) are often used with reduced down- and inflow velocities. Depending on the type of working activity this can have severe effects on the BSC's protection potential. To investigate the impact of working activities typical static and dynamic perturbations triggered by the presence of persons were simulated reproducibly. In this way the effect of individual disturbing factors could be quantified and compared.

Material and method: Two BSCs from different manufacturers were tested using a standardized microbiological test method. This involved nebulizing a spore suspension in the working space of a BSC towards the front aperture and collecting the germs which passed through the protective air curtain into the environment. Taking the nominal setpoint as a starting point, the down- and inflow velocities were reduced stepwise to determine the 'protection reserve' of the safety cabinets. The measurements were repeated in various simulated sitting and standing working situations.

Results and conclusion: Under undisturbed airflow conditions the downflow and inflow velocities of both BSCs could be reduced up to 64% compared to the nominal setpoint to maintain a safe operation. The effect of dynamic disturbances was greater than that of static ones. The

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 32

maximum airflow reduction for a sitting person in front of the access opening was still 63% and only 54% for a standing person. A moving arm within the workspace of the safety cabinet reduced the performance potential to about 44%, a fast moving person to only 24%. The results demonstrate that especially dynamic personnel activities have a significant effect on the protective capabilities of safety cabinets. As fast movements are an unavoidable part of a normal work routine the nominal setpoint of down- and inflow velocities must be sufficient to compensate even large perturbations. The correct approach for greater energy efficiency and reduced noise is thus not achieved by changing the operational parameters but by using innovative components and intelligent control systems.

P9 Aseptic preparation of cytostatic drugs in an isolator

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Introduction: Through the new German Ordinance on the Operation of Pharmacies (ApBetrO) the focus was set on an enhanced product protection during the production of parenteral drugs for individual application. In accordance with the GMP guidelines, production is possible in a class D cleanroom, as long as an isolator is used as the central work area. In many cases an isolator offers the most economic solution especially for small pharmacies. Due to the lack of experience many potential users as well as approving authorities are still unsure in view of the performance potential of this device.

Material and method: In an isolator set-up, consisting of a cytotoxic isolator, a cytostatic safety cabinet, and two ventilated airlocks, a comprehensive simulated production testing was carried out to determine if, and under which circumstances, a proper aseptic preparation of cytostatics could be performed. The experimental procedure was based on an established microbiological validation method for the controlling of aseptic production routines in pharmacies. During the simulation process 120 infusion bags were filled with a sterile culture medium. In addition to the microbial growth control inside the transferred culture media the microbiological contamination of the central work space was examined using settle and contact plates.

Results and conclusion: In none of the aseptically filled infusion bags microbial growth could be found after the incubation period. Apart for one exception (settle plate at the outer doorway of the right airlock) also the samples of the environmental monitoring remained germ free. In this way it could be shown that even under 'A-in-D'-conditions aseptic cytostatic preparations can be performed without problems. The simulation procedure also demonstrates that if ventilated airlocks are used, a pre-connected safety cabinet is to be recommended, if not essential to guarantee that sterile ready-to-use materials are not subjected to the D-room environment. Work routines, which up to now have been proven successful for use with safety cabinets, have to be adjusted to the requirements of an isolator. Working under space-restricted conditions notably requires an improved work planning to keep short preparation times. Nevertheless, an isolator can provide an appropriate working environment for the aseptic preparation of cytostatic parenterals.

P10 Protective gloves for handling cytotoxic drugs – the current situation

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Demands on protective gloves: To minimize the risks associated with the handling of cytotoxic drugs workers have to wear suitable personal protective equipment (PPE). Protective gloves represent the fundamental part of this last barrier against contamination. Due to a wide range of materials and products it is a difficult task to select the right glove type. What important requirements do protective gloves have to meet?

Personnel protection: Basic safety requirements are given by the European Directive 89/686/EEC: When exposed to high risks like an attack of CMR substances, users have to wear PPE of complex design. This PPE has to be tested in accordance with the current standards by an independent inspection authority (notified body). PPE which complies with the requirements is labelled with the CE marking in combination with the identification number of the notified body. The employer is obliged to supply the employees with certified PPE whereas every employee is under the obligation to wear the personal safety equipment provided.

A set of rules for the testing of protective gloves is given by the European Standard EN 374. It describes the methods to assess the barrier performance of gloves with respect to 'penetration' and 'permeation'. However, the test conditions described there do not cover the preparation of cytotoxics in some important aspects. Two current draft standards (prEN 374-1:2009 and prEN 374-4:2012), unfortunately, do not improve these test conditions substantially. How a specific test scenario might look like is shown by the US standard ASTM D6978-05. This standard takes into consideration important influential factors and basic conditions such as appropriate cytotoxic test chemicals and a sufficiently high test temperature.

Product protection: In recent times legal provisions focus on the cleanroom suitability of PPE used for the aseptic preparation of drugs. In addition to personnel protection gloves now have to meet the requirements of GMP-compliant working methods. Suitable gloves, therefore, must be powder free as well as cleaned, dried and packaged under cleanroom conditions.

When selecting gloves for the aseptic preparation of cytotoxic drugs, the user should make sure that they cover the complete range of requirements. However, permeation testing of relevant substances and/or formulations remains unsatisfactory.

P11 Evaluation of a new closed system device (VialShield/ Texium) compared to Phaseal system for preparation of cytotoxic drugs in isolators

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Introduction: Preparation of cytotoxic drugs must be realized in closed systems to avoid chemical contaminations and several devices have been developed in this way. In our unit, sterile cytotoxic preparations are performed aseptically in isolators (just-in-time process of production with cycles of peracetic acid decontamination of materials) with classical spikes. We compared two closed systems (Phaseal Becton Dickinson (PHA), and Vialshield/Texium Carefusion (ViT)) in order to choose one of them to upgrade our control of environmental contamination policy.

Material and method: Tests were carried for one week for each device. We evaluate, through a questionnaire, operators' feeling (safety, easiness of use, collection of rests). In addition, we measured the mean duration of preparations with these two devices and compared it to the mean duration of preparations with classical spikes (Spike Swan Codan, SPI). Finally, we measured the overall satisfaction of operators and their desire to use these devices in daily practice.

Results and discussion: We realized 540, 505 and 592 preparations with SPI, PHA and ViT, respectively. All users felt better protected against chemical contamination with both closed systems compared to SPI. Manipulations seemed easier with ViT than with PHA (80% of users satisfied vs 78%, respectively) as well as collection of rests (100% vs 56%, respectively). The two devices increased the mean duration of preparations compared to classical spike ($p < 0.005$). Nevertheless, this increase was more important with PHA than with ViT but not statistically significant ($p = 0.059$). Moreover, a slightly higher number of decontamination cycles were done with ViT ($p > 0.05$), maybe explaining the increase of mean duration of preparation. Finally, the overall satisfaction level was

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 33

www.ejop.eu

100% for ViT and 75% for PHA. All operators would use ViT daily and only 67% of them PHA.

Conclusion: Increase of duration of preparation observed with both devices should be probably reduced with daily practice. Operators consider that the two closed systems protect them equally against chemical contaminations. They would prefer to use ViT rather than PHA. We have now to validate this choice with specific tests (fluoresceine and titanium tetrachloride assays) to verify protecting properties of ViT compared to PHA.

P12 Another form of organization: ready-to-use solutions

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Usual dispensing of chemotherapy is based on preparation of individualized doses for each patient, immediately before administration. As the number and complexity of chemotherapy regimens increase, pharmacy production has to rationalize chemotherapy preparation delays. For many years and currently using the concept of standard doses we saw the emergence of the most prescribed dosages and decided to prepare ready-to-use (RTU) solutions with batch production. These preparations have been integrated into our important workload: 250 [152-366] preparations per day. Another form of organization aims to improve the efficiency of a Chemotherapy Prepared Unit to minimize patient waiting time in day care unit. Time to dispense extemporaneous preparation is measured at 1h 15min. For RTU preparations this time is reduced to 25 min. Each cytotoxic candidate for batch production must validate various criteria: administrated in day care unit, extended stability data (> 28 days), standards doses (max. 6) and must represent more than 60% of the production. The purpose of this study is to present the organization based on RTU bags in our workload.

Material and method: Actually, we prepare 20 batches of RTU preparations, corresponding to 7 drugs. During January 2014, we have analysed for these cytotoxics, the doses and the number of prescriptions and calculated the related part of the RTU preparations dispensed according to these prescriptions, see Table 1.

Results and discussion: For 5 drugs, RTU preparations covered more than 60% of dispensing. For the 2 others, differences can be explained. For doxorubicin, a large scale of doses [25–75 mg/m2] used in oncology and haematology, explains the lowest percentage. For irinotecan, we retain the main prescribed standard dose (340 mg). For bevacizumab, new batch with another standard dose (900 mg) will cover all the prescriptions (94%).

The acquisition of a distribution pump in 2013 allows to automate this process, thereby increasing the volume and quality of these preparations.

Conclusion: By using RTU preparations of different standard doses, we dispense the vast majority of prescriptions for these specialties. Batch production offers a new organizational ability to improve the pharmacy productivity, secure the preparation and reduce waiting time for patients. The introduction of standard doses is a request for this process, as well as periodic reassessment of these doses.

	Number of ≠ doses prescribed	Number of prescriptions	Dosages of RTU preparations	% preparations dispensing
Bevacizumab	8	103	300, 400, 500, 600, 700 mg	76%
Doxorubicin	13	255	40, 50, 90 mg	56%
Epirubicin	10	120	120, 130, 140 mg	74%
Fluorouracil	10	179	650, 750 mg	64%
Gemcitabine	10	127	1,400, 1,600, 1,800, 2,000 mg	77%
Irinotecan	10	76	340 mg	43%
Oxaliplatin	7	104	125, 150 mg	65%

P13 Evaluation of time dedicated to clinical trial activity in a centralized unit for cytotoxic drug preparations

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Introduction: One of the main goals of the French Cancer Plan 2009–2013, was to energize clinical research, furthermore, by increasing number of inclusions in clinical trials (CT). At Grenoble University Hospital CT activity is constantly increasing since 2005: 91 cancer CT were in progress in 2005, 124 in 2009, and 200 in 2013. This aim was recently carried on with new French Cancer Plan 2014–2019. This growth obviously impacts on pharmacy units especially on centralized units for cytotoxic drug preparations. Pharmacists are in charge of setting up CT, creating electronic protocols for electronic prescribing, managing stocks, organizing week plan, preparing and dispensing CT chemotherapies. We here seek to assess total time spent to CT activity in a cytotoxic drug preparation unit (CDPU) of a 2,200 bed French teaching hospital.

Material and method: From 1 January 2013 to 31 December 2013, we collected, in a forward-looking manner, the number and kind of CT chemotherapies prepared in our CDPU, number of new CT with parenteral chemotherapy set up, and time spent by pharmacists to create electronic protocols. We also recorded during one month from 1 November 2013 to 1 December 2013, time spent to managing stocks, organizing week plan, and preparing each chemotherapy being part of CT. Then, within each CT, we looked if experimental treatment needs more preparation time than standard treatment.

Results and discussion: Over the year 2013, 2,113 CT chemotherapies were prepared, corresponding to 6.1% of the chemotherapies prepared. 43 new CT with parenteral chemotherapies have been set up in our hospital, corresponding to 94 electronic protocols, representing 48% of all protocols created during this period. The pharmacist time spent was 12.5 hours per month corresponding to 65% of total time devoted to creating electronic protocols. Over one month (November 2013), managing stocks and organizing the week plan needed about 20 hours. We can estimate the pharmacy technician time spent preparing clinical trial chemotherapies to 70 hours, corresponding to 15 hours of extra time in comparison to standard treatment.

Conclusion: Time spent to clinical trial activity becomes a significant part of centralized cytotoxic drug reconstitution unit global activity. The purposes of new French Cancer Plan will increase again clinical trial activity in the next years. Adaptation and reorganization of our CDPU will be needed in order to meet these needs.

P14 Introducing a gravimetric control in cytotoxic drug preparation

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Introduction: In Victor Dupouy Hospital over 25,000 cytotoxic drugs are prepared each year in an isolator. In order to improve quality, the ongoing manufacturing processes are studied. A double control is necessary: a technician prepares the cytotoxic drug while another one controls it. The aim of this study is to assess the interest of introducing a gravimetric control in these preparations.

Material and method: The gravimetry technology, helped by a computer, measures the weight of removed and added volumes. In the centralized cytotoxic preparation unit, a balance is put inside the isolator, which enables to have an in-process control. Furthermore, it allows to scan both the bar codes on the cytotoxic vial and the solvent, in order to be

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 34

sure to use the right product at the right concentration. A screen gathers all the information necessary for the preparation and guides the technician step by step, measuring the weight of the volume to move forward to the next step.

Results and discussion: Beside the gravimetric control, other ways of controlling the cytotoxic drug preparations exist. Techniques, such as HPLC (High Performance Liquid Chromatography) or FIA (Flow Injection Analysis) used on the final product show various drawbacks: waste of a certain quantity of drugs, no discrimination between similar molecules, expensive investment. However, the gravimetric in-process control presents several advantages: the technician who controls the preparation is no more needed, the system could enhance traceability - each volume is weighed, each product is scanned and all this information is saved.

Nevertheless, this technology may not be accurate enough for very low volumes. Besides the system of control by a computer might be a source of errors due to computer bugs. Eventually, our unit has succeeded in releasing cytotoxic drugs within one hour and we will have to respect this timing since the manufacturing time is a crucial issue.

Conclusion: Introducing a gravimetric control for cytotoxic drug preparations present a lot of advantages at a reasonable cost. However, we do have to investigate some issues more precisely. Indeed, we will measure the duration of manufacturing with and without the gravimetric control. We must also test the reliability and safety concerning low volume preparations, drugs with different densities as well as identify possible computer bugs.

Poster Sessions: Automatic and robotics

P19 Chemotherapy IV compounding: comparison between robotic and manual preparations in the routine activity of an Hospital Pharmacy

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Introduction: Antineoplastic therapy includes several stages (from prescription to administration) that are vulnerable to opportunities for potentially harmful medication errors. In recent years, the implementation of automation in the oncology treatment has improved medication and personnel safety and workflow efficiency.

At the University Hospital of Ancona, more than 90% of antineoplastic therapies are actually prepared by automatic systems (APOTECAchemo), which minimize the potential errors during the compounding thanks to a total integration and control of all the phases involved in chemotherapy preparation.

The goal of the study is to compare the manual and the automatic production in terms of risk analysis, preparation time and dosage accuracy.

Material and method: The six most frequent drugs were monitored during two weeks of activity. 82 doses compounded manually and 152 by the robotic systems were evaluated in terms of dosage accuracy and preparation time.

The Failure Mode Effectiveness Critically Analysis (FMECA) was applied to assess the possible errors in both productive procedures. 6 failure modes were identified and each Risk Priority Number (RPN) was calculated.

Results: Accuracy, calculated in terms of percent relative error, showed an average value of 1.02% in the manual preparation and -0.63% for the automated process. All the preparations showed dosage errors within 5%. In terms of time preparation, the robotic compounding results 1.6 times slower, due to the introduction of additional control steps to the compounding process. Indeed, this reflects the reduction of the total RPN of 50% in the automatic preparation (83) with respect to the manual (166).

Conclusion: Thanks to the controls applied to each production step, automation introduces remarkable advantages in quality standards and risk lowering. The preparation time is longer with the robot, consistent with the additional safety controls that we do not perform manually, but quality requires time.

P20 Verification of the external surface contamination of bags compounded by a robotic system for IV-admixing

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Introduction: The need of protecting healthcare workers from occupational exposure to antineoplastic drugs has been a high priority task for the hospital management in recent years. This is one reason that drove the introduction of automation in the University Hospital of Ancona. Indeed, the most critical operations are performed in a closed area, under negative pressure.

Because skin contact represents the major source of exposure to drugs for pharmacy and healthcare personnel, here we wanted to evaluate the level of surface contamination of the products unloaded from the IV robot.

Material and method: 75 bags of fluorouracil (FU) compounded with APOTECAchemo during three weeks of routine activity were analysed. Each external surface (80 cm^2) was wipe sampled according to a well-established procedure [1], for a total of 150 collected samples.

The amount of FU was analysed by means of chromatography (HPLC/MS/MS) that assures a limit of quantification (LOQ) of 0.4 ng/sample (in our case 5 pg/cm^2).

Finally, data were compared with the benchmarks for surface contamination from antineoplastic drugs.

Results: The detection rate was 33%, 101 to 150 surfaces showed undetectable amount of FU or lower than the LOQ. The median value is < 5 pg/cm^2, while the 75th percentile is 6.06 pg/cm^2. Those numbers are below the corresponding guidance values defined as benchmarks by Schierl et al. (respectively 5 pg/cm^2 and 30 pg/cm^2), demonstrating the good working practice of the robot.

Two surfaces displayed a contamination higher than 0.1 ng/cm^2. The samples were wiped consecutively and are related to a single side of two bags, the other sides of which showed undetectable quantity of FU. Therefore, these contaminations were more likely due to the handling of the samples rather than associated to automatic preparation.

Conclusion: An exhaustive campaign to monitor the surface contamination of bags compounded with a robotic system was carried out. The results assess the good manufacturing processing of the automated compounding that prepares clean therapies. The next steps provide for extending this approach also to manual preparation and to other drugs like cyclophosphamide.

P21 Trastuzumab: optimal management of preparations made in laminar flow cabinet and robotic systems

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Introduction: Administrations of infusional chemotherapeutic preparations require at least two important conditions: security and accuracy. For this reason, Hospital Pharmacy of L'Aquila has acquired a Robotic System, APOTECAchemo (Ac), to optimize the management of drug

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 35

www.ejop.eu

residues and to minimize the activities at risk for the operator, avoiding any possible external contamination and human error. The aim of this study was to determine the required time and average percentage error (ae%) deriving from preparations of trastuzumab obtained by using a manual technique in vertical laminar flow cabinet -Isolator (Is) compared to those obtained by using Ac.

Material and method: The study was conducted from June 2012 to January 2014. In this period, 772 preparations of trastuzumab were prepared using Ac and 80 using Is. The ae% in Is was calculated as follows: pharmacists received prescriptions, through a computerized system, and produced the worksheets including therapy's data such as department, prescriber, patient, drug, dosage, volume, final container, lot and expiration date. In Is, each vial of drug was connected to device for reconstitution and weighed using analytical balance. Vials were subsequently diluted in appropriate volumes and then re-weighed. Drugs were introduced in final containers and vials were weighed again. Density values of trastuzumab are provided by the manufacturer and allowed to calculate the accuracy of volume actually taken and the e% for each preparation. Data were compared with ae% and the required time automatically calculated by Ac. Finally, an estimation of economic savings induced by centralization and utilization of drug residues was conducted.

Results and discussion: The ae% calculated in 18 months is -2.63 using Is vs -1.22 using Ac. Time required to prepare average doses of 371mg/therapy (as a result of dose schedule weekly and triweekly) is 13 minutes in Ac vs 8 in Is. The complete use of drug residues derived from Ac allowed to save an estimated budget of Euros 73,000.

Conclusion: The use of Is showed a critical variability among different operators. In addition, trastuzumab being a lyophilized drug, possible errors to reconstitute and to withdraw the exact volume may occur and compromise the preparation. The analysis showed that operations repeatedly carried out by Ac have lead reproducible results in terms of accuracy compared to Is.

Poster Session: Quality assurance/microbiology/analytics/stability in oncology pharmacy

P15 Proper handling of protein biopharmaceuticals in the pharmacy setting

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Introduction: Protein biopharmaceuticals account for a substantial proportion of hospital-administered drugs, especially in the oncology field. Proper handling of these drugs in the pharmacy setting is extremely important, and protein-based drugs have a set of stability liabilities that distinguish them from conventional, 'small molecule' drugs. Case studies of protein degradation that can occur in IV bags will be discussed, along with suggested general guidance for safe handling of protein biopharmaceuticals from a manufacturer's perspective.

Material and method: Aggregates from one clinical-phase humanized monoclonal antibody were chromatographically isolated and tested for their activity by a cell-based bioassay. Another clinical-phase compound, in this case an antibody-drug conjugate, was subjected to physical agitation stress in IV bags and assessed using size-exclusion chromatography to measure the generation of aggregates.

Results and discussion: The molecules discussed exemplify some of the consequences of mishandling of protein biopharmaceuticals. In the first example, it is seen that aggregates can dramatically affect the measured bioactivity of the monoclonal antibody, which emphasizes the potential impact of protein degradation products. In the case of the antibody-drug conjugate, the generation of aggregates is directly linked to the physical handling of IV bags. Phenomena observed in both of these examples are potentially generalizable to many protein-based drugs. Specific strategies for avoiding these problems are discussed.

Conclusion: Pharmacists play a critical role in their preparation of infusion solutions. In the case of proteins, subtleties of pharmacy practice are linked to dosing solution quality. Ensuring the quality of protein-based products in IV bags may require additional attention to how doses are handled compared to many other drugs, especially with regard to transportation, material compatibility, and beyond-use-dating.

P16 Stability of 2 mg/mL melphalan in 0.9% sodium chloride under sequential storage conditions

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Introduction: The stability of melphalan solutions depends on temperature and chloride ion concentration. The manufacturer indicates 1h 3m stability at room temperature. The objective was to study the stability of 2 mg/mL melphalan solutions diluted with 0.9% sodium chloride prepared with an infusion bag of sodium chloride at 4°C, storage of this melphalan infusion bag at 4°C and then at room temperature to simulate the steps 'preparation, transport and administration.

Material and method: The stability study has been conducted by visual inspection and by HPLC (current monograph of the Eur Ph). The stability study has been performed in 3 steps.

First step: To define the stability criteria for the acceptable concentration of melphalan and degradation products >> Analysis of a 2 mg/mL melphalan solution at Time 0 and 90 minutes after storage at room temperature (stability data from the manufacturer) (n = 3).Second step: Preliminary stability study in glass tubes for a 2 mg/mL melphalan solution stored in the refrigerator to determine the storage duration of the infusion bags in the third step (n = 3).Third step: Stability study in daily practice conditions (duration of storage defined after the second step).

Results and discussion: The stability criteria according to the manufacturer's recommendation have been determined: melphalan concentration above 92% of the initial concentration, 4 degradation products have been detected and their acceptance limits determined.

During the preliminary study in glass tubes at 4°C the melphalan concentration was above 95.1% of the initial concentration after 4 hours and 90.6% after 7 hours. A 4 hours duration of storage at 4°C was defined for the stability study in infusion bags. According to the criteria defined in the first step the best conditions for the storage of 2 mg/mL melphalan infusion bags were 4 hours at 4°C and then 1h30 at room temperature.

Conclusion: The best preparation and storage conditions for the 2 mg/mL melphalan solution in 0.9% sodium chloride are: 1-use a refrigerated 0.9% sodium chloride bag to prepare the melphalan infusion, 2-store the melphalan solution at 2–8°C for 4 hours and then 1h 30 at room temperature (administration to the patient). This 5h30 stability enhances the organization of the pharmacy staff and the nursing staff.

P17 Efficiency of the cleaning protocol for chemical contamination on external surface of cytotoxic vials

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Objective: Regarding cytotoxic drugs toxicity, environmental monitoring is conducted to identify and reduce sources of contamination for occupational exposure prevention. Despite corrective actions, a major source of contamination still persists: cytotoxic vials from the manufacturer. The aim of this study was to assess efficiency of manual decontamination procedures using gauze for several vials.

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 36

www.ejop.eu

Study design: Two standardized scenarios of vials contaminated by carboplatin (Assay A: 1 vial with 21,020 ng of platinum and 9 free contamination vials and assay B: 10 vials with 2,102 ng of platinum) were explored. Efficiency was estimated regarding the residual quantity of platinum on each vial after decontamination using gauzes soaked with 4 mL of Klerclean neutral detergent.

Results: Results show a good decontamination efficiency of the first vial of the two series with more than 81% of contamination removing. Nevertheless, a spread of the contamination from vial to vial with cumulative spread contamination was observed with a global contamination of 4,296 ng on the 9 vials initially free from contamination (mininmum 324 ng, mean 477 ng) for assay A. For assay B, 7,668 ng were found on the 9 next vials initially contaminated, corresponding to 59.5% of mean removing (67.0% to 41.1%).

Conclusion: Cytotoxic vials are at risk of exposure for healthcare workers. However, cleaning protocol was not sufficient and instead of clean vials, the use of the same gauze to clean several vials spread the contamination from vial to vial and the reduction of contamination was very limited. To durably improve the safe handling of our healthcare workers, we need help of manufacturers to limit external contamination.

P18 New subcutaneous formulation of bortezomib: stability assessment of reconstituted solutions

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Introduction: Bortezomib is an antineoplastic agent widely used in the treatment of multiple myeloma. It is a high-cost drug characterized by a very short stability. According to manufacturer once reconstituted it is stable at 25°C only for 8h, leading to a large amount of daily residuals. The subcutaneous administration has been authorized last year. In our previous work we already assessed the stability of intravenous formulation of bortezomib in original vials and polypropylene syringes. The considerable extension of stability (8 days) allows the preparation of bortezomib-syringes in centralized unit achieving a significant reduction of drug waste (-11%) as well as a remarkable cost saving (41 800 Euros estimated on the basis of consumption of 2013). In this work we aimed at evaluating the stability of subcutaneous bortezomib reconstituted solutions, prepared according to our operating conditions both in vials and syringes.

Material and method: Sample solutions of bortezomib were prepared according to clinical practice and stored in thermostat for 10 days in photoprotection conditions at 4 ± 2°C or 25 ± 2°C. HPLC analyses were carried out according to Carati et al. with minor modifications. Injections were performed in triplicate at times 0 (just after reconstitution), 5, 8 and 10 days. Quantification of bortezomib was done using external standard calibration. Precision, Linearity and Expanded Uncertainty of the method was calculated (EURACHEM guide). According to FDA and ICH guidelines the limit of stability considered was 95% of the initial concentration (measured at time 0).

Results and discussion: Results reached in this study confirm the possibility to extend the bortezomib stability even in subcutaneous formulation. The stability is assessed up to 5 days under routine clinical conditions of preparation, both at 4°C and 25°C. These results applied in our routine work will give an important contribution in reducing drug waste and improving cost efficiency, as previously experienced for the intravenous formulation.

Conclusion: It is reasonable to expect an increased use of subcutaneous formulation, since it reduces neurotoxicity as well as reduces infusion time of the drug. In this view the ascertainment of an extended stability of bortezomib even in this formulation is a promising strategy to contain costs.

P22 New function on the Stabilis database: level of evidence for stability studies of anticancer drugs

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Introduction: No information on quality of the stability studies was available on the Stabilis database. To facilitate searches of users, our goal was to create a quotation system to provide the level of evidence of the stability studies of injectable anticancer drugs.

Material and method: A checklist for the quotation of the publications has been built in relation with international recommendations: ICH Guidelines and 'Guidelines for the practical stability studies of anticancer drugs: A European consensus conference' (Ann Pharm Fr. 2011;69:221-31). We consider physical stability (visual and subvisual evaluation) and chemical stability (stability indicating capability, precision, linearity). Another evaluation system has been created with specific methods for proteins. The articles were rated according to these criteria to provide a level of evidence from A to D. For the stability studies based on biological methods we decided to impute a specific 'biological' quotation. Finally, we have designed pictograms and screens for users.

Results and discussion: We analysed 196 stability studies of injectable anticancer drugs: level A was attributed to 40% of the articles, level B to 21%, level C to 16%, level D to 16% and the 'biological' quotation to 3%. For the last 4%, we assigned a 'joker' when several molecules have different levels of evidence in the same article. In 71% of articles, stability was defined as 95% of the initial concentration. A good level of evidence (A or B) was imputed in most cases but the stability indicating capability is inadequately assessed in 52% of level D. Results for linearity or precision are not provided or outside specified values for 47% of level C and 75% of level D. Coefficients of variation were too high in 33% of level D. Most of the information is given by 42 new pictograms and we have created standardized comments, translated into 26 languages to precise or justify the level of evidence proposed. Finally, we wrote a notice to explain the evaluation system, available on the database website.

Conclusion: Level of evidence is an indicator of the quality of publications and will guide users of Stabilis. We also hope that this work help to realize more complete stability studies. The next step will be the analysis of the stability studies of another extensively studied pharmacological class: injectable antibiotics.

P23 Visual compatibility of defibrotide with selected co-administrated drugs during simulated Y-site administration.

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Introduction: Recently the Committee for Medicinal Products for Human Use of the European Medicines Agency, following a re-examination procedure, adopted a final positive opinion, recommending to grant a marketing authorization for defibrotide (so named Defitelio 80 mg/mL concentrate for solution for infusion, Gentium SpA, Italy) intended for the treatment of severe Venous Occlusive Disease in haematopoietic stem-cell transplantation therapy. Here is no reported information on the compatibility of diluted defibrotide with commonly intravenous drugs administrated in bone marrow transplant units. This lack of data may conduce to major defibrotide misuse and subsequent putative deleterious effects on patient such as implantable injection chamber device clogging.

Material and method: Clinically used concentrations of 44 drugs largely used in bone marrow transplant units, including anti-infectious,

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 37

www.ejop.eu

corticoids, sedatives, analgesics, and cardiovascular agents, were evaluated in 1:1 mixtures with defibrotide. The effect of mixing order was ascertained by studying both the tested drugs added to defibrotide solution and the defibrotide solution added to the tested drugs. The mixtures were then visually observed in front of both a matt black panel held in a vertical position and a non-glare white panel held in a vertical position under normal fluorescent light over a period of four hours at room temperature. Compatibility was defined as the absence of any colour change, haze, fibers, particles, gaz generation and precipitate.

Results and discussion: A total of 37 tested drugs demonstrated no evidence of visual incompatibility immediately and 60, 150 and 240 minutes after mixing. Seven tested drugs (amikacine, furosemide, midazolam, mycophenolate mofetil, nicardipine, tobramycine and vancomycine) demonstrated visual incompatibility with defibrotide at the initial and/or at the 60, 150 and 240 minutes observation time point.

Conclusion: Defibrotide was visually compatible with 37 intravenous drugs that are likely to be co-administrered in bone marrow transplant units. Nevertheless, further studies have to be done to ensure chemical stability of these mixtures. Seven drugs were identified as visually incompatible with defibrotide and should not be administered simultaneously with defibrotide through a common intravenous port.

P24 Near infrared spectroscopy to reduce medication errors with limited exposure of healthcare workers

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Objective: Medication errors during preparation can lead to side drug events. Regarding their toxicity, cytotoxic drugs are particularly at risk. By identification and quantification, analytical control can ensure correct molecule and concentration before administration. The aim of this study was to assess the feasibility of a non-invasive and non-destructive analytical method to control two of the most used cytotoxic drugs. It contributes to improve the safety for the patient with administration of conform preparation and for healthcare worker by limited preparation handling.

Study design: Near-infrared spectroscopy (NIRS) was used to analyse gemcitabine (GEM) and 5-fluorouracil (5FU) by direct measurement through standard glass vials at therapeutic concentrations. Because of complex spectral data, chemometric approach was applied to predictive cytotoxic concentration.

Results: Two calibration models were developed for 5FU and GEM using partial least-squares regression with determination coefficient (R2) higher than 0.9992, low prediction error (RMSECV: 0.483 and 0.139 mg/mL, respectively) and ratio prediction deviation (RPD: 36 and 125, respectively) signing a good capacity of the method to predict the concentration from 7 to 50 mg/mL and 2 to 40 mg/mL, respectively in less time than 1 minute.

Conclusion: This study is an example of the potentiality of NIRS, currently used in industry, to control drugs preparation before administration and without delaying it. It was applied on cytotoxic drugs but can extend to other drugs extemporary prepared at hospital by pharmacy but also nurses and thus, secure administration by reducing medication errors with limited exposure of healthcare workers.

P25 Extended stability of eribulin and cost optimization: experience from 3 French centres

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Background: Eribulin is the first anticancer drug demonstrating an improvement of global survival in third-line monotherapy of metastatic breast cancer. According to the manufacturer, the stability of both non-diluted and diluted solution is 24 hr at 4°C. Considering the recommended dose of 1.23 mg/m² and the amount of drug per vial (0.88 mg/² mL), the loss of product during the preparation may be significant. However, a published study from Poujol and co-authors [1] have shown a stability of eribulin up to 14 days, permitting thus an optimization of workload and costs. The aim of this study was to evaluate, in real life, the impact of the extended stability limits of eribulin on the handling practices and the optimization of costs.

Material and method: The study was performed from March 2012 to August 2013 in 3 French hospitals. Two periods have been evaluated: before and after modification on the stability limits. From the individual preparation files, different parameters were recorded (see below in the table). Results: Sixty-one eribulin patients were included from the third-line to the eight-line, always in monotherapy. Results are presented in the following table.

Parameter	Period 1 (stability=24hr)	Period 2 (stability=14 D)
Nb of patients	25	49
Nb of prescription lines (D1 et D8)	166	357
Mean dose (mg)	2,03 ± 0,33	2,03 ± 0,26
Nb of delayed treatments	5	4
Nb of dose modifications	4	16
% of patients treated the same day	27,5	NA
Theoretical residues (mL)	144,8	407
% of residue re-used	20 (29,25 mL)	36 (147 mL)
Value of the re-used residues (€)	4773	23900

Discussion: The modification of the stability limits has permitted, by using safely the vial residues, to generate additional money savings (+16%). However, the % of reuse could be more important if the residual volume to withdraw was superior to 0.5 mL. The low % of reuse in two hospital (30% versus 60% for the third) suggests further improvements, like preparation of a stock solution (diluted at 1/10) to increase the residual volume. In addition, this study indicates that eribulin was correctly prescribed and exhibits a good tolerance profile considering the low % of delayed prescriptions and dose modifications.

Conclusion: An extended stability limit (14 days) for eribulin as compared to this recommended by the manufacturer should lead to an improvement of manufacturing processes and significant cost savings.

Reference

1. Poujol S, et al., Stability of the ready-to-use solutions of eribulin for intravenous infusion. Ann Pharm Fr. 2012;70(5):249-55.

P26 Influence of freezing on physical stability of rituximab

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Rituximab (RTX) is a chimeric monoclonal antibody (mAb) widely used in the treatment of various haematological malignancies. Our team has recently demonstrated that RTX solutions are physically, chemically and

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 38

www.ejop.eu

microbiologically stable at + 4°C for 6 months. Freezing, even attractive, is generally not considered as an appropriate way to conserve proteins due to possible denaturation. Since few data are available on the influence of freezing on the physical stability of mAbs, the goal of our study was to understand the influence of freezing on RTX stability.

2 mL aliquots of 10 mg/mL solution of RTX in PP tubes were submitted to one cycle of freezing/thawing. Two methods have been used: static freezing (SF) at -22°C and liquid nitrogen cryonics (LNC), both followed by a room temperature thawing. Physical stability has been evaluated by UV spectrophotometry, Dynamic Light Scattering (DLS), Size exclusion Chromatography (SEC) and IR spectroscopy (IR).

For both freezing modes, DO ratios decreased at 279 nm and increased at 350 nm (0.0873 ± 0.0002 (reference) vs 0.1014 ± 0.0002 (SF) and 0.0956 ± 0.0001 (LNC)) traducing aggregation. Controversly, only one polydisperse population (polydispersity index > 0.1 diameter 12.35 ± 0.27 nm) was observed by DLS after freezing, suggesting that aggregates had a size above the detection range (6 µm). No retention time shift or additional peak were observed in SEC, but a significant decrease in AUC was observed (76.864 ± 2.699 vs 69.82 ± 1.297 (SF) and 70.51 ± 0.768 (LNC)) confirming loss by aggregation. For both freezing modes, IR showed numerous shifts revealing the destabilization of secondary structures of rituximab, with the appearance of α-helix instead of β-sheets and β-turns.

For both SF and LNC, it has been demonstrated that a freezing/thawing cycle alters RTX in solution (aggregation and secondary structure modifications), so freezing is not a proper method for rituximab conservation. Finally, our study point out that accidental freezing of RTX is probably harmful and should be avoided

P27 Pneumatic conveying systems and physical stability of monoclonal antibodies: the example of trastuzumab

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Trastuzumab (TZT) is a monoclonal antibody (mAb) used in the treatment of HER2-positive gastric and breast cancers. Mechanical stress during handling or transportation can induce TZT aggregation, potentially causing loss of efficiency as well as immunogenic adverse effects. In some hospitals, the need of a rapid drug dispensation from the pharmacy to the wards has led to the use pneumatic systems, but they are currently not used for the transportion of mAb bags due to the paucity of data on possible pitfalls. Nevertheless, some conclusive studies on rituximab and cetuximab have recently been performed and the aim of this work was to determine the influence of pneumatic transportation on the stability of diluted solutions of TZT.

Complementary analytical methods have been used: UV spectroscopy, dynamic light scattering (DLS), describing submicronic populations and their mean diameters, turbidity at 350 nm, size exclusion chromatography (SEC) and infrared spectroscopy (IR). Conditions tested were the presence or absence of residual air in the bag and the number of route (from 1 to 3). The concentration was 1.2 mg/mL in polyolefine bags.

Without air in the bag (purging), no modifications were observed comparatively to the reference (no route) after up to 3 routes. Only one peak was detected by SEC at 15.78 ± 0.01 min with an AUC of 88.37 ± 1.06 mAU. min. DLS revealed a unique population (polydispersity index (PDI) < 0.1) of a mean diameter of 11.38 ± 0.02 nm. A very slight increase of turbidity, 0.0400 to 0.0454 OD was observed. No secondary structure modifications were apparent by IR.

With residual air, some significant changes occurred in bags undergoing 3 routes: a significant increase in polydispersity (PDI = 0.157) was observed due to the appearance of a second population by DLS, an OD increase, and significant shifts in IR, indicating modifications of the secondary structure. All of these modifications demonstrated destabilization of the TRZ structure and beginning of aggregation.

In conclusion, aggregation, as a sign of physical instability, is correlated to the presence of air/liquid interface, as previoulsy demonstrated with rituximab and cetuximab as previously The absence of residual air in the bag (i.e. by purging) is mandatory for the safe use of pneumatic systems to transport mAbs.

P28 Development of analytical control for low-volume cytotoxic preparations destinated to paediatric patients

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Introduction: Our chemotherapy preparation unit produces 7,000 preparations per year for paediatric patients. Regarding the young age of our patients sixty-five per cent of these preparations are made in syringes with final volumes ranging from 20 to 50mL. These preparations are usually not sampled for analytical analysis because of the necessity of an important analytical volume. The objective of this study is to improve the quality control of these preparations by adding an analytical control considering that the volume that could be withdrawned from the preparation has to be the lowest possible.

Material and method: For each syringe (final volume ≥ 20 mL) one milliliter of diluent (5% dextrose or 0.9% NaCl) was added to the prescribed volume. After homogenization this supplementary volume was withdrawned from each preparation, to be analyzed. Samples were analyzed with a QCPrep+ analyzer coupling a Raman and UV spectrometers. Samples were automatically diluted by the analyzer in order to reach the 1.2 mL minimal volume required for analysis. The acceptance limit was set at ± 15% of the target drug concentration.

Results and discussion: The fraction of the total dose withdrawn from the syringes ranged from 1.96% (50 mL syringe) to 4.76% (20 mL syringe), which is in most cases greater than for the control of preparations produced in bags (0.1 to 2.4%).10 different cytotoxic drugs were tested and 108 of the 121 analytical controls were conform (89.3%). The 10.7% of non-conformity were mainly attributed to a lack of homogenization (a standardized procedure is needed). The choice of adding 1 mL diluent before sampling was made considering that drug concentration was not significantly modified and that the final volume of the preparation respect the medical prescription. Nurses work was then facilitated.

Conclusion: The results of this study are encouraging, and would permit to improve cytotoxic preparations quality and patient safety. Nevertheless, some problems persist: new calibration ranges at low concentrations are needed, some drugs do not have a sufficient signal to be analysed (vincristine) and we still wonder what is the maximum fraction of dose which can be devolved to quality control. However, the benefit in patient safety should be the priority in children as well as in adults.

P29 Long term physico-chemical stability of ipilimumab in opened commercial vial

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Introduction: Long-term physico-chemical stability of ipilimumab in opened commercial vial ipilimumab (IPI) is a monoclonal antibody use in the treatment of metastatic melanoma. The manufacturer indicates a stability of only 24 hours after opening. Our purpose was to study the physico-chemical stability of IPI in open commercial glass vial (ready to use solution, 5 mg/mL) at 25°C and 4°C during 3 months.

Material and method: Samples were withdrawn in aseptic conditions at several times: To (control), 2 weeks, 1, 2 and 3 months. One glass was stored at 25°C and the other at 4°C, in light-protecting bags. Physical stability was evaluated by UV spectroscopy (turbidity at 350

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 39

www.ejop.eu

nm), Dynamic Light Scattering (DLS), thermal denaturation curve, Size Exclusion Chromatography (SEC) and chemical stability by Ionic Exchange Chromatography (IEC) and UV second derivative.

Results: were presented as median +/- standard deviation (To versus 3 months) and measures repeated 3 times. Statistical analysis was performed by non-parametric Wilcoxon tests (significance = $p < 0.05$). Results and discussion Turbidity was not significantly modified at both storage conditions: 0,0649 +/- 0,0005 vs 0,0732 +/ -0,0009 (25°C), like mean hydrodynamic diameter measured by DLS (11.94 nm vs 11.94 nm 25°C, $p = 0.1$) and a low polydispersity index was found (< 0,1) translating a monodisperse population. Temperature of aggregation (Tm) stayed around 73.4°C. No significant change in profile in SEC was observed up to 3 months. IEC was performed at 3 month for technical reasons but at 1 month chromatogram profile was not modified and none new peak appeared. UV second derivative was stackable to To at both temperatures. Physical stability seemed to be maintained according to unchanged turbidity (indicating absence of aggregation), hydrodynamic diameters, Tm and SEC profiles. Chemically stability was ascertained by no chain scission in SEC, neither desamidation in IEC, and UV second derivative remained similar, showing an absence of tertiary structure modification.

Conclusion: We demonstrated that IPI stored in original vials at 4°C and 25°C remained stable up to 3 months. No significant physical or chemical instability was observed. Extended stability of unused vial residues, for a very expensive product like IPI, could permit an important cost saving in hospitals. These results should be completed by peptide mapping and Infrared spectroscopy to assess primary and secondary structures, and by the study of biological activity.

P30 Extension of the practical shelf life of hazardous drugs using a closed-system transfer device (CSTD) as a container system enabling drug vial optimization (DVO) for up to 28 days

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Introduction: Hospital pharmacists need support to reduce drug costs which for some hazardous drugs represent a significant expenditure. This study makes use of a closed-system transfer device (CSTD) Tevadaptor, to extend the practical shelf life of an unpreserved drug vial and reduce wastage. Recent publication of microbiological sterility data for 7 days using a CSTD is insufficient evidence alone to support shelf life extension. The study presented here reports data on the use of Tevadaptor as CSTD system for hazardous drugs and includes microbiological sterility and physico-chemical data for up to 28 days after first puncture.

Material and method: Assessment of microbiological sterility was performed using tryptone soya broth (TSB) as 'product' in drug vials fitted with Tevadaptor system (n = 332). All manipulations were performed within a grade A (EU GMP) environment. Samples were removed (5 mL) at each of the following time points: Day 0; 7; 14; 21 and 28 tested for growth. When not in use the drug vial/Tevadaptor system was stored in a pharmacy refrigerator (2–8°C). At day 28 the residual TSB in the drug vials (n = 332) was tested for microbial growth. Positive and negative controls demonstrated sterility of the TSB media and ability to promote growth for reference organisms. Non preserved drug vials of cisplatin, paclitaxel and methotrexate were fitted with Tevadaptor system and assessed by standard physicochemical methods: pH; visual appearance and high performance liquid chromatography with diode array detection (HPLC-DAD) over 28 days. For each of the hazardous drugs an aliquot was tested at: Day 0, 7, 14, 21 and day 28 after first puncture. A fully validated stability indicating HPLC method was used for quantifying the amount of active drug remaining.

Results and discussion: Tevadaptor system was tested with the following hazardous drugs: cisplatin; paclitaxel and methotrexate in preservative free drug vials for 28 days after first puncture. Results from the physico-chemical tests demonstrate chemical integrity was maintained in all three drugs for 28 days. Tevadaptor system maintained microbiological sterility for 28 days using TSB as 'product' when manipulations were performed in a Class A environment. Growth promotion tests were performed on the drug vials (n = 332) using 5 time points up to 28 days and no reported growths. Positive and negative controls were performed on the TSB 'product' media. This data supports the pharmacist's decision to use the Tevadaptor system to extend the shelf life of these hazardous drugs for up to 28 days reducing wastage.

Conclusion: The Tevadaptor system when used with hazardous drug vials is able to maintain both microbiological sterility and chemical stability for up to 28 days. Microbiological sterility is demonstrated along with physico-chemical data for three hazardous drugs: cisplatin, paclitaxel and methotrexate and supports the use of Tevadaptor system.

P31 Advantage and position of camera-assisted visual inspection in a chemotherapy production unit

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Introduction: The preparation of antineoplastic agents is a complex process, where several non-conformities can occur. To ensure the quality and the safety of chemotherapy preparations, different control strategies are used, such as analytical, gravimetric or video control and standard double visual check (oldest strategy). In our unit producing annually 20,000 preparations, 68% are bags which are inspected by analytical control. Preparations packaged in syringes and infusers (6,400 preparations annually) undergo the double visual check.

The objective of this work was to implement camera-assisted visual inspection to substitute the standard double visual check.

Material and method: A battery operated camera with voice recognition is attached on the outside of each isolator's work station. Pictures taken by the pharmacy technician are transferred instantly to our control laboratory for analysis and release. Procedures adapted to each type of preparation have been written to define the critical steps of the manufacturing process to be photographed (2–5 pictures). Pharmacy technicians and inspectors were also trained in the use of the device.

Results and discussion: The technical difficulties encountered during implementation were: the lack of picture sharpness, the battery life issues running down too quickly, and excessive sensitivity of vocal recognition leading to unnecessary pictures being taken. Corrective measures had to be implemented for the feasibility in routine of camera-assisted visual inspection: increased vigilance when taking pictures for sharpness, additionally the devices were connected to a power-outlet. This control strategy has the following advantages: it is inexpensive (Euros 1,200 for 4 workstations), easy to use and install, suitable for all sizes of production units, guarantees better tractability (archived pictures) and does not require more time than the standard double visual check.

Conclusion: Camera-assisted visual inspection replaced the standard double visual check in our unit therefore complimenting the analytical quality control. Despite its inadequacy as a legal evidence in case of an incident, it has the advantage of conserving pictures for a later viewing in case of potential errors and represents a step of quality improvement.

P32 Compatibility of epirubicin-loaded beads with different contrast media

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Purpose: The aim of the study was to determine the compatibility of epirubicin-loaded DC Bead with different non-ionic contrast media over a period of 7 days when stored light protected at refrigerated conditions (2–8°C).

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 40

www.ejop.eu

Method: 2 mL DC Bead (Biocompatibles UK Ltd) (bead size 70–150 µm (= DC Bead M1), 100–300 µm) were loaded with 75 mg Farmorubicin (Pfizer) powder formulation (dissolved in 3 mL water for injection to a concentration of 25 mg/mL) or 76 mg Epimedac (Medac GmbH) solution (2 mg/mL) within 2 h or 6 h, respectively. After removal of the excess solution, epirubicin-loaded beads were mixed in polypropylene (PP)-syringes with an equal volume (~1.5 mL) of contrast medium, i.e. Accupaque 300 (Nycomed Inc), Imeron 300 (Bracco SpA), Ultravist 300 (BayerVital GmbH), Visipaque 320 (GE Healthcare) and agitated in a controlled manner to get a homogenous suspension.

Syringes with loaded beads in contrast media were stored protected from light under refrigeration (2–8°C). Compatibility was determined by measuring epirubicin concentrations in the suspensions in triplicate on days 0, 1 and 7. A reverse phase HPLC assay with ultraviolet detection using a Symmetry (Waters Corporations) column C18 (250 mm x 4 mm) was utilized to analyse the concentration and purity of epirubicin. The mobile phase consisted of a phosphate buffer solution pH = 4.6 (72.5%) and acetonitrile (27.5%).

Results: Mixing of epirubicin-loaded beads with different non-ionic contrast media released 0.1–0.5% of epirubicin over a period of 24 h irrespective of the DC Bead size or contrast media. No further elution or degradation was observed after 7 days when the admixtures were stored protected from light under refrigeration.

Conclusion: Compatibility of epirubicin-loaded DC Bead with an equal volume of different contrast media in PP syringes is given over a period of 7 days. Due to a maximum elution of 0.1–0.5% of epirubicin from loaded DC Bead admixtures with contrast media can be prepared in advance in centralized cytotoxic preparation units.

P33 Loading, release and stability of epirubicin-loaded drug-eluting beads used for transarterial chemoembolization

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Purpose: The aim of this study was to determine the loading efficiency, physico-chemical stability, and release of epirubicin-loaded DC Bead (Biocompatibles UK Ltd) (bead size 70–150 µm (= DC Bead M1), 100–300 µm) after loading with epirubicin solution (2 mg/mL) or reconstituted powder formulation (25 mg/mL) and storage at room temperature, protected from light.

Method: DC Beads were loaded with 75 mg epirubicin (Epimedac (Medac GmbH) and Farmorubicin (Pfizer)) per 2 mL of beads. Drug loading efficiency and stability were determined by measuring the epirubicin concentration in the excess solution after predetermined intervals (maximum of 6 h) with different loading conditions (static or agitated).

Syringes with loaded beads were stored protected from light at room temperature. The beads were transferred into 200 mL phosphate buffered solution (PBS, pH 7.2) not followed or followed by addition of 200 mL of 20% NaCl as elution medium and stirred for 2 h to analyse the drug release and integrity of the epirubicin loaded beads. Elution experiments were performed and samples taken periodically over a 4-week period (day 0, 7, 14 and 28). A reverse phase HPLC assay with ultraviolet detection was utilized to analyse the concentration and purity of epirubicin.

Results: The loading procedure for DC Bead with epirubicin drug solutions resulted in a loading percentage of 95–99% within maximum 6 h dependent on the bead size, epirubicin concentration and loading conditions. Loading levels remained stable and no epirubicin degradation products were observed over the period of 28 days, while the loaded beads were stored light protected at room temperature.

Release of epirubicin into 200 mL PBS elution medium and additionally followed by release into the admixture with 200 mL 20% NaCl solution amounted to 5% and 20% of the loaded epirubicin, respectively. Integrity of loaded epirubicin was given over 28 days according to the purity of epirubicin measured.

Conclusion: Epirubicin-loaded DC Bead of different bead sizes and using different concentrations of epirubicin loading solutions exhibited physico-chemical stability over a period of at least 28 days when stored light protected at room temperature. Epirubicin is released until equilibrium is reached with the eluent. The release is restricted by volume and cation exchange capacity of the elution medium.

P34 Extended stability study of oxaliplatin infusions for dose banding

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Introduction: Dose-banding of chemotherapy is widely accepted in the UK and increasingly used in other European countries. In addition to minimizing treatment delay, the batch preparation of standard infusions enables prospective quality control and improves patient safety. The dose-banding approach is predicated on an extended shelf life (1–3 months) of pre-made drug infusions. Current stability data for oxaliplatin infusions is limited so this study evaluated the chemical and physical stability of oxaliplatin infusions using a sequential temperature cycling design to support the dose banding of oxaliplatin.

Material and method: Oxaliplatin infusions in 5% glucose, protected from light, at two concentrations (0.2 mg/mL and 0.7 mg/mL) were refrigerated (2-8°C) for either 1, 3, 7, 14, 28, 56 or 84 days, and then transferred to room temperature (25°C) for 24 hours before a further 7 days refrigeration at 2–8°C to replicate the scenario of infusions issued to the clinic and then returned to refrigerated storage following treatment delay for reissue 1 week later. Chemical stability was determined by HPLC assay of oxaliplatin with a fully validated stability-indicating method. The physical stability was determined from visual appearance, sub-visual particle counts, pH measurement and weight-change monitoring.

Result and discussion: Oxaliplatin infusions at both concentrations were chemically and physically stable throughout the entire study. The extended shelf life (84 days at 2-8°C) of oxaliplatin infusions can support the advance batch preparation of standard infusions required for dose banding. The concentration range selected (0.2 mg/mL and 0.7 mg/mL) was based on a patient BSA range, 0.59m² - 2.06m², at a standard dose of 85 mg/m², facilitating a dose-banding scheme to meet the requirements of all patients. Stability also remains assured if oxaliplatin infusions undergo additional 24 hours storage at 25°C (simulates transport to clinic and administration to the patient) and are then returned to the refrigerator for another 7 days (simulates treatment delay). This sequential-temperature cycling design simulates real-life practice and reduces drug wastage.

Conclusion: This rigorous study extends the shelf life of oxaliplatin infusions and enables the establishment of an oxaliplatin dose-banding scheme.

Poster session: Computer and software in oncology pharmacy

P35 Impact of CPOE on prescription safety in oncology

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Objectives: At the Heidelberg University Hospital preparations of antineoplastic drugs are ordered electronically with support of a prescription software developed by the hospital pharmacy (Computerized Physician Order Entry; CPOE). We analysed positive and negative impact on prescription errors compared to a paper-based order process.

Method: Within a timeframe of 5.5 months 8,463 software-based and 3,101 paper-based prescriptions were collected and analysed. Main

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 41

www.ejop.eu

categories of errors were 'dosage', 'medication', 'date and period of time', 'patient data' and 'administration'. These were assigned to 4 different degrees of severity according to the definition of the National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP).

Results: We found 68 errors (0.803%) in the software-based and 53 errors (1.709%) in the paper-based prescription group. This means a reduction of 53% ($p < 0.05$) in favour of CPOE-based prescription. The advantage of computerized prescription was also shown in all 4 severity grades, but this was only of significance in the two minor severity grades A and B. Most errors were documented in severity grade C, especially dose deviations between 5% and 50%.

Discussion: CPOEs help to reduce prescription errors compared to the paper-based order process. But the quality of the achieved benefit is more important and depends on staff and user training, user routine and functionality of the software. A constant further development based on practically collected experience should therefore be recommended to be able to minimize severe prescription errors by using CPOE systems.

P36 Safety in the reception, preparation and administration of treatments in Oncology-Haematology Outpatient Clinic. Implementation of traceability system

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Introduction: Cytotoxics drugs have a narrow therapeutic range and any error can have critical consequences.

Objectives: Traceability ensures quality control of preparations and patients safety.

Method: Traceability system (ISISH): reception, preparation and administration of cytotoxics, biological and clinical trials in two areas: Pharmacy Service and Oncology-Haematology Outpatient Clinic.

Parmacy Service: Medication, serums and fungible material bar code reading. Pharmacist validates prescriptions. Technician enters system with bar code ID and makes preparations. Treatments are displayed on screen and technician selects preparation using interactive voice system. System asks technician to identify batch number of each item, then to perform gravimetric control.

Finally, medication is labelled with all the information necessary for correct traceability. Pharmacist and technician carry out quality control of preparations.

Oncology-Haematology Outpatient Clinic: Nurse reads label on protective bag. ISISH automatically prints a production label of antiemetics, following the same steps as the production of preparations.

Each nurse has a Wireless PDA with a bar code reader for the administration of medication. Nurses identify themselves, read bar codes of patient, armchair/bed, medication and administration pump.

Results: The system validates each operation (staff safety), identification of medication (qualitative safety), weight/volumes (quantitative safety) and patient (administration safety).

The systems issues reports of stocks, unfinished vials, production and cost as well as general report on administration of treatments.

Conclusion: Traceability ensures a correct and unequivocal administration of medication prescribed.

P37 Replacement of an old IT system for preparation of cytostatics – is it worth it?

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Introduction: Increasing demand of compounded cytostatics at the hospital pharmacy has required a modern IT system for handling the chemotherapy prescriptions effectively and without delays. The old IT system for cytostatics production was unstable and insufficient. It had no support when invented 20 years ago by one person, now retired. It was based on a 'dos'-platform and it was not in GMP-compliance. The requirements for a new system were to be adequate for the increased activity in cancer therapy. The aim of this study was to describe and evaluate the effort of replacing an old – to a modern IT system.

Material and method: A tender for purchasing the new IT system was based on the guidelines in GAMP5 (Good Automated Manufacturing Practice) and local USR (User Requirements Specifications) The validation phase consisted of a validation plan and the validation protocols. Training plans for the staff was developed and the training was completed. After the qualification- and validation reports were completed the new system was implemented in real life. Retrospective data for efficacy based on working schedules for the staff and the number of preparations for the old - and new IT system was generated to evaluate the potential benefits of the new system.

Results and discussion: The results were measured by number of preparations compared to the working hours in the benches for one year. In 2008 with the old IT system we had 29,996 preparations and 6,916 working hours in the benches. That resulted in an average of 4.4 preparations per bench per hour. In 2013 with the new IT system we had 33,584 preparations and 6,032 working hours in the benches, that resulted in an average of 5.6 preparations per bench per hour. These results show that the amount of preparations per bench were increased based on optimized IT system related workflow. In addition to increased efficiency the new system also resulted in a GMP-compliant production. The important aspects that have to be considered are both economy and a time needed to introduce a new system.

Conclusion: The benefit of the replacement of the old it-system for preparation of cytostatics was increased efficacy and more timesaving workflow. We got a better GMP-level based on better compliance related to the URS. Support and updates is now delivered from a reliable supplier to secure a continuous production.

P38 Helping tool for pharmacies to become a coordination centre in cytostatic therapy

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Introduction: The prescription and preparation of cytostatic drugs requires exceptional care and accuracy.

With the toxicity and cost of the drugs the accuracy and quality of the preparations is critically important for both the patient and the pharmacist.

With the advancement of oncology preparation to good manufacturing practices (GMP) standards, computer-aided production allows for a far more accurate and cost-effective preparation with a minimum of wastage and a safer end product for the patient. With the increasingly complex toxicity and interaction of the cytostatic drugs, the pharmacist's role is changing from being a purely supportive role to now having to take an active part in the patient care decision-making process.

Method: Pharmacists now require a tool to assist them in achieving these goals. This tool must combine all of the stakeholders in the patient care pathway to allow the pharmacist to play an active role as taught by

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 42

www.ejop.eu

the ESOP masterclass. A computer programme that is now used with great effect in our hospitals allows for the direct access to patient data by all of the medical team and pharmacists, thus, ensuring that information about the care already given is immediately available. This allows for a far more accurate and successful treatment plan to be developed and applied to not only this patient but all further patients. This information can be examined or updated by any member of the therapeutic team as needed and is then immediately available for all other members of the team. These treatment plans allow for the more effective application of schedules for the application of not only the cytostatic drug, but also the supportive medication to aid in the palliative care of the patient. With this programme, the individual dosage of the drugs can be calculated to great accuracy dependent on many factors including, e.g. the body mass index and body surface area of the patient. This allows for a more effective dosage of the drug to be taken into account of both the AUC ("Area under the curve") and the estimated glomerular filtration rate. All data is automatically recorded in the Patient History section enabling the pharmacists to review the prescription before the preparation starts. In the centralised preparation service the use of the IT system ensures consistency and high quality in the preparation of the cytostatic preparations – even with staff rotations. This guarantees a uniform method of preparation processes in the production of the drugs.

Conclusion: The contribution of the pharmacist as part of the team can be considered an essential element in the quality assurance measures for the oncological service. In the future, the definition of pharmaceutical patient care must become the highest priority. This service must be understood as a great support for the patient and will become increasingly important within the hospital.

Poster session: Clinical pharmacy/pharmaceutical care in oncology pharmacy

P39 CAM use by patients receiving curative intent chemotherapy

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Introduction: Complementary and alternative medicine (CAM) that is biologically active has the potential to interact with conventional medicines, including antineoplastic treatments. Patients undergoing adjuvant treatment with curative intent chemotherapy need correct dose intensity to achieve best outcomes and negative interactions from CAM use could compromise dose intensity.

Method: 65 solid tumour malignancy patients receiving curative intent chemotherapy attending a cancer care day unit were interviewed on CAM use, on the day of receiving their first dose of chemotherapy, by the cancer pharmacist using an interviewer-guided, semi-structured questionnaire.

Results: 60% (39/65) of study participants engaged in CAM use, of which 80% (31/39) orally ingested CAM. Biologically active CAM assessed as having potential to interact with prescribed chemotherapy was ingested by 28% (18/65) of patients. Evidence-based mind-body CAM, such as massage, acupuncture, meditation and mild exercise was used by 23% (15/65) of patients for support during chemotherapy.

CAM was used by 54% (35/65) of patients during chemotherapy treatment for supportive care reasons, which included trying to improve the immune system, lessen chemotherapy side effects, improve chemotherapy effectiveness, feel in control, reduce stress and help sleep. For 28% of patients (18/65) CAM was used with the intention of treating their cancer. Many patients altered their diet with the aim of living a healthier lifestyle or treating their cancer and/or ensuring cancer did not return after treatment (43%, 28/65). Patients' CAM decision-making was influenced by advice from family and friends, practitioners (CAM and conventional), and from casual acquaintances met in person or on the Internet. Worryingly, 12% (8/65) of patients were told by a CAM adviser not to have chemotherapy treatment. The majority of patients (82%, 53/65) would have liked to receive specific information on which CAM is safe to use with chemotherapy before treatment commencement.

Conclusion: Patients being treated with chemotherapy with curative intent are unlikely to know the risks to their long-term cancer outcome if they take biologically active CAM at the same time. Health professionals working in cancer care need to provide patients with evidence-based information identifying which CAM may potentially compromise the effectiveness of their chemotherapy treatment.

P40 Why do we need more therapeutic drug monitoring in oncology?

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Introduction: Most anticancer drugs are characterized by a steep dose-response relationship and narrow therapeutic window. Inter-individual pharmacokinetic (PK) variability is often substantial. Thus, it is somewhat surprising that therapeutic drug monitoring (TDM) is still uncommon for the majority of agents. Goals of our workshop were to identify unresolved questions relating to anticancer drug TDM and to assess the rationale for more widely used TDM in oncology.

Material and method: A European workshop was held in France, May 2012, under the auspices of the French Society of Oncology Pharmacy (SFPO), to propose practical guidelines to improve anticancer drug TDM. Conclusions were based on selected studies and professional practice from several European countries.

Results and discussion: There are several reasons why TDM has never been fully implemented into daily oncology practice. These include difficulties in establishing appropriate concentration target, common use of combination chemotherapies for many tumour types, analytical difficulties with prodrugs, intracellular compounds and free fraction, the paucity of published data from pharmacological trials, and 'Day1 = Day21' administration schedules. There are some specific situations for which these limitations are overcome, including high dose methotrexate, 5-fluorouracil infusion and some high dose chemotherapy regimens. TDM in paediatric oncology represents an important challenge. Established TDM includes the widely used anticancer agents carboplatin, busulfan and methotrexate, with 13-cis-retinoic acid also recently of interest. Large inter-individual PK variability is evident for oral targeted therapies (including tyrosine-kinase inhibitors) but levels of evidence for TDM are, however, heterogeneous among these agents. Evidence for imatinib currently exists, others are emerging for compounds including nilotinib, dasatinib, erlotinib, sunitinib, sorafenib and mTOR inhibitors. TDM of therapeutic monoclonal antibodies is not scientifically founded.

Conclusion: The group considers that anticancer drug TDM is currently predominantly reserved for particular clinical situations, whereas benefits may be foreseen through its wider application. Considerable effort should be made to better define concentration-effect relationships and to utilize tools such as population PK/PD models and comparative randomized trials of classic dosing vs pharmacokinetically-guided adaptive dosing.

P41 Management of mucositis in paediatric oncology in low income countries

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EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 43

www.ejop.eu

Introduction: Mucositis can occur anywhere along the gastrointestinal tract, but oral mucositis refers to the particular inflammation and ulceration that occurs in the mouth. Oral mucositis is a common and often debilitating complication of cancer treatment. Approximately half of all patients who receive chemotherapy develop such severe oral mucositis that becomes dose-limiting such that the patient's cancer treatment must be modified, compromising the prognosis.

Material and method: The study was done by interviewing the patient using a questionare. Patient illegible were inpatient and daycare patients. From the patient survey the incidence were evaluated for mucositis and prophylaxis and the treatment and its effectiveness then compared to what was documented on hospital system, to evaluate level of documentation.

Results: The % of mucositis occurrence is 51%, male (60%) and females (40%), Patient age ranged from 0.3 to 6 years: 50%, from 7 to 12 years: 24%, from 13 to 19 years: 26%. The diagnosis were ALL: 37%, AML: 27%, NHL: 18%, OS: 1%, RMS: 11%, Others: 3% (ES,RM and WT). 48% of these patients used prophylaxis where 52% of these patients do not use any prophylaxis regimen. Grade of mucositis G1, G3 and G4 were 10%, where G2 was 24%.

Discussions and conclusion: There is an increase in mucositis incidence which may be due to poor adherence to prophylaxis in addition to gender, cancer type and age. Poor adherence to prophylaxis is due to either problem in product or problem in patient counselling. The most common problem of products is Hexitol mouthwash (41% only using it) which causes burning, nausea, vomiting and irritation. Most of patients are under age that can follow the right way to use the products also the parents are not educated enough to use these products correctly. The most common dose of chemotherapy that causes OM is Doxorubicin. Regular recording of patient's progress should be done with details. Methods of recording data should be updated: 'medical conditions' or 'chemotherapy toxicity' which will be more reasonable and time saving method.

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P42 The project oncology competence pharmacy: improvement of quality in German oncology pharmacies

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Introduction: Oral anticancer agents take up more and more space in the cytostatic therapy. Today up to 35% of new anticancer agents in development are oral formulations. This trend demands a lot of knowledge by the community pharmacy staff and claims for special education and expert knowledge in order to counsel and patronize patients as well as for the communication with other healthcare professionals. To ensure this standard the German Society of Oncology Pharmacy (DGOP) in cooperation with medac developed the project 'Oncology Competence Pharmacy' (OCP) to verify the specific cytotoxic drug knowledge of pharmacy employees.

Material and method: At the beginning every participating staff member gets his individual access to an e-learning platform where he has to pass through different trainings provided as online presentations and proof his educational success by a multiple choice test. Furthermore, the platform offers a medical management solution. To become a certified OCP, every member has to pass the starting training and the pharmacy needs to be self-examined. Once certified, the each participating member of an OCP has to educate himself regularly every 4 months in issues concerning chemotherapy provided by the e-learning platform.

Results and discussion: Currently 49 pharmacies with 512 members are certified and carry on the quarterly self-studies.

Conclusion: The OCP project with its corresponding online tool enables every staff member to study whenever it is possible for the individual, so that everyone may take the time he needs to gain qualification. The main target to ensure that every staff member has the same level of education is guaranteed by a multiple choice test. The concept of OCP improves the quality in oncology pharmacy and grants an offer of specialized pharmacies for the patients.

P43 Pemetrexed off-label use improvement after oncology pharmacist survey

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Introduction: Pemetrexed (ALIMTA) is a multi-targeted antifolate cytotoxic agent approved in Europe for use in the treatment of adults with advanced non-squamous non-small cell lung cancer (NSCLC) or mesothelioma. In France, as well as in our institution, pemetrexed represents the fourth drug cost and the first cost for a chemotherapeutic drug. Then, oncology pharmacist has the responsibility to analyse pemetrexed prescriptions in order to assess their conformity according to guidelines.

Material and method: We performed 2 retrospective analyses (from January 2011 to June 2012 and from January 2013 to June 2013) concerning all pemetrexed prescriptions in our Cancer Centre and we examined their conformity according to the most recent national and regional guidelines. Prescriptions are recorded as on-label, temporally acceptable or off-label uses. An oncology pharmacist intervention was performed after the first study to remind these recommendations to prescribers.

Results and discussion: Sixty and 21 patients were included in first (18-month) and second (6-month) survey, respectively, with similar mean age and sex ratio, suggesting that both populations are comparable. The percentages of patients treated for a NSCLC (92 and 95%) or a mesothelioma (3 and 5%) were also similar in both studies. However, we identified off-label uses according to the tumour localization (mostly head and neck cancer) in the first survey, but not in the second one. Pemetrexed is recommended in association with cisplatin as first-line therapy for NSCLC. The rate of unjustified association of pemetrexed with carboplatine (no co-morbidity, age < 75) decreased from 20% to 10% after pharmacist intervention. The conformity of pemetrexed prescriptions as maintenance therapy was also improved in the second period. The percentage of off-label pemetrexed uses, as second-line therapy, is similar in both studies. Surprisingly, we recorded several third- or later-line NSCLC treatments with pemetrexed during the first period, but not in the second one, 50% of them being not acceptable (mainly squamous tumours). The overall non-conformity rate of pemetrexed prescriptions for NSCLC was 27% in the first survey and decreased to 8% after pharmacist intervention.

Conclusion: Our study clearly demonstrates that oncology pharmacist survey and intervention are necessary to improve the off-label anticancer drug uses and consequently to reduced the associated costs.

P48 Low dose intensity in elderly patients treated with chemotherapy for colorectal cancer

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Introduction: Colorectal cancer is predominantly a disease of the elderly. The optimal Dose Intensity (DI) of the chemotherapy is often

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 44

www.ejop.eu

difficult to be delivered. Indeed, few elderly cancer patients are included in clinical trials, resulting insufficient data. We aimed to assess, in this population, the delivered doses of anticancer drugs in clinical practice.

Material and method: We conducted a retrospective observational study at the university hospital of Toulouse. Patients aged 75 years and above which have received a first-line chemotherapy for a colorectal cancer between September 2011 and April 2012 were selected. The main outcome measure was the median of Relative Dose Intensity (RDI) for each molecule. The calculation of DI variables was done according to the Hryniuk and Bush's method.

Results and discussion: Eighteen patients were eligible. The median age was 80 years [75;87], sex ratio 1.25. Before the beginning of the chemotherapy, the WHO stage was 0–1 in 94.4% of subjects. For all patients, an adenocarcinoma was confirmed, mainly localized in the colon (61%) and most often metastatic (78%). A proportion of 33% of patients was evaluated by a geriatric oncology consultation. The most frequently chemotherapy regimens used were FOLFIRI (44%) and FOLFOX (39%), then 5FU/LV (17%). Two patients received bevacizumab. The median number of cycles was 10 [2–12]. A proportion of 33% of patients received fewer cycles than expected by the protocol, because of delayed chemotherapy. A proportion of 67% of patients had a concession at the beginning of the chemotherapy. All confounded regimens, the medians of the RDI for irinotecan, oxaliplatin, leucovorin, 5-FU and bevacizumab were 84.1% [66.6;100], 64.9% [55.2;99.6], 99.9% [99.7;100], 74.7% [43;100] and 68.8% [37.5;100], respectively. All confounded molecules, the median of the average RDI was 80.2% [68.8;99.9]. A proportion of 61% of patients tolerated their chemotherapy. Three months after their last administration, the imaging showed for 45% of patients stable lesions, for 22% of patients an improvement and for 33% of patients a progression. During these 3 months, 39% of patients changed their line chemotherapy.

Conclusion: Our study showed that chemotherapy can be conducted in the elderly, as 67% of patients aged 75 years and above had stable or improved disease after treatment. However, specific geriatric assessments are necessary to identify and to target eligible patients to chemotherapy and to adapt doses.

P49 The role of clinical pharmacists in a multidisciplinary enteral nutrition support team (NST) in the care of cancer patients

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Introduction: Malnutrition is a frequent problem of cancer patients. Therefore, nutritional support is an important part of oncologic therapy. The aim is to ensure adequate nutritional intake to maintain nutritional status. For 14 years a multidisciplinary NST is established at the Klinikum Fulda (Germany). Pharmacists, nurses and a gastroenterologist are responsible for an effective and quality-assured nutritional care in inpatient and outpatient settings.

Material and method: Nurses and doctors can consult the NST for inpatients with nutritional problems or feeding tubes, mostly in patients with head and neck cancer. The NST conducts a nutritional assessment, calculates nutrient requirements and designs a nutrition plan. Before discharge the NST trains patient/relatives on handling of tube, dressing change, hygiene, administration of enteral formula and drugs. The pharmacist checks medication and creates a medication plan for drug-administration via feeding tube. The service includes also home care with a 24-hour on-call service, monthly visits, supply of enteral formula and devices check of body weight and stoma site. Problems are discussed in a weekly meeting.

Results and discussion: In total, 195 consultations on nutrition support were performed in 2013 for in- and outpatients, mainly in cancer and otolaryngology patients. NST took care for 141 patients (67% male, average age 65 years, 60% cancer patients) which received tube feeding at home. 173 nutrition plans and 100 medication plans were created. NST also gave advice in patients with problems like irritations around the stoma site or problems with enteral formula like diarrhea. In most cases complications were minor and have been solved by the NST. The main tasks of pharmacists in the NST are determination of suitability of drugs for application through feeding tubes, advises on drug-nutrient interactions and patient counseling on side effects of cancer therapy.

Conclusion: Maintaining a good nutritional status improves tolerability and efficacy of cancer therapy. Therefore, early nutritional support is an important factor in preventing malnutrition. To ensure a quality-assured care of enteral nourished patients, support by a multidisciplinary team is essential. Pharmacists are an important part of a NST and contribute their knowledge about drugs and enteral nutrition.

P50 Impact of multidisciplinary cancer conferences (MCCs) on cancer therapy management

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Introduction: MCCs are believed to improve patient outcomes and have been internationally adopted. At these meetings, a pharmacist is present to participate in treatment decisions. These decisions are taken collegially between oncologists, radiologists, radiotherapists and pharmacists after the presentation of the patient record.

Material and method: Each week, two MCCs specialized in haematology and senology as well as one MCC in general oncology are programmed in a university hospital. One form is filled by a resident at the time of submission of the record with following items: patient's identity, cancer type, stage, extension, chemotherapy line and committee decision. Agreed prescription to the decision is checked and guidelines compliance were evaluated by the resident and then validated by a senior pharmacist.

Results and discussion: 232 forms were issued for 225 patients (114 in oncology, 40 in haematology and 71 in senology). The table 1 shows: proportion of off-labelled decisions share of discussed cases and the adequacy of the parenteral chemotherapy decision and prescription.

Difference between the resident and senior expertise, is due to the understanding guidelines in accordance with chemotherapy lines, cytology and cancer stage. Pharmaceutical validation requires continuous training on standards and medical practices. Medical discussions do not integrate off-label status and are focused on: treatment discontinuation, preservation of alternatives, side effects, previous chemotherapy, resistance, slow or insufficient activity of anticancer agents, comorbidities, and drugs interactions, facing to patient's wishes. Several reasons may explain the lack of adequacy to decision and prescription: treatment adherence, patient's conditions or transfer to another hospital.

Conclusion: MCC is an important committee to support multidisciplinary and sharing decision where pharmacist has a specific role, especially for off-labelled indication (9–13%) and for discussed decision (0–44%). For resident, participation remains a very good training.

Our study links to the french IMPACTO survey:

MCC	Off-label decisions		Discussed decisions		Parenteral chemotherapy
Type	Resident classification	Experienced pharmacist classification	Discussed decisions in MCC	Off-label discussed decisions on off-label decisions	Parenteral chemotherapy prescription on parenteral chemotherapy decision
Hemato-oncology	3/40(7%)	5/40(13%)	5/40(13%)	0/5(0%)	31/32(97%)
General Oncology	16/120(13%)	11/120(9%)	18/120(15%)	3/11(27%)	83/105(79%)
Senology	14/72(19%)	9/72(13%)	25/72(35%)	4/9(44%)	38/53(72%)
TOTAL	32/232(14%)	25/232(11%)	48/232(21%)	7/25(28%)	147/190(77%)

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 45

P51 Clinical trials in cancer care: how to increase patient enrolment?

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Introduction: The second French Cancer Plan intended to enhance the involvement of patients in trials and stimulate research in drug early-stage development. It has fostered patient access to innovative therapies. In our not-for-profit cancer centre, patient enrolment in clinical trials has not increased as much as expected. To understand the underlying reasons, we set up a study to get doctors and patients feelings regarding participation in a clinical trial.

Material and method: We established 3 questionnaires, one for patients who refused to participate, one for those who accepted and one for doctors. Questionnaires were validated by a multiprofessional team including pharmacists and physicians. First we focused on the standpoint of physicians: questions were posed in a semi-directed interview by one investigator in 2013.

Results and discussion: 21 physicians were interviewed. Most important wards, Oncology and Haematology, were well represented with 9 of 10 oncologists, and 7 of 8 haematologists. We also interviewed 1 surgeon, 2 radiotherapists and 2 nuclear physicians. Regarding the proposal to participate in a trial, 83% of doctors will routinely offer clinical trials to patients matching inclusion criteria, and 92% will get a positive response. Most doctors propose in the context of a consultation, and spend more than 30 minutes to explain the trial to their patients. Relatives of patients are present in 70% of cases and influence the decision. The main reason that motivates doctors is a faster access to new treatment for their patient, advance of clinical research comes next. According to doctors, patients are motivated by access to a new treatment, trust in doctor, and altruism. To justify their refusal patients evoke fear of side effects, impression of being considered as a guinea pig, and constraints of the protocol.

The difficulties encountered by physicians in the inclusion of new patients are lack of time and complex documents intended to inform patients.

Conclusion: From interviews with physicians we identified prescribers and some patients' difficulties and motivations. Patients' fear is often due to a lack of knowledge about clinical trials. Thus, according to doctors a better patient awareness would probably delete some a priori and increase enrolment. Patient interviews will help us to understand further their expectations, particularly in terms of information regarding clinical trials.

P52 PI-based cART versus NNRTI-based cART in HIV-positive patients with chemotherapy for lymphoma: a retrospective analysis

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Introduction: The combination of antiretroviral therapy (cART) with chemotherapy in the treatment of lymphoma in HIV-positive patients has increased the overall survival of these patients. However, drug-drug interactions between antineoplastic agents and some of the antiretroviral agents are likely. Non-nucleoside reverse transcriptase inhibitors (NNRTIs) and protease inhibitors (PIs) can influence the activity of the CYP3A4 enzyme, thereby altering the exposure to the cytotoxics. So far, little is known about this interaction and its effect on the efficacy and toxicity of the chemotherapy. Also, there is no conformity which cART is preferable in combination with antineoplastic drugs. The aim of this study is to compare PI-based with NNRTI-based cART on the efficacy and toxicity of the chemotherapy.

Method: In this retrospective observational cohort study, clinical outcome and toxicity of chemotherapy and derived parameters, such as dose reduction, treatment delay and discontinuation were compared in patients with PI-based (n = 22) and NNRTI-based (n = 21) cART.

Results: Patients using PI-based cART had a significantly lower 1-year survival compared to NNRTI-based cART, but no significant differences were observed in reaching complete remission after chemotherapy. Toxicity and discontinuation of the chemotherapy were comparable in both treatment groups. However, there was a trend towards more severe myelotoxicity in patients with PI-based cART compared to NNRTI-based cART. Furthermore, patients with PI-based cART received dose-reduction or treatment delay earlier, implying that toxicity also occurred earlier in this group.

Discussion: This retrospective study shows that PI-based cART is more disadvantageous in combination with chemotherapy than NNRTI-based cART: a lower 1-year survival is observed and dose-reduction and treatment delay occur earlier, possibly based on the earlier onset of toxicity. The use of non-interacting-CYP3A4 integrase inhibitors (IIs) in cART in combination with chemotherapy should be considered, to avoid dose-reduction, treatment delay and discontinuation.

P53 Discrepancies in chemotherapy order forms before and after clinical pharmacists' interventions

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Introduction: Chemotherapy Preparation Unit (CPU) at the Pharmacy of University Medical Centre Ljubljana, Slovenia, prepares intravenous chemotherapy for patients with gastrointestinal cancer at the Ambulatory Care Unit of the Department of Gastroenterology. Clinical pharmacists (CPs) began to integrate in the cancer treatment process in 2013.

Material and method: A retrospective study assessed the impact of CP by investigating the completeness of Chemotherapy order forms (COFs), types and number of discrepancies during two periods – September–December 2012 (P I) and 2013 (P II).

Results and discussion: 216 and 178 COFs were received at the CPU during P I and P II, respectively. 60 CP interventions were registered during P II. The rates of fully completed COFs in P I and P II were 49.5% and 65.5%, respectively (p = 0.001). COFs with at least one discrepancy were recognized in 61.1% and 46.3% in P I and P II (p = 0.003). 6.9% and 0.9% of COFs prescribed intermittent instead of continuous infusions of 5-fluorouracil, because continuous infusions could not be given due to the organizational limitations. 21.3% and 15.3% of the prescribed protocols were not found in the international guidelines. In 23.6% and 18.6% of cases, dates for chemotherapy were delayed, which was particularly common around national holidays. Inappropriate cycle intervals were recognised from 17.1% and 10.2% of COFs. Doses more than 10% discrepant from the calculated ones (according to the patients' body surface area or weight) were prescribed in 28.9% and 7.7% of cases. One discrepancy in P I involved prescription of oxaliplatin to be diluted with saline solution.

Significant differences in the overall number of fully completed COFs and the overall number of discrepancies during P I and P II were attributed to the CPs' interventions, of which over one half was performed due to inappropriate dates for chemotherapy. A large number of discrepancies were present even after CPs' interventions, suggesting the need for further improvements of the medical treatment of cancer patients.

Conclusion: A retrospective assessment of intravenous chemotherapy prescribing for ambulatory patients with gastrointestinal cancer demonstrated a high number of insufficiently completed or discrepant COFs.

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 46

www.ejop.eu

The results confirmed the necessity for CPs' integration, together with a computerized prescribing system as a possible solution to further improve the quality and safety of the cancer treatment process.

P54 The role of the clinical pharmacist translating theory into practice (from education to community expectation)

S Kamal[1]

[1]*Children Cancer Hospital, Egypt*

The goal of our presentation is to describe our experience and the challenges of implementing Clinical Pharmacy in Egypt A journey of over 15 years in the field of hospital pharmacy made us confident that the more you as pharmacists are prepared to play your important role in the clinical setting, the more lives you can save.

Dr Sherif A Elnaga, our mentor, has taught us a few words: 'We cannot manage what we cannot measure.'. We have learned our lesson, that it is our duty to apply, any knowledge that we have learned so that our patients will be saved.

We have learned that the 'best way to learn to teach is,' and that as pharmacist, we chose a profession of lifelong learning, a profession that teaches you, human rights, and that all men must be treated equally. Training Pharmacists and satisfaction of patients is our strategic reward.

Finally We should not forget that this whole paradigm shift in the 57357 model, a national project, a fourth pyramid, but more important is a change agent, transforming the people and invested in people as human capital.

The 57357 model must survive. For this, we need your spirit in the service of the sick and the spirit of service to students and researchers.

P55 Valproic acid effectiveness

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[1]*Children Cancer Hospital, Egypt*

Introduction: In minimizing incidence of seizures in postoperative paediatric brain tumour patients valproic acid (VPA) has found clinical use as an anticonvulsant and mood-stabilizing drug, primarily in the treatment of epilepsy. VPA mechanism of action is believed to be the inhibition of the transamination of GABA and also blocks the voltage-gated sodium channels and T-type calcium channels, which makes VPA a broad spectrum anticonvulsant drug.

Seizures can present at any time before or after diagnosis of a brain tumour. The risk of seizures varies by tumour type and its location in the brain. It was believed that preventing seizures with antiepileptic drugs was effective and necessary, but it was later concluded that seizure prophylaxis was ineffective in people with brain tumours. However, post-operative seizure prophylaxis after brain tumour resection is still controversial.

Aim of the study: To assess valproic acid effectiveness in post-operative seizure prophylaxis in paediatric brain tumour patients Methods A retrospective review of paediatric brain tumour patients was performed. The patients were monitored for a period of 3 months post-operativly to determine whether VPA was effective in prophylaxis from seizures. The data collected included the patients' age, sex, weight, prescribed antiepileptic drugs AED), platelet count, albumin, liver enzymes, duration of VPA treatment, serum VPA concentration and any other medications the patients were receiving. Any clinical intervention and any drug interaction were recorded.

Results: Post-operatively, a total of 8 patients had seizures, 2 patients in the VPA group with an onset of 36 days and 7 days (associated with VP shunt) respectively, and 6 patients in the non-VPA group with an average onset of 32 days. Comparing the incidence of seizures post-operatively using Fisher's exact test, the difference between the two groups was not statistically significantly different (p = 0.11).

Conclusion: Although VPA tended to reduce the incidence of seizure events and to delay the onset of seizures post-operatively in brain tumour patients, the difference did not reach statistical significance. Further studies are needed to investigate this difference on a larger number of patients to examine whether the difference observed is real.

P56 Study objectives: to measure satisfaction of physicians and nurses about services provided by pharmacy at 57357 hospital

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Background: Through our way to success and passing by many obstacles, we as pharmacists have to improve our efforts to be adapted providing the highest medical and psychological care for the patients.

Material and method: Design: a simple questionnaire was done, by interviewing nurses and physicians, who are working in the wards of the hospital, during and after work that last for 5 days from 18 July to 29 July 2012.

Results:

1) Could clinical pharmacists be replaced by doctors or nurses? yes (4.5%) no (95.5%);
2) Is satisfaction for the services provided by the pharmacy? yes (62.5%) no (6.2%) somewhat (31.2%);
3) Are rules fair in the pharmacy? yes (33.3%) no (33.3%) somewhat (33.3%);
4) Is satisfaction with the level of care provided by the pharmacist? yes (72.7%) no (18.1%) somewhat (9.2%);
5) Does the managment support the pharmacist staff in hospital? yes (75%) no (18.5%) somewhat (6.5%); and
6) How do physician and nurses evaluate the behaviour of the pharmacist during work? *excellent (12.5%) *very good (37.5%) *good (31.3%) *acceptable (18.7%) *bad

Conclusion: Some problems in the hospitals were expressed by physicians and nurses and we are taking some steps forward as:

1) Factors influencing the provision of clinical pharmacy:
   - regarding medical knowledge, the following actions need to be taken:
     i) A medicinal magazine should be dispensed to all physician and pharmacist;
     ii) To make monthly conferences, contain 5 physicians and 5 pharmacists to show up their achievement:
   - regarding pharmacy practice, we need to increase the period of training in the round on the floor for more experience;
   - regarding cooperation of the medical team, the following actions need to be done:
     i) Divide the medical team into small groups (Study groups);
     ii) Decrease the medical gap between the medical team by making conferences for awareness of the pharmacists, physician and nurses all together;
     iii) Seeing that some of the pharmacists do not follow the system of the hospital or the infection control:
       a) apply strict punishment system to whom will not follow the rules;
       b) apply bonus for the best applicant of the rules; d) Regarding workflow analysis and workload analysis, the number of clinical pharmacists are not enough regarding their workload over the 24 hours.

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 47

www.ejop.eu

P57 Guidelines for implementing antimicrobial stewardship programme in paediatric oncology

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Introduction: This manuscript presents guidelines for implementation of antibiotic stewardship programme; a programme that provides appropriate selection, route, duration and dosing of antibiotic therapy. The primary goal of this programme is to optimize clinical outcomes by reducing unintended consequences of antibiotic use. The second goal of antibiotic stewardship programme has to do with the reduction of healthcare costs without impacting quality of care.

Material and method: There are two main strategies constituting the antibiotic stewardship programme: prospective audit with intervention and feedback; and formulary restriction and pre-authorization. The prospective phase started in 57357 children's cancer hospital by constructing a list to be filed with patients' information and review of pre-printed orders for restricted antibiotics.

Results: Length of antibiotic course for fever neutropenic patients varied between 1–4 days according to the drug. As for the length of stay, by the end of the study 27% of the patients were discharged from the hospital, only 1% died, and 68% remained inpatients. Inpatients stayed in the hospital from 1–70 days according to their cases.

Discussions and conclusion: Finally some recommendations were left for the hospital and some of them were supervised until its full application. The manual we are suggesting to be used in the hospital consisted mainly of three sections. The first section: is a list including all classes of antibiotics. The second section: has to do with patient outcomes, which include information about their length of therapy, their lab results for organisms. The third section: is the feedback that includes collected statistics consisting of no. of different anti-infective agents ordered, duration of anti-infective therapy, no. of anti-infective-agent doses, days of excess anti-infective dosage, cost of antiinfective agents, no. of microbiology cultures, length of stay in ICU, days from ICU admission to hospital discharge, total length of stay and total cost of hospitalization.To finally provide precise information about mortality and morbidity rates in the hospital, length of stay of patients and the rate of reduction in drug costs.

P58 The first time to use rasburicase in Egypt: what went wrong, what we have learned?

S Kamal[1]

[1]*Children Cancer Hospital, Egypt*

Purpose: To discuss the first 4 cases who recieved rasburicase and discuss the lesson learned.

Method: The study was a follow up of the first 4 cases of children who recieved rasburicase, the efficacy and safety was documented and reported to the P & T Committee.

Results: The drug was effective in reducing uric acid (UA) and preventing renal dialysis .It reduced UA level from 30.4 mg/dL,19.4 mg/dL,15.6 mg/dL, 20.3 mg/dL to 4.8 mg/dL, 4.0 mg/dL ,4.5 mg/dL and 4.5 mg/dL, respectively in less than 12 hours.

Conclusion: Between December 2007 and March 2008, 4 cases were reviewed .The 0.15 mg/kg dose for one day regimen was approved by the P & T committee and was added to the formulary, the pharmacy produced restricted drug form for rasburicase and printed guidelines for use and sample collection for UA blood assay.

P59 Translate theory into practice (TM), a programme for change

S Kamal[1]

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Most countries in the Middle East are struggling with providing chemotherapy medications and supportive treatment medications for their patients not only because of the lack of financial resources but also because of: 1) lack of drug procurement procedures that would ensure the best quality drug for the best price; 2) lack of preparation standards ensuring quality control, batching and saving drugs; and 3) lack of long-term inventory and financial planning for medications. Our team developed Oncology Clinical Pharmacy settings in more than 15 hospitals across Egypt. Our biggest project is developing the Department of Pharmaceutical Services in the new Children's Cancer Hospital. We helped oncology centres across the country to allocate their resources and introduced a lot of concepts into their daily practice starting from safety reaching pharmaceutical care plan and pharmacoeconomic studies. The aim of our presentation is to share with you our experience and the challenges of working in Egypt.

P60 Impact of pharmacy services in paediatric neuro-oncology

S Kamal[1], MM. Abbassi[1], S Abou ElNaga[1], AM Agha[1]

[1]*Children Cancer Hospital, Egypt*

Setting: Valproic acid (VPA) has found clinical use as an anticonvulsant and mood-stabilizing drug, primarily in the treatment of epilepsy. VPA mechanism of action is believed to be the inhibition of the transamination of GABA and also blocks the voltage-gated sodium channels and T-type calcium channels, which makes VPA a broad spectrum anticonvulsant drug. Seizures can present at any time before or after diagnosis of a brain tumour. The risk of seizures varies by tumour type and its location in the brain. It was believed that preventing seizures with antiepileptic drugs was effective and necessary, but it was later concluded that seizure prophylaxis was ineffective in people with brain tumours. However, post-operative seizure prophylaxis after brain tumour resection is still controversial.

Aim of the study: To assess valproic acid effectiveness in post-operative seizure prophylaxis in paediatric brain tumour patients.

Method: A retrospective review of paediatric brain tumour patients was performed to evaluate the effect of VPA on post-operative seizure prophylaxis. The patients were monitored for a period of 3 months post-operativly to determine whether VPA was effective in prophylaxis from seizures. The data collected included the patients' age, sex, weight, prescribed antiepileptic drugs AED), platelet count, albumin, liver enzymes, duration of VPA treatment, serum VPA concentration and any other medications the patients were receiving. Any clinical intervention and any drug interaction were recorded.

Results: Impact of clinical pharmacy service in neuro-oncology: 1) Reduction in the duration of Valproic prophylaxis from 6 month to only 3 month and we are aiming to reduce the duration to 1 month post-operatively; 2) Cost saving of 18916 Leon consumption of VPA (2011/2012 cost); 3) Increased patient satisfaction, because of the follow up visits and face to face communication done by the study; 4) Improved pharmacokinetic lab service and follow up on the recommendations; 5) The seizure severity scale and side effects scale is now used routine for all brain tumour patients, and other forms are being prepared for other diseases; 6) The patients were visiting the pharmacy every hospital admission asking for consultation.

Conclusion: As the services started following up patient since 5/2011, financial, clinical and humanistic benefits were very clear to be achieved.

P61 Drug information and pharmacy resource services in Egypt

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Drug information and pharmacy resource services in Egypt. Most countries in the Middle East are struggling with providing chemotherapy medi-

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 48

www.ejop.eu

cations and supportive treatment medications for their patients not only because of the lack of financial resources, but also because of: 1) lack of drug procurement procedures that would ensure the best quality drug for the best price; 2) lack of preparation standards ensuring quality control, batching and saving drugs; and 3) lack of long-term inventory and financial planning for medications. Our team developed Oncology Clinical Pharmacy settings in more than 15 hospitals across Egypt. Our biggest project is developing the department of pharmaceutical services in the new Children's Cancer Hospital. We helped all oncology centres across the country to allocate their resources and introduced a lot of concepts into their daily practice starting from safety reaching pharmaceutical care plans and pharmacoeconomic studies. The aim of this study is to provide a clear guideline on how to implement a Drug Information and Pharmacy Resource Service (DIPRS) in Egypt and the Middle East. This study is aiming to provide: 1) a brief description of the DIPRS; 2) importance and benefits of the DIPRS; 3) the problems that DIPRS will solve in daily healthcare activities; and 4) the implementation plan of the DIPRS project.

P62 Tannic acid as effective haemostatic agent in paediatric adenocarinoma: a case study

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Introduction: Standard treatment of profuse bleeding was done using patches of oxidized regenerated cellulose. There are no reports on managing failure of oxidized regenerated cellulose patches. Using tannic acid solution was recommended by the chief surgeon in the hospital, the pharmacy looked up the extemporaneous formulation of tannic acid and followed up the patient.

Material and method: This was a real time case study in the children cancer hospital Egypt tannic acid was prepared as a 40% solution in water and was applied to the surgical site three times daily as compresses for 3 month as the patient was on palliative treatment. The number of transfusion before and after using the tannic acid preparation was studied. The efficacy of the haemostatic activity was measured by the number of blood transfusion and stopping the bleeding.

Results: After the last operation the patient suffered from severe bleeding from the surgical site. Patches of oxidized regenerated cellulose were given to control bleeding with no success, where 3 blood transfusions were needed. After using the tannic acid 40% the need for transfusion decreased to one transfusion in the first week followed by three weeks without transfusion.

Discussion and conclusion: As mentioned by the mother the severe bleeding prevented the efficacy of the patches of oxidized regenerated cellulose by detaching the patch from the site of bleeding also she noted that the size of surgical site was preventing fitting the patch. The tannic acid 40% preparation in water and was applied to the surgical site 3 times daily as compresses for 3 month was very effective in stoping bleeding and improving the quality of life of our patient. The role of the pharamcists was very clear in following up the case, detecting the need for another intervention, searching for evidence for the new intervention, implementing the intervention then following up and reporting the case.

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P63 Comparing nephrotoxicities induced by amphotericin b vs liposomal amphotericin b

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Introduction: The objectives of this study are: to investigate the incidence of nephrotoxicity among paediatric cancer patients receiving amphotericin b at the Children Cancer Hospital Egypt (CCHE); to examine the incidences where patients were shifted from amphotericin b to liposomal amphotericin b; to determine whether these shifts were associated with an improvement of nephrotoxicity; to determine the cost-effectiveness of using liposomal amphorericin b to treat nephrotoxicity.

Material and method: Part A - Investigation of Amphotericin B-Induced Nephrotoxicity. Eligible patients will be identified and demographic, clinical, and laboratory data will be collected from the medical records for each patient. Part B - Examining the Use of Liposomal Amphotericin B. All incidences where conventional Amphotericin-B was shifted to liposomal amphotericin b to treat fungal infection will be recorded. Part C - Determining the Cost-Effectiveness of Liposomal Amphotericin B to determine the cost-effectiveness of using liposomal amphotericin b.

Results: The incidence where conventional amphotericin b was shifted to liposomal amphotericin b to treat fungal infection during a 5-month period was 20% with an average of 20 patient per month from a total of average 100 patients recieving conventional amphotericin b. The patients switching to the liposomal form mainly fall in the following categories: patient with increase in serum creatinine from baseline (50%); patient with persistent hypokalemia, hypomagnesemia despite correction (85%); patient with severe acute infusion-related reactions despite premedication (15%); CNS fungal infection (1%).

Discussion and conclusion: Salt loading and premedication guidelines were implemeted, infusion time was kept 4–6 hrs and hydration was carefully calculated and monitored.

A preprinted order was created for liposoma amphotericin b to outline the indication for shifting from conventional to liposomal form. The physician was asked to check the following to be allowed to order the liposomal form: fungal infection with patient intolerance defined as: 2.5 fold increase in serum creatinine from baseline; persistent hypokalemia , hypomagnesemia despite correction; severe acute infusion related reactions despite premedication; CNS Fungal Infection.

P64 Mucositis as chemotherapy toxicity in paediatric cancer patients

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Inflammation of the mucous membranes is mucositis. Can occur anywhere along the digestive tract from the mouth to the anus as it is all lined with mucous membranes.

The primary objective of this research study is to evaluate the demographics of 120 cancer patients (between 9 February 2010 to 15 February 2010) to create a database including the patient relevant information attempting to find a correlation between cancer and incidence of mucositis which is life threating. This study also takes into account patients' (age, type of cancer, chemotherapy, management of mucositis).

The therapeutic goal was to minimize incidence of mucositis in cancer patients from 6.6% to 1% based on evidence collection from the Children's Cancer Hospital 57357, Cairo, Egypt.

Conclusion: We observed that mucositis mainly occurred in AML, ALL cases, they are well-managed by the hospital. OUR GOAL is to reach 1%.

Recommendations:

1. Paliferm (kepivance) (º):
   It is recombinant keratocyte growth factor which stimulates proliferation and differentiation of epithelial cells including those of the GIT.
   It shows effectiveness with patients suffering from haematological malignancies (AML, ALL).

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 49

www.ejop.eu

2. New dosage forms ([1]);(to ensure patient adherence): e.g. lollypop and medical toothpaste containing medical ingredients (under investigation).
3. Laser and cryotherapy ([1.1]) (alternative treatment): using ice chips which induce local vasoconstriction with 5-FU (under investigation).
4. Herbal medicine:
   German chammomile ([2.1]): (mouth wash,ice cubes):
   Commonly used in Europe because of its safety.
   b- Muconict ([2.2]) (glass sprayer) protected by US Patent and Trademark Office.
   Rich in herbal vitamins, anti-oxidants, biostimulants with proven anti-inflammatory and regenerative properties, It is 100% natural.
5. As we know that cancer patient psychology is critical in fighting violent disease like cancer so we suggest family therapy and group therapy. ([3]).

P65 Plan for personalized medication management implementation in the Department of Pharmaceutical Service

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Pharmacogenetics is a valuable field where a lot of potentials for personalized medication management is available to be maximized, allowing the impact of gene variation on drug response to be studied and the results to be used to help pharmacists to tailor the medical care for each patient individually.

Pharmacists are in the perfect position to prevent ADRs, educate and ensure patient compliance, and monitor efficacy; all of which are extremely important for improving patient health. In addition, as the field of genetics continues to grow, the opportunity for pharmacogenetics to be introduced into the hospitals is increasing.

In this setting pharmacists will play a key role in applying pharmacogenetics to patient care. Application of pharmacogenetics requires knowledge and understanding of the disposition and pharmacokinetics of drugs. Pharmacists assess and evaluate a patient's complete medication therapy regimen via a comprehensive medication therapy reviews and patient education activities.

Clinical goals: Avoid adverse drug reactions; maximize drug efficacy; select responsive patients.

Scientific goal: Correlation of variation in DNA sequence and/or structure with variation in drug response phenotype.

Process: Phase one: by 5/2015 we will be able to interpret all the TPMT lab results and produce recommendations on the Cerner system and follow up its application then produce the 1st paper. **Phase two**: by the end 2015 we will add another test which is the CYP and interpret all the drugs used in the hospital affected by this CYP then produce the 2nd paper. **Phase three:** increase the networking with most of the institutes and organizations that have experience with our field so transfer from Monogenic trait phase to pathways – PK and PD.

Examples for international projects:

PAAR4Kids: Pharmacogenomics of Anticancer Agents Research in Children

CPIC: Clinical Pharmacogenatics Implementation Consortium Required steps:

1. Provide training for pharmacists to establish competencies in pharmacogenomic consults.
2. Identify drugs on formulary that are metabolized by polymorphic enzymes.
3. Create a departmental policy to provide direction to pharmacists and doctors regarding ordering pharmacogenetics test results.
4. IT and other infrastructure: we have to update our HIS to get pharmacogentic module.

P67 Italian oncology drugs database: analysis of bevacizumab's therapies in colorectal cancer by retrospective multicentre observational study

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Introduction: Colorectal cancer is due to the uncontrolled proliferation of cells in the colon or in the rectum. Antineoplastic agent bevacizumab has a high cost and also an innovative mechanism of action is monitored by the Italian Drug Agency. In order to monitor the effectiveness and safety of this drug, an observational, retrospective, multicentre, therapy with bevacizumab has been carried out in metastatic colorectal cancer.

The participating centres are: University Hospital of Siena, University Hospital of Perugia, University Hospital of Ancona and Gemelli University Hospital of Rome. Results will be compared with those of the previous trials of the drug.

Material and method: We analysed all the requirements of bevacizumab from October 2008 until 31 December 2012 AIFA. The primary endpoint is complete remission, partial remission and stable disease. The secondary endpoint is progression free survival.

Results and discussion: From the requirements on registers, it is seen that we have progression of the disease or death of around 50% of total, evenly between the participating centres. Considering the other half of patients with late treatment, that ended regular therapy or moved to another centre, in a few cases there is drug toxicity; the PFS average is 11.3 months, and this is higher than the pivotal Hurwitz of 10.6 months. In some rare cases the PFS turns out to be more than 24 months to reach peaks of 30 months.

Conclusion: The effectiveness of bevacizumab, and the risk/benefit ratio is more favourable than what emerges from the pivotal trials, and so we understand how resources used by health system for treatment with bevacizumab in colorectal cancer have been successful.

P68 Determination of plasma voriconazole in human by HPLC-FLD; application to pharmacokinetic studies and therapeutic drug monitoring

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Voriconazole (VCZ) is a broad-spectrum antifungal agent that is highly effective in both the treatment and prevention of invasive fungal infections in immunocompromised patients. Due to narrow therapeutic index (1.0 – 5.5 μg/mL), the non-linear pharmacokinetics of VCZ and its large inter-individual variability, the monitoring of VCZ plasma concentration is a clinical indication during antifungal therapy. Therapeutic monitoring of VCZ is a basis of individual dose adjustment that ensures efficient and safe pharmacotherapy [1, 2].

The aim of the study was to develop and validate a rapid and reliable HPLC-FLD method for the determination of VCZ in human plasma, which could be used in pharmacokinetic studies, as well as in therapeutic monitoring in routine clinical practice. The emphasis was placed on elaborating the analytical method that would require the minimum volume of the biological sample, what is especially important in paediatric patients [3].

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 50

www.ejop.eu

Chromatographic separation was accomplished on LiChrospher 100 RP-18e column. Developed HPLC-FLD method was validated according to the guidelines of the European Medicines Agency. Calibration curve prepared using 100 µL of plasma was linear in the range 0.1–10.0 µg/mL. The method is sufficiently selective, accurate, precise and fulfills the requirements for bioanalytical methods.

The HPLC-FLD method was applied to determine VCZ plasma concentration in 7 paediatric patients (six male and one female, 2–17-years-old) undergoing antifungal therapy. Initially, the part of the results was confronted with the results derived from certified reference laboratory in France. The validated method was applied in therapeutic monitoring of VCZ. Plasma concentrations of VCZ determined in six patients were below the therapeutic range. The dose adjustment based on the therapeutic drug monitoring resulted in the increase of VCZ plasma concentration that covered the therapeutic range.

The results indicate the need of individual dose adjustment to increase the effectiveness of antifungal therapy and to reduce the risk of development the pathogens resistance to VCZ.

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P69 Economic evaluation of bevacizumab off-label use in the treatment of brain tumours

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Introduction: Bevacizumab was the first anti-angiogenic treatment approved in Europe for metastatic colorectal cancer in 2005 and later for breast, kidney, pulmonary and ovary cancers. Bevacizumab is an anti-VEGF monoclonal antibody and one of the most expensive anticancer drugs. The aim of our study was to determine the prevalence of off-label bevacizumab uses and the related additional cost.

Material and method: We conducted a retrospective analysis (from January 2013 to June 2013) concerning all new bevacizumab prescriptions in our Cancer Centre and we examined their conformity according to the most recent regional guidelines. Prescriptions were recorded as on-label, temporally acceptable or off-label uses. We also estimated the cost of bevacizumab treatment regarding indications for the same period.

Results and discussion: We identified 59 patients newly treated with bevacizumab for our survey, most of them with colorectal cancer (41%). Fifteen to 17% of these patients were treated for breast or ovary cancer and less then 7% for advanced non-squamous non-small cell lung cancer. Surprisingly, and conversely to the previously mentioned indications, 20% of patients received bevacizumab to treat cerebral tumours, in absence of EMA approval. However, according to positive results from phase II clinical trials, the use of bevacizumab is considered as temporally acceptable for glioblastoma treatment in adults (67% of patients with brain tumour in our study) but as off-label use for the treatment of patients with oligodendriglioma (33% of patients with brain tumour in our study), regarding regional recommendations. The overall non-conformity (off-label uses) rate of bevacizumab prescriptions amounted to 8% of all prescriptions, mainly due to the use for patient treated with oligodendriogl ioma. Importantly, with almost 50% of drugs-related spending, bevacizumab uses represent the highest cost for drugs in our Cancer Centre. Surprisingly, bevacizumab uses for brain tumours correspond to one third of the overall spending for this drug, which is more than its uses for colorectal cancer.

Conclusion: In summary, our survey indicates that the follow-up of expensive anticancer drugs should be performed by oncology pharmacist to identify costly and, to some extend, inappropriate uses in patients. This is now the responsibility of oncology pharmacist, together with clinicians, to optimized bevacizumab uses in order to reduce cost.

P70 Development of pharmaceutical care consultations for patients with oral anticancer drugs

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Introduction: The use of oral anticancer drugs (ACD) dramatically increased due to recent progress in the development of targeted therapies. In order to improve monitoring of these therapies, pharmaceutical care consultations (PC) were proposed to patients of Centre Paul Strauss. Pharmacists perform: i) a complete pharmaceutical care evaluation; ii) a patient counselling; and iii) an assessment of adherence to treatment. Consultations occur at the initiation of the treatment, 1 month after the initiation and on medical request. The aim of this study was to evaluate the contribution of PC on usual medical care.

Method: A prospective study on patients receiving a PC was conducted during 6 months. Evaluations were performed on: i) pharmaceutical intervention (number, type and acceptance); ii) medication adherence (estimated by Girerd test); and iii) iatrogenic hospitalization caused by ACD (number and reason).

Results and discussion: 19 patients were included and 26 PC were performed. Drugs were mainly targeted therapy (13), others being chemotherapy (6). We identified 45 drug-related problems, including: non-conformity of medication reconciliation (15), adverse drug reaction (13), self medication (7), drug interaction (4), lack of laboratory test (3), inappropriate indication for medication (2), and non-adherence (1). Pharmacist interventions were conducted directly either with the patient (12) or with the oncologist (33). Pharmacist interventions conducted directly with the patient were: construction of drug administration plan, patients counseling on side effects and individual monitoring (self-monitoring of blood pressure, follow-up phone call). As well as for oncologist, pharmacist interventions have led to: additional prescriptions (medication or laboratory test), interruption of inappropriate drug, or warning about self-medication or about non-notified in medical record. No significant interaction between self-medication and ACD was found. Girerd test has shown a high or medium adherence (score between 0 and 2). Moreover, non-adequate behaviours were identified for 11 patients (58%). Only 1 hospitalization due to axitinib-induced hypertension was recorded during the study.

Conclusion: Our study shows that PC might positively improved adherence, side effects management and optimized the medication for patients treated with ACD. However, further investigations are necessary to assess the clinical benefit and the improvement of patient's quality of life.

P71 Efficacy and toxicity of irinotecan + bevacizumab as second-line treatment for glioblastoma multiforme

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EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 51

www.ejop.eu

Introduction: Review of efficacy and toxicity of irinotecan as part of the regimen irinotecan 150 mg/m²) +bevacizumab (10 mg/kg)/15d when used as second-line treatment in patients diagnosed with Glioblastoma multiforme (GBM).

Material and method: Retrospective review of medical records from 1 January 2012 to 31 December 2013 of all patients diagnosed with GBM and treated with irinotecan + bevacizumab after chemo-radiotherapy with temozolomide following Stupp regimen.

Results and discussion: GBM patients treated with irinotecan bevacizumab: 37 patients with a follow-up longer than 6 months: 32.

Patients that completed the 6 months regimen treatment: 10 (31%) number of patients with irinotecan dose reduction or discontinuation due to toxicity: 15 (22%) causes of treatment withdrawn: progression 12 (54%), stability 3 (14%), asthenia 4 (18%), Thrombopenia 1, diarrhea 1, death 1.

Median PFS is 3,58 meses.

Overall survival at 6 months from treatment initiation is 56% (18/32).

Overall survival at 12 months is 9% (3/32), all of the surviving patients had completed 6 months of irinotecan bevacizumab treatment.

Conclusion: Bevacizumab+ irinotecan is a poorly tolerated regimen. Rates of abandon

Bevacizumab+ due to toxicity is about 22%. Even though the sample size

Bevacizumab+ is too small to establish any firm conclusion, it seems

Bevacizumab+ that completing the 6 months treatment with irinotecan and

Bevacizumab+ bevacizumab could improve survival. Many other factors like

Bevacizumab+ performance status or MGMT methylation status must be

Bevacizumab+ incorporated into account before questioning again

Bevacizumab+ irinotecan´s role on second-line GBM treatments

P72 Assessment of medication use process in adult oncology unit

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Chemotherapy errors affect multiple stages of medication use process.

To reduce such errors and toxicities, error occurrence awareness, dose verification, proper documentation and appropriateness of supportive care treatment are important. Hence, the present study was conducted to assess the medication use process and dose related errors in an outpatient adult oncology unit of Tikur Anbesa Specialized Hospital (TASH). An institutional based cross sectional study was used in an outpatient adult oncology unit of TASH between May 1 and June 30, 2012. A total of 212 patient cards and 583 chemotherapy administrations were reviewed during the study period. The overall dose related error was found to be 228(39.1%); (under dose 58(25.4%), over dose 52(22.8%), wrongly reconstituted doses 106(46.5%), and wrongly adjusted doses 12(5.3%). Dose labeling and appropriate time of administration for each chemotherapy preparation was not at all practiced in the unit. Only 3 out of 14 dose verification and three of the documentations process activities were practiced in the unit. The supportive care treatment given in the unit was not according to the recommended standard. Out of the total of 23 equipment and supplies needed for chemotherapy service, only 8 of them were available. The findings of our study indicated that the medication use process in an outpatient adult oncology unit is below expected standards. Therefore, development of polices and guidelines, standardization of medication use process and emphasis on integration of pharmacist in the clinical team are recommended.

Keywords: medication use process, chemotherapy, supportive care, dose verification and documentation.

P73 The Impact of the oncology clinical pharmacist in patients' healthcare in one of the major Egyptian hospitals

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Background: The oncology clinical pharmacists have a critical role in the care of hospitalized patients, make many recommendations that improve patients' quality of care and/or reduce drug costs.

The purpose of this study was to review the most frequent clinical pharmacists' recommendations in the oncology unit in one of the largest hospitals in Egypt to identify the impact of the clinical pharmacist work on the patient care.

Method: Retrospective observational study was conducted to report and record the frequency of oncology clinical pharmacist recommendations. The data were collected on a daily basis by the oncology clinical pharmacist and recommendations were recorded and documented over 2 years (2011 and 2012).

Results: Patients' files and medications were reviewed for all oncology patients that were admitted to the hospital since January 2011 till December 2012 by the oncology clinical pharmacist. The documented recommendations over the two years were significant. Drug interactions, dose adjustment, improper drug administration either improper route or improper method of administration, improper drug dosage, incorrect drug frequency, untreated indication, drug with no indication, adverse drug reactions, incorrect drug duration but the most frequent clinical recommendations were drug interactions and improper drug selection (28%), then improper drug dosage (21%), followed by dose adjustment (15%) and the least clinical recommendation was regarding adverse drug reaction which representing (8%) of the total recommendations.

Conclusion: The documentation of the oncology clinical pharmacist work shows that the clinical pharmacist has an important role in oncology patient healthcare in oncology units although the clinical pharmacy is still considered a new approach of service provision in Egypt.

P74 Oral chemotherapy in Germany and Austria: the role of the community pharmacy

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Background: Provision with oral anticancer drugs is organized differently in different countries. Each chain of distribution comes with different tasks for community pharmacies that in turn require different skills. These are not always clear to physicians, patients – and even pharmacists.

Method: We compared the chains of oral antineoplastic drug distribution in Austria and in Germany.

Results: In Austria, oral antineoplastic drugs are prescribed mainly by hospital physicians, as there are hardly any ambulatory oncologists. In Germany, prescriptions of oral antineoplastic therapy are issued mostly by one of many ambulatory oncologists. In both countries the prescriptions are filled by a community pharmacy. Monitoring of side effects is done in day care clinics of hospitals in Austria and at the oncologist's practice in Germany. However, in oral, unlike in parenteral, anticancer therapy, the physician encounters the patient a great deal less frequently. Thus, the community pharmacist plays an important role in: i) counselling the patient at the beginning of and throughout the treatment, e.g. about treatment plans, drug interactions and supportive therapy; and ii) to inquire regularly about signs and symptoms of adverse drug effects

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 52

www.ejop.eu

in order to decide whether or not to refer the patient to the physician. While German pharmacies are supplied with oral anticancer drugs wholesale like with any other drug, Austrian pharmacists are supplied either wholesale or by the manufacturer, depending on the drug. With the necessary skill, the pharmacist is able to contribute significantly to patient safety and medication adherence. Yet, until now the organizational, professional and communicational skills are not fully provided by pharmacists' training and have to be acquired in part by postgraduate education. This can be stated for both countries, though the differences in the distribution chain may require a slightly different curriculum.

Conclusion: Both systems are similar in regard to the distinguished role of the community pharmacist for patient safety and medication adherence requiring extensive postgraduate education in the field of oral anticancer therapy. They differ mainly on the medical sector and in the supply chain of oral anticancer agents. Therefore, a comparison is a great chance to learn from each other.

P75 Pharmaceutical interventions in onco-haematology patients

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Introduction: Cancer drugs are high risk drugs, and the prescribing, preparation and administration require the collaboration of different healthcare professionals. Pharmacists play an important role in guaranteeing the safe, effective and economic use of them.

The aim of this project was to evaluate and analyse cost savings of pharmaceutical interventions in patients with cancer in a 120-bed general university hospital.

Material and method: Retrospective observational study of clinical interventions registered by a pharmacist in onco-haematology patients over a period of two years (2012–2013). Interventions were carried out in the chemotherapy-dispensing pharmacy, the outpatient dispensary and checking inpatients prescriptions. The data was obtained from the electronic chemotherapy prescription and dispensing programme Farmatools and the computerized medical record Selene.

Results and discussion: A total of 266 interventions were analysed. 81% were realized in outpatient area, 16 % in chemotherapy-dispensing pharmacy and 3% in inpatients unit. The kind of drugs that required interventions were: 45.8% oral antineoplastic agents, 37.6% supportive therapy (erythropoiesis-stimulating agents and white blood cell growth factors), 12.8% monoclonal antibodies and cytotoxics drugs, 3.8% premedication and others medicines.

The type of interventions were: 72% patient counselling (providing verbal and written information about the treatment), 18% detecting medication errors, 5.5% adjusting the doses according to vials and giving the exactly dose needs for oral treatment, and 4.5% drugs information questions (mainly about interactions).

In relation to medication errors, the most frequent causes of error (81%) were incorrect doses and dosage frequency: 58% overdosage cases and 23% insufficient dosing. Other causes were: 8.5% incorrect drug, 4% omission of drug and 6.5% inappropriate administration.

The total cost savings obtained were Euros 14,420 according to adjusting the doses, therapeutic substitution and correcting the dose in overdosage cases.

Conclusion: The most frequent interventions were made with oral antineoplastic drugs and supportive therapy, mainly in the outpatient area, where patient counselling has seemed to improve quality in patient care.

Pharmaceutical interventions contributed positively to patient safety and treatment efficacy and resulted in significant medication cost avoidance.

P76 Impacto: mapping of the pharmacist's clinical practice in onco-haematology in France

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Introduction: Pharmaceutical analyses of chemotherapy prescriptions by hospital pharmacists are activities codified by regulation and rules (bon usage). The involvement of the pharmacists in clinical pharmacy activities in the oncology setting is not clearly identified, justifying the development of a mapping of these activities.

Material and method: A survey had been sent to 330 French chemotherapy centres and results were collected through the Monkey Survey platform. The questionnaire had been created and tested by a pilot group of pharmacist. It included a majority of closed questions (90%). The covered items concerned: pharmacist involvement to clinical staff of onco-haematology (RCP); computerized ordering systems; pharmaceutical analysis; referencing procedures for new drugs; pharmacist participation in the validation of chemotherapy protocols. Results are based on a declarative process.

Results and discussion: With an overall participation rate of 32.4%, 107 centres have participated to this study at the national level. More than 95% of them used a computerized ordering system and three quarters of them submitted the introduction of new compounds to an analysis by the drug therapeutic committee.

Prescription analysis allowed detecting around 2% of errors from the current prescription. Clinical pharmacist participates to RCP at a level of 46% for senior pharmacist and 42% for junior pharmacist. This involvement in the RCP allowed anticipating protocol's modification and temporary used authorization. 92% of the senior pharmacists (over 2 years experience) estimate that they highlight the risk of no reimbursement for prescription out of the guideline during RCP, resulting to a modification of the prescription for 40% of them. This level of intervention is lower with respectively 64% and 10% for the juniors (less than 2 years experience).

Conclusion: This study underlines the expert value of the clinical pharmacist dedicated to oncology setting in pre and post analysis prescriptions. It also suggests an intervention difference between senior and junior pharmacist. This study represents the first step of a future prospective evaluation of both clinical and pharmacoeconomics impact of these interventions.

Keywords: iatrogeny, medical staff, onco-haematology, pharmaceutical analysis

P80 Retrospective cost/effectiveness (C/E) analysis of prophylaxis of febrile neutropenia (FN) in breast cancer patients treated with epirubicin/adriamycin and cyclophosphamide in dense dose schedule (DD EC/AC)

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Introduction: Filgrastim (F) and pegfilgrastim (peg-F) are two active agents with different direct cost and effectiveness in preventing febrile neutropenia (FN) in cancer patients (pts) treated with cytotoxic chemotherapy. The objective of this report is to analyse the differences in C/E and cost to avoid one FN episode in Breast Cancer (BC) pts treated with EC/AC in dose dense (DD) schedule in a third level hospital.

Material and method: Retrospective study (2010–2012) of the incidence of FN in pts with BC with DD EC/AC and peg-F. For F, data published on the three anthracycline-DD pivotal trials (CALGB9741, MA

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 53

www.ejop.eu

21, AGO III) and for peg-F data from our series of pts, who received adjuvant therapy with 4 cycles of EC14 (Epirubicine (E) 90 mg/m2 IV d 1, Cyclophosphamide (C) 600 mg/m2 IV d 1) or AC14 (Adriamycin (A) 60 mg/m2 IV d 1, C 600 mg/m2 IV d 1) every 14 days with with peg-F, 6 mg/cycle as support therapy. C/E ratio = cost of prophylaxis / 1-% FN cost to avoid one FN episode = per cycle prophylaxis cost + (unitary FN episode cost x %FN)

Results and discussion: During 2010, 2011 and 2012, 163 pts (mean age, 50) were treated with DD EC/AC (108 pts with EC, 55 pts with AC]. The incidence of FN was 5,5% (9 pts).

Pivotal trials for F reviewed: CALGB9741, MA 21, AGO III. Mean number of F doses employed/cycle were 8, 11 and 8, respectively. FN rate was 9% (n = 46 pts), 15,8 % (n = 111 pts) and 7% (n = 44), respectively. Mean cost of a FN episode in Spain is estimated in Euros 3,519 (Mayordomo, 2009). Cost of a single dose of F and peg-F in Spain is Euros 56.99 and Euros 956, respectively.

C/E ratio for F was Euros 5.01 (CALGB 9741); Euros 7.45 (MA 21) and Euros 4.90 (AGO III) and for peg-F was Euros 10.12. Cost to avoid one FN episode was Euros 772.63 (CALGB 9741); Euros 1,182.89 (MA 21); Euros 702.25 (AGO III) and for peg-F was Euros 1,159.45. Mean cost from the three F trials is of Euros 919.

Conclusion: In our series of pts, peg-F has a higher C/E ratio than F according to data published in preventing FN in BC pts treated with DD EC/AC and peg-F as prophylaxis for FN. The calculated cost to avoid one FN episode is similar for both drugs, so the decision of preventing FN in our series of pts with F or peg-F should be made considering factors other than economic.

P81 The need for therapeutic drug monitoring of imatinib in patients with CML

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Introduction: Imatinib administered at 400 mg once daily is a standard treatment of chronic myeloid leukaemia (CML). Many previous studies revealed the correlation between the minimal plasma concentration of imatinib at steady state and both cytogenetic and molecular response in patients with CML. These studies proved that effective steady-state trough imatinib plasma level (C_{trough}) is above 1,002 ng/mL. Plasma concentrations of this tyrosine kinase inhibitor, which are observed in clinical practice, show significant inter-subject variability. Furthermore, plasma concentrations of this drug may be influenced by many factors, such as genetic polymorphism of CYP3A4/5 isoenzymes, differences in activity of efflux and uptake transporters (BCRP, Pgp, hOCT1), interactions with co-administered drugs, non-adherence to the treatment. Therefore, therapeutic drug monitoring (TDM) appears to be crucial factor for improving efficacy and safety of therapy with this drug.

Material and method: The aim of the study was to determine C_{trough} of imatinib in CML patients. The analysis of plasma concentrations of imatinib was conducted on 44 patients with CML (mean [SD]; age, 50.0 [12.4] years; weight, 78.3 [15.3] kg; and creatinine clearance, 93.3 [34.2] mL/min). In order to mearsure C_{trough} of imatinib, blood sample was collected just before the next dose of the drug. Imatinib concentrations were determined by high-performance liquid chromatography with UV-detection.

Results and discussion: The mean C_{trough} in our patients with CML was 838.9 ± 672.3 ng/mL. Only in 27% of analysed patients steady-state trough imatinib plasma levels reached the recommended value. Most of our patients did not achieve desirable level, what should induce verifications of the standard dosage scheme of the drug.

P82 Antineoplastic prescriptions errors in hospitalized cancer patients

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Introduction: Medication errors with antineoplastic drugs may be catastrophic due to the drugs' high toxicity and small therapeutic index. In order to reduce it, our mission is to increase awareness about drug event. The present study was aimed to describe the number and nature of antineoplastic prescription errors.

Material and method: From January 2012 to December 2013, the retrospective study was conducted in a 970-bed teaching hospital in France. The number and the nature of pharmacists' interventions (IPs) related to antineoplastic prescriptions errors were registered and quoted on the French Society of Clinical Pharmacy (SFPC) website tool (ACT-IP). The rate of medication errors was estimated unit by unit, as well as the months with a higher risk of errors. Errors were classified according to their frequency and status of prescribers ranging from residents to senior physicians.

Results and discussion: Among the 6,026 antineoplastic prescriptions, 228 (3.8%) contained at least one error, corresponding to a total of 239 medication errors. Medication dose errors represent the most common type of errors (61.1%), followed by the wrong solvent of dilution (14.2%). September (5.5%) and October (5.3%) were the months most at risk, while February (2.5%) and December (2.6%) were the least. Error rate was lower in oncology day care unit, where the most antineoplastic chemotherapy was prescribed: 2,614 prescriptions by digestive oncology day care unit with only 130 errors (5.0%), and 1,167 other oncology day care unit with 10 errors (0.9%). In 2013, 18.6% of medication errors were made by residents, 64.4% by senior physicians and 10% not informed in the digestive oncology unit. This unit is the only unit where residents can prescribe without approval by senior physician.

These results demonstrate that medication errors occurred frequently in our hospital, at a rate of 3.8%. Medication dose errors are considered to be the most dangerous for patients. The relationship between the rate of medication errors and month of the year is still unclear. It cannot be assigned by the biannual rotation of residents. These results also suggest that prescribing more may decrease prescribing error.

Conclusion: These results stress the need for increased awareness of antineoplastic error prescriptions and the necessity to develop preventive actions, as pharmacist integration in medical oncology wards.

P84 Use of bevacizumab in first-line HER2-negative metastatic breast cancer: cost-effectiveness analysis according to contractual agreements in Italy

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Introduction: The FDA has withdrawn the approval granted for bevacizumab in combination with paclitaxel for the treatment of metastatic breast cancer. In the European Union, however, the biological is still approved as first-line therapy of metastatic breast cancer in combination with paclitaxel or capecitabine. The use of bevacizumab depends on the results of long-term follow-up of important studies still in progress that might call into question the decision of the FDA. The aim of this study is to determine whether treatment with bevacizumab plus paclitaxel in metastatic breast cancer is cost-effective compared with paclitaxel monotherapy, whereas the negotiated agreements in force in Italy (CS cost-sharing, pay-back PB).

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 54

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Material and method: Cost-effectiveness analysis was conducted: considering the purchase price of the drugs in the hospital, the cost of therapy for a patient standard of 65 kg and 1.7 sqm, the months of life gained, the savings due to the repayments of pharmaceutical companies for the application of CS/PB; determining the ICER (incremental cost-effectiveness ratio) relative to the value of Euros 60,000*(Messori et al. 2003*), threshold of acceptability for reimbursement, officially not defined in Italy.

Results: The cost of one year of treatment with paclitaxel 90 mg/sqm, 1-8-15/q28 is Euros 1,103.90, when combined with bevacizumab 10 mg/kg 1-15/q28 is Euros 58,006.20, with 1.7 months of life gained on the OS; the ICER is Euros 406,436 per life-year gained. By applying the cost-sharing for the first 3 cycles and the PB for the patients responders, the ICER decreases to Euros 195,401.78 with a saving of 52% on the cost of treatment by the pharmaceutical industry. Referring to the PFS of 5.6 months of life gained, the ICER is Euros 113,802.00, but instead is reduced to Euros 54,712.5 applying CS and PB.

Conclusion: While considering the application of the agreements negotiated of cost-sharing with the pharmaceutical company, treatment with paclitaxel-bevacizumab is not cost-effective in relation to overall survival, falls within the threshold of acceptability only for responding patients for at least 1 year when referring to PFS. It is however, a therapeutic alternative to consider for triple-negative patients who have a poorer prognosis and currently limited availability of treatments.

P85 Adjuvant chemotherapy in early breast cancer in a Spanish hospital

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Introduction: Treatment decisions are based on several prognostic and predictive variables. Adjuvant hormonal therapy and chemotherapy improve both disease-free survival (DFS) and overall survival (OS). Obtaining a relative dose intensity (RDI) equal to or greater than 85% of that programmed is a positive predictive factor for OS and DFS for adjuvant chemotherapy.

Material and method: Retrospective study, one year selection period. Eligible patients aged 18 years or older, newly diagnosed early breast cancer were included. Patients who had not had a complete anatomopathological assessment prior to chemotherapy administration were excluded. The following data were recorded: age, weight, height, body surface area, histology and grade of the tumour, molecular subtype, chemotherapy regimen, dose (including delays and reductions) and granulocyte colony-stimulating factor (G-CSF) administration. The average RDI per patient and chemotherapy regimen was calculated.

Results and discussion: 37 patients were analysed, the average age of them being 55 years (33–76) and average body surface 1.73 ± 0.17 m^2. 94.6% patients had infiltrative ductal carcinoma and 5.4% infiltrative lobulillar carcinoma. Of all, 48% were grade III, 43.2% grade II and 8.1% grade I. There were 8.1% basal-like tumours, 29.7% Luminal A, 45.9% Luminal B, and 16.2% HER2 positive. The most prescribed chemotherapy regimens were: FAC (cyclophosphamide, doxorubicin and 5-fluorouracil) 4 cycles followed by paclitaxel 8 cycles, cyclohosphamide plus docetaxel 6 cycles and AC (cyclophosphamide and doxorubicin) 4 cycles followed by paclitaxel 12 cycles plus trastuzumab for 1 year. 16.2 % patients did not reach a RDI ≥ 85% of that programmed. 8.1% of patients received G-CSF as a primary prophylaxis and 13.5% as a secondary prophylaxis.

Conclusion: Sequential administration of anthracyclines with taxanes was the standard of treatment for adjuvant regimens. Most patients (83.7%) received an appropriate RDI.

P86 Assessment of professional practices in nutrition in a French cancer centre

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Background: Nutrition is a major issue in the prognosis of cancer patients. Two studies on the evaluation of nutritional practices were conducted in a 4-years interval (2009 and 2013) in our French regional cancer centre. A decrease in undernutrited patients was observed, but not as much as expected after the set up of a local nutrition committee including a nutritionist doctor, dieticians and ward referents. We have conducted an audit of professional practices to address these issues.

Method: A prospective study was carried out over a 2-month period among senior physicians. Doctors were interviewed face-to-face using a questionnaire validated by a multiprofessional team. Topics covered in the questionnaire were: organization of nutrition support, theoretical knowledge (daily energy needs, normal BMI), clinical practice (nutritional assessment at patient's admission and stay), perception of nutritional care.

Results: The study enrolled 21 doctors (9 oncologists, 11 haematologists, 1 surgeon) representing well oncology and haematology wards. For organization of nutrition support: 90% of doctors are aware of the nutrition committee, 43% identify a nutrition referent in their ward (although 86% are unable to name this referent). For theoretical knowledge: 71% know daily energy needs and 86% the normal BMI. 62% do not know BMI depends on age. 95% of doctors know the percentage of weight loss over the last 6 months. For clinical practice: all doctors perform a nutritional assessment on patient admission (with weight check); 65% request an albumin test and 35% pre-albumin; 12% measure how much food the patient takes. 75% perform a nutritional assessment regularly during hospitalization, and 24% use screening tools. Only 5% know the characteristics of nutrition tubes available in the hospital. For perception of nutritional management: 76% think they have insufficient experience in artificial nutrition. 81% declare detecting cases of malnutrition is not difficult. Half of doctors have been trained in nutrition (38% during their study period, 19% after).

Conclusion: Most doctors are aware of the local nutrition committee and its theoretical organization. Knowledge assessment is satisfactory. However, physicians do not call enough on the nutrition committee as shown by the poor identification of their nutrition referent. Few doctors use tools of screening. Suggestions would be to better develop teamwork and to go on proposing local training sessions.

Poster Session: Managing side effects in oncology pharmacy/oncology pharmacists intervention

P87 Peripheral neuropathy in patients receiving paclitaxel and oxaliplatin containing chemotherapy: prevalence and handling

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Introduction: Chemotherapy-induced peripheral neuropathy (CIPN) is a progressive, permanent, and often irreversible condition featuring pain, numbness, tingling and sensitivity to cold in the hands and feet. CIPN is a frequent side effect caused mostly by taxanes, platinum derivates, vinca alkaloids and bortezomib. The aim of our study was to identify the prevalence of CIPN among patients receiving paclitaxel or oxaliplatin and to clarify whether this frequent side effect of chemotherapy is sufficiently handled.

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 55

Material and method: We conducted a survey among cancer patients who received either paclitaxel or oxaliplatin containing chemotherapy. Patients were asked to describe whether they have any symptoms of CIPN. Severity of symptoms was assessed according to the Common Terminology Criteria for Adverse Events. We measured sensory and motor abnormalities and pain on a grading scale of 0 (absent) to 4 (severe). We also asked, whether this side effect is handled properly.

Results: 81 patients participated in the survey. 41 patients received paclitaxel and 40 patients oxaliplatin. 82% of patients reported at least one CIPN symptom and most of them (82%) assessed their symptoms either moderate (grade 2) or severe (grade 3). Sensory dysfunction was the most common complaint (83%), following motor dysfunction (71%) and pain (56%). Pain was more related to paclitaxel therapy: 70% of those patients who complained pain (grade 2 or grade 3) received paclitaxel. Significant proportion of patients (24%) did not tell about CIPN symptoms to their doctors. Additionally, 26% of patients found that doctors did not pay enough attention to their symptoms and 33% of patients admitted that they would need more in-depth information about CIPN. Consequently, 55% of patients did not receive medicines that could have alleviated their complaints.

Conclusion: CIPN is common side effect of paclitaxel or oxaliplatin containing chemotherapy. However, this frequent condition is not properly handled due to the patient- and doctor-related factors. Clinical pharmacist should be a member of a multiprofessional team to monitor and assess the side effects of cancer treatment and inform patients on how to handle those side effects safely and effectively.

P89 Topically applied antioxidants as an efficient prevention and treatment strategy against the development of a palmar-plantar erythrodysesthesia during chemotherapy

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Introduction: Chemotherapeutics frequently induce side effects as palmar-plantar erythrodysesthesia (PPE/Hand–Foot Syndrome [HFS]). After systemic application pegylated liposomal doxorubicin (PLD) is delivered onto the skin surface with the sweat and penetrates back into the stratum corneum. Here free radicals occur destroying healthy tissue. Although several therapy concepts have been discussed in the literature, so far no clinically efficient strategy could be presented; thus, this side effect remains a clinical challenge. The aim of the study was to examine if topically applied antioxidants are able to prevent the development of PPE during chemotherapy.

Material and method: The mechanism of the ointment is based on antioxidant substances with a high radical protection factor (RPF) neutralizing the free radicals before penetrating back into the skin. The ointment contains porous microparticles (10–100 µm) loaded with antioxidants, thus forming a protective film on the surface of the skin. The investigation included 20 patients diagnosed with ovarian cancer receiving PLD (40 mg/m²/4 cycles). The patients were requested to apply the ointment on the palmar-plantar region at least twice daily starting 2 days before chemotherapy.

Results and discussion: 12 patients (60%) followed the study protocol. None developed PPE. 1 patient died and was evaluated as a dropout. 7 patients (35%) did not follow the study protocol. 6 of the 7 patients who interrupted the application developed mild PPE. After resuming the application the PPE symptoms disappeared completely. 1 patient who applied the ointment regularly, but failed to follow the behavioral instructions developed PPE grade II. An intensified application scheme induced the reduction of the PPE to grade I before next cycle. The only known cure for PPE is dose reduction or interruption until symptoms are reduced. This strategy is based on topical application of antioxidants with a high RPF of 4,500 which is up to 20 times higher compared to other products.

Conclusion: In summary the results demonstrate clear evidence that regular application of the antioxidant containing ointment with a high RPF represents an efficient prevention strategy to avoid the development of PPE and also a treatment strategy for an existing PPE.

P90 Reporting of adverse drug reactions at Institute of Oncology Ljubljana in 2013

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Introduction: Institute of Oncology Ljubljana (OIL) is the leading institution for cancer care in Slovenia. Since cytostatic drugs are highly toxic, quite a few adverse drug reactions (ADR) occur. Clinical outcome varies from minor grade 1 ADR, to even death. The aim was to collect all of the reported ADRs in one year period at OIL, in order to make a statistical evaluation of reported ADRs that occurred by grades (using CTCAE classification) and cytotoxic agents.

Material and method: Special web-based application, that was developed for monitoring and reporting ADRs at OIL, was used – www.nuz.si. Collected ADR were sent to the Agency of the Republic of Slovenia for Medicines and Medical Devices (ARSZMP) and the National Centre for Pharmacovigilance in CIOMS form. All reported ADRs were statistically reviewed.

Results and discussion: In 2013 there were 146 submitted ADRs, which represents 0.29 % of all 50,775 applications (cytotoxic agents and biologicals) in our institute. This number suggests that under-reporting is highly present. Mainly the reports were sent to the pharmacy department by doctors or nurses. The most reported ADR was infusion reaction, which occurred in almost 50% of all submitted cases. Majority of reported ADRs were grade 2, followed by grade 3 and grade 1. The worse ADR occurred was grade 4 multi-organ failure, which led to death (grade 5). Most of ADRs were reported for biologicals such as rituximab (35) and cetuximab (15). Among other cytotoxic agents ADRs associated with oxaliplatin (23) and carboplatin (19) were the most commonly submitted. On a national level there are around 1,000 ADRs reported yearly, and almost 15% of all are coming from OIL. That puts OIL in the first place by the number of reported ADRs, among healthcare institutions in Slovenia. Web-based application is currently used only at OIL, but its use is expanding to other secondary regional cancer care centres which have been being established in the past few years throughout the country and are taking over most common cancer therapies.

Conclusion: ADR reporting is important for monitoring the safety of medicinal products. As results suggest, under-reporting of ADRs is still present and represents huge problem considering the safety of medicinal products. With active involvement of oncology pharmacists and expanding the use of online application we hope to encourage all healthcare professionals to report ADRs and thus provide safer cancer therapy and drug therapy in general.

P91 Data and analysis of oncological drugs extravasation at IRCCS-IRST's oncology wards

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Introduction: The extravasation of oncological drugs is a rare complication related to the IV administration of these drugs. Extravasation

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 56

can cause serious and persistent injury to the soft tissue. These events are often under-reported and not properly treated but are estimated to occur in 0.01% and 7% of IV infusions. Our goal is to analyse the cases of extravasation that occurred over a three-year period and to verify the effectiveness of management systems in use at IRCCS-IRST.

Material and method: We analysed extravasation cases reported by oncology wards from 1 January 2011 to 31 December 2013. The pharmacy gathered data from forms reporting extravasation cases. These data were compared with those reported in nursing folders and with those found in our computerized system for prescription of oncological therapies. In the end we analysed the current literature to assess the adequacy of procedures for the treatment of extravasation in use at our centre.

Results and discussion: Physicians reported 81 cases of extravasation to the pharmacy, of which 28 were observed in 2011, 31 in 2012 and 22 in 2013 and the prevalence (extravasation cases/number of infusions) was 0.07%, 0.08% and 0.06%, respectively. These cases involve 78 patients (2 of which were affected by multiple events); males made up 59% of the sample and females 41%; the average age was 64. The sites of administration were: forearm-arm (60 cases), wrist (8), hand (1), missing (12). The cases of extravasation we analysed refer to preparations in bags which were infused using peripheral venous access. The oncological drugs involved are antimetabolites in 23 cases, platinum compounds in 16 cases, anthracyclines and related substances in 12 cases, taxanes in 11 cases, podophyllotoxin derivates in 7 cases, alkylating agents in 6 cases, vinca alkaloids in 3 cases, monoclonal antibodies in 2 cases and combination of two drugs in 1 case. The 81 cases are all related to a mild symptomatology and patients were treated according to the treatment protocols shared by the pharmacy and the oncology wards.

Conclusion: The low and decreasing occurrence of extravasation events and the complete resolution of symptoms allowed us to verify the efficacy of our management systems of extravasation. The pharmacy decided to update all internal procedures for the treatment of extravasation on the basis of the data found in specific literature.

P93 Overcoming allergic reactions to chemotherapy

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Introduction: Oxaliplatin is an active agent in the treatment of colorectal cancer. Although the drug´s dose-limiting toxicity is a cumulative sensory neuropathy, allergic reactions must always be considered due to their severity and because they represent an important and irreversible reason for treatment discontinuation.

Material and method: Based on the outcome of previous studies, the pharmacy department together with an immunologist developed a 12-step desensitization protocol. In this study we evaluate the safety and efficacy of the protocol in 2 patients with history of previous allergic reactions to oxaliplatin.

Results and discussion: The desensitization protocol, was first performed in a 61-year-old male patient with metastatic colorectal cancer, treated with Oxaliplatin 85 mg/m², intravenously (IV) over 2 hours, leucovorin 350 mg/m2 IV over 2 hours and 400 mg/m² bólus of 5-FU followed by 2,400 mg/m² IV as a continuous 46 hour infusion, every two weeks (FOLFOX6mod). The patient developed an immediate hypersensitivity reaction after 60 mL of the second administration of Oxaliplatin with symptoms of cough, shortness of breath, flushing and urticaria. The third cycle was initiated with the desensitization protocol and repeated in the next 2 cycles without complications.

The second patient was a 65-year-old female diagnosed with locally advanced colon cancer and receiving adjuvant chemotherapy with Oxaliplatin 130 mg/m² IV over 2 hours and oral capecitabin 1000 mg/m² twice daily during 14 days (XELOX). In the third cycle, clinical manifestations of hypersensitivity reaction occur with cough and dyspnea. The desensitization protocol was performed with success in the fourth and fifth oxaliplatin administration.

Skin tests were not performed because of time delay.

Through rapid desensitization, patients receive their target dose of medication in divided incremental steps. This tecnique allowed these patients, who experienced hypersensitivity reactions to chemotherapy, to continue to benefit safely from a very effective treatment option.

Conclusion: The role of an oncology pharmacist goes further than preparing and dispensing chemotherapy. This study reveals a new target for pharmacovigilance, monitoring patients at risk of severe or fatal allergic reaction on re-exposure to chemotherapy and developing safety procedures to control the immune response to a cytotoxic drug.

P94 Pharmaceutical optimization: creation of a decision tool

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In spite of a close collaboration between the hospital pharmacy and the oncology department, a computerized system and pharmacy' patients records, pharmaceutical analysis in our institution is still limited due to many biological evaluations being done off site and not accessible to pharmacists.

We decided to audit medical and pharmaceutical practices in the management of cancer treatments to evaluate processes and the benefits of a pharmaceutical analysis optimization.

This study reviewed prescriptions of injectable chemotherapy from the oncology department over a 4-week period. Socio-demographic data, biological evaluations (BE), treatment delay (D), dose adjustments (DA) and pharmaceutical interventions were collected. A second pharmaceutical analysis including BE was performed on the same prescriptions using a checklist following recommendations*. This new tool indicated what biological and clinical examinations to check and how to adapt drug doses if side effects were reported.

(*Vidal 2013, Dossier du CNHIM 2013).

One hundred and fifty-seven prescriptions were analysed (87% from the day unit). They concerned 88 patients and generated 20 confirmations by phone, 34 pharmaceutical opinions leading to a change of prescription in 73.5% of cases and 302 preparations.

BE were found in 96% of cases (with 79% done off site), but 38% were incomplete.

One hundred and seventeen prescriptions (74.5%) were in accordance with recommendations of our checklist (initiations: 17/21, DA: 32/42, prescriptions without DA: 68/94). Fourteen D (> 3 days) were observed, justified in 93% of cases.

For 40 prescriptions (25.5%), we discovered non-respect of contraindications (3), non respect of rest period (1) and maximum dose (2), lack of D or incomplete DA secondary to haematological side effects (9), dosing not correlated to renal function (14), DA without evident explanation (3), other inappropriate dosing (2) and prejudicial lack of biological check-up (6).

Analysis of older DA underlined a heterogeneous care for the 5-fluorouracil and confirmed the few oxaliplatin DA when severe haematological side effects occured.

This study highlights the need to raise medical team awareness, to harmonize practices and to increase pharmaceutical involvement. It will be proposed to generalize the use of our checklist and to encourage pharmacists to go into the oncology department to become better acquainted with BE.

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 57

P95 Clinical guidelines on the use of antiemetic agents to prevent chemotherapy induced nausea and vomiting and attitudes of healthcare professionals towards the guidelines

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Introduction: Chemotherapy induced nausea and vomiting (CINV) are side effects that cancer patients receiving chemotherapy fear the most. CINV affects the patient's daily quality of life, and can increase the burden on the healthcare system, if symtoms are not prevented. The first Icelandic Clinical Guidelines on the Use of Antiemetic Agents to prevent CINV and radiation induced nausea and vomiting were published in 2011 at Landspítali - The National University Hospital of Iceland.

Material and method: The aim of this study: to document the antiemetic drug therapy prescriptions for patients recieving chemotherapy, before implementation of CINV guidelines, to evaluate the clinical outcomes of antiemetic drug therapy and to document the attitudes of doctors and nurses towards the CINV guidelines.

Chemotherapy regimens and supportive antiemetic drug therapy was collected and categorized. Patients receiving chemotherapy answered a questionnaire on nausea and vomiting, and those with a high score were followed-up at home. Focus group discussions were carried out to evaluate attitudes of nurses and doctors.

Results and discussion: A mean of 1.5 antiemetic and 1.5 chemotherapy drugs were prescribed for each patient. About 60% of the patients were not prescribed antiemetics according to the CINV guidelines.

Patients experiencing nausea was 32.1–37.9% and 5.0% of patients vomited the first four days after chemotherapy. Specialist doctors and nurses have a positive attitude towards the new CINV guidelines in general. They believe that the guidelines are useful in their daily working routine. Specalist doctors think it is necessary to have the guidelines implemented in the electronic drug prescribing system at the hospital, for successful implementation.

Conclusion: The majority of patients did not recieve the appropriate antiemetic drug therapy. By implementing the CINV guidelines into the IT system, it is more likely that antiemetic drugs get prescribed accordingly. Patients are experiencing nausea and vomiting despite antiemetic drug therapy, so there is a great opportunity to improve the use of profylactic antiemetic therapy. Attitudes of doctors and nurses are in general positive, but it is vital to implement the CINV guidelines electronically.

P96 Antifungal prophylaxis by posaconazole in haematology: a 6-year review of therapeutic drug monitoring (TDM) and impact of invasive aspergillosis (IA) in an integrated cancer centre

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Introduction and objective: Posaconazole (PSZ) is used for antifungal prophylaxis in patients with neutropenia after induction therapy for acute myeloid leukaemia or myelodysplasic syndromes and in patients with acute graft-versus-host diseases after allogeneic haematopoietic stem cell transplantation (HSCT). TDM of PSZ is performed at the Saint-Louis Hospital in Paris to evaluate its effectiveness using residual plasma concentrations (PCs). This study identifies patients on PSZ who benefit from a TDM and evaluates the number of IA in patients receiving PSZ for prophylaxis.

Material and method: Patients on prophylaxis by PSZ benefiting from a TDM were collected from January 2008 to December 2013. For each measurement of PCs, data on the first day of treatment and results of assays were obtained from the pharmacy and the pharmacology laboratory. Measurements during the first 5 days of treatment were excluded because the steady state concentration of PSZ is obtained after 5 days. The effectiveness threshold of PSZ PCs was set at 0.5 mg/L. Patients who developed an IA, according the EORTC criteria, were collected during the same period.

Results: The number of patients on PSZ having a TDM increased from 69 in 2008 to 182 in 2013, with an average number of dosages per patient evolving from 2.1 to 4.7. The proportion of patients with a PC of PSZ above 0.5 mg/L increased from 74% to 87%. Treatments with PSZ were prophylaxis after chemotherapy (45%) or after HSCT (46%) and curative treatment (8%). 39 patients receiving PSZ prophylaxis developed a potential (n = 17), probable (n = 20) or proven (n = 2) IA. Among them, 24 patients benefited from a TDM of PSZ and 8 had a correct PC before the occurrence of IA.

Conclusion: The increase of patients with an effectiveness PC is explained by the systematization of phone calls from the pharmacy to communicate the results of assays, with assistance for dose adjustment since 2011. The pharmacy also provides a therapeutic education with patients to improve the adherence. During the study period, 80% of patients on prophylaxis by PSZ who developed IA did not benefit from TDM or had a PC of PSZ below 0.5 mg/L. These data bring out the importance of TDM for PSZ considering factors leading to lower PCs of PSZ and exposing to opportunistic fungal infections.

P97 Never events in cancer care: assessing the impact of an original communication tool

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Background: After invasive procedures and care-associated infections, drugs represent the third cause of serious adverse events related to care. Inspired by the British model of the National Health Service, 'Never Events' are defined by the French National Security Agency of Medicines and Health Products (ANSM) as a list of serious adverse drug events that should not happen if appropriate prevention actions are taken. This work has been chosen by our multidisciplinary working group on safety healthcare, to improve health professionals' awareness on these 'never events'.

Method: This project is conducted in a French regional cancer centre. The working group has created an easy-to-use and fun pocket size communication tool that describes each never event, one by one. This tool is intended for nurses, residents, senior physicians and explains different sides of 13 'never events' (serious risks, solutions ...) and also brings some links to quality procedures that exist in our centre database. A questionnaire has been created to evaluate professional practices before and after the release of the tool. This quiz is built with multiple choice questions (MCQ). Each MCQ explores one never event described on the tool. The quiz questions highlight the most important messages of never events. The quiz is administered anonymously (job position and ward are optional), and is available on the Centre's intranet site. It is easily accessible and is promoted by a communication campaign (posters in care service, oral communication in meeting, email ...).

Results: The first step is occurring with the release of the electronic questionnaire. We hope to include approximately 70 doctors, 20 residents and 140 nurses. The collected answers will be electronically processed. The communication tool will be distributed on March. Then,

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 58

the quiz will be submitted again to healthcare professionals in the course of May. The comparison of results between before and after use of the tool will allow to assess its impact.

Conclusion: This easy and practical tool and the valuation of professional practices that it allows, is a part of a global dynamic of quality improvement and care safety. This communication tool should reduce the occurrence risk and prevent these events, whose consequences can be dramatic.That is why an update of the tool is planned as well as regular assessments about theoretical knowledge and clinical practice.

Poster Session: Organization and management

P98 Asparaginase induced severe hyperlipidaemia in children

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Introduction: To describe hyperlipidaemia in paediatric patients receiving L-asparaginase.

Material and method: Between May 2013 and February 2014, three cases of asparaginase-related hyperlipidaemia were observed. In this period 14 paediatric patients were treated with a regimen that included asparaginase/pegasparaginase.

Results and discussion: Three patients experimented asparaginase induced hyperlipidaemia. All of them received intramuscular asparaginase isolated from *E. coli.* One patient was an 8 years old female with high-risk lymphoblastic leukaemia diagnosis. At induction phase she received 10 doses of asparaginase (10,000UI/m²/48h) without hyperlipidaemia. At intensification phase 10 doses of asparaginase with the same schedule were administrated again. After 5 days of the last dose, triglyceride level was 6,280 mg/dL and cholesterol level was 598 mg/dL. Severe hypoglycemia and grade 1/2 transaminitis were observed. Treatment with bezafibrate for 9 days and absolute diet during 5 days were prescribed. This therapy resulted in a clinical improvement. Asparaginase retreatment at maintenance phase was satisfactory. Another patient was a 2-year-old male with intermediate-risk acute lymphoblastic leukaemia diagnosis. At induction phase 8 doses of asparaginase (10,000UI/m²/48h) were planned. After the 6th dose, slight elevation of triglyceride level was observed. The 8th dose was not administered due to triglyceride level (1,000 mg/dL). This patient did not require any specific treatment and after 24 hours triglyceride level was 205 mg/dL. The last patient was a 6-year-old female with T lymphoblastic lymphoma diagnosis. At intensification phase, 10 doses of asparaginase (10,000UI/m²/48h) were planned. However, after 5 days of the 7th dose, serious side effects were observed. Triglyceride level increased to 1,000 mg/dL and grade 3 hyperbilirubinemia and transaminitis were detected. Bezafibrate treatment was started and it was maintained during 11 days until normalization.

Conclusion: Hyperlipidaemia in children during asparaginase therapy are relatively common. Monitoring lipid levels before and during asparaginase treatment is important and could prevent the risk of potential complications.

P99 Oncology pharmacy practice in Tikur Anbessa Specialized Hospital (TASH): the Ethiopian experience

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Introduction: Today, almost all increases in new cancer cases worldwide are arising from the developing countries and the overall cancer mortality rates are higher in these countries. Ethiopia is not an exception and its annual incidence and mortality of all cancer types reported by GLOBOCAN in 2012 were 61,000 and 45,000, respectively. However, oncology services are wholly inadequate – no cancer registry exists, and only one cancer centre in TASH, with a handful of doctors and nurses, struggles to serve the entire country of more than 80 million populations. Among other efforts, TASH has recently begun oncology pharmacy to help promote the services and curb the anguish related to cancer.

Objective: The objective of this work is to share experience on the practice of oncology pharmacy in TASH and show the challenges and opportunities associated to the practice in the hospital.

Method: Reviewing of documents and current practice were used as source of information

Results and discussion: TASH pharmacy directorate has recently been reorganized into six major units and the number of pharmacy professionals has been increased from 28 to 59. Each unit has its own responsibility, staff and team leader. Oncology pharmacy is one of the units, composed of five pharmacists, currently practising in adult and paediatric oncology/haematology units. The team is responsible for three major activities: cytotoxic drug preparations, clinical pharmacy services and dispensing of anticancer medications to patients with proper counselling. Oncology pharmacists, therefore, contribute in ensuring the availability of chemotherapy medications at reasonable prices and their rational use. However, absence of sufficient trained and experienced oncology pharmacists, lack of proper facilities and protocols and shortage of drugs are major challenges of the practice. On the other hand, the recent paradigm shift in understanding the impact of cancer by the government, change in pharmacy curriculum, strong commitment of the hospital, and fruitful collaborations with international partners could be considered as opportunities in succeeding the practice in Ethiopia.

Conclusion: Oncology pharmacy is a key component of pharmacy services in Tikur Anbessa Specialized Hospital. There are clear importance of oncology pharmacy practices in the hospital with some challenges and opportunities.

P102 Waiting time for patient receiving chemotherapy at day hospital

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Introduction: According to the SFPO guidelines, patient with cancer should not wait more than one hour to receive their treatment during day hospital. At our hospital, chemotherapy is prepared continuously from 7:30 a.m. to 5:30 p.m. We have performed a 9-week study to assess the time to prepare chemotherapy and the average waiting time for patients admitted to day hospital.

Material and method: During 42 days, from 2 December 2013 to 7 February 2014, we have listed the number of patients admitted to day hospital in oncology and haematology services, the number of chemotherapy prepared per day and the number of pharmacy technicians making chemotherapy. We have identified the time of chemotherapy order, the time of manufacturing sheet edition, using the software Chimio, and the time of pneumatic sending. We have collected this data in Excel to calculate the waiting time for patient and the preparation time after and before 1:00 p.m., with 5 or 6 pharmacy technicians, and for a quiet day (less than 170 preparations) or a busy day (more than 170 preparations). Student test were used to perform statistical analysis.

Results: On average 152.6 preparations are made per day (56.6% for day hospital). Due to chemotherapy prepared in advance, 28.1 % of patients do not have to wait for treatment. For the other patients, the average waiting time was 54 minutes. On average, 13 patients are waiting more than one hour each day. Regarding the exact preparation time, there was no significant difference ($p = 0.169$) between the duration time for a quiet day versus a busy day: 51 minutes vs 49 minutes, respectively. We

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 59

www.ejop.eu

have undertaken a significant difference (p = 2,34E-10) between the average preparation time before and after 1:00 p.m. 54 minutes vs 39 minutes, respectively. We observed a significant difference (p = 0.014) between the preparation time obtained with 5 versus 6 pharmacy technicians: 59 minutes vs 48 minutes, respectively. Finally, regarding the average number of patients waiting more than one hour there was a significant difference (p = 0.048) between 5 versus 6 pharmacy technicians: 18 patients vs 11 patients, respectively.

Conclusion: This study highlighted that waiting time was most of the time in accordance with the SFPO guidelines. In conclusion, the preparation time mainly depends on the time of the day and on the number of pharmacy technicians, but not on the number of chemotherapy prepared during the day.

P103 Optimization study of the use of romiplostin

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Introduction: Romiplostin increases platelet production through binding and activation of the thrombopoietin receptor, and is used to treat Idiopathic Thrombocytopenic Purpura (ITP). Since the approval by the Spanish agency in 2010, romiplostin has been dispensed monthly (weekly administration) to outpatients from the pharmacy department for auto-administration at home. However, due to the expensive price, an alternative to optimize the use of romiplostin have been implemented.

Material and method: The aim of this study is to assess cost savings achieved with a new dispensing procedure started in May 2013, and to compare costs between April and June 2013. Instead of dispensing the medication for the whole month; we decided to prepare weekly dose syringes of romiplostin in the Pharmacy Department for all patients at the same day, and administer them in the Outpatient Clinic, thus we could use vials more efficiently.We reviewed patients treated with romiplostin from April to June 2013 in our hospital. Data were collected from pharmacy electronic databases. Therapy cost was calculated from manufacturer sales price plus 4% VAT.

Results and discussion: Seven patients had been treated with romiplostin, and all of them had the same dose during the study. In April, we spent Euros 21,644 treating ITP, mean of Euros 3,092 per patient; nevertheless, in June we spent Euros 12,287, with a mean of Euros 1,755 per patient. The overall decrease was Euros 9,357, saving a mean of Euros 1,337 per patient each month.

Although patients have to come to the hospital every week; these visits provide information of compliance to both clinician and pharmacist.

Conclusion: In order to decrease therapy cost of expensive treatments, we have conducted a new strategy preparing weekly doses of romiplostin in the Pharmacy Department, which has saved Euros 1,337 per patient each month (Euros 9,357/total monthly).

P104 A Pharmacists day in oncology pharmacy

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Introduction: For more than 25 years Oncology Pharmacy represents a solid component in the treatment of cancer patients. Its fields of activity had to be redefined and processes redesigned and tested for feasibility. The contribution of Oncology Pharmacy is used daily by members of the healthcare team. The action of a pharmacist is not sufficiently documented; therefore we want to bring some light into the darkness.

Material and method: To find out how pharmacists make practical contribution throughout the day, we invited members of the DGOP to document their activities for one week. In the end we asked them to give us the summary of their daily routine in Oncology Pharmacy field. All activities that are not related to oncology should be disregarded.

We asked about the following:

The manner in which the request has been processed: online, fax, mail or phone.

The number of preparations per day, classified by: cytostatic drugs and antibodies, parenteral nutrition, analgethic formulations and antibiotic solutions.

The number of dispensed oral anticancer drugs per day.

The time required for the manufacture, treatment management of IV as well as oral medication, billing, and internal QMS.

The amount of daily contacts with physicians, patients, their families and payers, as well as the kind of contact: personally, by mail or by phone.

Results and discussion: It regards both, hospital and community pharmacies. Around 600 pharmacists were contacted. At the time of preparation of this abstract, 40 responses had been received. More answers are about to be collected and evaluated in the following weeks. For ECOP representative results will be presented.

Conclusion: 25 years after implementing pharmacist in the treatment process, a considerable demand for process improvement is needed. Consulting activities of the pharmacist must assume an even greater extent, in order to provide all the necessary support to the patient.

Poster Session: Palliative care in oncology pharmacy

P105 A study of morphine prescribing practice at Komfo Anokye Teaching Hospital, Ghana

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Background: There are few opioids available in Ghana, e.g. morphine, pethidine. Fentanyl patches, oxycodone, are not affordable in Ghana. Morphine is the only strong opioid paid for by the national health insurance, hence making it easily available for patients with or without health insurance. Morphine mixture is cost-effective. Morphine as oral and parenteral preparation is the only option left to treat servere cancer pain in our clinical setting. Despite doctors prescribing oral morphine at the directorate, many cancer patients with servere cancer pain do not achieve adequate pain relief.

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 60

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Aim: This evaluation was done to look at the current standards of practice in oral morphine prescribing pattern at the Directorate of Oncology, Komfo Anokye Teaching Hospital.

Method: A review of morphine prescription of 566 new patients' folders were analysed against an established standard guideline which was modified to suit the local population.

Results: 7% of patients were prescribed morphine. Several deficiencies in morphine prescribing were identified. These include prescribing morphine at 8-hourly intervals, absence of review after prescribing morphine, lack of double dosing at night, omission of breakthrough dose, location of pain was often not indicated in patients' hospital folders.

Conclusion: Although much is know about morphine, there is in approptaite prescribing of morphine which leads to uncontrolled cancer pain. Education and implementation of local guideline will improve the use of morphine in cancer pain management. Review of guidelines must also be carried out to determine whether such guidelines have improved morphine prescription pattern.

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Poster Session: Other

P107 Occupational exposure

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A new approach for occupational exposure assessment of healthcare workers exposed to cytotoxic drugs during preparation process.

Objective: The aim of this study was to perform an exposure assessment procedure in order to identify criticality exposure of the cytotoxic drugs preparation process and prevent occupational exposure by implementation of corrective actions.

Study design: Exposure was estimated by indirect approach for similar exposure groups of actors through criticality index (CI) based on four exposure factors: contamination on workplace surface, protection, worker knowledge and the time of exposure. CI was classed into 3 classes of criticality defined regarding practices and guidelines to prioritize corrective actives: acceptable (CI<74), tolerable (74<CI<194) and intolerable (CI>194). This methodology was applied on the cytotoxic drug preparation process in a French hospital pharmacy during 3 years. **Results:** In 2011, pharmacist exposure (CI:41) was acceptable while exposure of laboratory (CI:82), pharmacy technician (CI:85), cleaning technician (CI:102) and pharmacy technician aide (CI:119) was tolerable. Considering most critical situations, targeted corrective actions were implemented. In 2012 and 2013, pharmacy and laboratory technician exposure was acceptable and other groups were tolerable. Despite a strengthening of corrective actions in 2013, a low decrease of CI (mean 7%) was observed for cleaning technician, pharmacy technician and pharmacy technician aide. This result was considered acceptable due to increase of production of 25% from 2011 to 2013.

Conclusion: This procedure is a innovate approach to estimate exposure of actors and to improve cytotoxic handling before incident. This procedure was also helpful to identify area at high risk of exposure to prioritize corrective actions.

P108 Off-label drug in oncology

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Background: The off-label use allows treatment with drugs (approved for a different indication) when there are no therapeutic alternatives. In Italy, this is regulated by Ministerial Decree 94/98. The protocol must be submitted by the physician for approval to the approval of Medical Director of competence, who can seek advice to the Ethics Committee. The off-label use is authorized for individual patients, it must be supported by scientific literature and informed consent of the patient.

Purpose: Increasing request for off-label use in oncology stressed the need to Asl-Lecce Ethics Committee to draw up an electronic database to highlight the epidemiology.

Material and method: The Scientific Secretariat of the Ethics Committee receives the request for off-label drugs use, verifies the completeness and examines the characteristics, prepares documents for submission to the Ethics Committee. Once approved, it is recorded in an Excel database to detect: the clinic, hospital ward, physician, the proposed drug use, the authorized indication in Italy, patient's diagnosis and date of approval.

Results and conclusion: The analysis included all data that did emerge from 1 February 2013 to 1 February 2014. During this period 34 requests for off-label drug use have been submitted to the Ethics Committee. The oncology ward has made 73% of the requests, 15% Haematology, 9% Rheumatology and 3% Endocrinology. In particular, oncological requests were analysed. In only one case the required off-label drug has been approved in Italy, during the year analysed, the others have not yet received approval from Competent Authority and patients continue to be treated according to the process of off-label. Growing requests for off-label drugs use underlines the need for doctors and patients to have access to innovative treatments when there are no therapeutic alternatives and no possibility to be included in clinical trials.

The monitoring system has allowed to observe that the drugs for which was requested off-label drugs use were then registered for that indication by AIFA (Competent Authority for Italy); and will allow the Ethics Committee to propose set up of non-profit clinical trials to the doctors, occurs when a further increase in off-label drugs use request.

P109 Italian oncology drugs database

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Introduction: The non-Hodgkin lymphoma is a malignant neoplastic disease that develops when damage occurs in a lymphocyte cell. Currently, the first-line therapy for highly aggressive lymphomas must provide, for the use, in combination with chemotherapy, anti-CD20 monoclonal antibody rituximab. The antineoplastic rituximab of latest generation is monitored by the Italian Drug Agency in the indication of non-Hodgkin lymphoma. In order to monitor the effectiveness and safety of this drug, an observational, retrospective, multicentre, uncontrolled study of rituximab's therapies has been carried out, according to therapeutic indications subject to AIFA monitoring. The participating centres are: the University Hospital of Siena (Coordinating Centre), Clinical Governance of Pharmaceutical Expenditure Sector and Haematology and Transplantations, the University Hospital of Perugia and the University Hospital of Ancona. Results are compared with those of the pivotal trials of rituximab.

Material and method: We analysed all the requirements of rituximab from October 2009 until 31 December 2012 AIFA. We are going to see how the main endpoint outcomes considering complete remission, partial remission and stable disease.

Results and discussion: The response rate are 82% in Siena's hospital, 82.44% in Ancona's hospital and 84,9% in Perugia's hospital having an average of 83.1% compared with 81% of Marcus's studies, among the

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 61

www.ejop.eu

remission: 83.6% of total remissions and 16.4% of partial. The 28.4% of recurrences is in Ancona against 14.9% and 17.6% of Perugia and Siena. However, in Ancona, previous therapies were composed on only chemotherapy without rituximab.

Conclusion: Concerning efficacy of rituximab, the risk-benefit ratio is more favourable than that which emerging from Marcus's clinical trial. From these data we understand how the resources used by the health system for rituximab therapy in lymphomas have been successful.

P110 Herbal plants and food supplements interactions with anticancer drugs

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Introduction: The use of herbal products (HP) and food supplements (FS) is common and frequent among cancer patients. Even if HP or FS may alter PKs of ACD, there is no real prescription guidelines devoted to warning clinicians and help them to avoid such deleterious interactions.

Material and method: We first evaluate HP/FS-ACD interactions knowledge of clinicians through a specific questionnaire. In a second time, we summarized HP/FS-ACD direct interactions and compared ACD metabolic pathways and metabolizing enzymes or transporters targeted by HP/FS. Based on case reports and relevant reviews, we classified interactions in 5 meaningful colour levels: green (no interaction proved in humans), yellow (possible interaction considering *in vitro* studies), orange (suspected interaction considering *in vivo* studies and/or drug PK pathways), red (interaction reported in human or strong evidence of interaction risk) and grey (no data). Finally we constructed a practical tool based on this colour code.

Results and discussion: 65 clinicians were questioned. All specialties were represented (adults and paediatrics, solid tumours and haematology). 80% of them knew that HP/FS-ACD interactions may occur, 43% said that they knew if their patients used HP/FS but only 15% of them were able to cited 3 relevant of such interactions. Finally, 90% would like to have a practical tool to prevent these HP/FS drugs interactions. A few numbers of HP/FS putative interactions with ACD are studied. No-interaction is rarely reported, i.e anastrazole/gingko biloba. 225 interactions were considered as possible, 100 suspected, and 92 as real or strongly probable. Many putative interactions remain unknown due to the lack of data. At the end of this work, it appeared that these kinds of interactions are considered relevant by clinicians who wait for a practical tool. Moreover, it is clear that literature is dramatically poor in the field, frequently contradictory, and that it is very difficult to determine the real impact of HP/FS on PK profile of ACD.

Conclusion: To conclude, it is not an option to let clinicians without 'minimal' guidelines. Our work constitutes a first step in this way. We have now to go into this issue further in order to validate definitively our tool and evaluate it in practical conditions.

Poster Session: Treatment/regimen

P112 Monitoring of therapeutic plasma 5-fluorouracil levels in clinical oncology

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Introduction: The 5-fluorouracil (5-FU) is a well-known antineoplastic drug used for the treatment of several tumours, mostly colorectal cancer (CRC). 5-FU has large pharmacokinetic variability resulting in unexpected toxicity or ineffective treatment. This may be caused by possible genetic deficit of dihidropirimidina desidrogenase (DPD) and other non-genetic factors which are still be identified. Thus, predicting the individual response of 5-FU therapy is still a clinical challege.

Material and method: We selected 21 patients with CRC cancer, including 10 females and 11 males, with a mean age of 68 years, that received continuous infusion of 5-FU administered by means of elastomeric pumps. Their first 5-FU dose was determined using the BSA method according to standard dose of FOLFOX4 regimen. Samples were collected as a venous blood draw by these patients, drawn at the 20th hour of the continuous 5-FU infusion. The samples were treated with a rapid immunoassay for bi-reagent to agglutination of nanoparticles and were analysed with a spectrophotometer to determine the plasma levels of 5-FU. Then, AUC values were calculated and compared with the optimal value of 25 mg*h/L.

Results and discussion: All the plasma levels of patients enrolled in the study was less than the optimal value of 25 mg.h/L with a minimum value of 2.93 mg*h/L and a maximum value of 10.59 mg.h/L. This could be due by various factors including the above-mentioned genetic viability of DPD expression as well as an incorrect use of the infusion systems by the patient, and an incorrect time of blood sampling related to the short half-life of 5-FU.

It would thus be useful to assume, through subsequent studies, which may be the cause of the results on which to focus for the discussion of the results.

Conclusion: Results reached in this study clearly indicate that monitoring 5-FU levels could provide physicians with an effective tool to better understand clinical outcomes and to achieve optimal therapeutic effect while avoiding sub-therapeutic or toxic drug levels.

P114 Comparative toxicities of two platinum salts (cisplatin and oxaliplatin) used in relapsed/refractory lymphoma

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Introduction: Optimal salvage chemotherapy regimen for patients with relapsed or refractory Hodgkin's and non-Hodgkin's lymphoma remains unclear due to the lack of randomized clinical trial. Currently, the DHAP protocol (dexamethasone, cisplatin, cytarabine) is progressively replaced by less nephrotoxic regimens with carboplatin or oxaliplatin. However, this change of practice was not based on comparative studies of efficacy and safety. In this context, toxicity profiles of a large series of patients with refractory/relapsed lymphoma treated with DHAP or DHAOX (dexamethasone, oxaliplatin, cytarabine) was assessed.

Material and method: This retrospective study included all patients treated with DHAP or DHAOX regimens between February 2007 and May 2013 in the Haematology Department of Lyon University Hospital (Hospices Civils de Lyon, France). In the case of B-cell lymphoma, rituximab was added to DHAP or DHAOX. Toxicities were assessed according to the National Cancer Institute Common Toxicity Criteria. Renal toxicity was assessed using creatinine clearance. Treatment interruptions related to toxicity were recorded.

Results and discussion: This study involved 212 patients with a mean age of 55 years [17–80 years]. 133 patients were treated with DHAP (62.7%) and 79 patients with DHAOX (37.2%). Rituximab was added for 76.9% of patients. The common toxicity of DHAP and DHAOX remains the haematologic toxicity. Febrile neutropenia were reported for 31.5% of patients treated with cisplatin versus 16.5% with oxaliplatin ($p = 0.015$). Nephrotoxicity was mainly reported with cisplatin regimen leading to 11.2% grade III-IV renal failure versus none with oxaliplatin ($p = 0.001$). Auditory toxicity was only reported with cisplatin ($n = 11$). Oxaliplatin was implicated in 74.6% of neurotoxicity ($n = 59$) with 20.3% grade

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 62

www.ejop.eu

III-IV. For 33 patients initially treated with cisplatin, switches to oxaliplatin were required with 78.7% due to nephrotoxicity.

Conclusion: Renal failure associated with DHAP regimen appeared to be important in terms of frequency and severity. DHAOX regimen presents more manageable toxicity profiles than DHAP regimen, which make it more attractive particularly when autologous stem cell transplantation is projected. Given the retrospective methodology, results have to be interpreted with caution. Moreover, these results have to be confronting with comparative efficacy of DHAP and DHAOX.

P115 Brentuximab-vedotin: review of indications, efficacy and safety

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Introduction: Brentuximab-vedotin is an antibody drug conjugates which is capable to inducing CD30-expressing tumour cell apoptosis. This drug is indicated to treat Hodgkin's lymphoma (HL) and Anaplastic Large Cell Lymphoma (ALCL). The dose is 1.8/kg by IV infusion every 3 weeks during 8 to 16 cycles. This retrospective study aims to analyse indications, safety and efficacy of Brentuximab-vedotin.

Material and method: We realized a register of all patients treated with Brentuximab-vedotin for 18 months. The information collected is the patient's identity, indications, the number of cures, dose adjustments, patient's clinical status and causes of treatment discontinuation.

Results and discussion: Our registry has recorded 17 patients including 7 men, 8 women and 2 children. The median age is 48 years. 7 (41%) patients were treated for an indication in AMM: 6 (35%) for HL and 1 (6%) for ALCL. 6 patients were treated after failure of autologous haematopoietic stem cell transplant and one after failure of 2 multi-agent chemotherapy. The off-label prescriptions concern 10 (59%) patients: 1 (6%) for large B-cell lymphoma, 5 (29%) for cutaneous T-cell lymphoma CD30 + (CTCL), 3 (35%) for peripheral T-cell lymphoma CD30 + (PTCL) and 1 child treated for HL. The median number of previous chemotherapy is 3. At the end of the analysis, 10 (59%) patients are still being treated, 5 (29%) patients stopped treatment due to disease progression, 1 (6%) patient (affected by PTCL) is in partial remission after 4 cycles and 1 (6%) patient (treated for HL) is in stable remission since 18 months after 5 cycles. The median number of cycles in patients with failure is 9. 4 (23%) patients had adverse effects. 4 had peripheral neuropathy but only 1 patient with neuropathy grade 3 required a dose adjustment to 1.2 mg/kg. 1 patient had grade 3 reversible neutropenia. This study shows a strong drift towards off-label use in dermatology mainly (CTCL and Sezary Syndrom).

Conclusion: We cannot yet conclude of Brentuximab-vedotin efficacy in dermatology indications like Sezazy Syndrom because the majority of patients are being treated. In practice, this molecule seems to have a good safety profile. Treatment efficacy seems moderate (only 1 patient is in stable remission) but Brentuximab-vedotin is a third-line therapy and this treatment allows prolonging the life of a few months without significant adverse effects.

P116 Effectiveness and toxicity of nabpaclitaxel in metastatic pancreatic cancer in previosly treated patients

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Introduction: Our objective was to evaluate the effectiveness and toxicity of nabpaclitaxel (NP) in metastatic pancreatic cancer in previously treated patients(pt), off- label use.

Material and method: Retrospective data of pt treated with NP for pancreatic cancer were collected from medical history and our pharmacy application, from August 2011 to January 2014: gender, age, performance status (PS), chemotherapy schedule, line of treatment (tx), dose, start and ending dates of tx, progression and death, delayed/reduced doses and cause, cycles received, cause of end of tx, previous and subsequent tx and toxicity.

Results and discussion: 11 pt were selected. 3 were excluded from analysis because they received less than 3 doses. 8 pt (4 men) were included. 5 were treated with NP 125 mg/m²+gemcitabine 1,000 mg/m² days 1,8 and 15, of a 28 day-cycle; 3 were treated with NP 100 mg/m² days 1,8 an 15, of a 28-day cycle. Mean age: 60 years (40–78). 5 pt had PS 0, 2 PS 1 and 1 PS 2. Mean previous lines: 3.6 (2-6). Previous tx: gemcitabine (8 pt), FOLFIRINOX (5 pt), erlotinib (5 pt), capecitabine (2 pt) and GEMOX (2 pt). Mean NP dose: 203 mg (166–256). Dose was reduced 10–30% in 3 pt from second or third cycle. Administration was delayed in 4 pt due to toxicity (anaemia, thrombocytopenia, asthenia and digestive toxicity). Mean tx duration was 2.3 months (0.5–3.6). Pt received a mean of 7 doses (3–11), 2.9 cycles (1–4). 6 pt discontinued tx due to progression and 1 due to decline in functional status. 3 pt were alive at the end of the study, one of them was still on NP (on complete response). Subsequent tx: capecitabine in 5 pt and FOLFIRI in 1 pt. Mean progression free survival (PFS) was 2.6 months (0.9–4.3). Mean overall survival (OS) was 4.7 months (1.2–8). Grade 3 toxicities were anaemia (13% grade 3), asthenia (25% grade 3, 13% grade 4), nausea (13% grade 3) and mucositis (13% grade 3). Grade 2 non-haematological toxicities were xerostomia (100%), anorexia (75%), asthenia (62%), alopecia (88%), constipation (63%) and neurotoxicity (88%); and grade 2 haematological toxicities were anaemia (50%), thrombocytopenia (75%) and neutropenia (63%).

Conclusion: Our results are similar to data published in other studies. We consider our PFS and OS of relevance, especially in our heavily pretreated pt. Toxicity was acceptable, with asthenia and digestive toxicity as the most remarkable adverse events. Low neuro and haematological toxicities allowed most pt to receive other tx after progression.

P117 Off-label treatments results

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Introduction: Off-label treatments are characterized as those that do not correspond to the labelled indications. They are intended to respond to unmet medical needs, the needs of poorly studied populations or not studied at all in trials. It is important to control if these treatments are adequate and useful for patients, in order to provide further information about benefit-risks on them.

Material and method: The aim of this study is to describe the results of the off-label treatments prescribed in a Spanish Oncology Service during 2012. This is an observational retrospective study that compares the expected number of chemotherapy cycles described in literature with the number of cycles received by patients. We have analysed data differentiating between the endpoint treatment, curative (both adjuvant and neoadjuvant) or palliative. Data were collected from pharmacy electronic databases and Off-label Committee reports.

Results and discussion: During this period, 32 off-label treatments were requested at the dedicated Committee; 9 (28%) were rejected due to a lack of evidence. Twenty-three (72%) were approved, 9 (39%) of them for curative purpose and 14 (61%) for palliative intention. We excluded one of the requested treatments from statistical analysis because it was approved due to a shortage of the standard therapy. In terms of results, 5/7 (71%) patients with curative treatments completed the expected number of cycles. For neoadjuvant treatments, 2/3 (67%) patients

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 63

www.ejop.eu

completed the whole treatment, and the other patiens withdrew voluntarily. For adjuvant therapies, 3/4 (75%) finished all cycles treatment, while the others discontinued due to toxicity. For palliative regimens, 8/15 (53%) patients achieved at least the same number of cycles described in literature. All treatments were stopped by disease progression.

Conclusion: To ensure an appropriate efficacy in our patients, off-label treatments have to be evaluated by a multidisciplinary Committee; it is important to report if these treatments are useful or not. Some important differences between curative and palliative treatments have been observed in our study. While more than 70% of patients on curative treatments have completed the same treatment as it was in the literature, only 53% in the palliative setting have reached the expected number of cycles. So, we can confirm that, if chosen properly, off-label treatments can contribute to improve cancers disease treatment.

P118 Axitinib use evaluation

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Introduction: Axitinib, a tyrosine kinase inhibitor of vascular endothelial growth factor receptors (VEGFR)-1, 2 and 3, is an EMA approved drug for the treatment of adult patients with advanced renal cell carcinoma (RCC) after failure of prior treatment with sunitinib or a cytokine. The purpose is to evaluate the experience of using axitinib for the treatment of adult patients with RCC in a tertiary hospital, in terms of efficacy and security.

Material and method: Retrospective study in patients treated with axitinib (November 2012–February 2014) age, sex, ECOG performance status, stage, site of metastasis, prior treatments, dose and duration of therapy were obtained. The safety [adverse reactions (AR) and grade of severity (g) by NCI (CTCAEV.v4)] and efficacy [progression-free survival (PFS)] of axitinib were evaluated. Data were obtained from electronic prescribing and medical history.

Results: Treatment of 5 patients, with the following clinical and demographics, were reviewed: 3 men and 2 women, with a mean age of 52 years, ECOG: 0-1 (n = 5), CCR stage IV intermediate/favourable prognosis (4 patients) and poor prognosis (1), with lung metastasis (3 patients), liver metastasis (1) and both (1). Prior treatments were sunitinib, sorafenib, everolimus and pazopanib (mean number = 3). All patients started treatment according to the dose approved (5 mg/12h). Median duration of therapy was 7 months (4–13). One patient keeps on treatment, and the other 4 switched treatment (3 due to progression, 2 of them finally died, and 1 due to intolerance). Clinical and radiological response in 3 of 5 patients with a median of PFS of 7 months was observed. AR were reported: acneiform syndrome gI (1 patient), hypertension (HTN) gII (1 patient: controlled with an angiotensin converting enzyme inhibitor), diarrhea gII, vomiting gI and asthenia gI (1 patient: were corrected by decreasing the dose to 5 mg/24h); acute renal failure gIV (1 patient with chronic renal failure who assumed temporary hospitalization and discontinuation of treatment until correction episode, restarting dose 5 mg/24h, subsequently suspended for worsening renal function)

Conclusion: The use of axitinib was adapted according to its approval by EMA in all patients. Results in terms of PFS were similar to the pivotal clinical trial, in the same way that the AR observed in our patients are described as very common (HTN, acneiform syndrome, diarrhea, vomiting) and common (renal failure).

P120 Efficacy and safety profile of the combination of non-pegylated liposomal doxorubicin with trastuzumab and lapatinib as neoadjuvant chemotherapy for HER2-positive BC patients in a third level hospital

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Introduction: Doxorubicin (D) is one of the most active drugs for breast cancer (BC), but its clinical utility is limited because of a cumulative dose-dependent cardiac myopathy. Non-pegylated liposomal doxorubicin (npeg-LD) improves the therapeutic index of D by significantly reducing cardiotoxicity and provides comparable antitumour efficacy.

Npeg-LD in combination with trastuzumab (T) as neoadjuvant chemotherapy for locally advanced BC has shown promising activity and cardiac safety.

Lapatinib (L) is an effective agent for BC that has shown to enhance trastuzumab activity.

The main objective of this report is to analyse the efficacy and safety profile of the combination of npeg-LD with T and L as neoadjuvant chemotherapy for HER2-positive BC patients (pts) in a third level hospital.

Material and method: Retrospective study (September 2012–December 2013) through electronic medical record review (chemotherapy prescription database ONCOBASS) of our series of pts treated with non-pegylated liposomal doxorubicin (50 mg/m² IV day 1) in combination with trastuzumab [6 mg/kg IV day 1 (8 mg/kg loading dosis)], and lapatinib (1,000 mg PO daily, day 1–21) every three weeks for four courses as neoadjuvant chemotherapy for HER2-positive BC.

Results and discussion: During the period of study, 5 pts with HER2-positive BC were treated with the combination studied (mean age, 54) as neoadjuvant regimen. Median of cycles administered was 4.4. Three pts (60%) were diagnostised with IIB, one (20%) with IIIB and the fifth one (20%) with IV stage. Three pts (60%) presented pathologyc complete remission (pCR) after treatment, one (20%) stabilized disease and one (20%) clinical complete response (she is still on treatment). Median overall survival for all pts was 12 months. The most frequent toxicities were grade 1 diarrhea (80%), grade 1 oral mucositis (80%), grade 1 asthenia (20%), grade 1 anaemia (20%), grade 2 nausea (60%) and grade 1 palmar-plantar erythrodysesthesia (PPE) (40%).

Conclusion: In our series of pts, the combination of non-pegylated liposomal doxorubicin with trastuzumab and lapatinib as neoadjuvant chemotherapy has demostrated to be a highly effective (3/3 pCR) and safe regimen for neoadjuvant treatment of HER2-positive BC patients.

P121 Maintenance of erlotinib and gefitinib after acquire resistance in advanced lung cancer

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Introduction: Most advanced non-small cell lung cancers (NSCLCs) with activating epidermal growth factor receptor (EGFR) mutations initially respond to the EGFR tyrosine kinase inhibitors (TKIs) gefitinib and erlotinib. However, over time, most tumours develop acquired resistance to EGFR-TKIs. It is described that some of these patients with acquire resistance have accelerated progression or a disease flare after discontinuation of TKI. We evaluated the efficacy and safety of systemic chemotherapy in combination with EGFR-TKI in patients with disease progression.

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 64

www.ejop.eu

Material and method: Through pharmacy recordings, we included retrospectively all patients of our institution with EGFR-mutant stage IIIB or IV NSCLC that progressed during gefitinib or erlotinib therapy and then received systemic chemotherapy with the continuation of EGFR-TKI.

Results and discussions: Seven patients were identified (female 5/7, non smokers 5/7). Four patients received gefinitib and three patients erlotinib in monotherapy until progression of the disease. Median time to progression: gefitinib 21.2 months and erlotinib 16 months. The systemic chemotherapy received while maintaining TKI was: Erlotinib: Carboplatine-paclitaxel (n = 1, number of cycles = 6); carboplatine-paclitaxel-bevacizumab (n = 1, number of cycle = 6); carboplatine-pemetrexed (n = 1, number of cycles = 5. Then this patient received 10 cycles of erlotinib-pemetrexed). In these 3 patients the reason of discontinuation of erlotinib was the availability of afatinib, a second generation TKI, which was active against EGFR mutations identified.

Gefitinib: carboplatine-paclitaxel-bevacizumab (n = 3, number of cycles = 5.Two patients received maintenance with bevacizumab, 14 and 2 cycles, respectively); carboplatine-pemetrexed (n = 1, so far this patient has received just 2 cycles and is still ongoing with this combination).

The median time to maintain the TKI was 5.8 months.Progression and/or adverse events were not the reason of discontinuation of the TKI in none of these patients.

Conclusion: The rapid disease progression described in some patients after gefitinib or erlotinib discontinuation, was not detected in these patients who maintain the previous TKI while receiving second-line of systemic chemotherapy. Systematic chemotherapy in combination with erlotinib or gefitinib after disease progression shows favourable response and acceptable toxicity.

P122 Dabrafenib and trametinib combination therapy for compassionate use in braf activating mutaion positive metastatic melanoma

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Introduction: The treatment landscape for metastatic melanoma has extremely changed recently, including last FDA approval of the combination use of dabrafenib (BRAF inhibitor) and trametinib (MEK-inhibitor). Our aim is to review the available safety and effectiveness data of the combination in our compassionate use programme setting.

Material and method: A multicentre, retrospective, observational study including patients with BRAF activating mutation positive metastatic melanoma treated with dabrafenib, 150 mg, twice daily and trametinib, 2.0 mg, once daily from July 2013 to February 2014. Data recorded: sex, age, ECOG performance status, previous radiotherapy (RT) and/or interferon treatment, distant metastasis classification, treatment starting and ending dates, treatment cycles and adverse events (AE). Effectiveness was determined by RECIST and progression-free survival (PFS) rates. Common Terminology Criteria for Adverse Events v4.0 were utilized for AE reporting and safety assessment.

Results and discussion: Of the 10 patients reviewed, 5 patients were male, the average age was 48.9 years [standard deviation (SD) 12.2; range 24–65], all had baseline ECOG PS of 0 or 1 and all had M1c disease with an average of 3.2 sites of metastasis (SD 1.1). 3 patients had received prior treatment with Interferon/RT and 1 patient with interferon alone. The average number of cycles administered per patient was 4 (SD 2.0; range 1–7) and the median following treatment was 109 days (range 27–239). Objective response rate assessed was 60% (95% CI: 26.2, 87.8), 6 patients with partial response. 3 patients (30%) achieved stable disease and 1 patient (10%) had progressive disease despite the treatment (the only case of death). PFS rates after 17 and 34 weeks of treatment were 88.9% (95% CI: 43.3, 98.4) and 66.7% (95% CI: 16.0, 91.4), respectively. At the end of the analysis period, 6 patients were still under treatment. One patient experienced grade 2 asthenia and grade 1 fever requiring treatment delay. 2 cases of grade 1 skin toxicity and 1 case of grade 1 ocular toxicity were also reported and no delays, dose modifications or discontinuations were needed.

Conclusion: Our data analysis showed consistent effectiveness and safety profile of dabrafenib and trametinib combination in patients with BRAF activating mutation-positive metastatic melanoma.

P123 Breast neoadjuvant chemotherapy in a Spanish hospital

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Introduction: The main objective of neoadjuvant treatment is to improve surgical outcomes in patients for whom a primary surgical approach is technically not feasible. Also allows for an early evaluation of the effectiveness of systemic therapy. To obtain a relative dose intensity (RDI) equal to or greater than 85% of that programmed is a positive predictive factor for overall survival (OS) and disease-free survival (DFS) in neoadjuvant chemotherapy.

Material and method: Retrospective study, one year selection period including all the patients with their planned treatments completed by 1 January 2014. The following data were collected: age, weight, height, body surface area, histology and grade of the tumour, molecular subtype, chemotherapy regimen, dose (including delays and reductions and the reasons for them) and granulocyte colony-stimulating factor (G-CSF) administration. The average RDI per patient and chemotherapy regimen was calculated.

Results and discussion: 20 patients were analysed with an average age of 48 (30–76) and an average body surface of 1.74 ± 0.14 m^2. 95% patients had infiltrative ductal carcinoma and 5% infiltrative lobulillar carcinoma. There were 25% basal-like tumours, 15% Luminal A, 35% Luminal B and 25% HER2 positive. Chemotherapy regimens prescribed were: TAC x 6 (docetaxel, doxorubicin and cyclophosphamide) 40%, FAC (fluorouracil, doxorubicin and cyclophosphamide) x 4 followed by weekly paclitaxel x 12 ± trastuzumab 25%, AC (doxorubicin and cyclophosphamide) x 4 followed by weekly paclitaxel x 12 plus trastuzumab 20%, AC x 4 followed by weekly paclitaxel x 8, 10% and lyposomal doxorubicin and cyclophosphamide x 4, 5%. Only one patient (5%) did not reach 85% RDI. She only received eight of the 12 planned doses of weekly paclitaxel due to neurotoxicity. 45% patients received G-CSF as a primary prophylaxis of neutropenia.

Conclusion: Sequential administration of anthracyclines and taxanes ± trastuzumab was the standard neoadjuvant treatment, except for triple negative tumours where TAC is the preferred chemotherapy regimen. 95% patients received an appropriate RDI. Prophylaxis with G-CSF must always be administered with TAC.

P124 Azacitidine treatment in acute myeloid leukaemia: practical evaluation and predictive factors of outcome

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Introduction: Azacitidine (VIDAZA) is a treatment option for elderly patients or relapsed Acute Myeloid Leukaemia (AML). Since its approval, consumption of azacitidine rose, leading to increased expenses. We

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 65

www.ejop.eu

therefore decided to perform an evaluation study of AML treatment. The primary endpoint was to ascertain that treatment indication followed the EMA marketing authorization. The secondary endpoint was to determinate AML remission predictive factors.

Material and method: We retrospectively analysed patients treated by azacitidine in the adult Haematology Department from January 2008 to December 2013. Age, diagnosis parameters, previous AML treatment, prognosis factors (medullar caryotype, and FLT3-ITD mutation), white blood count (WBC) and percentage of blasts in bone marrow (BM) aspiration were assessed for every patient. Follow-up evaluations were also recorded: number of treatment cycles, BM response (decreased BM blast percentage), haematological response (increased platelet count, WBC count and haemoglobin), transfusion independence and survival.

Results: During the study period, 47 patients were treated with azacitidine for AML, in first line (n = 27; 57%) and subsequent line (n = 20; 43%). Thirty-three treatments (70%) were decided during a multidisciplinary meeting. Thirty-two (68%) were concordant with the marketing authorization and 15 (32%) not concordant (BM blasts > 30%). Median age was 67 years [32–85] with a sex ratio M:F 1.61. The median number of cycles was 6.5 [1–27]. Nineteen patients (40%) achieved a haematological response after a median of 4.8 cycles [2–8]. Transfusion independence was reached for 5 patients (11%). Twenty-seven patients (57%) had a BM evaluation after a median of 4 cycles [1–7]: BM response was reached for 17 patients (36%). The 30 (64%) non-responders received a median of 3.7 cycles [1–14]. Patients with a BM response had a median overall survival of 17 months versus 4.5 months for non-responders (p < 0.0001). In univariate analysis, age below 65 and initiation of azacitidine after a previous treatment were associated with a poorer outcome (p = 0.0153 and p = 0.0139, respectively). However, patients treated in second line were significantly younger (p = 0.0019).

Conclusion: Sixty-eight percent of azacitidine treatments were conform to the marketing authorization. We identified age below 65 and second-line therapy as predictive factors of poorer outcome. However, these findings have to be validated in a prospective cohort

P125 Experience with metastasic renal cell carcinoma (mRCC) treatments: first-line/second-line sequence

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Background: During the last seven years, seven new agents have been approved by regulatory agencies for the treatment of metastasic renal cell carcinoma (mRCC): sorafenib, sunitinib, temsirolimus, everolimus, interferon/bevacizumab, pazopanib and axitinib.

Material and method: A retrospective analysis from patients treated with targeted therapies between November 2011 and October 2013 in a single institution was carried out. Studied therapies were classified according to their mechanism of action: VEGF inhibitors (sunitinib, sorafenib, pazopanib, axitinib) and mTOR inhibitors (everolimus and temsirolimus). Interferon/bevacizumab line was not studied because there were no cases.

Objetive: The primary objective was to evaluate the overall survival in diferent treatment sequences in 68 mRCC patients in a tertiary hospital.

Results: Seventy-five per cent of patients were male, median age was 64 (range 44–81) thirty seven (54.4%) received only one line of treatment, 20 (29.41%) two lines, 6 (8.82%) three lines, 3 (4.41%) four lines and 2 (2.94%) up to five lines. At the time of analysis, median overall survival (OS) for the overall population was 26.8 months (22.7–30.7). More than 2 years survival rate was 54% (vs 50%*) Out of 41 patients who initiated therapy with sunitinib 50 mg once daily on schedule 4–2; 19 patients (46.3 %) needed a down-tritation of dose. The dose adjustment average time was 4.2 months (IC95: 2.6–5.7) Considering only the first two lines of treatment; 35 (51.4%) patients received only VEGF inhibitor (sunitinib) and 2 (3%) mTOR. The remaining (45.6%) received the following sequences: 15 (48.4%) VEGF/VEGF, 12 (38.7%) VEGF/mTOR, 3 (9.7%) mTOR/VEGF, 1 (3.23%) other. We analyse the differences on survival of VEGF/VEGF sequence and VEGF/mTOR sequence. Significant differences in terms of median OS were found among the two sequences. Median OS was 33.2 months (CI95% 27.5–38.9) for the VEGF/VEGF sequence and 21.9 months (CI95% 12–31.5) for the VEGF/mTOR sequence [p < 0.027 Log (Rank Test)].

Conclusion: The clinical outcome of mRCC has improved markedly with targeted therapies. New lines of treatment have increased the survival of these patients. Even though this analysis has a small number of patients, it shows a greater benefit in patients that received the VEGF/VEGF sequence vs patients that received the VEGF/mTOR. Limited by the small sample size, the results are similar to those previously reported in this setting. *Motzer RJ, Escudier B, Bukowski R, et al. Prognostic factors for survival in 1059 patients treated with sunitinib for metastasic renal cell carcinoma. Br J Cancer. 2013;108(12):2470-7 **Ruiz L, Bolós MV, Viqueira, Esteban E. Outcome of metastasic renal cell carcinoma (mRCC) patients in the era of new targeted therapies. ESMO 2013.

P126 Evolution of compassionate use drugs in oncology

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Introduction: Compassionate use drugs are those still in development, but available through expanded access programmes to patients when no other treatment exists. The objective is to describe our experience in oncology.

Method: A prospective observational study was performed during 2010–2014 in a 450-bed teaching hospital. Data collected: demographics (mean, IC95%), indication and line of treatment, cause of discontinuation, duration of therapy (DOT) (mean months, IC95%) and cause of dose reduction.

Results: A total of 18 patients were included (2010 = 0; 2011 = 2; 2012 = 1; 2013 = 12; 2014 (2 months) = 4) All drugs were oral: n = 7 (38.9%) afatinib, n = 4 (22.2%) axitinib, n = 3 (16.7%) crizotinib, n = 3 (16.7%) regorafenib, n = 1 (5.5%) dabrafenib. Afatinib: treatment of Epidermal Growth Factor Receptor inhibitors tyrosine kinase-naïve patients with advanced non-small lung cancer (NSCLC). 7 patients: 6 women (85.7%), 68.8 years (58.2–79.5); treatment: n = 4 (57.1%) in 2nd line, n = 3 (42.9%) 3rd line; patient outcome: n = 3 (42.9%) still on treatment, n = 3 (42.9%) discontinuations (n = 1 (14.3%) progression disease (PD), n = 2 (28.6%) adverse effects (AE): diarrhoea, mucositis, asthenia, athaxia), DOT 4.2 (-9.5–17.9), n = 3 (42.9%) dose reduction for diarrhoea. Axitinib: advanced renal cell carcinoma after failure of treatment with sunitinib or cytokines. 4 patients: 4 men (100%), 67.3 years (48.3–86.2); treatment: n = 4 (100%) 3rd line; patient outcome: n = 4 (100%) discontinuations ((n = 1 (25%) PD, n = 3 (75%) AE: proteinuria, emesis, asthenia, anorexia), DOT 2.3 (-0.98–5.6). Regorafenib: metastatic colorectal cancer previously treated or not suitable for such therapies. 3 patients: 2 men (66.6%), 63.3 years (33.0–93.7); treatment: n = 3 (100%) in 4th line; patient outcome: n = 2 (66.7%) discontinuations ((n = 1 (33.3%) PD, n = 1 (33.3%) AE: dysphagia, thrombocytopenia, hiperbilirrubinemia), DOT 1.5(-2.3–5.3), n = 1 (33.3%) dose reduction for AE: rash, alopecia, thrombocytopenia). Crizotinib: NSCLC, positive for anaplastic lymphoma kinase, previously treated. 3 patients: 2 men (66.6%), 78 years (63.1–92.2); treatment: n = 3 (100%) 2nd line; patient outcome: n = 1 (33.3%) still on treatment, n = 2 (66.7%) discontinuations (n = 1 (33.3%) PD, n =1 (33.3%) AE: emesis), DOT 13.5 (-111.0–138.0). Dabrafenib: unresectable or metastatic melanoma with a BRAFV600 mutation. 1 men, 79 years; still on 1st line treatment.

Conclusion: Compassionate oral chemotherapy treatments have been growing remarkably during last years. All patients were previously treated.

EJOP • Volume 8 • 2014 • Issue 2(supplement) • P. 66

P127 Off-label use of Mitomycin C to prevent complications induced by laser surgery in laryngeal cancer

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Laryngeal cancer represents about 1% of cancers. Advanced laryngeal cancers are often treated by combining radiation and laser excision surgery. A variety of curative surgical procedures are also recommended for laryngeal cancers, some of which preserve vocal function.

Main complications of laser resection are partial or complete dysphonia by the occurrence of synechia (i.e. glothic adherence). Mitomycin C has been reported to prevent this iatrogenic effect.

Mitomycin C is an antineoplastic antibiotic indicated in various malignancies. Off-label, Mitomycin C is also used for glaucoma surgery in order to prevent trabecullum fibrosis.

Here, we report two cases of Mitomycin C use during chirurgical procedures for patients treated with laser resection of the larynx followed by radiotherapy.

Patient 1: A 50-year-old man diagnosed with laryngeal classified T2 No Mo with dysphonia.

Patient 2: A 71-year-old man with a cancer of the vocal folds classified T1B No Mo with partial dysphonia.

Considering dysphonia, it had been decided to add a local application of Mitomycin C to the chirurgical procedure.

Bibliographic analysis indicated that Mitomycin C had been succesfully used in this indication at either 0.4 and 1.0 mg/mL. The preparation consists of a reconstitution of a vial of mitomycin (10 or 20 mg) with isotonic chloride sodium solution to achieve a final concentration of 0.4 mg/mL and 10 mL of the final solution is filled in a syringe (final therapeutic object). Immediately after resection, drug was applicated by swabbing for 10 minutes.

3 months after surgery, laryngeal exploration of the first patient shows a small scar. The patient fully recovered his ability to speak.

For the second patient exploration shows a small local granuloma. The only change reported on the voice was a deeper sound.

4 and 2 years after surgery, complete responses are still observed for both patients, and none of them experience any dysphonia.

Laser resection associated with Mitomycin C swabbing and radiotherapy allowed complete and durable response for both patients. This treatment has restored the vocal capacities of both patients.

Anti-proliferative properties of Mitomycin C prevent fibroblastic proliferation, thus Mitomycin C is a therapeutic option as adjuvant therapy in surgery of the larynx cancer in order to prevent dysphonia.

P128 Chemotherapy regimen check service by pharmacists contributed to safe chemotherapy

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Introduction: Recently, a chemotherapy computer order entry system was developed, and National Cancer Center Hospital East introduced the system to administer safe chemotherapy. However, we also have developed a chemotherapy regimen process using paper-based check sheets to evaluate chemotherapy, because we think the computer order entry system is not enough to find errors. The chemotherapy regimen check by pharmacists is becoming a general practice in Japanese pharmacy services, however, benefits of the service are not yet clear. The objective of this retrospective chart review was to clarify how pharmacists contributed to safe cancer treatment using the paper-based check sheets through pharmacist inquiry records.

Material and method: A retrospective analysis was conducted between January 2013 and December 2013 in outpatient chemotherapy. Data was collected from pharmacy records.

Results: We had a total of 35,062 chemotherapy regimens regarding 18,515 patients in twelve months. Of 35,062 chemotherapy regimens, pharmacists' inquiry average rate was 2.2% (n = 408). However, a modified rate of chemotherapy prescriptions, according to pharmacists' inquiries, was 53.1% (217/408). Of these inquiries, 49.5% were 'reasons of change was unclear (n = 202)', 22.0% were 'physicians' prescription errors (n = 90)', 15.1% were 'pharmacists suggestions to improve chemotherapy (n = 62)', and 13.2% were 'finding differences between physicians' records about chemotherapy and their chemotherapy prescriptions (n = 54)', respectively. Out of the 217 modified prescriptions due to pharmacists' interventions, 32.7% was 'reasons of change was unclear (n = 71)', 34.5% was 'finding prescription errors (n = 75)', 18.4% was 'pharmacists suggestions to improve chemotherapy (n = 40)', and 28.5% was 'finding differences between physicians' records about chemotherapy and their chemotherapy prescriptions (n = 31)', respectively.

Conclusion: Pharmacists' inquiry rates pertaining to chemotherapy was only 2% in outpatient chemotherapy, however, modified prescription rates due to the pharmacists' inquiries was about 50%. The chemotherapy regimen check by pharmacists contributed to safe and adequate administration of cancer chemotherapy, and the results showed the chemotherapy computer order entry system is not perfect.

Author Index

EJOP • Volume X • 2014 • Issue X(supplement) • P. 68