MUNI
PHARM

BRNO
UNIE STUDENTŮ FARMACIE

XXI. STUDENTSKÁ VĚDECKÁ KONFERENCE

NADNÁRODNÍ KOLO

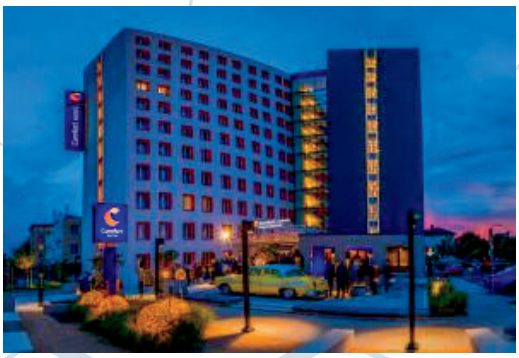



4. 5. 2023
Zentiva, Praha

ZENTIVA

VEČERNÍ RECEPCE A UBYTOVÁNÍ

Comfort Hotel Prague City East
Bečvárova 14
100 00 Praha 10



Ubytování je zajištěno včetně snídaně
Parkovat lze na hotelovém parkovišti
Společná večeře bude probíhat od 18:00 formou rautu přímo v hotelové restauraci

REGISTRACE

Hlavní recepce Zentivy
U kabelovny 529/16
100 02 Praha 10

Zahájení proběhne v místnosti Fragner
Konference se bude konat v místnostech Vision room a Ivabradine
Začátek od 9:00 (registrace od 8:15)

KONEC KONFERENCE

13:45 – 14:15 – Porada poroty
14:30 – Vyhlášení výsledků
15:00 – Závěr konference

MUNI PHARM

PARTICIPUJÍCÍ FAKULTY

Farmaceutická fakulta, Masarykova univerzita
Farmaceutická fakulta v Hradci Králové, Univerzita Karlova
Farmaceutická fakulta, Univerzita Komenského v Bratislave
Univerzita veterinárskeho lekárstva a farmácie v Košiciach

SPOLUORGANIZÁTOŘI

Za Zentivu:
Mgr. David Vích, HR Business Partner
PharmDr. Jan Röder, Head of Portfolio Management

Za Farmaceutickou fakultu Masarykovy univerzity a Unii studentů farmacie:
Mgr. Petr Mokrý, Ph.D.
doc. PharmDr. Peter Kollár, Ph.D.
Daniela Hlavatá

ČLENOVÉ ODBORNÉ POROTY

Sekce biologická:

PharmDr. Jakub Treml, Ph.D., Farmaceutická fakulta, Masarykova Univerzita

PharmDr. Andrea Balažová, Ph.D., Farmaceutická fakulta, Univerzita Komenského v Bratislave

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PharmDr. Adriána Fečkaninová, Ph.D., Univerzita veterinárskeho lekárstva a farmácie v Košiciach

Sekce chemická:

doc. PharmDr. Renata Kubínová, Ph.D., Farmaceutická fakulta, Masarykova Univerzita

RNDr. Roman Mikláš, PhD., Farmaceutická fakulta, Univerzita Komenského v Bratislave

doc.Ing. Stanislav Rádl, CSc., Zentiva

prof. PharmDr. Lucie Nováková, Ph.D., Farmaceutická fakulta v Hradci Králové, Univerzita Karlova

Sekce farmaceutické technologie:

doc. PharmDr. Kateřina Kubová, Ph.D., Farmaceutická fakulta, Masarykova Univerzita

Ing. Vít Zvoníček, Zentiva

PharmDr. Eva Šnejdrová, Ph.D., Farmaceutická fakulta v Hradci Králové, Univerzita Karlova

Sekce sociální a klinické farmacie:

PharmDr. Bc. Hana Kotolová, Ph.D., Farmaceutická fakulta, Masarykova Univerzita

PharmDr. Ľubica Lehocká, PhD., Farmaceutická fakulta, Univerzita Komenského v Bratislave

PharmDr. Petra Matoulková, Ph.D., Zentiva

PharmDr. Lenka Ťupová, Ph.D., Farmaceutická fakulta v Hradci Králové, Univerzita Karlova

XXI. STUDENTSKÁ VĚDECKÁ KONFERENCE

NADNÁRODNÍ KOLO

HARMONOGRAM

SEKCE BIOLOGICKÁ - CHEMICKÁ -
FARMACEUTICKÉ TECHNOLOGIE -
SOCIÁLNÍ A KLINICKÉ FARMACIE

4. 5. 2023

Zentiva, Praha

9:00
SLAVNOSTNÍ ZAHÁJENÍ KONFERENCE
Místnost: Fragner, Zentiva

SEKCE CHEMICKÁ
Místnost: Ivabradine, Zentiva

9:30
ISOLATION OF COMPOUNDS FROM *MACLURA POMIFERA* BARK
Ivana Machalová
Farmaceutická fakulta, Masarykova univerzita, Brno

9:45
ŠTÚDIUM VPLYVU PRIMÁRNYCH n-ALKOHOLOV NA PROFIL LATERÁLNEHO TLAKU V MODELI PĽÚCNEHO SURFAKTANTU
Denisa Fujašová
Farmaceutická fakulta, Univerzita Komenského v Bratislave

10:00
A HIGH-TEMPERATURE LC-MS METHOD FOR EFFICIENT BOTTOM-UP PROTEOMIC ANALYSES WITH MINIMIZED ARTIFACTS
Mykyta Starovoit
Farmaceutická fakulta v Hradci Králové, Univerzita Karlova

10:15
GREEN SYNTHESIS OF SILVER NANOPARTICLES USING *AGRIMONIA EUPATORIA* L. AND THEIR ANTIBACTERIAL ACTIVITY
Lenka Kozubová
Univerzita veterinárskeho lekárstva a farmácie v Košiciach

10:30
PŘESTÁVKA

10:45
SYNTHESIS OF POTENTIAL METALLOENZYME INHIBITORS
Julie Řeháková, Kateřina Urbanová
Farmaceutická fakulta, Masarykova univerzita, Brno

11:00
OPTIMALIZÁCIA CE-MS METÓDY PRE ANALÝZU MITRAGYNÍNU A 7-HYDROXYMITRAGYNÍNU
Laura Hudáková
Farmaceutická fakulta, Univerzita Komenského v Bratislave

11:15
SYNTHESIS OF COUMARIN BASED FLUOROPHORE PROBES
Barbora Koutníková
Farmaceutická fakulta v Hradci Králové, Univerzita Karlova

SEKCE FARMACEUTICKÉ TECHNOLOGIE
Místnost: Ivabradine, Zentiva

11:30
METHODS OF INCORPORATION OF DETECTION REAGENTS FOR PHOSGENE DETECTION INTO NANOCOMPOSITE PELLETS
Viktória Kučerová
Farmaceutická fakulta, Masarykova univerzita, Brno

11:45
FORMULATION AND CHARACTERIZATION OF PLGA BASED FFS FOR LOCAL DRUG DELIVERY
Hana Hnátová
Farmaceutická fakulta v Hradci Králové, Univerzita Karlova

12:00
THE PARTICULATE SYSTEMS CONTAINING LIPOPHILIC DRUGS OF NATURAL ORIGIN FOR VETERINARY APPLICATIONS
Daniela Hlavatá
Farmaceutická fakulta, Masarykova univerzita, Brno

12:15
PREPARATION OF TABLETS BY SELECTIVE LASER SINTERING
Lukáš Ficek
Farmaceutická fakulta v Hradci Králové, Univerzita Karlova

12:30
PŘESTÁVKA NA OBĚD

SEKCE BIOLOGICKÁ

Místnost: Vision room, Zentiva

9:30
BIODISTRIBUTION OF SYSTEMATICALLY APPLIED HYALURONAN IN RHEUMATOID ARTHRITIS
Anna Chadimová
Farmaceutická fakulta, Masarykova univerzita, Brno

9:45
THE EFFECT OF RESVERATROL AND GAMBOGIC ACID ON THE DNA DAMAGE CAUSED BY DAUNORUBICIN IN NEONATAL RAT CARDIOMYOCYTES
Martin Mašín
Farmaceutická fakulta v Hradci Králové, Univerzita Karlova

10:00
TOXIC EFFECTS OF THE INVASIVE PLANT *ASCLEPIAS SYRIACA L.*
Nikoleta Koldušová
Univerzita veterinárskeho lekárstva a farmácie v Košiciach

10:15
TESTING OF NEW ANTAGONISTS OF BETA-ADRENERGIC RECEPTOR IN VIVO (PHASE II)
Karla Buráňová
Farmaceutická fakulta, Masarykova univerzita, Brno

10:30
PŘESTÁVKA

10:45
PHOTOSENSITISERS AS THE FUTURE OF TUMOR THERAPY
Ingrid Hlbočanová
Farmaceutická fakulta v Hradci Králové, Univerzita Karlova

SEKCE KLINICKÉ A SOCIÁLNÍ FARMACIE

Místnost: Vision room, Zentiva

11:00
THE COVID-19 PANDEMIC IMPACT ON HOSPITAL PHARMACIES IN THE CZECH REPUBLIC
Lucia Havlíková
Farmaceutická fakulta, Masarykova univerzita, Brno

11:15
ANALYSIS OF DRUG DOSAGE ADJUSTMENT IN PATIENTS WITH CHRONIC KIDNEY DISEASE
Jana Procházková
Farmaceutická fakulta v Hradci Králové, Univerzita Karlova

11:30
POSKYTOVANIE LEKÁRENSKEJ STAROSTLIVOSTI TEHOTNÝM ŽENÁM VEREJNÝMI LEKÁRNIKMI V SLOVENSKEJ REPUBLIKE
Zuzana Baníková
Farmaceutická fakulta, Univerzita Komenského v Bratislave

11:45
CURRENT TRENDS IN PSYCHOPHARMACOTHERAPY OF FIRST-EPISODE SCHIZOPHRENIA
Nicole Šafářová
Farmaceutická fakulta, Masarykova univerzita, Brno

12:00
FOLLOW-UP PATIENTS AFTER COVID-19 MONOCLONAL ANTIBODIES ADMINISTRATIONS
Jiřina Minaříková
Farmaceutická fakulta v Hradci Králové, Univerzita Karlova

12:15
PŘESTÁVKA NA OBĚD

XXI. STUDENTSKÁ VĚDECKÁ KONFERENCE

NADNÁRODNÍ KOLO

ABSTRAKTY

SEKCE BIOLOGICKÁ

4. 5. 2023

Zentiva, Praha

BIODISTRIBUTION OF SYSTEMATICALLY APPLIED HYALURONAN IN RHEUMATOID ARTHRITIS

Author: Anna Chadimová [1], Daniela Rubanová [2,3], Matěj Šimek [5], Kristina Nešporová [5]

Supervisor: Lukáš Kubala [2,3,4], Marta Chalupová [1]

[1] Department of Pharmacology and Toxicology, Faculty of Pharmacy, Masaryk University, Brno
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Key words: rheumatoid arthritis, hyaluronic acid, in vivo imaging, biodistribution

Rheumatoid arthritis (RA) is a chronic inflammatory autoimmune disease primarily affecting the joints. It can lead to cartilage and bone damage. Current therapy involves DMARDs (conventional, biological, nonbiological), NSAIDs and glucocorticoids, which are used to reduce joint inflammation and relieve pain. Various strategies have been introduced to improve ways how to face RA. Hyaluronan (HA), a naturally occurring molecule, plays a vital role in many fields of advanced biomedical applications. It is a large glycosaminoglycan that is the main component of the extracellular matrix. One of the possible fields of use is also RA therapy, in which HA is administered as a therapeutic agent directly to the damaged joint – intraarticulary. The effect of intraarticular administration is based on the physicochemical properties of HA. Some studies have shown that systemic application could be another effective way of administration. However, the mechanism of action has still not been well explained for systemic application. It is why we aimed to study the distribution of systematically applied HA and its mechanism of action in inflamed joints. We used adjuvant-induced arthritis (AIA) mouse model to test our hypothesis that HA accumulates in an arthritic joint. Mice were administered i.v. with fluorescently labelled HA and IVIS XR Lumina in vivo imaging was used to evaluate its pharmacokinetics in a time course. HA conjugated with biotin was used for histological analysis of distribution within paws. The accumulation of HA in the AIA paw reached its peak after 4 h and was stable till the end of experiments at 12 h post injection. Histological analysis confirmed the increased accumulation of HA in the AIA paw, which seemed to accumulate in soft tissue of the paw. Our data indicate that the i.v. application of HA could be an interesting therapeutic strategy in the treatment of RA as HA accumulates in the arthritic joints.

Animal experiments were approved by the institutional Animal Care and Use Committee (protocol n.52/2020 from 15th June 2020).

THE EFFECT OF RESVERATROL AND GAMBOGIC ACID ON THE DNA DAMAGE CAUSED BY DAUNORUBICIN IN NEONATAL RAT CARDIOMYOCYTES.

MAŠÍN, M.,[1] KERESTEŠ, V.,[1] JIRKOVSKÁ, A.,[1]

Department of Biochemical Sciences, Faculty of Pharmacy in Hradec Králové, Charles University, Czech Republic

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DNA Topoisomerases comprise a family of enzymes that are able to alter DNA topology by transient single- or double-strand breaks (DSB) during fundamental processes such as replication and transcription. Inhibition of topoisomerase II (TOP II) is the main mechanism of action of some antitumour drugs, such as anthracyclines (ANT; e.g., daunorubicin). They stabilize the DNA TOP II complex, leading to the formation of DSB and later to apoptosis. Other inhibitors, that interact with the enzyme without the DSBs formation1, can modulate the effect of ANT.

We studied the DNA damage caused by daunorubicin (DAU) and its main metabolite daunorubicinol (DAUnol) and the effect of two naturally-derived compounds and TOP II catalytic inhibitors resveratrol (RES) and gambogic acid (GA) in neonatal rat cardiomyocytes. The DNA damage was determined as the extent of histone H2AX phosphorylation (γH2AX) and by Comet Assay.

It can be concluded that both DAU and DAUnol (1,2 μM) exhibit DNA damage that is dependent on the time of exposure – increases during the 6h period. Nevertheless, this trend was detected only by the γH2AX. RES (1, 10, 100 μM) alone did not induced DNA damage and at a concentration of 100 μM it reduced DAU-induced γH2AX. GA at higher concentration (1 μM) independently increased both γH2AX and Comet Assay signal and also increased DAU induced DNA damage.

The study was supported by the Czech Science Foundation (21-16195S) and Charles University (GA UK 1674119, SVV 260 550)

References

1. POGORELCNIK, B., PERDIH, A., & SOLMAJER, T.: Current medicinal chemistry, 20(5), 2013. 694-709.

TOXIC EFFECTS OF THE INVASIVE PLANT *ASCLEPIAS SYRIACA L.*

Nikoleta Koldušová
Školiteľ: PharmDr. Ľudmila Balážová, PhD.

Farmácia, Univerzita veterinárskeho lekárstva a farmácie v Košiciach,
Katedra farmaceutickej technológie, farmakognózie a botaniky

Key words: invasive plant, cardioactive glycosides, *in ovo*, *Asclepias syriaca* L.

The plant *Asclepias syriaca L.* (American milkweed) belongs to the list of invasive and non-native plant species. Thanks to its invasiveness it is widely spread in pastures, meadows and near human settlings. The threat of drug ingestion by animals led us to monitor secondary metabolites and their toxicity. By spectrophotometric analysis, we proved the presence of cardioactive glycosides in the aerial part of the plant, with a concentration of 0.02%. By subsequent *in ovo* application of our extract to chicken embryos, we observed a slowing of the heart rate. We have proven the potential danger of the invasive plant *Asclepias syriaca L.* (American milkweed). It is essential to be careful around the plant, both for livestock and people.

TESTING OF NEW ANTAGONISTS OF BETA-ADRENERGIC RECEPTOR IN VIVO (PHASE II)

Karla Buráňová[1], Ahmet Davut Aksu[1], Jana Hložková[1,3], Peter Scheer[1,3], Petr Mokrý[2], Milan Sepši[4,5]

[1]Department of Pharmacology and Toxicology, Faculty of Pharmacy, Masaryk University
[2]Department of Chemical Drugs, Faculty of Pharmacy, Masaryk University
[3]International Clinical Research Centre, St. Anne´s University Hospital, Brno
[4]Faculty of Medicine, Masaryk University
[5]Department of Internal Medicine and Cardiology, University Hospital Brno

Keywords: animal model, beta-blockers, heart rate, blood pressure, hypotensive effect

Background and Aims: The thesis aims to evaluate the influence of newly synthesized potential beta-adrenergic receptor blockers on heart rate and blood pressure in an in vivo rat model. The synthesis and testing of new molecules is an integral part of the developing health system, the ambition is to continue the research of the most promising enantiomers of the tested substances.

Methods: For our experiment, 30 male Wistar albino laboratory rats (b.w. 200 - 250 g), and all procedures and animal experiments were performed in full compliance with the directive of the ethical committee. The rats were anaesthetised using the inhaled isoflurane 2.5%, next, xylazine (5 mg/kg) along with ketamine (35 mg/kg) i.m. and a mixture of 8% urethane and 0.6% alpha-chloralose at a dose of 8 ml/kg i.p. were administered. The left carotid artery was carefully prepared and cannulated by insertion of a heparinized granule for invasive blood pressure measurement. A model of pharmacologically induced hypertension by continuous infusion of terlipressin was used. Systolic, diastolic, mean, pulse arterial pressure, as well as heart rate and ECG were monitored. The substances BN35, BN41, LK50K1 in concentrations of 1.25 mg for 5 minutes were followed. The effect of the substances was compared with the control groups (esmolol, metoprolol) that served as the standard of evaluation.

Results: The substance BN35 reduced systolic, mean, and diastolic pressure. LK50K1 had a neutral effect on pulse pressure. BN41 had a neutral effect on heart rate and diastolic pressure but increased systolic, mean, and pulse pressure.

Conclusions: After processing and evaluation of individual results, BN41 of the studied substances had minimal effect on arterial blood pressure and is a suitable candidate for further testing.

Acknowledgement: This study was supported by the University specific research grant MUNI/A/1262/2021 in cooperation with the team of prof. Groszek from the University of Technology in Rzeszow, Poland.

PHOTOSENSITISERS AS THE FUTURE OF TUMOR THERAPY

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Tumor diseases represent one of the largest groups of malignant illnesses in the world. Their incidence is slowly shifting from developed countries to third world countries and therefore they represent the most widespread health problems, often leading to the death of patients. Intensive research and development of new and effective anticancer drugs and treatment methods is devoted because of the spread and mortality of these diseases. One of the intensively researched modern method is photodynamic therapy (PDT), which is utilizing photosenzitisers (PSs). To ensure the maximum efficiency, effectiveness of PDT and maximalization of results, it is necessary to observe three basic parameters – effective PS, light and oxygen. These individual components do not represent danger to the patients on their own, but their combination brings positive effect in the cancer treatment. The principle of the method is administration of an inactive PS to the patient with subsequent irradiation by light of suitable wavelength. PS is activated during the irradiation and the reaction with oxygen leads to a photochemical reaction with the formation of highly toxic reactive oxygen species (ROS). ROS are toxic to the target cells and trigger cell death in irradiated tissues. Development of novel PSs and testing their effectiveness in the fight against malignant and non-malignant forms of tumor is important. The aim of my work was to determine the activity of new PSs derivates described as peripherally substituted subphthalocyanines with benzocrown or tyrosine methyl ester as axial ligands on HeLa and SK-MeL-28 cell lines using broad spectrum of methods (such as cell uptake, BCA protein assay, subcellular localization etc.).

The study was supported by: SVV 260 550

References

1. Cengel, KA., Simone, CB. 2nd, Glatstein, E.: PDT:What's Past Is Prologue. CancerRes. 2016 May 1;76(9):2497-9. doi: 10.1158/0008-5472.CAN-16-0927. PMID: 27197260; PMCID: PMC5568068.

2. Dougherty, TJ,Gomer, CJ., Henderson, BW., Jori, G., Kessel, D., Korbelik, M,, Moan, J., Peng, Q.:Photodynamic therapy. J Natl CancerInst. 1998 Jun 17;90(12):889-905. doi: 10.1093/jnci/90.12.889. PMID: 9637138; PMCID: PMC4592754.

XXI. STUDENTSKÁ VĚDECKÁ KONFERENCE

NADNÁRODNÍ KOLO

ABSTRAKTY

SEKCE CHEMICKÁ

4. 5. 2023

Zentiva, Praha

ISOLATION OF COMPOUNDS FROM *MACLURA POMIFERA* BARK

Author: Ivana Machalová[1]
Supervisor: PharmDr. Margita Dvorská, Ph.D.[1]

Department of Natural Drugs, Faculty of Pharmacy, Masaryk University, Brno

e-mail: 484553@muni.cz

Key words: *Maclura pomifera*, xanthones, chromatographic methods

Introduction: *Maclura pomifera* (Moraceae) is a dioecious tree native to North America. Its root bark is known for being a source of biologically active xanthone derivatives. The occurrence of xanthones in the stem bark has been described only in related species. Xanthones are secondary metabolites specific for several plant families exhibiting various biological activities.

Aim: This work deals with literature research focused on xanthones, their biological activity and the structure-activity relationship. Furthermore, it deals with the isolation and identification of selected compounds, especially xanthones, from *M. pomifera* stem bark.

Methods: The isolation of compounds was performed by using chromatographic methods. The fractions were obtained from hexane and chloroform portions of ethanolic extract by column chromatography. Another source for the isolation was the pink precipitate from water/ethyl acetate interphase which was separated by preparative HPLC. The nature and purity of the fractions and isolated compounds were subsequently analysed by HPLC or TLC. The selected substances were identified by NMR, MS and UV/Vis.

Results: We isolated three xanthones and probably a compound of terpene origin. Isolated xanthones were identified as 1,3,5,6-tetrahydroxyxanthone-4-glucoside (Fig. 1) – a new compound, 1,3,5,6-tetrahydroxyxanthone (Fig. 2) – isolated for the first time from *M. pomifera* and osajaxanthone – previously isolated from *M. pomifera* root bark (Fig. 3).

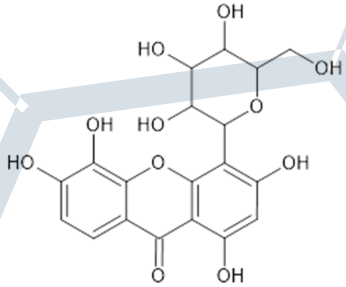

Fig. 1

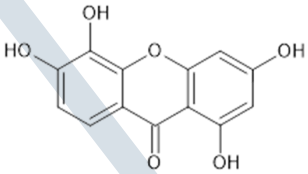

Fig. 2

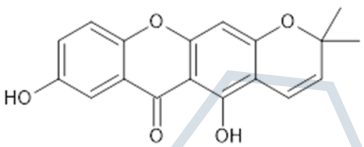

Fig. 3

ŠTÚDIUM VPLYVU PRIMÁRNYCH n-ALKOHOLOV NA PROFIL LATERÁLNEHO TLAKU V MODELI PĽÚCNEHO SURFAKTANTU

Autor: Denisa Fujašová (2. ročník)
Školiteľ: Mgr. Mária Klacsová PhD.

Katedra fyzikálnej chémie liečiv, Farmaceutická fakulta, Univerzita Komenského v Bratislave

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KĽÚČOVÉ SLOVÁ
Pľúcny surfaktant, Alkoholy, Celkové anestetiká, Laterálny tlak, Excimérová fluorescencia

Pľúcny surfaktant predstavuje prvú fyzikálnu bariéru pri inhalačnom podaní celkových anestetík. V tejto práci sme študovali zmeny profilu laterálneho tlaku v syntetickom modeli pľúcneho surfaktantu spôsobené zabudovaním primárnych alifatických n-alkoholov. Ako model pľúcneho surfaktantu sme použili zmes lipidov POPC (palmitoyloleoylfosfatidylcholín) a POPG (palmitoyloleoylfosfatidylglycerol) v hmotnostnom pomere 9:1. K lipidovej zmesi sme pridávali alkoholy s počtom uhlíkov v reťazci n (kde n = 8, 10, 12, 14, 16, 18). Pomer alkoholov k lipidom bol konštantný 0,4:1 mol:mol. Zmeny laterálneho tlaku sme študovali prostredníctvom metódy excimérovej fluorescencie. Merania sme vykonali v dvoch hĺbkach membrány s využitím dipyrenylových fluorescenčných sond: 1,2-bis-(1-pyrénbutanoyl)-fosfatidylcholínu a 1,2-bis-(1-pyréndekanoyl)-fosfatidylcholínu. Intenzitu emisie sme zaznamenávali pri teplotách 25, 30, 37 a 42 °C. V prípade všetkých vzoriek priamo úmerne s teplotou rástol aj laterálny tlak, čo je prejavom vyššej miery neusporiadanosti lipidových reťazcov. Závislosť laterálneho tlaku od dĺžky alkoholového reťazca mala rastúci charakter až po hexadekanol (n = 16), ktorý má v reťazci rovnaký počet atómov uhlíka ako palmitoyl v použitých lipidoch. Tento výsledok poukazuje na to, že zabudovanie dlhších alkoholov do dvojvrstvy ju stabilizuje a nespôsobí v jej štruktúre výrazné poruchy, aké sa pozorujú v prípade zabudovania kratších alkoholov.

A HIGH-TEMPERATURE LC-MS METHOD FOR EFFICIENT BOTTOM-UP PROTEOMIC ANALYSES WITH MINIMIZED ARTIFACTS

STAROVOIT, M.R.,[1] JADEJA, S.,[2] LENČO, J. [1]

[1,2]Department of Analytical Chemistry, Faculty of Pharmacy in Hradec Králové, Charles University, Czech Republic

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The mainstream in proteomics is currently a bottom-up approach. The workflow typically involves enzymatic digestion of proteins into peptides and their subsequent separation using reversed-phase liquid chromatography (RPLC) hyphenated online with mass spectrometry (MS). The quality of the MS data was proven to be inherently associated with the quality of the RPLC separation, which is advised to be performed using high column temperature and acidic mobile phases.[1] Although temperature represents an easy and powerful means for improving peptide separation, these analytical conditions also bring a significant risk of in-column peptide degradation and artificial modification. In the worst scenario, these phenomena decrease the number of identified peptides and proteins or may eventually compromise the reliability of results.[2]

In this study, we sought to develop an easy method to preserve the advantages of high temperature RPLC for bottom-up proteomics while minimizing the risk of peptide artifact production. The method relies on an inline trap column installed upstream of an analytical column. The trap column has lower retentivity than the analytical column and is maintained at a safe temperature. Consequently, it shortens the residence time of peptides in the unsafe environment of the heated analytical column. The proposed method was preliminarily optimized with RPLC-UV analyses of standard peptides and then examined in RPLC-MS analyses of a complex bacterial proteome. There, it provided a significant decrease in the abundance of modified peptides without loss in the separation quality.

The study is supported by the Project of the Czech Science Foundation (GAČR No. 22-21620S).

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GREEN SYNTHESIS OF SILVER NANOPARTICLES USING *AGRIMONIA EUPATORIA* L. AND THEIR ANTIBACTERIAL ACTIVITY

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Key words: silver nanoparticles, green synthesis, *Agrimonia eupatoria* L.

Nanoparticles have found wide applications in antibiotics production, drug transport, in diagnostics, prophylaxis and therapy of diseases. The green synthesis of nanoparticles using microorganisms and plants is regarded as a preferred approach. We used common agrimony (*Agrimonia eupatoria L.)*, for its suitable metabolites, cost-effectiveness, easy availability and medicinal properties. An aqueous agrimony extract reduced silver nitrate to silver nanoparticles (Ag NPs), which were characterized by UV, FTIR and TEM analysis. The change in the color of the solution from light yellow to dark brown indicated the synthesis of Ag NPs. The presence of biosynthesized Ag NPs, which showed maximum absorption at 425 nm, was detected by UV-VIS spectrophotometry. Using the method of transmission electron microscopy (TEM), we found that the nanoparticles had a spherical shape and a size of 20 ± 4.6 nm. The binding of metabolites from the extract to the surface of nanoparticles was proved by the Fourier transform infrared spectroscopy (FTIR). Using fast, inexpensive and eco-friendly method, we created silver nanoparticles, which contain medicinal substances from agrimony. Using the microdilution method, we found that nanoparticles exhibit antibacterial activity against *Escherichia coli* and *Staphylococcus aureus.* This nanoparticles have the potential to be used in transdermal therapy due to the antimicrobial properties of silver and regenerative, anti-inflammatory effects of agrimony.

SYNTHESIS OF POTENTIAL METALLOENZYME INHIBITORS

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Key Words: potential inhibitors, metalloenzymes, HDAC inhibitors, acrylamide synthesis

The main aim of this experimental study was to prepare new compounds, which could be used as metalloenzyme inhibitors. About one third of all proteins are metalloproteins, which have extended spectrum of functions in vivo, including regulation of blood pH, modulation of DNA transcription etc. Metalloproteins contain a metal ion as a cofactor. Dysfunction of their regulation may have effect on progression of many diseases, including cancer, heart disease, and HIV/AIDS. For that reason, inhibition of metalloenzymes is an attractive target of their treatment [1;2].

Experimental work contained four steps of the synthesis. It was based on the reaction of methyl p-hydroxycinnamate with several substituted 2-chloro-N-phenylacetamides prepared from corresponding anilines and 2-chloroacetyl chloride in the basic condition. Methyl ester was hydrolyzed to acid and, in the last step, substituted acrylamide was synthesized.

The purity and structures of prepared compounds were analyzed by TLC, NMR and HPLC.

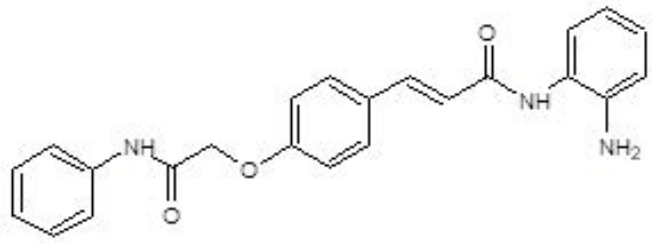

Figure 1 Structure of acrylamide

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OPTIMALIZÁCIA CE-MS METÓDY PRE ANALÝZU MITRAGYNÍNU A 7-HYDROXYMITRAGYNÍNU

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KĽÚČOVÉ SLOVÁ:
Kratom, Mitragynín, 7-hydroxymitragynín, Kapilárna elektroforéza, Hmotnostná spektrometria

Kratom (*Mitragyna speciosa* Korth.) je strom pochádzajúci z juhovýchodnej Ázie, ktorý obsahuje psychoaktívne pôsobiace indolové alkaloidy – mitragynín a jeho metabolit 7-hydroxymitragynín. V nízkych dávkach vykazujú tieto alkaloidy účinok podobný kokaínu alebo metamfetamínu, vo vyšších dávkach sú ich účinky asociované s eufóriou, analgéziou a sedáciou. Kratom patrí medzi rozšírené a často zneužívané nové psychoaktívne substancie. Na Slovensku bol v roku 2021 zaradený do I. skupiny omamných a psychotropných látok. Pre správnu identifikáciu a kvantifikáciu mitragynínu a 7-hydroxymitragynínu v rôznych matriciach je potrebné disponovať spoľahlivými analytickými metódami, ktoré môžu nájsť využitie ako súčasť toxikologických vyšetrení. V predkladanej práci sme sa venovali optimalizácii metódy na báze kapilárnej zónovej elektroforézy v spojení s hmotnostnou spektrometriou. Ako optimálny základný elektrolyt bola zvolená 100 mM kyselina mravčia. Najvhodnejšie zloženie pomocného roztoku predstavuje zmes izopropanolu s 0,1 % kyselinou mravčou v pomere 75/25 s prietokom 6 µl/min. Ionizácia analytov bola prevedená elektrosprejom, pričom optimálne napätie na kapiláre je 5000 V. Po optimalizácii parametrov hmotnostného spektrometra bolo finálne zvolené napätie na fragmentore 180 V, kolízna energia o hodnote 35 eV, teplota sušiaceho plynu 300°C, jeho prietok 6 l/min a tlak rozprašovacieho plynu 7 psi.

SYNTHESIS OF COUMARIN BASED FLUOROPHORE PROBES

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DNA topoisomerases are essential enzymes that can be found in both procaryotic and eucaryotic cells. These enzymes are fundamental for processes, such as replication and transcription, that require accessing the information stored in DNA and therefore altering the topological state of DNA strands. Topoisomerases play an important role in the therapy of bacterial infections as well as anti-cancer treatment. Both types (human topo I and II) can be targeted during anti-cancer theraphy. Isoform IIα is overexpressed during proliferation of the cell and is characteristic for cancer cells. Inhibition of this isoform leads to DNA damage in cells and consequently to cell apoptosis. This is why inhibitors of topoisomerase IIα are studied as candidates for anicancer therapy.[1]
In this project we took our interest in preparation of new entity based on coumarin (fig. 1) that could exert an activity agains human topoisomerase IIα. Results regarding the synthesis and biological activity of obtained will be discussed during the presentation.

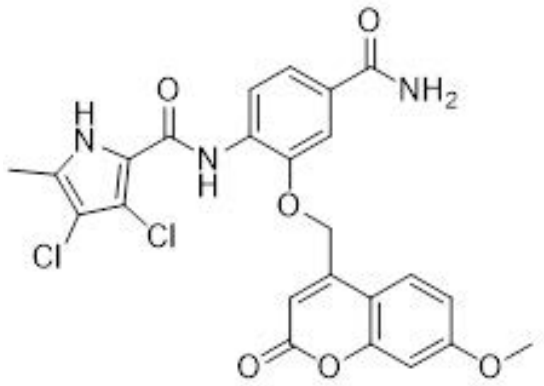

Fig.1 Coumarin based fluorophore

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NADNÁRODNÍ KOLO

ABSTRAKTY

SEKCE FARMACEUTICKÉ TECHNOLOGIE

4. 5. 2023

Zentiva, Praha

METHODS OF INCORPORATION OF DETECTION REAGENTS FOR PHOSGENE DETECTION INTO NANOCOMPOSITE PELLETS

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Key words: detection, detection tube, lyophilization, pellets, phosgene

Introduction: Chemical warfare agents (CWAs) are fast-acting and lethal substances, even at low concentrations. They still pose a serious threat in some parts of the world. Rapid detection and identification are important parts of safety precautions. Detection by detection tubes (DTs), which can contain carriers in form of pellets, is based on the formation of colored products, which are usually evaluated visually.

Methods: This study aimed to prepare pellets containing silica nanoparticles and other substances with high specific surface area using the spheronization extrusion technique and to verify the possibility of incorporating detection reagents (DRs) into pellets. Samples were dried in a hot air oven or lyophilized, and their physico-mechanical properties were evaluated. Selected samples were tested for diphosgene by Oritest s.r.o. The behavior of the samples in the presence of acetyl chloride, which is a simulant of phosgene, was also investigated.

Results: Samples containing Neusilin® US2 had higher hardness, but samples containing FujiSil® had higher interparticular porosity. Open pores on the surface increased the specific surface area and enabled better adsorption of DRs and CWAs. Lyophilization resulted in a decrease in the number of closed pores and an increased number of open pores. The incorporation of DRs from an ethanol solution during wetting reduced pellet hardness. The physico-mechanical properties of all batches met the requirements for filling into DTs.

Conclusion: During the detection of diphosgene, the pellets did not reach sufficient sensitivity. When tested with an acetyl chloride solution in acetone at a concentration of 1100 ng/ml, the tests were positive; however, at a concentration of 5.5 ng/ml, the pellets did not reach sufficient sensitivity. The used DRs or the methods of their incorporation are considered inappropriate. To improve their sensitivity, it would be advisable to increase the basicity of carriers, increase the amount of DRs, or use different DRs.

FORMULATION AND CHARACTERIZATION OF PLGA BASED FFS FOR LOCAL DRUG DELIVERY

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Many of the topical non-steroidal products used for treatment of local pain or inflammation contain either a salicylate ester (methyl, glycol) or salicylate salt (triethanolamine, diethylamine). The study showed that formulations containing methyl salicylate enable direct penetration of salicylate into underlying tissues.1 The film-forming systems (FFS) based on PLGA derivative were formulated and characterized in our work. A non-commercial derivative of PLGA branched on poly(acrylic acid) with a defined molar mass and branching ratio 2 was used as a drug carrier and in situ film-forming polymer. Thin films were prepared by a film casting method in which salicylic acid (SA), methyl salicylate (MS), and PLGA were dissolved in acetone. The thermal properties of the films were evaluated using DSC showing SA molecularly dispersed in polymer. SEM showed a relatively smooth surface of the films without cracks. The adhesive properties of the film formed in situ at 32 °C were measured using a tensile test on an absolute rheometer at a contact force of 1 N and a contact time of 30 s. Tests showed that the plasticizer increases the adhesion force. The release of salicylate from the films of a defined area was tested at a temperature of 32 °C into a phosphate buffer of pH 5.5. The burst was about 25% after 9 hours followed by steady release over 6 days influenced by SA and MS concentration. We plan to continue testing the effect of pH on the dissolution of salicylates from PLGA and permeation tests.

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THE PARTICULATE SYSTEMS CONTAINING LIPOPHILIC DRUGS OF NATURAL ORIGIN FOR VETERINARY APPLICATIONS

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Key words: thymol, pellets, rabbit, dissolution, stability

Digestive disorders and diseases are common in rabbit livestock and have high negative economic impacts. In the context of local treatment of intestinal mucosa in rabbits, thymol, an anti-inflammatory agent, was formulated into the pellets and coated with a gastro-resistant polymer. To maintain a controlled release of drug dosage form, it is essential to optimize the processes that maintain such characteristics, which are conventionally verified by a dissolution test. These data provide information on the amount of drug released from the dosage form in the specific medium at the specific time, simulating *in-vivo* conditions. Multiple batches were tested for the dissolution behavior of different coatings. The best formulation was selected for long-term stability and accelerated stability testing, yet also incorporated into feed granules and tablets.

Pellet batches consisting of thymol (dissolved in the self-emulsifying system), Neusilin®, chitosan and microcrystalline cellulose were prepared and coated with Eudragit® L30 D55 to the wt. 50 % of meeting the pharmacopoeial limits for release of less than 10% of thymol released within the first 2 h. Stability study was performed to evaluate pellets with optimized coating layer thickness and its composition. The pharmacopoeial limit was exceeded after three months at storage conditions of 40 °C, 75 % RH, and therefore accelerated stability was terminated. At 25 °C, 60 % RH, the sample was stable for 6 months. Based on the results, a storage period of 6 months at 25 °C was suggested.
The evaluation of different strategies for incorporating pellets into feed, granulate (crushed rabbit feed with thymol pellets) and tablets (compressed granulate), was tested to evaluate whether the preparation process did cause any damage to the pellets. The tablets and granulate met the pharmacopoeial limit and released less than 10% of thymol within 2 h in pH 1.2. Granulate was judged superior due to the simple feasibility of larger volume production.

We believe that the properly designed drug dosage form might be a promising strategy to highlight thymol potential in the local treatment of the intestines.

PREPARATION OF TABLETS BY SELECTIVE LASER SINTERING

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This work focuses on the preparation of orally dispersible tablets by selective laser sintering (SLS). The present project is a pilot study conducted on the 3D printer Sintratec Kit at the Department of Pharmaceutical Technology. SLS is a 3D printing method based on the fusion of powder particles using a laser beam that sinters the individual particles together in the layers of material.1-2 The matrix forming polymer used in work was Kollidon® VA64 which was combined with two pigments namely Candurin® Gold Sheen and NTX Ruby Red. In addition, mixtures of the polymer with a co-processed dry binder Prosolv® ODT G2 and a physical mixture of mannitol, silicified microcrystalline cellulose, and crospovidone at the concentrations of 20%, 40%, and 60% were used. The influence of printing parameters, especially laser speed, on tablet quality was tested. NTX Ruby Red pigment was selected for final tablet printing. The best powder formulation for optimal printing progress and high-quality properties of the orally dispersible tablets was the mixture of Kollidon® VA64 with the addition of 40% Prosolv® ODT G2 or physical mixture. The optimum laser speed for the preparation of placebo tablets were found to be 90 m.s -1 and 100 m.s -1. At this speed, tablets with 5% of the model drug were printed and showed acceptable mass uniformity, measurable destructive force, and disintegration time below one minute.

The study was supported by Grant SVV 260 547

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NADNÁRODNÍ KOLO

ABSTRAKTY

SEKCE KLINICKÉ A SOCIÁLNÍ FARMACIE

4. 5. 2023

Zentiva, Praha

THE COVID-19 PANDEMIC IMPACT ON HOSPITAL PHARMACIES IN THE CZECH REPUBLIC

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Key words: pandemic, COVID-19, hospital pharmacies, questionnaire survey, SARS-CoV-2, protective equipment

Background and Aims: The COVID-19 pandemic brought many changes and new requirements with it that individual hospital pharmacies and their employees had to deal with such as the use of personal protective equipment, personnel changes, or assistance with vaccination against the disease COVID-19. The thesis aimed to find out what technical changes, personnel changes, and changes related to completely new requirements hospital pharmacies were forced to adopt resulting from the COVID-19 pandemic in two years, from March 2020 to May 2022, and to evaluate their extent.

Methods: A questionnaire survey was conducted, which addressed all hospital pharmacies in the Czech Republic, using the GoogleForms web interface. The survey took place over a period of two months, from 9.6. 2022 until 31.7.2022. The questionnaire contained a total of 34 questions, of which 27 were closed-type, and 7 were open-type. The individual questions were divided into four thematic areas (demography of the medical facility, specific changes in the technical requirements of the pharmacy, personnel changes in the pharmacy, new requirements for hospital pharmacies during the COVID-19 pandemic, and new activities in which individual pharmacies participated as a result of the pandemic).

Results: Fifty-four completely completed questionnaires were included in the final evaluation (50% return rate). The largest significant increase was recorded in the use of personal protective equipment, respirators (99%); on the other hand, the lowest significant increase was recorded in the use of air ionizers (1%). Most of the listed technical parameters were not used by pharmacies at all before the pandemic. The exception is surface disinfectants, which were used by 88% of pharmacies even before the pandemic. 76% of pharmacies participated in the individual preparation of disinfection, while the majority prepared disinfection for personal purposes (90%). In most pharmacies, there were no changes to the opening hours, and the pharmacy's operating hours remained unchanged even during the pandemic (83%). Almost half of hospital pharmacies (46%) experienced restrictions on the operation of the pharmacy due to reasons such as quarantine or a positive result of a test for the disease COVID-19.

Almost all hospital pharmacies experienced an increase in questions from patients regarding testing for COVID-19; the most frequently used form of implementation of these questions was direct communication between the patient and the pharmacist (99%). 96% of hospital pharmacies experienced the problem of unavailability of drugs and medicinal preparations. Most often, they solved this problem by trying to increase the stock of drugs primarily used to treat COVID-19 (93%). 99% of hospital pharmacies participated in new activities that they had to face as a result of the COVID-19 pandemic, such as the distribution of vaccines and assistance with vaccination or the distribution of medicinal preparations for the disease of COVID-19 and related activities.

Conclusion: It is clear from the results that the COVID-19 pandemic greatly impacted hospital pharmacies and significantly affected their functioning. Our results show that the hospital pharmacies were able to promptly react to the newly created situation and tried to continue to do everything for safe operation with the least possible impact on limiting the operation of the pharmacy.

Author's CV: Lucia Havlíková is a fifth-year student at the Faculty of Pharmacy of Masaryk University

ANALYSIS OF DRUG DOSAGE ADJUSTMENT IN PATIENTS WITH CHRONIC KIDNEY DISEASE

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Several medications excreted by the kidneys or associated with an increased risk for adverse drug events in patients with chronic kidney disease (CKD) require dosage adjustment, avoidance, or cautious use. Our objective was to identify inappropriate drug dosages in patients with CKD admitted to the hospital. This study represents a sub-study of the previous cross-sectional study1 that examined drug-relatedness of unplanned hospital admissions to University Hospital Hradec Králové in 2018. The data were obtained from electronic medical records. In this sub study, the appropriateness of drug dosages in patients with an estimated glomerular filtration rate (eGFR) between 15 and 60 ml/min per 1.73 m2 was compared with the dosages recommended by the Summary of Product Characteristics.

The medication history of 348 patients has been checked for the appropriateness of drug dosages in relation to the eGFR. 200 (57 %) patients had at least one medication that required dosage adjustment and 37 (11 %) patients had at least one medication that required avoidance. Inappropriate drug dosages were identified in 103 (30 %) patients. Perindopril represented the most frequent medication with inappropriate dosage adjustments, followed by metformin, ramipril, and fenofibrate. The inappropriateness was identified via one single explicit measure. However, various factors influence the decisions to adjust the dose: goals and the strategy of treatment, therapeutic index, the proportion of non-renal elimination of the medication, or the possibility of monitoring.

The study was supported by Charles University (Project SVV 260 551, Project GA UK 14120).

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POSKYTOVANIE LEKÁRENSKEJ STAROSTLIVOSTI TEHOTNÝM ŽENÁM VEREJNÝMI LEKÁRNIKMI V SLOVENSKEJ REPUBLIKE

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KĽÚČOVÉ SLOVÁ: Gravidita, Lekárenská starostlivosť, Verejný lekárnik

Súčasťou lekárenskej praxe vo verejných lekárňach sú konzultácie zdravotných problémov gravidných žien, ktoré si vyžadujú farmakoterapeutické riešenie. Pri poskytovaní lekárenskej starostlivosti tehotným ženám je potrebné brať ohľad nie len na matku, ale aj na plod, ktorý je spoluužívateľom farmakoterapie. V predkladanej práci sme hodnotili názory a poskytovanie lekárenskej starostlivosti tehotným ženám verejnými lekárnikmi na území Slovenskej republiky. Realizácia prieskumu prebiehala prostredníctvom elektronického anonymného dotazníka v dvoch sieťach verejných lekární. Dotazníkového prieskumu sa zúčastnilo 141 respondentov pričom počet valídnych (hodnotených) odpovedí bol 120. Z výsledkov prieskumu vyplýva, že medzi najčastejšie konzultované problémy patrí bolesť hrdla, nauzea a vracanie, horúčka a bolesti, suchý kašeľ, a bolesť hlavy. Najčastejšou intervenciou verejných lekárnikov pri zdravotných problémoch bolesť hrdla (94,16%), nauzea a vracanie (62,5%), horúčka a bolesti (73,33%) bolo odporúčanie použitia lieku/vitamínu/ výživového doplnku/ rastlinného lieku čajoviny. Väčšina lekárnikov podľa dotazníkového prieskumu (94,16%) je si istá pri poskytovaní lekárenskej starostlivosti tehotným ženám a uvádza, že má dostatočné znalosti na riešenie farmakoterapeutických problémov tehotných žien (76,66%). Respondenti prejavili záujem o absolvovanie projektu ďalšieho vzdelávania zameraného na farmakoterapiu tehotných žien. Hodnotené odpovede dotazníkového prieskumu zahŕňali aj odporúčania lekárnikov v rozpore s SPC, použitie homeoterapie a odporúčaní ľudového liečiteľstva.

CURRENT TRENDS IN PSYCHOPHARMACOTHERAPY OF FIRST-EPISODE SCHIZOPHRENIA

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Key words: schizophrenia, first-episode psychosis, antipsychotics, psychopharmacotherapy

Introduction: Schizophrenia is a serious mental illness with a spectrum of complex symptoms. Positive symptoms are mostly dominant in the acute phase of schizophrenia and the main treatment method of these symptoms is the usage of antipsychotics. Nowadays, there is a wide range of effective antipsychotics available on the market, which help to achieve remission in patients with schizophrenia. Adequately chosen medication in the first-episode of psychosis in schizophrenia is essential for patient's long-term well-being.

Aim: The aim of this thesis was to analyse the antipsychotic medication used in Bohnice Psychiatric Hospital in the therapy of first-episode schizophrenia and to further compare these practices with guidelines of the Czech Psychiatric Society ČLS JEP.

Methods: Data was collected from Bohnice Psychiatric Hospital database. From all patients hospitalized for psychotic disorders in years 2016-2022, a set of 32 patients with a diagnosis of schizophrenia who were treated for first-episode psychosis (FEP) with a maximum age of 40 years was selected. Among these 32 patients there were 17 men and 15 women. Age, sex, physiological functions and antipsychotic medication and its dosage were recorded for each patient.

Results: Average age of patient with FEP in schizophrenia were 26,35 years for men and 29,33 years for women. Of the total number (N=32) of patients, olanzapine (53,1 %) and risperidone (34,4 %) were the most common first choice medications. Initial recommended dosage of olanzapine (10 mg/day) and risperidone (2mg/day) was followed in 70,6 % (N=17) and 81,8 % (N=11) cases respectively. Risperidone was chosen as a first choice medication in 47,1 % (N=17) men and 20 % (N=15) women. Olanzapine on the other hand was prescribed as a first choice medication in 73,3 % (N=15) women and 35,3 % (N=17) men. In 41 % (N=22) cases, olanzapine was dosed off-label. LAI/depot antipsychotics were used only in 15,6 % (N=32) cases. 56,3 % (N=32) of patients were released from hospital on antipsychotic combination therapy. Most commonly used combinations were observed between multi-acting receptor-targeted antipsychotics (MARTA) and dopamine receptor partial antagonists (DRPAs) in women - 87,5 % (W, N=8) vs. 30 % (M, N=10) and between MARTA and haloperidol in men - 60 % (M, N=10) vs. 37,5 % (W, N=8)

Conclusions: Olanzapine was overall the most effective antipsychotic medication for stabilizing FEP in schizophrenia (62,4 %, N=32) in patients hospitalized in Bohnice Psychiatric Hospital. As a first choice medication, risperidone was more frequently prescribed in men and olanzapine in women. In majority of cases, the Czech Psychiatric Society ČLS JEP guidelines for treatment of acute phase of schizophrenia and the recommended dosage by manufacturer for each antipsychotic were followed. The main difference between the clinical practice and Czech Psychiatric Society ČLS JEP guidelines was the approach to polypharmacy.

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FOLLOW-UP PATIENTS AFTER COVID-19 MONOCLONAL ANTIBODIES ADMINISTRATIONS

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At height of COVID-19 pandemic surge of Delta variant, monoclonal antibodies became a vital treatment option for SARS-COV-2 positive outpatients. Casirivimab and imdevimab (C/I) were used under EMA emergency use authorisation (EUA) and there was paucity of real-world data on safety and effectiveness. The study aimed to describe drug safety, self-reported symptom burden and patients characteristics (indication, vaccination status) in SARS-COV-2 positive outpatients within 90 days post-C/I infusion. Ethics committee approval was obtained. Prospective multicentric survey was conducted from September 2021 till April 2022 in three teaching hospitals. The data collected using electronic medical records comprised: patient details, vaccination status, date of SARS-COV-2 positive test, indication, need for hospitalization. Structured telephone questionnaire adapted from BLAZE-1 trial1 with symptom scoring was used on D (day) 0, D+7, D+29 and D+90 post C/I infusion. Within studied period 401 (median age 66 years; 57,9 % females) were followed. The most frequent indications included age over 65 years (55,9 %), hypertension (57,1 %), diabetes mellitus (21,2 %). Adverse events were reported by 13,5 % of patients, most commonly chills, fever, diarrhea. Subjective worsening of symptoms after C/I infusion was reported by 3,5 % subjects by D+7. 9,2 % patients observed no difference in symptom score between D0 and D+7. Altogether 84,8 %; 91,8 % and 93,5 % patients reported improvement in symptom burden score by D+7, D+29 and D+90 respectively. We describe real-life outpatient utilisation of C/I in terms of patient characteristics, self-reported symptom burden and adverse events.

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