Pharmacy Education (2020) 20(3) 77 - 90
https://doi.org/10.46542/pe.2020.203.7790

CONFERENCE ABSTRACTS

FIP VIRTUAL 2020

New, Personalised and Precision Medicines, including Drug Delivery and Industrial Pharmacy and Scientists

Design of solid powder particles for a needle-free injection

Lukas Pietsch*, Geoffrey Lee

Lehrstuhl für pharmazeutische Technologie, Friedrich-Alexander-Universität Erlangen-Nürnberg, Erlangen, Germany

Background: In 2020, the COVID19 pandemic has shown the medical need for vaccinations. The conventional method of vaccine application is intravascular injection of a liquid solution. However, this method is associated with some disadvantages, such as a high risk of infection.

Purpose: The approach of a needle-free ballistic administration accelerates solid powder particles to a sufficient speed so that they are able to penetrate into the skin and address target Langerhans cells. For this purpose, the particles require certain characteristics (Weissmueller *et al.*, 2017). The main criteria for a successful application is the particle size as well as the density (Maa *et al*., 2004).

Method: One potential production process is freeze-drying out of a solution with a subsequent milling step (abbreviated to FD). Another modified approach is spray-freeze drying (abbreviated to SFD). Dried powders are treated afterwards by ultrasonic microsieving (6000 vibrations per seconds for ten minutes) in order to segregate a useable fraction (38 µm to 75 µm). Tap density was determined according to the protocol by Ph.eur. guidelines. Helium pycnometry determines the true density. The magnitude of density is described by the quotient of tap density ρ tap and pycometric density ρ He- pycnometer.

Results: Estimated density of examined samples containing trehalose and mannitol could not exceed 50%.

Conclusion: The described techniques reveal a quite porous structure of the product. This structure might not be sufficient for particles to successfully penetrate into the skin. These powder particles might burst upon the surface. However the dimension of the speed has to be considered as well as it plays a crucial role as well.

References

Maa, Y., Ameri, M., Shu, C., Payne, L.G., & Chen, D. (2004) Influenza Vaccine Powder Formulation Development: Spray-Freeze-Drying and Stability Evaluation. *Journal of Pharmaceutical Sciences,* **93**(7), 1912-1923. https://doi.org/10.1002/jps.20104

Schiffter, H., Condliffe, J., & Vonhoff, S. (2010) Spray-freeze-drying of nanosuspensions: the manufacture of insulin particles for needle-free ballistic powder delivery. *Journal of the Royal society*, **7**, 483-500

Weissmueller, N., Marsay, L., Schiffter, H.A., Carlisle, R.C., Rollier, C.S., Prud'homme R.K., & Pollar, A.J. (2017). Alternative vaccine administration by powder injection: Needle-free dermal delivery of the glycoconjugate meningoccocal group Y vaccine. *PLoS ONE*, **12**(8) https://doi.org/10.1371/journal.pone.0183427

* = *Presenting Author*

ISSN 1477-2701 online

Maghemite/PLGA (core/shell) nanocomposites for combination antitumor therapy

Fátima Fernández-Álvarez[1]*, Gracia García-García[1], Consolación Melguizo[2,3,4], José C. Prados[2,3,4], José L Arias[2,3,5]

[1]*Pharmacy and Pharmaceutical Technology, University of Granada, Granada, Spain*

[2]*Biosanitary Institute of Granada (ibs.GRANADA), Andalusian Health Service (SAS) – University of Granada, Granada, Spain*

[3]*Institute of Biopathology and Regenerative Medicine (IBIMER), Biomedical Research Centre (CIBM), University of Granada, Granada, Spain*

[4]*Department of Human Anatomy and Embryology (Faculty of Medicine), University of Granada, Granada, Spain*

[5]*Pharmacy and Pharmaceutical Technology (Faculty of Pharmacy), University of Granada, Granada, Spain*

Background: Combination therapy is a promising move against cancer. Superparamagnetic iron oxides can help in engineering nanoplatforms that can maximise the accumulation of chemotherapeutics into malignant cells (Jamieson & Lippard, 1999) simultaneously providing antitumor magnetic hyperthermia functionalities.

Purpose: Development of a reproducible procedure to obtain maghemite/PLGA nanocomposites (NCs). In vitro evaluation of: i) the loading of Cisplatin to the NCs and the drug release kinetics; and, ii) the magnetic hyperthermia effect.

Method: Incorporation of oleic acid onto the maghemite nuclei was confirmed by the analysis of the surface thermodynamics. The NCs were prepared by emulsion/solvent evaporation2 and size was analysed by PCS. Magnetic responsiveness and heating capacity were characterised. Drug loading was determined by UV-Vis absorbance measurements. The dialysis bag technique was used to characterise in vitro the drug release. The hyperthermia effect was evaluated against T84 human colon cancer cells.

Results: Complete coating of the nuclei with oleic acid improved the yield (%) in the production of NCs (≈ 270 nm). Maximum drug loading and entrapment efficiency values were 15% and 73%, respectively. Cisplatin release was a biphasic process involving an early rapid release phase followed by a longer second phase. Drug release was faster under hyperthermia conditions (45°C). The antitumor magnetic hyperthermia capacity of the NCs significantly decreased the viability of T-84 cells.

Conclusion: A reproducible methodology to obtain Cisplatin-loaded NCs was defined. The nanoplatform showed promising capabilities for combination therapy against cancer.

References

Jamieson, E.R., & Lippard, S.J. (1999). Structure, Recognition, and Processing of Cisplatin–DNA Adducts. Chemical Reviews, **99**. https://doi.org/10.1021/cr980421n

A magnetopolymeric nanocomposite for synergistic anticancer treatments

Gracia García-García[1]*, Fátima Fernánde-Álvarez[1], Consolación Melguizo[2,3,4], José C. Prados[2,3,4], José L. Arias[1,2,3]

[1]*Pharmacy and Pharmaceutical Technology Department, Faculty of Pharmacy-University of Granada, Spain*

[2]*Biosanitary Institute of Granada (ibs.GRANADA), Andalusian Health Service (SAS)-University of Granada, Spain*

[3]*Institute of Biopathology and Regenerative Medicine (IBIMER), Biomedical Research Centre (CIBM)-University of Granada, Spain*

[4]*Department of Human Anatomy and Embryology, Faculty of Medicine-University of Granada, Granada, Spain*

Background: Antitumor magnetic hyperthermia can defeat malignancies per se or, more interestingly, be combined with chemotherapy to optimise clinical outcomes (Dagogo-Jack & Shaw, 2018). Superparamagnetic iron oxides are ideal materials in this scenery. However, limited biomedical use is associated to pure nanoplatforms exclusively made of them

Purpose: Formulation of magnetite/poly(ε-caprolactone) nanoparticles (Fe3O4/PCL NPs) loaded with Gemcitabine (Gem). In vitro analysis of the potentialities in combination therapy (hyperthermia and chemotherapy) against cancer.

Method: NPs were obtained by interfacial polymer disposition, and characterised by dynamic light scattering, electrophoresis, X-ray diffractometry, and thermodynamic analysis. Gem loading and release was characterised by UV- Vis absorbance determinations. Drug release was analysed by the dialysis bag method (pH 7.4, at 37 and 45°C). Magnetic responsiveness and heat generation were evaluated in vitro. Antitumor hyperthermia-mediated by the Fe3O4/PCL NPs was investigated in HT-29 human colon adenocarcinoma, T-84 human colon carcinoma, and MCF-7 breast cancer cells.

Results: A reproducible procedure was developed to produce the NPs (125 nm in size) capable of significantly reducing cell viability in T-84, HT-29 and MCF-7 lines to: 34.0%, 32.0% and 28.0%, respectively. Maximum Gem loading and entrapment efficiency values were found to be 11.0% and 84.0%, respectively. Gem release was a biphasic process dramatically accelerated at the maximum temperature of hyperthermia (45°C).

Conclusion: Gem-loaded Fe3O4/PCL NPs have demonstrated in vitro promising possibilities for combination antitumor therapy. In vivo studies are in progress.

References

Dagogo-Jack I., & Shaw, A.T. (2018). Tumour heterogeneity and resistance to cancer therapies. Nature Reviews. *Clinical Oncology*, **15**(2), 81-94. https://doi.org/10.1038/nrclinonc.2017.166

Anti-thyroperoxidase and anti-thyroglobulin antibodies: a comparison of techniques

Laura Alcazar[1], Marta García Collia[2]*, Ignacio Arribas Gómez[1], Roberto Pariente Rodríguez[3], Paloma Lapuente Suanzes[3]

[1]*Biochemistry, Hospital Ramón y Cajal, Madrid, Spain*

[2]*Vocal Nacional Analistas Clínicos, Consejo Gral COFs, Madrid, Spain*

[3]*Inmunology, Hospital Ramón y Cajal, Madrid, Spain*

Background: Hypothyroidism is a frequent disease of autoimmune origin and anti-thyroperoxidase (TPO) and anti-thyroglobulin (TG) antibodies are involved in the damage of the gland. Therefore, the measurement of these autoantibodies in serum samples is useful in the etiologic diagnosis of hypothyroidism

Purpose: To analyse the interchangeability of the results of anti-TPO and anti-TG measured by two analysers, Architect i2000 (Abbott) and Phadia 250 (Thermofisher).

Method: A total of 107 serum samples were measured by both techniques. Results were expressed in IU/mL. The comparison analyses were performed with Passing-Bablock non-parametric linear regression test, Bland-Altman concordance test and intraclass correlation coefficient (ICC). The analyses were conducted with MedCalc statistical assistant.

Results: Passing-Bablock regression analysis showed that Anti-TG's intercept was 3.338 [95% CI = 1.115-5.007] and anti-TPO's intercept was 0.918 [95% CI = 0.762-1.166]. Anti-TG' slope was 2.307 [95% CI = 1.884-2.712] and anti-TPO's slope was 0.442 [95% CI= 0.129-0.477].

Bland-Altman concordance study for anti-TG's showed a means difference of -69 [95% CI = from -591 to 452], and anti- TPO's means difference of 75 [95% CI = from -181 to 331]. ICC of anti-TG was 0.438 [95% CI = 0.166-0.622] and ICC of anti-TPO was 0.838 [95% CI = 0.649-0.922].

Conclusion: Passing-Bablock analysis revealed a systematic bias for both anti-TG and anti-TPO analysis, and also a proportional bias between the two techniques. Bland-Altman concordance study didn't show any bias. ICC yields low value for anti-TG and fairly good for anti-TPO. For this reason, it is concluded that these techniques are not interchangeable, and other reference values are needed.

Recommendations for pre-emptive genotyping in the Netherlands

Ka-Chun Cheung*, Marga Nijenhuis, Mandy Crommentuijn – van Rhenen, Inge Holsappel

Medicine Information Centre, Royal Dutch Pharmacists Association, Den Haag, Netherlands

Background: The Dutch Pharmacogenetics Working Group (DPWG) of the KNMP has been developing pharmacogenetic guidelines since 2005. These guidelines, however, do not indicate wether patients are eligible for genotyping. Since 2017, the DPWG has started to develop recommendations for pre-emptive genotyping.

Purpose: The recommendations for pre-emptive genotyping will increase the clinical use of pharmacogenetics and aim to optimise therapy and prevent side-effects. It indicates the relevance of genotyping for a specific drug and it increases the availability of genotypes overall.

Method: The clinical implementation score is used to determine if pre-emptive genotyping is essential, beneficial or potentially beneficial. The criteria for this score include the clinical effect, level of evidence, number needed to genotype and pharmacogenetics information in the Summary of Product Characteristics.

Results: Pre-emptive genotyping is indicated to be essential for 13 drugs, beneficial for five drugs and potentially beneficial for 21 drugs to date.

Conclusion: The recommendations for pre-emptive genotyping are a next step into clinical implementation of pharmacogenetics. In the PREPARE study (www.upgx.eu) a complete panel of genotypes is determined when a patient is eligible for inclusion. Until a complete genotyping panel is standard of care, the recommendations for pre-emptive genotyping can help healthcare professionals to select the most relevant patients for genotyping to optimize therapy and prevent side-effects. This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 668353.

Health technology assessment of precision and personalised medicine interventions: Methodological developments

Dalia M. Dawoud[1]*, Emily Leckenby[2], Páll Jónsson[2]

[1]*Science Policy and Research, National Institute for Health and Care Excellence (NICE), London, United Kingdom*

[2]*Science Policy and Research, National Institute for Health and Care Excellence (NICE), Manchester, United Kingdom*

Background: Current approaches to assess the value of health technologies focus on estimating average effects on a cohort level and, in doing so, may not consider the heterogeneity among individuals and the impact of their characteristics on response to treatment.

Purpose: To facilitate the development of methodologies to deliver more customised information on the effectiveness and cost-effectiveness of personalised medicine interventions.

Method: Next Generation Health Technology Assessment project (HTx) is a five-year Horizon 2020-funded project. As part of HTx, potential therapeutic areas and interventions for developing methods for personalised cost effectiveness analysis and comparative effectiveness research have been identified.1 Patient-level prediction models are developed using conventional as well as artificial intelligence (AI) and Machine Learning (ML) techniques. These methods will be tested in a "policy sandbox" environment to assess their potential for implementation in real-world health technology assessment (HTA) decision making context.

Results: The following therapeutic areas have been identified for development of patient level prediction models: head and neck cancer, diabetes, multiple sclerosis and myelodysplastic syndrome. The interventions tested include sequences of treatment, digital technologies and telehealth. Planned outputs include prediction models that could be used to guide clinical decision making.

Conclusion: Recent advances in the area of precision medicine show promise in relation to using AI and ML methods to facilitate personalized assessment of treatment effect. HTA organisations should develop their methods to respond to this change.

References

Next Generation Health Technology Assessment project (HTx). (2020). About HTx Project. Available at: https://www.htx-h2020.eu/about-htx-project/

Suitability of the demand in request for thyroid hormones from Spain

Marta García Collía[1]*, María Salinas Lacasta[2], Inmaculada Martín Navas[3], Daniel al Kassam Martínez[4], Miriam Albert Hernández[5], Diego García Martínez de Artola[6], Jose Antonio Carbajal de Lara[7], Pilar Marí[8], Cristina de la Mata[9], Sara Doménech García[10], Nerea Bastida Lertxundi[11], Milagrosa Macías Sánchez[12], Angel San Miguel Hernández[13], Blanca Fernández Fatou[14]

[1]Member of Clinical Analysts, General Council of Pharmaceutical Colleges of Spain, Madrid, Spain

[2]Official College of Pharmacists (OCPH), Alicante, Spain

[3]OCPH, Baleares, Spain; *[4]OCPH, Asturias, Spain*

[5]OCPH, Zamora, Spain *[6]OCPH, Tenerife, Spain*

[7]OCPH, Albacete, Spain *[8]OCPH, Castellón, Spain*

[9]OCPH, Burgos, Spain *[10]OCPH, Madrid, Spain*

[11]OCPH, Guipuzcoa, Spain *[12]OCPH, Cáceres, Spain*

[13]OCPH, Valladolid, Spain *[14]OCPH, Badajoz, Spain*

Background: The request for Thyroid Hormones (TH) in primary care (PC) medical is essential in the early diagnosis and monitoring of Thyroid Pathology.

Purpose: Study the demand and the adequacy in the request for laboratory tests in the request of TH parameters from PC in Spain and the differences between CCAA.

Method: Participating public laboratories were required to serve the needs of a Department of Health (DS), which will complete a form regarding the number of thyroid tests requested, from primary care for one year and the number of inhabitants of the DS. The request for each test was calculated for every 1,000 inhabitants and the ratio of request for free thyroxine (fT4) and triiodothyronine (fT3) for thyrotropin (TSH), (fT4 / TSH), (fT3 / TSH) and anti-thyroglobulin antibody (TgAb) with respect to anti-peroxidase (TPOAb) (TgAb / TPOAb) and the results between the different CCAA, with more than 4 participants.

Results: 110 laboratories that attended to 27,798,262 inhabitants participated. It was requested about six million TSH, which represented an expense of 10,643,840 Euros. The TSH demand data for every 1,000 inhabitants ranged from 198 to 289, and the request for fT4 doubled in the DS with the most demand. The TPOAb request per 1000 inhabitants varied from 0.2 to 11.2, and the application of TgAb and TPOAb was concomitant in five CCAA, as shown by TgAb / TPOAb results.

Conclusion: There is a high demand for laboratory tests of TH in PC. The request and expense in the TSH measure is very high. The variability observed between the CCAA and the inadequacy, especially in antithyroid antibodies, suggests that design strategies, on a national scale, are needed to improve your application.

Regional variability in recommendations for patient for laboratory testing in primary care

Marta García Collía[1]*, María Salinas Lacasta[2], Daniel al Kassam Martínez[3], Inmaculada Martín Navas[4], Milagrosa Macías Sánchez[5], Nerea Bastida Lertxundi[6], Delia Quilez Agreda[7], Rosario Caro Narros[1], Cristina Gutierrez Fornés[9], Diego García Martínez de Artola[10], Angel San Miguel Hernández[11], Sara Doménech García[12], Miriam Albert Hernández[13]

Counsellor Clinical Analysts General , General Council of Pharmaceutical Colleges of Spain, Madrid,

[2]Member of Clinical Analysts, Official College of Pharmacists (OCPH) Alicante, Spain

[3]OCPH Asturias, Spain *[4]OCPH Baleares, Spain,*

[5]OCPH Cáceres,Spain *[6]OCPH GuipuzKo, Spain*

[7]OCPH Navarra, Spain *[8]OCPH Segovia, Spain*

[9]OCPH Tarragona, Spain *[10]OCPH Tenerife, Spain*

[11]OCPH Valladolid, Spain *[12]OCPH Madrid, Spain*

[13]OCPH Zamora, Spain

Background: Preparation of the patient for laboratory tests is crucial for a subsequent accurate interpretation of many laboratory results.

Purpose: The aim was to investigate what the current practice and regional variability of recommendations regarding patient preparation for laboratory tests requested by Primary Care physicians is in Spain.

Method: A call for data was posted by email. Spanish laboratories were invited to fill out and submit a survey regarding current practice and agreement with a proposed harmonised recommendation.

Results: Sixty-eight (68) laboratories participated in the study. In 50 (73%) of those, fasting was always recommended regardless of the requested tests; in 16 (24%) it was just encouraged when tests requiring fasting were ordered; in 2 (3%) institutions fasting was always recommended except for CBC and/or coagulation tests. Only one third (24/68; 35%) of the laboratories systematically recommended a 12-hours fasting. In 48 (71%) water intake was allowed without restrictions during the fasting period and only in 9 (13%) to a maximum of 500 ml. In 45 (66%) a light meal was recommended before fasting. In 39 (57%) computerised order entry offered the possibility to print customised recommendations automatically in the primary care doctor's office according to the requested tests. Forty-nine (49) (72%) laboratories agreed with the proposed recommendation

Conclusion: There was a high variability in patient's preparation for laboratory testing. A significant proportion of centres did not follow international guidelines.

Effectiveness of evolocumab in the treatment of familial hypercholesterolemia and cardiovascular disease

Javier García Marín*, Marina Fages Pérez, Alberto Soria Martín, Javier Romero Puerto, María Paz Quesada Sanz, José Ramón Ávila Álvarez

Farmacia, Hospital Punta de Europa, Algeciras, Spain

Background: Evolocumab is a monoclonal antibody that reduces LDL cholesterol (LDL-C) levels by binding to PCSK9.

Purpose: To evaluate the efficacy of evolocumab in the treatment of familial hypercholesterolemia (FH) and cardio-vascular disease (CVD).

Method: Observational and retrospective study of patients who started treatment with evolocumab between January 2016 and April 2020. Data were obtained from the outpatient dispensing module ATHOS-Prisma and from the Digital Unique History (Diraya). The variables collected were: age, sex, diagnostic, baseline LDL-C and LDL-C reached after the start of treatment and mean duration of treatment. To evaluate the efficacy, a reduction of at least 50% was considered with respect to the baseline value of LDL-C and / or target values of LDL-C <100 mg / dL in patients with high cardiovascular risk (CVR) and LDL-C <70 mg / dL in patients with very high CVR or CVD

Results: A total of 34 patients, 15 men and 19 women, with a mean age of 60.2 years, 20 of them with CVD and 14 with FH (five with high CVR and nine with very high CVR) were included. 12 patients were administered as monotherapy, and in 22 cases, in combination with statins and/or ezetimibe with an average duration of 20.2 months. The mean baseline LDL-C was 181.7 mg/dL (93-298) and LDL-C reached 102.7 mg/dL (6-262). 18 patients reached LDL-C target values, 11 with CVD, five with FH with very high CVR and two with FH with high CVR.

Conclusion: Evolocumab seems to be more effective in achieving LDL-C target values in patients with very high CVR or CVD, but it would be necessary to study if it is associated with a decreased cardiovascular events. The combination or not with statins and/ or ezetimibe does not seem to affect the efficacy.

Acquired Haemophilia can be caused by aortic stenosis? A clinical case report

Manuel Linares Torres[1], Marta García Collía[2]*

[1]*Clinical Biochemistry, Hospital Ramón y Cajal, Madrid, Spain*

[2]*Vocal nacional de analistas clínicos , Consejo General del Colegio Oficial de Farmacéuticos de España, Madrid, Spain*

Background: Haemophilia is a rare disorder in which the person's blood cannot clot normally as it lacks sufficient clotting factors; specifically: F.VIII (Haemophilia A) or F.IX (Haemophilia B). According to literature, congenital haemophilia is caused by mutations in the genes that encode F.VIII or IX, whereas acquired haemophilia is produced by autoantibodies against these factors.

Purpose: In this study, a patient with aortic stenosis was analysed. They had aPTT (activated Partial Thromboplastin Time) elongated and 46% of F.VIII activity without the presence of F.VIII inhibitor. After replacing their aortic valve with a biological prothesis the patient presented a normal aPTT and F.VIII activity. The purpose of this abstract is to relate aortic stenosis to acquired haemophilia.

Method: In the laboratory coagulometric methods were used to measure the aPTT and F.VIII activity. Moreover, a literature search in Pubmed was conducted using the keywords 'aortic stenosis', 'Haemophilia' and 'Factor VIII'.

Results: A syndrome which can relate aortic stenosis to blood clotting deficiency is Heyde syndrome, which connects aortic stenosis with acquired VonWillebrand disease. VonWillebrand factor (FVW) is a multimeric protein which is fragmented when passing through the degenerative aortic valve. FVW concentration is normal but it does not work.

Conclusion: There are no reports about acquired haemophilia cases produced by non-immune causes. The only explanation that the authors have found is associated with Heyde syndrome, which connects aortic stenosis with acquired VonWillebrand disease. FVW is fragmented when passing through the degenerative aortic valve, its concentration is normal, but it does not work. Thus, FVW will not be able to protect F.VIII, developing haemophilia A.

References

Binnetoğlu, F.K., Babaoğlu, K., Filiz, Ş.G., Zengin, E., Altun, G., Kılıç, S.Ç., & Sarper, N. (2016) Acquired von Willebrand syndrome in children with aortic and pulmonary stenosis. *Cardiovasc Journal of Africa*, **27**(4), 222-227

Selvam, S.N., Bowman, M., Inglis, M., Kloosterman, R., Grabell, J., Casey, L., Johri, A.M., & James, P. (2019). Patients with aortic stenosis have von Willebrand factor abnormalities and increased proliferation of endothelial colony forming cells. *Journal of Thrombosis and Haemostasis*, **18**(3), 593-603. https://doi.org/10.1111/jth.14715

Theis, S.R., Turner, S.D. (2019), Heyde Syndrome. StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2020-2019.

Tsuchiya, S., Matsumoto, Y., Doman, T., Fujiya, T., Sugisawa, J., Suda, A., Sato, K., Ikeda, S., Shindo, T., Kikuchi, Y., Hao, K., Takahashi, J., Hatta, W., Koike, T., Masamune, A., Saiki, Y., Horiuchi, H., & Shimokawa, H. (2020). Disappearance of Angiodysplasia Following Transcatheter Aortic Valve Implantation in a Patient with Heyde's Syndrome: A Case Report and Review of the Literature. *Journal of Atherosclerosis and Thrombosis*, **27**(3), 271-277. https://doi.org/10.5551/jat.49239

Standardised interpretation of CYP2D6 genotypes and phenotypes: From lab reports to clinical recommendations

Luana Mifsud Buhagiar[1,2], Anthony Serracino-Inglott[1,2]*, Godfrey LaFerla[3]

[1]*Department of Pharmacy, Faculty of Medicine and Surgery, University of Malta, Malta*

[2]*Medicines Authority, Malta*

[3]*Department of Surgery, Faculty of Medicine and Surgery, University of Malta, Malta*

Background: Interpretation of CYP2D6 genotypes to assign phenotypes is critical since clinical recommendations are based on phenotypes. In 2019, the CYP2D6 Genotype to Phenotype Standardisation Project addressed concerns of discordant phenotype assignments.

Purpose: What are the practical implications of the consensus on standardised CYP2D6 genotype to phenotype translation?

Method: Buccal swabs were obtained from 42 consenting patients on amitriptyline therapy attending Mater Dei Hospital.

Lab analysis, using real-time PCR with SNP genotyping assays, reported CYP2D6 genotype (e.g. *1/*1), copy number variation (e.g. 2), and phenotype (e.g. normal metaboliser). CYP2D6 activity scores were calculated and the phenotypes inferred by lab reports reconsidered in line with the newly published standardisation - downgrading a CYP2D6 activity score of 1 from normal to intermediate and downgrading CYP2D6*10 activity score from 0.5 to 0.25.

Results: The lab reported three intermediate, 35 normal and four ultra-rapid CYP2D6 metabolisers. Aberrant metabolism was identified in 17% of patients. The reconsideration exercise assigned an intermediate metaboliser status to 14 patients previously categorised as normal, rendering 50% of patients to deviate from the normal phenotype. The impact of consensus changes was evident in the CYP2D6 intermediate metaboliser status for which tricyclic antidepressant clinical guidelines recommend a 25% reduction in dose.

Conclusion: Pragmatic construal of standardisation concerns may necessitate review of genotype-inferred phenotypes stored in patient health records. Further clinical research with harmonised phenotype assignments is anticipated.

Galenic preparations for the prevention of the spread of COVID-19

Francesca Baratta[1,2], Viviana Ramonda[1]*, Gaetano Di Lascio[2], Paola Brusa[1,2]

[1]*Department of Drug Science and Technology, UNIVERSITY OF TURIN,* [2]*Aid Progress Pharmacist Agreement onlus non- profit association, Torino, Italy*

Background: A.P.P.A. Project is the main activity of the non-profit organisation Aid Progress Pharmacist Agreement (A.P.P.A.) which is the result of the cooperation between the University of Turin and Italian Pharmacists and it operates in the field of International Health Cooperation. The objective of the Project is the realisation of Galenic laboratories within healthcare facilities located in Developing Countries. Seven Projects are currently on-going in Madagascar, Angola, Chad and Haiti.

Purpose: In view of the pandemic caused by COVID19, and to reduce its spread as much as possible in the hospitals where the Project is active, the goal was to implement specific procedures on site for the production of alcoholic solutions, liquid soaps and disinfectant gels in accordance with WHO guidelines.

Method: The A.P.P.A. labs have been promptly equipped with standard procedures for the preparation of disinfectant formulations. The procedures have been developed in a very simple way to allow their introduction on site even remotely and without a specific training path that requires to be carried out in person.

Results: Since the manual skills have been acquired during the preparation of Galenic formulations over time, local operators had no difficulty with the new formulations; if necessary specific indications are given by email or by phone calls. In the labs where these formulations had already been introduced in the past for the prevention of nosocomial infections, the setting up has been enhanced by the reorganisation of the production activities.

Conclusion: The Galenic preparation, also in these contexts, resulted a good strategy for healthcare personnel and for hospitalised patients.

References

WHO [World Health Organisation]. (2009). WHO Guidelines on Hand Hygiene in Health Care: A Summary. Available at: https://www.who.int/gpsc/5may/tools/who_guidelines-handhygiene_summary.pdf

WHO [World Health Organisation]. (2020). Water, sanitation, hygiene, and waste management for the COVID-19 virus. Available at: https://www.who.int/publications/i/item/water-sanitation-hygiene-and-waste-management-for-the-covid-19-virus-interim-guidance

A.P.P.A. Project: Therapeutic food prepared in galenic laboratories

Viviana Ramonda[1]*, Francesca Baratta[1,2]*, Francesca Tarditi[2], Gaetano Di Lascio[2], Paola Brusa[1,2]

[1]Department of Drug Science and Technology, University of Turin, Italy

[2]Aid Progress Pharmacist Agreement onlus non- profit association, Torino, Italy

Background: A.P.P.A. Project is the main activity of the non-profit organisation Aid Progress Pharmacist Agreement, which is the result of the cooperation between the University of Turin and Italian Pharmacists, and it operates in the field of International Health Cooperation. The aim of the Project is the realisation of galenic laboratories within healthcare facilities located in Developing Countries. Seven Projects are on-going in Madagascar, Angola, Chad and Haiti. Against child malnutrition, WHO and UNICEF have provided guidelines for the preparation of food products with high energy content and easy to administer, among these are the Ready to Use Therapeutic Food (RUTF), peanut-based paste in a plastic wrapper. The supply of RUTF is almost impossible in the realities in which A.P.P.A operates, because they are always very far from their respective capitals, the cost of transport can get to two euros per dose and the product is not always available.

Purpose: To allow local operators to produce a specific therapeutic food on site composed of local raw materials with the addition of mineral salts and vitamins.

Method: A feasibility study and cost analysis were conducted, then a standard operating procedure was established, whose application could be sustainable by the requesting health structures.

Results: In according with WHO guidelines, an operating procedure has been developed. One serving ranges from 0.30 and 0.40 Euros, definitely lower than the industrial one.

Conclusion: The operating procedure has already been introduced in two laboratories during the year 2019 and the technicians were trained for the preparation. In the coming months, a follow-up of the treatment of hospitalised patients is expected.

References

USDA [U.S. Department of Agriculture). (2012). Commercial item description: ready-to-use therapeutic food (RUTF). Available at: https://www.ams.usda.gov/sites/default/files/media/CID%20Therapeutic%20Food%2C%20Ready-To-Use.pdf

WHO [World Health Organisation]. (1999). Management of severe malnutrition: a manual for physicians and other senior health workers. Available at: https://www.who.int/nutrition/publications/severemalnutrition/9241545119/en/

Finding new analytical solutions for personalised breast cancer treatment

Miranda Sertić[1]*, Tajana Silovski[2], Slaven Crnković[3,4], Biljana Nigović[1]

[1]Department of Pharmaceutical Analysis, University of Zagreb Faculty of Pharmacy and Biochemistry, Zagreb, Croatia

[2]Klinicki Bolnicki Centre Zagreb, Zagreb, Croatia

[3]Ludwig Boltzmann Institute for Lung Vascular Research, Austria

[4]Otto Loewi Center, Physiology, Medical University of Graz, Graz, Austria

Background: Breast cancer is the most common malignant tumour in women. Systematic medication therapies include chemotherapy, endocrine therapy, targeted therapy and immunotherapy.

Purpose: In clinical practice, the concept of therapeutic drug monitoring (TDM) is increasingly being used to achieve the best therapeutic effect of the drug with minimal risk of side or toxic effects. In oncology patients, this concept is still being adapted, with only a small number of drugs (such as methotrexate) in which TDM is part of the standard of care. For many anticancer drugs there is still not enough data on the effectiveness and importance of this approach.

Method: Patients not achieving desired treatment outcomes will be chosen for TDM. New analytical methods, employing both liquid chromatography (LC) and capillary electrophoresis (CE) coupled to a sensitive mass spectrometer (MS) and sample pre-treatment methods, will be developed to ensure accurate, fast and reliable drug determination.

Results: Through this is an ongoing project, new analytical LC-MS and CE methods will be developed for the analysis of novel drugs, cyclin-dependent kinases 4 and 6 (CDK4/6) inhibitors palbociclib and ribociclib, which are used in combination with endocrine therapy (anastrozole and letrozole) or antiestrogen fulvestrant.

Conclusion: Newly developed analytical methods can be used in routine clinical laboratories for TDM of patients on these cancer treatment protocols. Additional post-marketing surveillance, PK and metabolic studies of palbociclib and ribociclib will give more insight into their pharmacokinetics in real patients with co-morbidities and additional therapy.

UV/Vis spectroscopy in determining water content in solvents

Maria Xiberras[1], Nicolette Sammut Bartolo[1], Everaldo Attard[2], Victor Ferrito[1], Anthony Serracino-Inglott[1]*

[1]*Department of Pharmacy, University of Malta, Msida, Malta*

[2]*Rural Sciences and Food Systems, University of Malta, Msida, Malta*

Background: The Karl Fisher titration is one of the main methods used to determine water content in solvents. Adopting the UV/Vis spectroscopy could be a simpler alternative to the Karl Fisher method.

Purpose: To develop an alternative method to the standard Karl Fisher for the determination of water content in tetrahydrofuran (THF) as an example of a solvent.

Method: A method to determine the water content in alcohol-based solvents using cobalt chloride (CoCl2) as an indicator and a UV/Vis spectrometer, was adapted for THF. Three solutions of CoCl2 in anhydrous THF at a concentration of 1.69x10-3 mol/L, 3.42x10-3 mol/L and 6.98 x10-3 mol/L, were prepared. For each concentration, eight dilutions which make up to a volume of 1 mL, were made in triplicates, by adding 0.1, 0.5, 1, 2, 5, 8, 10 and 15 µl respectively, of HPLC grade water. Analysis of the solutions was conducted using UV/Vis spectrometry (200nm to 800nm).

Results: THF has an absorbance between 200-320nm. CoCl2 has an absorbance between 480-720nm with a maximum absorbance at 672nm observed in the 1.69x10-3mol/L and 3.42 x10-3mol/L solutions and at 669nm in the highest THF/CoCl2 solution. The average absorbance for each dilution was calculated at 672nm and plotted. From their respective polynomial equations, an initial increase in absorbance followed by a decrease on further addition of water was observed. This variance in absorption could be due to the incomplete dissolution of CoCl2 in THF, forming a very fine suspension which escapes detection.

Conclusion: UV/Vis spectroscopy may present an alternative method for the determination of water in solvents. Yet, the Karl Fisher titration remains the method of choice.

Might selenium nanoparticles help as adjuvant antitumor therapy?

Ines Adam-Dima[1]*, Mihaela Balas[2], Carmen Nicoleta Purdel[1], Denisa Margina[3]

[1]*Toxicology, 'Carol Davila' University of Medicine and Pharmacy Bucharest, Bucharest, Romania*

[2]*Biochemistry and Molecular Biology, University of Bucharest, Bucharest, Romania*

[3]*Biochemistry, "Carol Davila" University of Medicine and Pharmacy Bucharest, Bucharest, Romania*

Background: Selenium nanoparticles (SeNPs) exhibited multiple therapeutic roles in in vitro and in vivo studies, qualifying them as a potential remedy for metabolic, cancerous or infectious diseases.

Purpose: In this study, we aimed to evaluate the biological effects of chemogenically synthesised SeNPs on two cell lines – normal (MRC-5) and malignant (PANC-1).

Method: We synthesised SeNPs using sodium selenite and glutathione and stabilised them with bovine serum albumin. We tested the resulted SeNPs on PANC-1 cancer cells and MRC-5 normal cells, with a sodium selenite control. We evaluated citotoxicity using LDH test and MTT test, for 0.1-25 µg/mL SeNPs. We also measured the intracellular ROS formation induced by hyperglycemic culture media (25mM glucose), with the fluorescent probe 2',7'- dichlorodihydrofluorescein diacetate.

Results: PANC-1 cell membrane was insignificantly damaged compared to control, as a mild decrease of LDH concentration was observed after the SeNPs treatment. Yet, for these cells, the viability decreased up to 42% for the highest SeNPs applied dose, in a dose-dependent manner. A slight increase of LDH level and a decrease of 43% of cell viability were noticed at the highest SeNPs dose, 25 µg/mL, with no significant variations in the 0.1-5 µg/mL range. The ROS level in normal cells slightly varied for the applied doses, which could be interpreted as a self-limitation of SeNPs harmful effects that would the benefit/risk balance control.

Conclusion: We can conclude the SeNPs, as well as sodium selenite, exerted no significant effect on normal cells, but

decreased the cancer cells viability. These results support the hypothesis that SeNPs could represent a potential adjuvant antitumor treatment.

Development of chitosan nanoparticles surface functionalised with heparin to target Plasmodium ookinetes

Fátima Fernández-Álvarez[1]*, Elena Lantero-Escolar[2,3,4], Elisabet Martí Coma-Cros[2,3,4], Gracia García-García[5], Xavier Fernàndez-Busquets[2,3,4], José L. Arias[1,6,7]

[1]*Department of Pharmacy and Pharmaceutical Technology (Faculty of Pharmacy), University of Granada, Granada, Spain*

[2]*Nanomalaria Group, Institute for Bioengineering of Catalonia (IBEC), Spain*

[3]*Barcelona Institute for Global Health (ISGlobal, Hospital Clínic-Universitat de Barcelona), Barcelona, Spain*

[4]*Nanoscience and Nanotechnology Institute (IN2UB), University of Barcelona, Barcelona, Spain*

[5]*Pharmacy and Pharmaceutical Technology, University of Granada, Spain*

[6]*Biosanitary Institute of Granada (ibs.GRANADA), Andalusian Health Service (SAS) – University of Granada, Granada, Spain*

[7]*Institute of Biopathology and Regenerative Medicine (IBIMER), Biomedical Research Centre (CIBM), University of Granada, Granada, Spain*

Background: Therapeutic approaches against malaria target different pathogen life stages. Ookinetes adhere to the midgut epithelium of adult female Anopheles to form an oocyst. This is considered to be a critical and possible target for future transmission-blocking strategies (Marques *et al*., 2017). Ookinetes interact with hosts binding glycosaminoglycans, e.g. Heparin (hep) (Dinglasan *et al*., 2007). The positive surface electrical charge of chitosan nanoparticles (CS NPs) favours electrostatic attractions toward negative biological surfaces (Unciti-Broceta *et al*., 2015).

Purpose: Development of a reproducible procedure to formulate CS NPs surface functionalised with hep.

Method: CS NPs were prepared by coacervation (Unciti-Broceta *et al*., 2015) and hep was covalently linked to CS NPs. Methylene blue spectroscopic competition technique was used to determine the hep:CS ratio. Size and electrokinetics were characterised by photon correlation spectroscopy and electrophoresis, respectively. The techniques helped in demonstrating the efficient incorporation of hep onto the NPs.

Results: CS NPs were characterised by a small size (≈115 nm). The electrophoretic properties were found to be controlled by the pH and ionic strength of the aqueous media. The adequate hep:CS ratio to obtain hep-CS NPs was 1:25. Efficient incorporation of hep moieties onto the particle surface was postulated given the slight increase in size (mean diameter ≈160 nm) and the change in the surface electrical charge.

Conclusion: It has been defined a reproducible methodology for the formulation of CS NPs adequately coated with hep. Electrophoresis was a sensitive technique to demonstrate the positive electrostatic interaction of hep with the NP surface.

References

Dinglasan, R.R., Ghosh, A.K., Saito, A., van Kuppevelt, T.H., & Jacobs-Lorena, M. (2007). Plasmodium falciparum ookinetes require mosquito midgut chondroitin sulfate proteoglycans for cell invasion. *Proceedings of the National Academy of Sciences of the United States of America*, **104**(40), 15882-15887. https://doi.org/10.1073/pnas.0706340104

Marques, J., Valle-Delgado, J.J., Urban, P., Baro, E., Prohens, R., Mayor, A., Cistero, P., Delves, M., Sinden, R.E., Grandfils, C., de Paz, J.L., Garcia-Salcedo, J.A., & Fernandez-Busquets, X. (2017). Adaptation of targeted nanocarriers to changing requirements in antimalarial drug delivery. *Nanomedicine*, **13**(2), 515-525. https://doi.org/10.1016/j.nano.2016.09.010

Unciti-Broceta, J.D., Arias, J.L., Maceira, J., Soriano, M., Ortiz-Gonzalez, M., Hernandez-Quero, J., Munoz-Torres, M., de Koning, H.P., Magez, S., Garcia-Salcedo, J.A. (2015). Specific Cell Trageting Therapy Bypasses Drug Resistane Mechanisms in African Trypanosomiasis. *PLoS Pathology*, **11**(6). https://doi.org/10.1371/journal.ppat.1004942

Improving the colloidal stability of a magnetic colloid by engineering a chitosan-based nanostructure

Gracia García García[1]*, Fátima Fernánde-Álvarez[1], José L. Arias[1,2,3]

[1]*Pharmacy and Pharmaceutical Technology Department, Faculty of Pharmacy-University of Granada,*

[2]*Biosanitary Institute of Granada (ibs.GRANADA), Andalusian Health Service (SAS)-University of Granada,*

[3]*Institute of Biopathology and Regenerative Medicine (IBIMER), Biomedical Research Centre (CIBM)-University of Granada, Granada, Spain*

Background: Nano-sized iron oxide particles are characterised by superparamagnetism, a useful property in Biomedicine. Tendency to aggregation frequently occurs, which could mean the loss of clinical use, along with a possible increase in toxicity (risk of embolisation). Generation of a physical barrier onto the iron oxide surface by using biodegradable polymers may facilitate the stabilisation of the nanoparticles (NPs). If chitosan is used, additional functionalities may be gained by the resulting magnetic NP, e.g. mucoadhesiveness, increased cell uptake, and pH- triggered drug release (Ali & Ahmed, 2018).

Purpose: Formulation of magnetite/poly(ε-caprolactone) (Fe3O4/PCL, core/shell) NPs, and (Fe3O4/PCL)/chitosan (core/shell)/shell NPs, and comparison of their colloidal stabilities.

Method: Core/shell NPs were prepared by interfacial polymer disposition, while (core/shell)/shell NPs were obtained by coating the surface of the core/shell particles with chitosan by coacervation. Size was determined by photon correlation

spectroscopy, and the surface electrical charge was estimated by electrophoresis. Samples were kept at 4.0±0.5 °C, and ultrasonicated before analysis.

Results: Initial mean size of the negatively charged core/shell NPs was 170 nm, while mean diameter of the positively charged (core/shell)/shell NPs was 300 nm. Irreversible aggregation was found for the Fe3O4/PCL particles at day 2. On the opposite, the (Fe3O4/PCL)/chitosan NPs were stable during the study (30 days).

Conclusion: Chitosan coating is needed for a long-term stabilization of Fe3O4/PCL NPs, thus postulating its potential use to control the stability of magnetic colloids being used in Biomedicine.

References

Ali, A., & Ahmed, S. (2018). A review on chitosan and its nanocomposites in drug delivery. *International journal of biological macromolecules*, **109**, 273–286. https://doi.org/10.1016/j.ijbiomac.2017.12.078

Legibility analysis of the patient information sheets of pharmaceutical preparations

Ignacio García Giménez*, Olalla Montero Pérez, Maria De Las Aguas Robustillo Cortés

Pharmacy Department, Hospital Juan Ramón Jiménez, Huelva, Spain

Background: All drugs dispensed in the Pharmacy department (PD) must have a leaflet with information about that medication. In case of pharmaceutical preparations elaborated in the PD, a patient information sheet (PIS) must be written in order to be dispensed with the medication, and it must be understandable notwithstanding the patient's sociocultural level.

Purpose: To analyse the PIS legibility of the pharmaceutical preparations dispensed in the PD.

Method: PIS of the most dispensed pharmaceutical preparations were analysed with the Férnandez-Huerta rate (FHR) (206,84 – 60 x (syllables/words) + 1,02 x (words/sentences)) and with the Szigriszt-Pazos rate (SPR) (206,835 – 62,3x (syllables/words) - (words/sentences)). Normal score was established as the minimum level of an understandable PIS (>60 in FHR and >50 in SPR). Those PIS with <50 were rewritten to reach normal score.

Results: Seven PIS were analysed. Results obtained (FHR, SPR): cyclosporine eye drops (65.22, 60.11) (normal, normal), cidofovir cream (62.48, 57.54) (normal, normal), furosemide oral solution (41.33, 35.01) (hard, very hard), hydrochlorothiazide oral suspension (49.08, 43.13) (hard, quite hard), insulin eye drops (66.71, 61.86) (normal, normal), omeprazole oral suspension (52.48, 46.57) (quite hard, quite hard), sildenafil oral suspension (60.33, 55.15) (normal, normal). Results obtained after rewritten process (FHR, SPR): furosemide (60.81, 55,29), hydrochlorothiazide (60.86, 55.46), omeprazole (60.43, 55.21).

Conclusion: The PIS were modified to improve their comprehension and to guarantee a correct treatment. The rest of the PIS less dispensed of the pharmaceutical preparations will be analysed too and rewritten if necessary.

Post-sexual assault kits dispensed in a hospital pharmacy department

Ignacio García Giménez, Olalla Montero Pérez*, Raquel Sánchez del Moral

Pharmacy Department, Hospital Juan Ramón Jiménez, Huelva, Spain

Background: The high risk of suffering a sexually transmitted disease (STD) after a sexual assault demands a quick and effective treatment to prevent it.

Purpose: To analyse the use of post-sexual assault kits since their implementation in 2011.

Method: An observational and retrospective study was performed. A protocol was jointly elaborated by the Emergency, Gynaecology and Pharmacy departments. Three different kits were prepared for prophylaxis of gonorrhoea, syphilis and chlamydia:

- ADULT KIT (K1): ceftriaxone 250 mg intramuscular (IM), azithromycin 1g oral, penicillin G benzathine 2,4M UI IM.
- CHILD KIT (K2): ceftriaxone 125 mg IM, erythromycin 250 mg/6h for seven days.
- BETA-LACTAM ALLERGY KIT (K3): erythromycin 500 mg/6h for 15 days.

Additionally, one or many of the following drugs can be added if considered necessary by the physician:

- Anal fissure (A): clindamycin 600 mg IM.
- HVB prophylaxis (B): specific globulin and first vaccine dose.
- Tetanus prophylaxis (C): specific globulin and first vaccine dose (not in the first trimester of pregnancy). - Pregnancy prophylaxis (D): levonorgestrel 1500 mcg.
- HIV prophylaxis (E): the one prioritised at the moment of dispensation.

The following data were registered in an Excel database during 2011 to 2019: dispensation date, sex, age and dispensed kit.

Results: Ninety-seven kits were dispensed (87 K1, 9 K2, 1 K3). Mean age: 26 years (6-53), 97.9% women. In some cases other prophylaxis drugs were prescribed with adult kits (2.06% A, 16.5% B, 8.2% C, 49.5% D, 7.2% E) and child kits (2.1% B, 1% C, 4.1% D).

Conclusion: These kits are a quick and effective way to dispense the adequate treatment to prevent a STD in assaulted patients.

Evaluation of the effects of a deodorant produced from the extracts of flower buds of clove

Favour Onyeaso[1]*, Ogbonna Okorie[2], Chukwumerije Onyenoha[2]

[1]Pharmaceutics and Pharmaceutical Technology, University of Port Harcourt Teaching Hospital, Port Harcourt, Choba, Nigeria
[2]Pharmaceutics and Pharmaceutical Technology, University of Port Harcourt, Port Harcourt, Choba, Nigeria

Background: Deodorant products prevent the growth and activity of bacteria found in the armpit of humans. Aluminium salts, however, are suspected to increase the risk of certain diseases necessitating the use of alternative natural product extracts.

Purpose: This study aimed at evaluating the in vitro antimicrobial effect of crude extracts of clove against bacteria extracted from the armpit of humans and to compare the effectiveness of the crude extracts against an established aluminium-containing deodorant.

Method: Different acetone extracts (2.5% to 25.0%) of clove were evaluated via antimicrobial susceptibility testing to the bacteria isolated from the armpits of four female volunteers. The minimum inhibitory concentration of the extract was determined to be 5.0%. Deodorant sticks were prepared with 10.0% and 25.0% clove extracts as the active component. A placebo was also prepared. Using the Agar diffusion method, antimicrobial susceptibility testing was carried out using the deodorants formulated with the clove extract and the placebo product. A commercial deodorant containing Aluminium Zirconium Tetrachlorohydrex Gly was also tested.

Results: Antimicrobial activities determined by the inhibitory effects of test formulations towards the bacteria indicated that the deodorant formulations containing 10.0% and 25.0% clove extracts, were more effective in inhibiting the growth of the bacteria while both the placebo and the formulation containing Auminum Zirconium Tetrachlorohydrex Gly were ineffective.

Conclusion: This work demonstrates that clove extract can be used as a safe and effective active component in them formulation of deodorant. An enlarged version of this study is expected and possible patenting of the work.

Perception of delivery systems used for medicinal cannabis

Ceren Bereketoglu, Nicolette Sammut Bartolo, Anthony Serracino-Inglott*

Department of Pharmacy, University of Malta, Msida, Malta

Background: Cannabis for medicinal use is available in various dosage forms. The opinion of patients about medicinal cannabis dosage forms has not previously been evaluated.

Purpose: To evaluate the preferred delivery methods for medicinal cannabis through a patient-focused analysis.

Method: Two self-administered questionnaires were developed to evaluate opinions of users and potential users of medicinal cannabis with regards cannabis dosage forms. The questionnaires were validated using the Delphi method and disseminated at two clinics in Malta following ethics approval. Participants were asked to rate methods of administration using a 5-point Likert scale (where 1 is least preferred and 5 is most preferred).

Results: The 87 (61 male) users and 101 (55 male) non-users of medicinal cannabis completed the questionnaires. Medicinal cannabis users rated edibles (n=66), tea (n=65), drinking oil (n=72) dosage forms and non-users rated liquid (n=79), vegetarian capsule (n=79) and capsule (n=79) as the most preferred methods of cannabis administration orally. Users prefer cannabis in the form of cigarettes (n=71) and tinctures (n=67) while non-users prefer spray (n=80), patch (n=78), and nebulisers (n=76).

Conclusion: Both users and non-users of cannabis for medicinal purposes, indicated different preferences for medicinal cannabis dosage forms. Availability of patient-preferred dosage forms is desirable to meets patients' needs. The great variety of dosage forms requested by potential patients is a challenge to the evolving manufacturing industry for medicinal cannabis.

The assessment of pharmacy students involvement in scientific research projects

Zrinka Duvnjak, Alison Ekwere Williams*, Shaimaa Yahya, Mohamed Fouaad, Tsz To Sham

Pharmacy Education Committee, International Pharmaceutical Students Federation, The Hague, Netherlands

Background: There is global variation in the pharmacy and pharmaceutical sciences experiential education. This may affect the competences of students, the future pharmaceutical workforce, in their scientific careers.

Purpose: The research aimed to assess the extent, motivation, and barriers for the involvement of pharmacy students in scientific research projects, with respect to different parts of the world they are coming from.

Method: A quantitative descriptive study was conducted. A well-structured questionnaire was distributed across the IPSF network. 657 responses from 63 countries of all five IPSF regions were received and analysed by Microsoft Excel. The extent of involvement indicators (duration of involvement, number of

hours per week, number of posters made, etc.), barriers, and facilitators were evaluated.

Results: Twenty-eight percent (28%) of all the respondents have been involved in scientific projects, with extent (in percentages) varying from 8% (African) to 30% (European), depending on the region. The main facilitator of being involved was an investment in a future career of which 51% of the involved students were in the best ten percent of their academic class based on grades. Half of the involved students have presented at least one research poster. The main barrier of involvement for all the regions was the inadequate project budget and the lack of opportunities.

Conclusion: Differences in the level of involvement between the world regions exist, however, the challenges are similar. Opening more opportunities and lowering curriculum workload, could cause a higher involvement of students in science. As the future pharmaceutical workforce, they should be given adequate opportunities to gain experience in practices of scientific research.

Evaluation of phenylpropanoic acid derivatives to target markers of inflammasome pathway

Manas Kinra[1]*, Devinder Arora[2], Jayesh Mudgal[3], Madhavan Nampoothiri[3], Alex Joseph[4]

[1]*Department of Pharmacology, Manipal College of Pharmaceutical Science, Manipal Academy of Higher Education, Manipal, India*

[2]*School of Pharmacy and Pharmacology, Griffith University, Gold Coast, Australia*

[3]*Department of Pharmacology, Manipal College of Pharmaceutical Science, Manipal Academy of Higher Education, Manipal, Manipal, India*

[4]*Department of Pharmaceutical Chemistry, Manipal College of Pharmaceutical Science, Manipal Academy of Higher Education, Manipal, Manipal, India*

Background: Pyroptosis is an important component of immune system and is regulated by NOD-like Receptors (NLRs). Among the NLR family, role of NOD-like receptor Pyrin containing domain 3 (NLRP3) is now well established in a number of inflammatory conditions. NLRP3 is present in the cytoplasm of the cells of the immune system, specifically, macrophages and microglia. NLRP3 gets activated when the membrane bound Toll-like Receptors such as TLR4 (Groslambert & Py, 2018) recognise a specific danger signal (Yang *et al*., 2019). Phenylpropanoic acid derivatives have not been evaluated for specific pathways of inflammation at a molecular level. In this study, we have screened these compounds against various proteins of NLRP3 inflammasome pathway.

Purpose: To evaluate the selected derivatives of naturally occuring phenylpropanoic acid derivatives against important molecular markers of NLRP3-inflammasome pathway.

Method: *In-silico* evaluation was done using AutoDock v4.2. Based on free energy of binding and bonding profile, selected candidates were screened in-vitro for the activity. Human glioblastoma cell line was used to assess the inhibition of NLRP3-inflammasome pathway. RT-qPCR and ELISA were used as quantitative tests to measure the activity of the compounds.

Results: Out of eight selected compounds, four were short-listed for in-vitro screening based on in-silico results. All four of the selected molecules showed promising results in-vitro, when compared against standard inhibitors.

Conclusion: Phenylpropanoic acid derivatives, with their potent anti-inflammatory activity can be developed as NLRP3-inflammasome inhibitors and hence, can be useful in prevention as well as treatment of various inflammatory and auto-inflammatory disorders.

References

Groslambert, M., & Py, B.F. (2018). Spotlight on the NLRP3 inflammasome pathway. *Journal of Inflammation Research,* **11**, 359. https://doi.org/10.2147/JIR.S141220

Yang, Y., Wang, H., Kouadir, M., Song, H., & Shi, F. (2019). Recent advances in the mechanisms of NLRP3 inflammasome activation and its inhibitors. *Cell death & disease*, **10**(2), 1-11

Pigmented villonodular synovitis successfully managed with imatinib

Hector Mateo[1]*, Beatrice Seddon[2]

[1]*Pharmacy, University College London Hospitals NHS Foundation Trust, London, United Kingdom*

[2]*Clinical Oncology - Sarcoma Unit, University College London Hospitals NHS Foundation Trust, London, United Kingdom*

Background: Anti-colony-stimulating-factor-1 recently emerged as potential therapeutic target vs PVNS (Brahmi, Vinceneux, & Cassier, 2016). Limited experience with imatinib only in retrospective cohorts (Cassier *et al*., 2012; Tap *et al*., 2019).

Purpose: Assessing efficacy/safety of imatinib in a patient with long-standing PVNS.

Method: A 37-year-old male with PVNS (tendon sheath right knee, multiple decreasingly-effective operations between 2013 to 2019) was analysed. He was found to have Obesity (BMI 45), T2DM, hypercholesterolemia, and suspected Gilberts' syndrome. Empaglifozin, metformin, sitagliptin, atorvastatin, naproxen paracetamol, dihydrocodeine, and oxycodone were prescribed. NKDA; no tobacco/alcohol. A Management plan was put in place of neoadjuvant imatinib for six to 12 months (consent obtained, off-label use granted), then total knee replacement and RT. Baseline imaging, blood tests, and cardiac function performed.

Efficacy: radiographic response/clinical findings (pain reduction, flexibility).

Safety: toxicities requiring reduction/discontinuation.

Results: Imatinib 400mg/day (started in August 2019), immediate response confirmed by CT. Pain reduction (VAS eight to three), knee flexibility (100o to ~130o), reduced oedema. Neutropenia (0.37x109/L) post-initiation (imatinib withheld, restarted at 100mg/day and up-titrated). Nausea (g2) (domperidone prescribed), fatigue and appetite loss (g1). Nonsignificant raised bilirubin (normal total/conjugated, reticulocytes, LDH and haptoglobin).

Conclusion: Significant and sustained clinical/radiographic response shortly after initiation. Despite an isolated neutropenia episode requiring temporary discontinuation, its safety profile was manageable (only mild nausea & fatigue). This report offers insightful information in the management of long-standing PVNS in a patient with multiple co-morbidities.

References

Brahmi, M., Vinceneux, A, & Cassier, P.A. (2016). Current Systemic Treatment Options for TGCT/PVNS: Targeting the CSF1/CSF1R Axis. *Current treatment options in oncology*, **17**(2), 10. https://doi.org/10.1007/s11864-015-0385-x

Cassier, P.A., Gelderblom, H., Stacchiotti, S., Thomas, D., Maki, R.G., Kroep, J.R., van der Graaf, W.T., Italiano, A., Seddon, B., Dômont, J., Bompas, E., Wagner, A.J., & Blay, J.Y. (2012). Efficacy of imatinib mesylate for the treatment of locally advanced and/or metastatic tenosynovial giant cell tumor/pigmented villonodular synovitis. *Cancer*, **118**(6), 1649–1655. https://doi.org/10.1002/cncr.26409

Tap W *et al*. (2019). Pexidartinib versus placebo for advanced tenosynovial giant cell tumour (ENLIVEN): a randomised phase 3 trial. *The Lancet*, **394**(10197), 478-487. https://doi.org/10.1016/S0140-6736(19)30764-0

Comparative study of chemical composition of Xanthoceras sorbifolia growing in Inner Mongolia

Qirigeer (Tselger)[1,2], Bagenna[2], Laxi Namujila[3], Munkhzol Malchinkhuu[4], Purevsuren Sodnomtseren[1]*

[1]*School of Pharmacy , Mongolian National University of Medical Sciences , Ulaanbaatar, Mongolia*

[2]*College of Mongolian Medicine, Inner Mongolia University for the Nationalities, Tongliao, China*

[3]*College of Mongolian Medicine , Inner Mongolia University for the Nationalities, Tongliao, China*

[4]*School of BioMedicine, Mongolian National University of Medical Sciences , Ulaanbaatar, Mongolia*

Background: *Xanthoceras sorbifolia* Bunge has the strength to reduce fever, reduce edema, and relieve pain. This plant is widely used in Mongolian medicine for the treatment of inflammatory diseases and is included in many traditional medicines such as Senden 4, Senden 7, Senden 9, Senden 25, Agar 19. Distributed in Inner Mongolia, Northeast, Northwest and Northern parts of China.

Purpose: To reveal chemical composition of *Xanthoceras sorbifolia* and compare the contents of samples collected from different places in different years.

Method: The 27 samples collected in different years from 12 places in Inner Mongolia were used for this study and the chemical compositions of them and the contents of epicatechin, dihydroquercetin and myricetin were defined by High Performance Liquid Chromotography in all samples.

Results: Epicatechin, dihydromyricetin, dihydroquercetin, myricetin, quercetin and naringin were revealed in *Xanthoceras sorbifolia* Bunge and the contents of epicatechin, dihydroquercetin and myricetin were defined in all samples. The chemical compositions of these samples were similar, but the content of some substances were different in studied 27 samples collected in different years from 12 places in Inner Mongolia.

Conclusion: The chemical compositions in samples collected from different places were similar, but the content of some substances were different.

References

Medical dictionary. (2002). Khukh Khot. Inner Mongolia, 606

Ishbaljir. (1985). The moon king of Medicines. Inner Mongolia, **243**, 354-357, 373

Standardisation study of the Natural Musk

Myadagbadam Urtnasan[1], Purevsuren Sodnomtseren[2]*, Chimedragchaa Chimedtseren[1]

[1]*Institute of Traditional medicine and Technology, Ulaanbaatar, Mongolia*

[2]*School of Pharmacy, Mongolian National University of Medical Sciences , Ulaanbaatar, Mongolia*

Background: The musk, a biological secretion with unique odour, is produced by the Siberian musk deer (*Moschus Moschiferus* Linnaeus). For thousands of years, the musk has mainly been used to treat white channel disorders. In Asian countries it was prescribed for the treatment of neurological, cardiovascular, respiratory and sexual dysfunctions. Although in Traditional Mongolian Medicine, the musk was used to treat bacterial infectious diseases, it has not been the subject of standardised research until now, which defines the background of this research study.

Purpose: To conduct a standardisation study and determine the quality and safety parameters of Natural Musk.

Method: Quality parameters (moisture, total ash) and safety parameters were determined by Mongolian National First Pharmacopoeia methods. The content of main biologically active compounds in the natural musk was determined by HPLC methods.

Results: Suitable condition of HPLC to reveal muscone in Natural Musk were defined and the content of muscone in Natural Musk was determined as 0.235±0.12%. Some quality and safety parameters of Natural Musk determined as: moisture 6.35±0.72%, total ash 2.62 ± 0.32%, Cd was not detected.

Conclusion: The standardisation indicators of Natural Musk were defined and Mongolian national pharmacopoeia monograph's draft for Natural Musk was developed.

Standardisation study of cultivated Sophorae alopecuroides L

Purevsuren Sodnomtseren[1]*, Erdenechimeg Chuluunbaatar[2], Chimedragchaa Chimedtseren[3]

[1]School of Pharmacy, Mongolian National University of Medical Sciences, Mongolia

[2]Research laboratory, Institute of Traditional medicine and Technology, Ulaanbaatar, Mongolia

[3]Administrative department, Institute of Traditional medicine and Technology, Ulaanbaatar, Mongolia

Background: *Sophorae alopecuroides* L has the ability to suppress nausea, replenish energy, suppress shortness of breath, soothe constipation, remove phlegm, heal wounds. It grows in Dundgobi, Dornogobi, Gobi-Altai, Bayankhongor, Umnugobi provinces of Mongolia and this plant is cultivated in Dashinchilen soum of Bulgan province of Mongolia.

Purpose: To conduct the standardisation study of the root of *Sophorae alopecuroides* L cultivated in Mongolia.

Method: The root of cultivated *Sophorae alopecuroides* L was collected in September and used for this study. The plant anatomy was detected by light microscopy and standardisation indicators were defined according to Mongolian National Pharmacopeia. Oxymatrine and matrine were revealed by Thin Layer Chromotagraphy (TLC) and content of oxymatrine was determined by spectrophotometric assay.

Results: Special features of root of *Sophorae alopecuroides* L were defined. Oxymatrine and matrine in the root were revealed by TLC using solution of chloroform-methanol-concentrated ammonia with proportion of (10:1.2:0.6). The content of total alkaloids calculated as oxymatrine in the root was determined as 0.45±0.1%, humidity as 6.9±0.25%, ash as 4.65±0.32%, acid insoluble ash as 2.1±0.2% and water-soluble extractive as 18.56±2.45%.

Conclusion: The standardisation indicators of root of cultivated Sophorae alopecuroides L were defined and pharmacopeia monograph of the root was developed.