W101. Pharmacometrics and machine learning

Prof Pierre Marquet, University Hospital of Limoges

Pharmacometrics is the quantitative analysis of interactions between drugs and living organisms, and it mainly relies on mechanistic models, e.g., compartment models to describe drug pharmacokinetics (dose-concentration relationships) or E/Emax models to describe drug pharmacodynamics (concentration-effect relationships). Machine learning, which belongs to artificial intelligence at large, gathers a flurry of complex classifying or regression tools that aim to construct pathways between input and output data (if supervised), for instance to estimate an outcome based on existing data, with no explicitly defined models. In this workshop, we will present a single centre experience of using machine learning for pharmacometrics objectives in organ transplantation, as a replacement or complement to mechanistic models, always with improved performance. The possibility and limitations of using synthetic (simulated) data for some of these goals will be discussed and examples shown. More specifically, the machine learning regressors and classifiers that will be presented were trained, tested and externally validated, and have been used since to: (i) estimate patient overall exposure (area under the curve) to immunosuppressive drugs (ISDs), or iohexol clearance, using limited sampling strategies; (ii) classify kidney biopsy lesions, a surrogate outcome of ISD efficacy; and (iii) to predict kidney graft survival, a hard outcome of ISD benefit-risk balance. Plans to integrate PK, PD, disease evolution and benefit-risk prediction models will be discussed with the audience.

W102. Machine learning, clinical pharmacology and the quality use of medicines

Dr David Liew, Austin Health

ASCEPT Annual Scientific Meeting
Transformational Pharmacology & Toxicology
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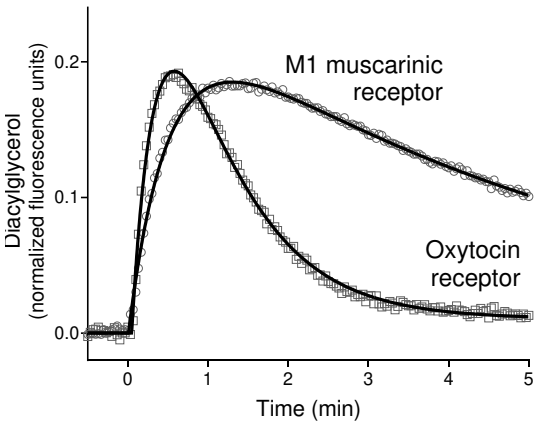
W103. Curve fitting methods for quantifying the kinetics of G-protein-coupled receptor signalling

Sam R.J. Hoare[1]. Pharmechanics LLC[1], Owego, NY, USA

Introduction. The timing of G-protein-coupled receptor (GPCR) signalling is a potential determinant of efficacy and toxicity of therapeutics and therapeutic candidates targeting these receptors. Surprisingly, GPCR time course data are rarely analysed by curve fitting.

Aims. The aim was to develop routine curve fitting methods that can be used to quantify pharmacologically useful parameters from GPCR signalling time course data.

Methods. Equations were derived based on mechanistic frameworks of GPCR signalling that empirically describe almost all observed GPCR signalling time course curve shapes. These equations were installed as a freely-available plug-in to the commonly-used curve fitting program GraphPad Prism.



Parameter	M1 receptor	Oxytocin receptor
Signal generation rate (NFU per minute)	0.48	0.85
Decline half time (minutes)	3.6	0.5

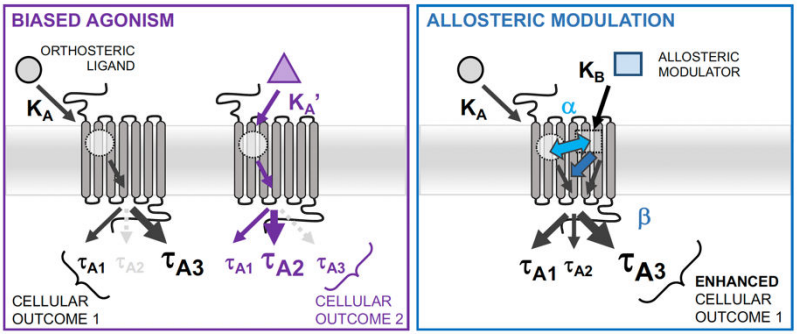
Results. The curve fitting enabled quantification of signalling kinetics using intuitive, mechanistically meaningful parameters, including the signal generation rate (initial rate before onset of signal decline mechanisms) and the signal decline rate (typically a manifestation of receptor desensitization and/or signal degradation). These parameters enabled quantitative pharmacological comparison of signalling kinetics, for example, the more rapid diacylglycerol generation and desensitization rates for the oxytocin receptor compared with the M1 muscarinic receptor (see figure above).

Discussion. These curve fitting methods will enable investigators to routinely quantify the kinetic pharmacology of GPCR signalling, providing a quantitative framework for applying the timing of signalling to the understanding of GPCR function and the development of novel therapeutics targeting these receptors.

W104. Quantification of Allostery and Biased Signalling

Celine Valant, Drug Discovery Biology, Monash Institute of Pharmaceutical Sciences, Parkville, VIC, Australia

Introduction. Major life science challenges include, understanding how chemicals outside cells signal to proteins inside, how this results in physiological responses, and how dysfunction of these processes leads to pathophysiology. After centuries of relentlessly exploring how receptors are regulated by endogenous and/or drug-like molecules, new ideas have emerged in the field that have completely changed and revitalized it. The first paradigm is biased signalling, which is the ability of structurally distinct ligands to stabilise different pools of receptor conformations leading the distinct cellular outcomes. The second paradigm is allostery, which is the mechanism by which some ligands (synthetic or natural) can recognise and bind different regions of receptors compare to the endogenous hormone (orthosteric) binding site, and consequently alter the physiological responses. However, both allostery and bias are very complex, making reproducibility and description challenging.



Methods. This workshop will use key novel analytical models to analyse and interpret allostery and bias signalling at a major family of GPCR, the muscarinic acetylcholine receptors.

Results. Here, we provide definitions, guidelines and analytical models for any scientists to quantify and report allostery and ligand bias, using data generated in our laboratory.

Discussion. The workshop will also allow any participant to join with their own set of data, exploring either allostery or bias, and the team will assist with data analysis, representation and interpretation.

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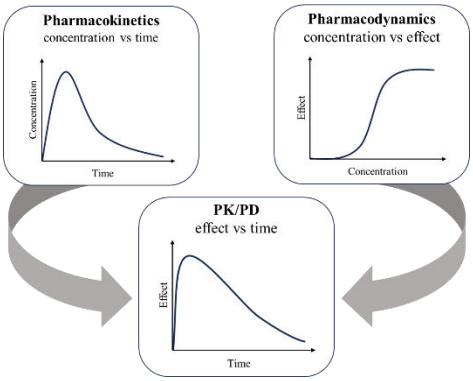
W105. Use of pharmacokinetic and pharmacodynamic analysis in drug discovery

Xiao Zhu. School of Pharmacy, Fudan University, Shanghai, China



Introduction. An integrated understanding of the three Pillars of survival – including exposure at the site of action, target binding, and expression of functional pharmacological activity - is essential in improving decision-making during drug development. The fundamental role of the pharmacokinetics (PK) is often disregarded in *in vitro* experiments despite its significance in the explanation of *in vivo* results.

Aims. This workshop aims to enable participants to comprehend the influences of PK on pharmacodynamic (PD) outcomes and to attain proficiency in fundamental PK/PD quantitative analysis.

Methods. This workshop will demonstrate the complex impact of PK on PD through the simulation using R package rxode2. Specifically, the simulations will offer insights into the time-dependent relationship and hysteresis effect between PK and PD. In addition, attendees will gain hands-on experience with the sequential PK/PD modelling processes using the classic pharmacological software, GraphPad Prism.

Results. Neglecting PK factors in interpreting research results can lead to misinterpretations of pharmacological responses and misleading conclusions. This workshop will highlight the utility and the limits of GraphPad Prism in basic PK/PD analyses.

Discussion. PK plays a critical role in understanding the dynamics of drug actions within the body. Given the complexity of PK/PD analyses, professional pharmacometrics software is recommended.

W106. Using computers in toxicology education: Python for PK calculations

Dr Slade Matthews, The University of Sydney

Pharmacokinetics is the very architype of incorporating mathematics into pharmacology. Many students who take biological subjects such as pharmacology are, however, reluctant to embrace the incorporation of mathematics into their studies. For this reason, I am searching for ways to facilitate student learning in pharmacokinetics. At a previous ASCEPT meeting (2018) I presented a graphical user interface (PK-graph: https://slademtox.github.io/Pharmacokinetic-sym/) for generating pharmacokinetic curves. But this tool separates the students from the math. Hence, I have created a new tool, PK-calcs (https://slademtox.github.io/PK_calcs/) that will bring the PK formulas to prominence and (hopefully) improve student understanding. This workshop will be interactive demonstrating the latest iteration of pharmacokinetic teaching that I am developing. In this session you will be introduced to the Python programming language and learn to write simple scripts to demonstrate pharmacokinetic relationships. It will introduce the utility of cloud computing for educational purposes negating the need for students to setup complicated infrastructure before getting down to the learning part of their activities. This session will set the scene for the subsequent workshop sessions on computational approaches to toxicology which now dominate the “New Approach Methodology” dialogue in NIH agencies such as NICEATM, (NTP [National Toxicology Program] Interagency Center for the Evaluation of Alternative Toxicological Methods) and ICCVAM, (Interagency Coordinating Committee on the Validation of Alternative Methods).

W107. Toxicological modelling and simulation at the molecular and cellular levels

Raymond Luie, The University of Sydney

Toxicity is driven by the interaction of chemical toxicants and biological targets described by molecular initiating events in an adverse outcome pathway. This presentation introduces computational methodologies that can model and simulate these toxicodynamic processes at the finer molecular and cellular scales. The different ways a molecule can be encoded and represented *in silico*, such as SMILES strings, molecular fingerprints, and constitutional descriptors, then further applied to data-driven quantitative structure – activity relationship modelling will be discussed. Furthermore, the ways in which ligands and proteins can be modelled in 3D space with physics-based molecular simulations in order to elucidate toxic mechanisms of actions will be examined. Participants will have the opportunity to follow along coding demonstrations which introduce how molecules can be visualised, analysed, and prepared for further modelling and simulation.

W108. Intro to TK and PBTK methods in toxicology and risk assessment

Dr Antti Mikkonen, Environment Protection Authority Victoria

Toxicokinetic (TK) and Physiologically Based Toxicokinetic (PBTK) models are commonly used as tools for “translating” dose related information from animal toxicity studies to humans. Today this is a common approach in guideline development for environmental toxicants. However, these tools can also be used to unravel risks related to complex environmental exposures where traditional methods may not suffice.
This presentation provides:

- a brief introduction to TK/PBTK methods used in health-based guideline value development and environmental human health risk assessment;
- an overview of the tiered risk assessment and model development approaches for environmental contaminants;
- example of exposure scenarios result in dynamic body burdens and TK/PBTK methods are needed for risk characterisation; and
- some examples for TK/PBTK model development in R.

W109 Artificial intelligence and machine learning for toxicity testing

Daniella James-New, The University of Sydney

This presentation explores the modern data-driven modelling paradigm pivotal to the development of predictive toxicological models. Participants will be guided by a coherent workflow beginning with an introduction to sources of "big toxicological data" from high throughput screening campaigns in the form of raw canonical SMILES, particularly in the context of large-scale chemical and assay data curation. A focal point will be the core of machine learning algorithms that mine quantitative structure-activity relationships between molecular encodings and toxicological endpoints, illustrated using Interactive Python scripts that showcase a Random Forest Regression model running in real time. Emphasis will be given to best practices for the application of artificial intelligence in toxicology within a regulatory environment, highlighting the importance of using hold-out test sets to ascertain the model's capability to generalize, thereby ensuring external validity. Participants will experience a hands-on introduction to complex data structures central to big data and machine learning in a cohesive and integrated learning environment.

W110. Innovations in immunosuppressant therapeutic drug monitoring implemented in France

Prof Pierre Marquet, University Hospital of Limoges

Therapeutic drug monitoring is mandatory or strongly recommended for most immunosuppressive drugs (ISD) and is currently based on the measurement of trough levels (C0), except for mycophenolate mofetil (MMF), for which the interdose area under the curve (AUC) is the only reliable exposure index. However, consensus conference reports also recommended the use of AUC for tacrolimus and cyclosporine. Accurate AUC estimation, using the classic trapezoidal rule, requires taking many blood samples, but alternative methods compatible with a limited sampling strategy (LSS) have been proposed, including maximum a posteriori Bayesian estimation (MAP-BE). MAP-BE based on population PK models and limited individual information can reliably estimate individual patient PK parameters, hence the AUC. For the past two decades, our team has developed PK models for most maintenance ISD in various transplant populations, thanks to multiple PK studies that we, as well as other academic institutions or pharmaceutical companies, have conducted. These PK models have been developed using mostly iterative two-stage modelling (ITSIM). LSSs and Bayesian estimators have been optimized to best estimate the interdose AUC of the different drugs in various situations. Several of these tools have been used in clinical trials. In particular, a randomized trial (Le Meur et al. Am J Transplant. 2007) as well as an exposed vs. non-exposed study nested in a longitudinal cohort of kidney transplant recipients demonstrated that AUC-based dose adjustment of MMF resulted in significantly less acute graft rejection episodes than the standard dose strategy.
Also, in 2005 we opened up the use of our Bayesian estimators for routine dose individualization of ISD to the global transplant community, by means of our expert system ISBA (ImmunoSuppressive drugs Bayesian dose Adjustment) accessible online. Since then, we have received >120,000 requests from all the continents. Analysis of this huge database has provided unprecedented information regarding: the variability of ISD doses and AUCs in the huge transplantation populations before PK-driven dose adjustment; the efficiency of PK-driven dose adjustment to reduce exposure variability and reach predefined AUC targets; and the individual C0 targets of tacrolimus that can be derived from the AUC/C0 ratio.
In order to increase further the level of evidence, we are conducting a nationwide study with the French Transplantation Agency in approx. 40,000 patients (of whom about 17,000 have benefited from ISBA) to better evaluate the clinical efficacy of this approach and decipher in more detail the exposure - effects relationships of ISD.
Recently, we have successfully used machine learning as a complement or replacement of AUC Bayesian estimation, as well as for two important outcomes of transplantation and ISD treatments, i.e. GFR estimation based on iohexol plasma clearance and classification of kidney graft biopsies.

W111. Clinical application of alternative sampling technologies in Australia

Richard C Kevin[1,2]. Department of Clinical Pharmacology and Toxicology, St Vincent's Hospital Sydney[1], Sydney, NSW, Australia; School of Clinical Medicine, The University of New South Wales[2], Sydney, NSW, Australia.

Alternatives to venepuncture blood collection, variously termed volumetric absorptive microsampling, microfluidics, or capillary sampling, are touted as revolutionary for TDM services. These technologies promise patient self-sampling, reduced discomfort and risks for patients, and reduced costs of sampling, transport, and analysis. Yet limited clinical implementation has been achieved in Australia. This presentation will outline the current "state-of-play" of alternative blood sampling technologies in Australia, identify key stumbling blocks to implementation, and suggest pathways for future development and integration into clinical practice.

W112. Clinical pharmacology across continents – perspectives from Chile

Jana Stojanova, St Vincent's Hospital Sydney, NSW, Australia

In this brief presentation, I will present some details about applied clinical pharmacology in Chile. I will discuss the education and training trajectories of the professionals involved in the discipline, and contrast these with Australia and France, with the former exhibiting similarities to most anglophone countries, and the latter exhibiting similarities to most continental European countries. I will cover the Chilean health system and realities related to availability and distribution of resources. I will present informal data to show that, despite challenges and limitations, clinical pharmacology in Chile is vibrant and promising.

W113.0Endo Axiom and Oral insulin: the gap between an academic paper and a clinical trial

Dr Nicholas Hunt, Endo Axiom

This workshop will discuss the experience of our team at Endo Axiom in taking our oral insulin formulation through the stages of manufacturing development to good manufacturing progress and accredited toxicity studies (good laboratory practice). These stages are critical as they allow for a phase 1 clinical trial. They are designed to standardise the production of pharmaceutics, validate pre-clinical toxicity studies and can be achieved through translation focused grants and company financing.

W114. Innovation at the interface of industry and academia

Dr Andrew Harvey, The University of Queensland

Many Australian success stories in drug development have their origins in our universities and medical research institutes. For innovations to progress from the academic lab into the hands of drug developers who can bring a drug to market, well-informed decision-making and significant investment is required. Commercial and clinical considerations will guide every experiment undertaken along the translational path. This presentation will draw on my experience translating Australian research into novel CNS drug candidates within academia, biotech, and a university-embedded drug discovery capability, the Queensland Emory Drug Discovery Initiative (QEDDI).

W115. Next generation therapeutics inspired by psychedelics from nature

Josh Ismin, Psylo

Mental illness is a health crisis. It is estimated that 50% of the population can expect to develop a mental disorder at some point in our lives. Mounting evidence suggests that psychedelic assisted therapy will rewrite how we treat severe mental illness, but this resource intensive modality will lack the ability to reach the majority of patients in need. Inspired by psychedelic compounds that exist in nature, Psylo is developing neuroplasticity-inducing drugs with tempered side-effects which can be deployed as safer, more efficacious take-home medications to treat neuropsychiatric conditions. In this session Psylo's CEO and co-founder Josh Ismin will talk through the company's origin and ambitions for revolutionising mental health treatments.

W116. The Dangerous Business of Stepping Out Your Door: D1 to First in Man in Pharma

A/Prof Laura Jacobson, The Floery Institute of Neuroscience and Mental Health

The path from target identification/validation to first in man studies is a journey fraught with traps and pitfalls for drug discovers and developers. This presentation will briefly highlight what this journey can look like for a low-molecular weight drug candidate in a pharmaceutical industry setting. The pathway includes iterative processes between medicinal chemistry, pharmacology, ADME (absorption, disposition, metabolism, elimination), pharmaceutical development, toxicology, medical affairs, marketing, project management and early discussions with FDA/regulatory authorities. Assays include analyses of target efficacy, off-target profile, pharmacokinetics, pharmacodynamics and predictors of safety pharmacology. As Phase I nears, formulation, batch scale-up and clinical design grow in importance. Examples used will include two programs for central nervous system (CNS) indications: inhibitors of beta secretase 1 (BACE1) for Alzheimer's disease and orexin receptor antagonists for insomnia and will illustrate that even if you do keep your feet, there's still no knowing where you might be swept off too.

W117. Inosi Therapeutics: The role of serendipity in moving from academic to translational research

Dr Tracy Gaspari, Iniosi Therapeutics

The struggle to take that big leap from being an academic researcher to commercialisation of your research is real and there is no one stop shop for all the answers. This presentation will outline my journey of moving from a pure academic researcher to one that is on a steep trajectory in understanding how to commercialise your research. I will highlight the roles that serendipity, combined with resilience, innovation and strong preclinical data all played in the formation of the spinout company, Inosi Therapeutics.

W118. Pharmacogenetics and the Environment: A Bigger Picture of the Ethnic Factors that Influence Drug Disposition and Response

Carwyn Davies[1], Frances Stringer[1]. Clinical Pharmacology Modelling & Simulation, GSK R&D, Abbotsford, VIC, Australia[1].

Understanding the different intrinsic and extrinsic factors that influence drug response can help identify population-specific responses to medicines, including differences in drug response between ethnic groups. Pharmacogenetics explores relationships between genes and drug effects, and is an example of an intrinsic factor that can explain inter-ethnic differences in drug response. Clinically significant impacts on drug disposition (pharmacokinetics) and drug response (pharmacodynamics, efficacy and safety) have been reported as a result of differences in pharmacogenetic profiles across ethnic groups [1]. Pharmacogenetic research often invokes the assumption that ethnic categories can sufficiently distinguish populations with high or low prevalence's of certain genetic variants, allowing clinicians to identify high-prevalence groups for testing. However, pharmacogenetic screening based on an individual's race or ethnicity is problematic, as it is limited by racial categories that have populations with genetic variations [2]. Furthermore, for certain drugs other factors beyond genetics are additionally important in explaining variability between ethnic groups.

Regulatory bodies and clinical organisations both play an important role in evaluating the clinical relevance of factors that influence drug response, including pharmacogenetics, and providing clinical recommendations on optimal drug dosages and identify population-specific responses. The evaluation of drug-gene associations as well as other factors that influence drug disposition and response by regulatory bodies can have clinical implications for patients from ethnic groups when these factors are reported at a higher prevalence, or also at times where pharmacogenetic information is lacking for specific ethnic groups. In this session the regulatory framework for clinical trials as well as the design of drug-gene association studies will be reviewed. The role of pharmacogenetics, other intrinsic and extrinsic factors that influence the variability in drug response between ethnic groups will also be profiled, to better understand how medications are evaluated for diverse ethnic populations in clinical development and practice.

References

[1] Magavern E et al (2022) Br J Clin Pharmacol. 88: 27–33. [2] Goodman et al (2021) JAMA 325: 625-626.

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W119. The Potential of Model Informed Precision Dosing and Pharmacogenomics for Clozapine Therapy

Sam Mostafa[1,2], Thomas M Polasek[2,3], Chad Bousman[4,5,6,7,8], Reza Rafizadeh[9], Amin Rostami-Hodjegan[10,11], Leslie Sheffield[1], Robert Stowe[12,13], Prescilla Carrion[12], Ian Everall[4,5,14,15], Christos Pantelis[4,5,15], Carl MJ Kirkpatrick[2]. MyDNA Life Australia Limited[1], Melbourne, VIC, Australia; Centre for Medicine Use and Safety, Monash University[2], Melbourne, VIC, Australia; Certara[3], Princeton, New Jersey, USA. Melbourne Neuropsychiatry Centre, Department of Psychiatry, University of Melbourne, Melbourne, VIC, Australia[4]; The Cooperative Research Centre (CRC) for Mental Health, VIC, Australia[5]; Alberta Children's Hospital Research Institute, Cumming School of Medicine, University of Calgary, Calgary, AB, Canada[6]; Hotchkiss Brain Institute, Cumming School of Medicine, University of Calgary, Calgary, AB, Canada[7]; Departments of Medical Genetics, Psychiatry, Physiology and Pharmacology, and Community Health Sciences, University of Calgary, Calgary, AB, Canada[8]; BC Mental Health and Substance Use Services BC Psychosis Program Lower Mainland Pharmacy Services Vancouver, BC, Canada[9]; Centre for Applied Pharmacokinetic Research (CAPKR), School of Health Sciences, University of Manchester, Stopford Building, Oxford Road, Manchester, M13 9PL, UK[10]. Certara UK Limited, Simcyp Division, Sheffield, S1 2BJ, UK[11]; Department of Psychiatry, Detwiller Pavilion, 2255 Wesbrook Mall, Vancouver, BC Canada V6T 2A1[12]; Djavid Mowafaghian Centre for Brain Health, University of British Columbia, Vancouver, BC, Canada[13]; Western Australian Health Translation Network, Nedlands, WA, Australia[14]; Florey Institute of Neuroscience and Mental Health, University of Melbourne, Melbourne, VIC, Australia[15]

Introduction. Physiologically based pharmacokinetic (PBPK) modelling and simulation is used for model informed precision dosing (MIPD) by constructing "virtual twins" (VTs) of real patients. This approach incorporates a large number of covariates to predict pharmacokinetics (PK), including ethnicity, gender, age, pharmacogenomics of drug metabolising enzymes and transporters, and co-administered medications. Clozapine was chosen in this study to further understand the capacity of VTs to delineate combined gene-environment effects.

Aims. To determine whether increasing the number of modelled covariates in VTs improves the prediction of clozapine PK and to determine whether VTs could be used in clinical practice a priori to suggest starting doses.

Methods. Virtual twins of Australian schizophrenic patients (N=42) treated with clozapine were built in Simcyp®. The effects of systematically increasing covariate virtualisation (low, medium, and high) on predicted clozapine PK were evaluated. Further testing in Canadian schizophrenic patients (N=11) was undertaken to evaluate the performance of VTs in predicting the optimal dosage range of clozapine to reach steady state concentrations.

Results. Increasing the covariate virtualisation from low (demographic) to high (demographic, environmental and pharmacogenomic interaction) improved the prediction of clozapine steady state concentration. The coefficient of determination (R2) increased from 0.07 (low virtualisation) to 0.368 (high virtualisation). Subsequent testing in the Canadian cohort demonstrated that VTs can reasonably predict (i) clozapine steady state concentrations (R2 ranging between 0.29 to 0.60) and (ii) the clozapine starting dosage range required to achieve target steady-state concentrations in ~ 73 % of patients.

Discussion. A high virtualisation MIPD-VT approach can predict clozapine PK and provide a recommended dose range for individual patients that will achieve the clozapine concentrations within the required therapeutic range.

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W120. Marching towards health system funding of pre-emptive pharmacogenomic testing which integrates with electronic medical record (EMR) systems across the globe.

Associate Professor Leslie J Sheffield
Leslie J Sheffield MyDNA Life Australia Pty LTD and GenSeq Labs 20th Level , 627 Chapel St. South Yarra Vic 3141

MyDNA Life is an Australian pharmacogenomic (PGx) testing company which provides PGx testing internationally in eight countries with literature derived test interpretation for medical practitioners and pharmacists. It has developed various ways of delivering these reports and this has been aided by different service requirements in different hospitals, pharmacies and countries. Some of these will be described in this presentation.

Most requests are for patients already taking a drug but since 2018 for the last 3 years the Peter MacCallum Centre has been using a pharmacist led testing system for DPYD for all patients to undergo treatment with 5FU and capecitabine. In 2022 this has expanded to do UGT1A1 and TPMT has started in 2023. 2023 also is starting with a MRFF funded research grant to expand this panel of pre-emptive tests.

MyDNA has developed a pharmacy pharmacogenomic testing system in 2000 Australian pharmacies and a smaller number of pharmacies in three provinces in Canada.

myDNA has sends out pharmacogenomic reports in the standard way as pdfs but has developed ways of reporting using electronic reports as several types of interactive portals as well as integration more fully with secure portal access into existing EMR systems.

A GP demonstration system in New Zealand will be described which has led to full integration with an international GP electronic record system. MyDNA has a laboratory in the USA and launched a pharmacogenomic service which features an interactive electronic report that can be sent to various medical record systems. This interactive report and the one that is fully integrated with an EMR will be demonstrated. myDNA has also partnered with an overseas partner to provide a reporting platform for large international laboratories using the Illumina global diversity array to provide pharmacogenomic reports from the Illumina Diversity Array.

In 2022 the UK document on personal prescribing advocated moving to a panel approach to pharmacogenomic as pre-emptive testing. At the same time Scotland indicated it would develop a study of patients on polypharmacy who would be pre-emptively tested for a panel of pharmacogenomic tests, and the results would be integrated with hospital and GP electronic record system. The aim would be to eventually set this up as a NHS funded PGx testing of polypharmacy patients in Scotland with full integration with the extensive electronic record systems available. myDNA has been involved with this project and some of the practical difficulties in doing so will be described.

W121. Investigating generative AI to build research and scholarship capacity in pharmacology and toxicology education

Dr Megan Anakin, The University of Otago

Dr Megan Anakin will build educational research capability with participants to study generative AI. Dr Anakin will use examples to illustrate key principles that are core to translating teaching practice into educational research. Working in groups centred around their preferred area of interest determined by the three areas of presentation in the first half of the workshop, participants will be facilitated by Dr Anakin to construct a research question and outline educational research approaches appropriate to investigating the use of generative AI in educational contexts.

W122. AI-Enhanced Health Education: Shaping health professionals for tackling future complex problems

A/Prof Kellie Charles, The University of Sydney

Background: Health professional degree programs are adopting research capstone units to cultivate skills for the future research workforce. These units often involve substantial written assessments that summarise extensive literature. With the advent of large language models, academics are grappling with the decision of integrating or prohibiting AI support in written assessments.

Summary of Work: Responding to the evolving AI landscape, we adopted a design-thinking approach to reshape the curriculum and assessment framework of a 13-week project course. Formerly, the assessment consisted of group oral presentations and a final literature review. The revamped version integrates AI ethically into the research process. Students now undergo a series of low-stakes assessments, emulating creative research responses to real-world public health challenges. Guided by an authentic health brief (Aust Govt vaping cessation regulations), students develop knowledge and skills to create a multimedia plan for a 60-minute educational activity and an evaluation strategy tailored to a chosen community. This revised assessment structure empowers students to tackle the pressing issue of vaping in our society using AI for information gathering and processing. Rubrics for group assessments were updated to evaluate knowledge application, including AI's role in producing assessable outputs.

Results: The 2023 implementation of the restructured research capstone project is in progress, with an evaluation study combining student-generated assessments, year-end surveys, and qualitative analysis of student reflections planned. To date, student learning has been maximised by providing students with agency and autonomy to follow their interest in the topic. Explicit teaching the research skills needed for this project type (e.g. teamwork, critical analysis, design thinking, communication and persuasive messaging) from inter-disciplinary experts are viewed favourably by students undertaking a challenging research project.

Discussion: Responsible use of AI in research is a crucial skill for all healthcare students. Educators must explore innovative ways to infuse new technologies into more creative assessments. This capstone project offers a potential model for addressing a wide spectrum of healthcare challenges. It facilitates students' ethical use of AI, while promoting critical thinking and creativity in addressing complex public health issues. The lessons learned from this project can extend to various healthcare contexts, fostering future-ready professionals prepared to embrace technology's potential while maintaining academic integrity.

W123. Academic integrity and generative AI

Prof Adam Bridgeman, The University of Sydney

New and existing artificial intelligence tools present urgent and compelling challenges and benefits for higher education. In this talk, Adam will present Sydney's approach to generative AI as one of productive and responsible engagement. AHe will explore the implications of tools such as ChatGPT on learning, teaching, assessment and how they can be leveraged to make these activities more effective, efficient, and improve student learning.

W124. Quality of information and bias in generative AI

Prof Emilio Badoer, School of Health and Biomedical Sciences, RMIT University, Bundoora Melbourne, Australia

Generative artificial intelligence (AI) is a powerful tool that is increasingly used by students, researchers and academics. A recent survey of approximately 1600 respondents found that about 15% used generative AI to write part or all of their grants for them. It was even higher regarding manuscript writing where 25% of respondents admitted to using generative AI to write manuscripts (N*ature* **621**, 672-675 (2023)). The use of generative AI by students especially in assessments is a challenging issue in higher education. There are advantages in using generative AI. For example, it may help English expression particularly if English is not the native language. However, there are also pitfalls. And a key contributor to the pitfalls is the quality of the output. In other words, is the output accurate and is it relevant? There are many factors that can influence the quality of the output. Firstly, accuracy of the data upon which the generative AI platform is trained. One thinks immediately of the saying "rubbish in – rubbish out". Secondly, bias in the training data. This can be a major problem in the healthcare sector using generative AI to diagnose disease. Is the training data representative of the whole population? If not, one can envisage the potential for an inaccurate output and the potential of an inaccurate diagnosis. These are just some examples which highlight that generative AI can be very useful but developers and users must be aware of the potential pitfalls. Inaccurate, biased and just plain wrong information that is used to train generative AI platforms will clearly influence the output of generative AI and the output will simply add fuel to the fire. We must all be vigilant and we need to ensure that our students do likewise.