

CONFERENCE ABSTRACTS

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### *New generation of pharmaceutical scientists*

#### **Adjunctive vitamin D therapy adherence in different disease conditions in children: A cross-sectional study from Pakistan**

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Posters Tuesday, September 26, 2023, 12:30 PM - 2:30 PM

**Background:** The popularity of vitamin D prescribing has increased recently due to its extracellular effects other than its conventional use in bone deformities. Adherence to standard guidelines is crucial when the question comes to disease management and prescribing. The present study aimed to assess the adherence to adjunctive vitamin D therapy in different disease conditions according to the standard guideline, and the impact of socioeconomic status on the consumption of vitamin D in children.

**Methods:** Cross-sectional observational study was conducted among 600 ambulatory pediatric patients at Children's Hospital, Pakistan Institute of Medical Sciences Islamabad, from December 2017 to July 2018. A self-designed structured questionnaire was used to collect data from the patient's medical records. Adherence to adjunctive vitamin D therapy was assessed by the U. S endocrinology clinical practice guideline of vitamin D deficiency to evaluate the evidence-based prescribing in different disease conditions in terms of 25-hydroxy vitamin D testing and prescribed vitamin D dose. The standard guideline recommends 25-hydroxy vitamin D testing in high-risk vitamin D deficiency diseases. In low-risk vitamin D deficiency disease, empirical maintenance therapy is recommended (400-800 IU). The effect of socioeconomic status on the consumption of vitamin D was examined by chi-square. Alpha value ( $p \leq 0.005$ ) was considered statistically significant. Descriptive statistics analysis and chi-square were analyzed by SPSS version 25.

**Results:** Adjunctive vitamin D therapy was prescribed among 600 pediatric patients, in 10 diseases and 22 comorbid conditions; these were categorized as low-risk vitamin D deficiency diseases and high-risk vitamin D deficiency diseases. 25-hydroxy vitamin D testing adherence in high-risk vitamin D deficiency diseases were as; seizures (5%), bone deformities (12.9%), steroid-resistant nephrotic syndrome (1.0%), cerebral palsy (6%), and meningitis (12.3%), hypothyroidism (10%); whereas in low-risk vitamin D deficiency diseases were as; respiratory tract infections (60%), general weakness (86%), diarrhea, vomiting, abdominal cramps (85%), urinary tract infection (11%). Among 600 patients, 22 comorbid conditions were found in (35%) patients in which adjunctive vitamin D therapy was prescribed. In comorbid conditions, adherence to 25-hydroxy vitamin D testing was only in (13%) patients. Adjunctive vitamin D dose adherence was in (41.3%) patients considering the severity of disease and comorbidity whereas (28%) patients received adjunctive vitamin D dose even less than the empirical maintenance dose (400IU). Low socioeconomic status found a significant association ( $p < 0.05\%$ ) between vitamin D consumption (vitamin D-rich food, food fortification products, and vitamin D supplementation) in children and mothers.

**Conclusions:** It was concluded that adjunctive vitamin D therapy was being prescribed for different disease conditions and comorbidities. Overall, low adherence to the standard guideline was observed in disease management in children. Low socioeconomic status affects vitamin D consumption in children. Due to low socioeconomic status vitamin D consumption was compromised in the majority of children.

## Systematic review of intravenous drug compatibility in neonatal intensive care setting

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**Background:** Patients in Neonatal Intensive Care Units (NICUs) often receive multiple intravenous (IV) medications through a single line. Hence, reliable physicochemical compatibility data, pertaining to NICU drugs, should be available.

**Purpose:** To conduct a systematic review of physicochemical compatibility of IV drugs used in neonatal setting.

**Method -** The 'SPIDER' systematic review model was used to formulate the research question. The search strategy included a predetermined list of NICU drugs prepared by a clinical expert panel. Selection of abstracts from database search results, was facilitated by a semi-automated, machine learning tool, 'Research Screener'. The selected articles were then subjected to full-text reading to include in the review, based on pre-determined inclusion criteria.

**Results:** Data base searching and deduplication produced 25597 articles for initial screening, of which, 118 were selected for the review. The majority (72%) had only evaluated physical compatibility, 2% evaluated chemical compatibility only, and 26% evaluated both physical and chemical compatibility of selected IV drug combinations. Physical compatibility has been evaluated by both visual and subvisual methods. High Performance Liquid Chromatography (HPLC) is the most widely used technique to assess chemical compatibility. Although physical compatibility data are available for crucial NICU drugs such as inotropes and prostaglandins, there are limited chemical compatibility data for several drugs, including epinephrine and alprostadil.

**Conclusion:** Although physicochemical compatibility information is imperative for clinical decisions, these combined data are reported in <30% of published literature.

**Key words -** Physical compatibility, chemical compatibility, neonates, NICU, systematic review, machine-learning, pharmaceutical science

## Big data-driven translational research based on medical database for chemotherapy-induced adverse events

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### Background

Cisplatin is a widely used chemotherapeutic agent for various human malignancies. Despite its benefits, 25% of patients experience severe nephrotoxicity, and no preventive drugs are currently available. Current preventive measures include hydration and diuretics, such as furosemide. The FDA Adverse Events Reporting System (FAERS) database, a major global database containing millions of reports on drug-associated adverse events, is widely used for pharmacovigilance. Recently, the FAERS database was employed for drug repositioning research against various diseases, and candidate drug identification for hypertension and depression. The database enables the determination of clinical implications based on experimental evidence, and the drug effects have been confirmed to align with experimental results in a mouse model. A combined analysis using the FAERS database and conventional experimental techniques could be advantageous for confirming the "novel efficacy" of existing drugs.

### Purpose

This study aimed to investigate the potential of diphenhydramine (DPH), an antihistamine, as a novel preventive treatment for cisplatin-induced nephrotoxicity (CIN) through in-vitro and in-vivo experiments.

### Methods and Results

The FAERS analysis examined 1,534 drugs used alongside cisplatin and identified DPH as a potential candidate for preventing cisplatin-induced kidney injury. DPH was found to mitigate cisplatin-induced cell death in the proximal tubular cells of the kidney. Mice administered with cisplatin experienced kidney injury with significant dysfunction (mean plasma creatinine: 0.43 vs 0.15 mg/dL), and showed increased levels of oxidative stress, apoptosis, inflammatory cytokines, and MAPK activation. DPH alleviated cisplatin-induced kidney damage and inflammatory cytokine levels in H1RKO mice. There was no difference in renal OCT2 expression and cisplatin content between WT and H1RKO mice. This suggests that DPH protects against CIN by both H1R-dependent and -independent mechanisms. However, treatment with DPH alleviated most of the symptoms and markedly reduced the concentration of cisplatin in the kidney (mean platinum content: 70.0 vs 53.4 µg/g dry kidney weight). Crucially, DPH did not interfere with the anti-tumor effect of cisplatin in any of the in-vitro or in-vivo

experiments. In vivo, cisplatin-treated mice had increased plasma creatinine levels, while mice treated with both cisplatin and DPH had significantly improved renal function. DPH prevented CIN without affecting its anti-tumor efficacy. In a study of 1,467 patients, with 1,416 DPH non-users and 51 DPH users, propensity-matched patients showed similar characteristics, despite overall differences in patient characteristics. The incidence of AKI was lower in patients undergoing DPH treatment (6.1%) than that in patients not undergoing DPH treatment (22.4%), suggesting that DPH suppresses cisplatin-induced AKI.

#### Conclusion

DPH demonstrated efficacy as a novel preventive medicine against CIN; therefore drug repositioning should be considered, especially since DPH is already administered to cancer patients undergoing chemotherapy. A future prospective study is needed to elucidate the potential of DPH as a prophylactic therapy for CIN.

### The impact of food on the oral absorption of N-acetyl-D-mannosamine (ManNAc) in healthy adult males and females

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**Background:** GNE myopathy is a rare autosomal disease leading to progressive wasting of skeletal muscles. The enzymatic defects in GNE myopathy result in impaired biosynthesis of the most prominent sialic acid, N-acetylneuraminic acid (Neu5Ac), thus reducing sialylation of muscle glycans. N-Acetyl-D-mannosamine monohydrate (ManNAc), a neutral monosaccharide and precursor to Neu5Ac, is currently under clinical development as a therapeutic agent to promote sialic acid production and sialylation of hyposialylated muscle glycans. Given the proposed chronic dosing regimen, a further understanding of the absorption properties of ManNAc, particularly the potential impact of food on ManNAc pharmacokinetics, is required.

**Purpose:** To determine the comparative pharmacokinetics of ManNAc after oral dosing in healthy adult males and females under fasting and fed conditions.

**Method:** This was a single-centre, open-label, randomised, two-way crossover study to evaluate the pharmacokinetics of ManNAc administered as an oral solution (4 g in 200 mL water) under fasting and fed (standard high-fat, high-caloric meal) conditions. Blood samples were collected prior to dosing and up to 48 hours following administration for quantification of plasma ManNAc and Neu5Ac concentrations using a validated liquid chromatography/tandem mass spectrometry method.

Pharmacokinetic parameters were calculated for baseline-corrected plasma concentration-time data using a standard non-compartmental approach. The comparative pharmacokinetics of the study treatments were analysed using a linear mixed-effects analysis of variance (ANOVA) model. Numerical deconvolution was used to evaluate the cumulative fraction of the bioavailable dose absorbed over time under both fasting and fed conditions.

**Results:** Administration of ManNAc in the fed-state led to a significant increase in both the rate and extent of ManNAc and Neu5Ac exposure. For ManNAc, the baseline-corrected maximal concentrations (C<sub>max</sub>) increased 1.4-fold (90% CI: 116–160%), and area-under-the-curve (AUC<sub>inf</sub>) increased 1.6-fold (90% CI: 132–190%) after a high-fat, high-caloric meal, compared to the fasting state. The plasma concentrations of Neu5Ac increased in a similar manner (C<sub>max</sub> 90%CI: 136–171%; AUC<sub>48</sub> 90%CI: 128–176%). The effect of food on ManNAc pharmacokinetics exhibited a significant gender effect, with a 97% increase in relative bioavailability with food in females compared with a 21% increase in males. Deconvolution analysis of the absorption-time profile suggested that food consumption increased the duration of ManNAc absorption, rather than the absorption rate, which appeared zero-order in nature.

**Conclusion:** The gastrointestinal absorption of ManNAc was enhanced by 50-60% after the consumption of a high-fat meal, resulting in a comparable increase in the plasma concentrations of the critical sialic acid, Neu5Ac. The impact of food was significantly greater in females than males, possibly because food extended the duration of ManNAc absorption to a greater magnitude in females in comparison to males. The improved ManNAc absorption caused by a high-fat, high-caloric meal should be further investigated to better understand the factors affecting the oral bioavailability of this endogenous compound.

### Novel Approaches for bone regeneration technique using beta-tricalcium phosphate from coral beach sand

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**Background information:** As day by day we are seeing an increase in population we can also expect osteoporosis cases are also going to increase. So scientists are trying all new different methods in order to treat this particular disease by reducing the risk of contamination and infection. Marine corals are such materials with high porosity and network-like structure that mimic the structure of human bone. Beta

tricalcium phosphate is extracted from the coral sand and it is formulated into collagen scaffolds and gelatin sponges. They are able to mimic the natural extracellular matrix of the bone, thereby increasing the ability of bone regeneration due to their network structure the proteins which are entrapped in that network structure or cells will control the release of materials as required.

**Purpose:** Preparation of scaffolds, gelation sponges, and hydrogel made of Beta tricalcium phosphate extracted from coral sand

**Methods:** Beta tricalcium phosphate was extracted from coral sand by using the hydrothermal conversation method. converted tricalcium phosphate was prepared into microspheres by using a single emulsion technique then they are converted into various other formulations like hydrogels, gelatin, sponges, and hydrogels.

**Results:** extracted tricalcium phosphate was subjected to EDS analysis, SEM, and in vivo studies were carried out in which they showed prolonged and slow release of calcium phosphate. Ex vivo comparative studies were yet to be done.

**Conclusion:** Hence the objective of the study is to extract beta-tricalcium phosphate from coral beach sand and prepare microspheres by simple emulsion method these microspheres are loaded with bone regenerative drugs and then convert to scaffold and gelatin sponge. To confirm the compatibility between the excipients and beta-tricalcium phosphate FTIR, XRD studies will be done. In order to know the shape and structure of the prepared scaffold and gelatin sponge SEM studies will be done. Ex-vivo studies will be done to know the calcium phosphate. In vivo studies will be done in mice to know the bone growth and the time taken for the formation of new bone development.

## A deep learning AI-based system for drug identification

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RFMO-04 - Rapid Fire Session Monday, P1-P2, September 25, 2023, 2:30 PM - 4:00 PM

### Background:

Medication errors harm at least 1.5 million people every year leading to an estimated \$3.5 billion in morbidity and mortality costs annually. Whether it be the increased number of medications, older age, or poor transition of care that is associated with medication errors, we have continued to search for better methods of reducing said harm. Hence, the development of a deep learning-based system to accurately identify prescription pills.

### Purpose:

To propose the utilization of artificial intelligence (AI) in identifying numerous pills with high precision. In hopes to

reduce patients' misuse of medications and assist healthcare professionals.

### Method:

165 pill images were collected from Shin Kong Wu Ho-Su Memorial Hospital's database for identification. The confusion matrix concept within the ResNet50 model developed by Natalia Larios Delgado and EfficientNet-b5 training model was then adopted for image classification and text detection. This study then trained and compared the proposed models based on images of the front, back, and side views of drugs.

### Results:

The experimental results show that with 165 images generated from 11 classified as "Grade 3 confusion matrix" drugs the AI-based system achieved an accuracy level of 90.9%.

### Conclusion:

This study demonstrated how a deep learning AI-based model for pill identification can generate accuracies greater than 90%. If integrated into existing prescription systems such as hospitals, community pharmacies, or other healthcare facilities, not only does it reduce medical errors but also allows pharmacists time to conduct higher-level tasks by simplifying the drug identification process.