hsc College of Pharmacy

Showcase Event

Friday,
October 22
1-4 pm
Come-and-Go

IREB
2nd Floor Foyer

Join Us to Celebrate Pharmacy Week & Our HSC College of Pharmacy

Poster Abstracts & Event Program

HIGHLIGHTS


Research


Clinical Practice


Education & Teaching


Service

Welcome to the 2021 HSCCP Showcase Event

Coming together to celebrate Pharmacy Week and our HSC College of Pharmacy

Activities Include:

1:00 – 3:00 pm	Poster Sessions & Competition
3:30 – 4:00 pm	Awards Presentation, IREB 2nd floor
1:00 – 4:00 pm	Light Snacks Giveaways Mix-n-Mingle Tours of IREB, PreClinical Services and Pharmaceutical Analysis Core Lab

Poster Presentations **1:00 pm – 3:00 pm**

IREB-260 Research – Pharmaceutical Sciences

IREB-230 Research – Public Health/Health Outcomes

IREB-250 Research – Practice-Based Research

IREB-250 Clinical Practice

IREB-270 Teaching & Education/Service

Research

Pharmaceutical Sciences (IREB-260)

RPS-001: Discovery of Slack Potassium Channel Inhibitor Tool Compounds: Hit Optimization of VU0531245

Qunies, Alshaima'a M, Spitznagel, Brittany D; Du, Yu; Weaver, C. David; Emmitte, Kyle A
alshaimaaqunies@my.unthsc.edu

Malignant Migrating Partial Seizures of Infancy (MMPSI) is a rare and devastating form of infantile epilepsy. MMPSI is linked to several KCNT1 gain-of-function mutations, which lead to the hyperactivation of Slack channels. Slack channels are sodium-activated potassium channels encoded by the KCNT1 gene, and are critical regulators of electrical activity in the central nervous system. The objective of our project is to utilize an iterative hit optimization strategy to discover small molecules that selectively inhibit Slack channels and possess properties that enable their use as in vivo tools. To achieve this objective, a high throughput screen was performed

versus a 110K-member compound library against the WT and representative MMPSI-associated KCNT1 mutations. The hit VU0531245 (VU245) was selected for Structure-Activity Relationship (SAR) optimization studies. The resulting compounds were evaluated for their Slack activity via a Tl+ flux assay in HEK-293 cell lines stably expressing A934T mutant Slack. SAR studies have revealed that modifications at 2-position of the western phenyl are generally well tolerated. Fluorinated, deuterated, and alicyclic alkoxy groups maintained potency while improving some DMPK properties. In the central region of the molecule, an azetidine ring was preferred for Slack activity, and fluorine substitution was tolerated but failed to reduce high metabolic clearance. Five-membered heteroaryl rings were tested in the central region; nonetheless, the 1,2,4-oxadiazole ring of the hit remained optimal for Slack activity. The eastern portion of the scaffold revealed a region more amenable to multiple substituted aromatic rings. A 4-fluorophenyl ring demonstrated a metabolic advantage over the thiophene ring, and served as the basis for further SAR exploration. Finally, a sulfonamide linker was the most potent of the prepared linkers; however, it may represent a metabolic liability and alternative bioiososteric replacements will be pursued.

RPS-002: Long-term effects of gestational hypoxia on neurodegeneration: Sex and age differences

Wilson, Elizabeth Nicole; Mabry, Steve; Rybalchenko, Nataliya; Engelland, Rachel; Fadeyibi, Oluwadarasimi; Osikoya, Oluwatobiloba; Cushen, Spencer C; Goulopoulou, Styliani; Cunningham, Rebecca L.
elizabeth.wilson@unthsc.edu

Background: Hypoxic insults during late gestation may lead to an increased risk for neurodegenerative diseases in progeny, such as Parkinson's disease (PD). Gestational hypoxic stress is a common consequence of prenatal stressors that manifest in late pregnancy (e.g., preeclampsia, eclampsia, inflammation, placental abruption). It is unknown whether hypoxic insults during late gestation have long-term effects on brain regions associated with PD, such as the nigrostriatal pathway. We hypothesized that late gestational hypoxia would result in sustained nigrostriatal impairment in male progeny.

Methods: To determine whether exposure to hypoxia in late pregnancy induced PD-associated behaviors and oxidative stress in progeny, timed pregnant Long-Evans rats were exposed to five days (gestational days: 15-19) of chronic intermittent hypoxia (CIH) or room air normoxia. Progeny were tested during two developmental stages (puberty and young adulthood). To examine the integrity of the nigrostriatal pathway, we quantified ultrasonic vocalizations. Results: Gestational CIH impaired the integrity of the nigrostriatal pathway during puberty and young adulthood in both male and female progeny, as evidenced by ultrasonic vocalization changes. Long-lasting consequences of CIH during late gestation was most evident in young adult male progeny.

Conclusions: Hypoxia during late gestation induced sustained nigrostriatal pathway impairment, especially in males. Gestational hypoxic stress increases nigrostriatal pathway vulnerability, which could increase PD risk and may also be involved in the increased risk for PD in men compared to women.

RPS-003: Long-term effects of late gestational maternal hypoxic stress on mood disorders: Sex and age differences

Mabry, Steve; Wilson, E. Nicole; Rybalchenko, Nataliya; Engelland, Rachel; Fadeyibi, Oluwadarasimi; Osikoya, Oluwatobiloba; Cushen, Spencer C; Goulopoulou, Styliani; Cunningham, Rebecca L
steve.mabry@unthsc.edu

In utero insults have been linked with increased fear and anxiety in progeny. In utero hypoxic stress is associated with a multitude of gestational complications such as pregnancy-associated hypertensive disorders and intrauterine growth restriction. Maternal hypertension during pregnancy is also associated with increased mood and anxiety disorders in progeny. However, it is unknown if these associations are due to in utero hypoxic stress. Timed pregnant female Long-Evans rats were exposed to five days (GD 15-20) of chronic intermittent hypoxia (CIH) or room air (normoxia – 21% O2) for 8 hours during their sleep phase. Each CIH cycle was 6 min of 3 min hypoxia (10% O2) and 3 min normoxia for a total of 10 CIH cycles/hour. At weaning, progeny was pair-housed with a conspecific of same sex and similar weight. To examine anxiety, we quantified anxiety-related behaviors (time spent in the center of open field arena, marble burying test, social behaviors with conspecifics) along with quantifying food intake and body weight during puberty (postnatal day, PND 40-45) and young adulthood (PND 60-65) in male and female progeny. Maternal CIH impacted body weight in young adult males but did not affect food intake, regardless of sex or age of progeny. However, maternal CIH increased anxiety related behaviors in pubertal females. These effects of maternal CIH on anxiety in pubertal females were not maintained, as these behaviors resolved in young adulthood. Maternal CIH did not impact male progeny, regardless of age. Exposure to maternal CIH during late gestation resulted in increased anxiety related behaviors in pubertal female progeny. Maternal hypoxia during late gestation may temporarily increase the risk for mood and anxiety disorders in pubertal females.

RPS-004: Development of a biorelevant dissolution method for oral drug formulation

Shah, Brijesh; Dong, Xiaowei
brijesh.shah@unthsc.edu

Dissolution is a pivotal analytical tool for solid oral dosage forms. Previous published dissolution methods include one-step dissolution in individual simulated gastric fluid (SGF, pH 1.2), simulated intestinal fluid (SIF, pH 6.8) or phosphate buffer saline (PBS, pH 7.4) which does not signify the realistic transit effect and only mimic the pH, thus leading to inapt in-vivo performance. Docetaxel (DTX), a poorly water-soluble drug, commercially available only as injectable forms, for which we developed oral DTX granules in our previous report that showed higher oral absorption in the rats compare to DTX powder. However, one-step dissolution in SGF showed no difference between DTX granules and DTX powder. Therefore, to represent the ideal in-vivo state and to predict its performance more closely, two-step biorelevant dissolution is warranted. The study objective was to develop a two-

step biorelevant dissolution method using oral DTX granules as a model drug formulation and compare with previously reported dissolution methods. Dissolution of DTX granules and DTX powder was studied in five different methods viz., one-step dissolution in (i) PBS with 0.5% tween-80, (ii) SGF, (iii) two-step dissolution in SGF and SIF with pancreatin, two-step biorelevant dissolution in (iv) fasted SGF (FaSGF) and fasted SIF (FaSIF) with pancreatin and (v) fed SGF (FeSGF) and fed SIF (FeSIF) with pancreatin. DTX release from the granules was highest (80%) in the fed state biorelevant media and was comparable with the release in PBS with 0.5% tween-80 thus suggesting physiological insignificance of the compendial method as surfactant results in the overestimation of the drug release. Instead of using artificial surfactant-based dissolution method, the two-step biorelevant dissolution method in Fed state reflected the in-vivo difference between DTX granules and DTX powder and also showed its potential to predict in-vivo performance of solid oral dosage forms.

RPS-005: Discovery of Small Molecule Slack inhibitors for the treatment of MMPSI: SAR studies around HTS hit compound VU0606170

Mishra, Nigam M.; Spitznagel, Brittany D.; Qunies, Alshaima'a M.; Acuna, Valerie; Acebo, Jonathan; Weaver, C. David; Emmitte, Kyle A.
nigam.mishra@unthsc.edu

Malignant Migrating Partial Seizures of Infancy (MMPSI) is a severe, drug resistant, and often fatal disease. Slack channels, encoded by the KCNT1 gene, are sodium-activated potassium channels that regulate essential electrical activity in the central nervous system. Approximately 30 gain-of-function mutations in Slack channels are associated with a variety of epilepsies, most frequently MMPSI. Drugs that can inhibit the activity of mutant Slack channels may provide effective treatments for MMPSI and other epilepsies.

The objective of our work is to develop selective small molecule inhibitors of Slack as leads for development of MMPSI therapeutics employing a library synthesis based, iterative hit optimization approach. The hit compound VU0606170, an inhibitor of Slack Channels was identified via High-throughput Screening (HTS) utilizing a thallium (Tl+) flux assay and cells stably expressing wild-type and MMPSI-associated, mutant Slack channels. VU0606170 has multiple regions amenable to rapid SAR development through the preparation of small libraries of compounds.

SAR studies around hit compound VU0606170 identified a chiral-methyl analog in the piperizine core as optimal for potency while modifications to linker B did not improve potency. Certain isosteric core analogs were effective but less potent than their piperazine counterparts. Several urea and amide analogs were prepared at linker A, and a few moderately potent compounds were identified. Replacement of the sulfamide linkers with a sulfonamide gave potent compounds in some cases. Second- and third-generation libraries were prepared that combined optimal functional groups from across the chemotype with a goal of improving potency and/or DMPK properties. Lastly, in-vitro DMPK studies with selected compounds generally revealed high clearance, high protein binding, and good membrane permeability within the series.

RPS-006: Interaction of Allosteric Ligands with Sigma-1 Receptor: A Molecular Docking Study

Kumari, Pratibha; Brown, Damon L.; Liu, Jin
pratibha.kumari@unthsc.edu

COVID-19 viral replication, occurs in a modified compartment derived from the Endoplasmic Reticulum (ER), causes ER stress and makes the cell adapt to the virus's needs. We know that the cell stress response signaling pathways diminish as a function of age leads to a dramatic increase in the mortality rate of elderly populations in viral infection. Hence the modulation of ER remodeling and stress response could be crucial for the management of COVID-19 infection. Studies show that the sigma-1 receptor (Sig1R), an ER membrane protein, assists to cope up with ER stress when binding to the agonist ligand. The positive allosteric modulators (PAMs) compounds are known to increase the activity of agonist ligands and could provide enhanced cytoprotective properties when cells are in situations of extreme stress, such as viral infection. Phenytoin, some benzazepine derivatives, and methylphenylpiracetam act as PAMs of Sig1R and have been used for various therapeutic applications. However, the molecular basis of their interactions in Sig1R is poorly understood. In this work, we have performed molecular docking study to shed light on the binding site, interactions, and the binding affinity of the identified PAMs of the Sig1R. We have identified possible binding pockets in the Sig1R and docked PAMs in these pockets. This study reveals that PAMs can bind at the orthosteric as well as the other allosteric binding pockets. Ropizine and benzazepine derivatives are found to be the two most optimal modulators for allosteric binding sites. The long-term objective of this research is to be able to define an allosteric binding pocket that could lead to the development of Sig1R allosteric modulators

RPS-007: Design of man-made miniature CRISPR-Cas systems using computational and artificial intelligence technologies

Jayasinghe Arachchige, Vindi Mahesha; Liu, Jin
Vindi.Jayasinghearachchige@unthsc.edu

An RNA-guided targeted genome engineering platform, CRISPR/Cas system is one of the breakthrough of the twenty-first century. Despite the wealth of its advancement, there are some associated limitations that needs to be overcome for the betterment of this revolutionized technology. Among them, the larger size of the available Cas proteins that are essential for the functioning of these tools limit their in vivo administration due to the low delivery efficiency. To address this issue, we have used computational chemistry tools to design smaller versions or compact size Cas proteins that can be used as an alternative. These man-made miniature Cas proteins are less than half size of the currently used CRISPR systems such as Cas9 or Cas12a. The sequence-based modelling studies using Swiss model has shown the similar folding of these reduced proteins compared to their original counterparts. Further experimental validation of their ds-DNA cleavage activities remains to be determined at this point of the study.

RPS-008: L4 protects lens epithelial cells from oxidative stress

Zhang, Jinmin; Lal, Kevin; Yu, Yu; Dang, Terry; Wu, Hongli
jinminzhang@my.unthsc.edu

Around 30 million people are suffering cataract in the USA. Free radicals, including reactive oxygen species (ROS) and lipid radicals, can cause cataract via oxidizing proteins in the lens. L4 is a water-soluble 12-membered tetraaza macrocyclic pyridinophane, synthesized by Johnston et al. It has three functional groups: 1) the metal-binding site, which can bind with copper; 2) the pyridol moieties and 3) hydroxyl groups. L4 can protect murine hippocampal HT-22 cells and BV2 microglial cells from oxidative stress via upregulating Nrf2. To test if L4 can protect lens epithelial cells from oxidative stress, assays were performed that examined cell viability, proliferation, and intracellular ROS levels after L4 treatment with or without Tert-Butyl hydroperoxides (tBHP) challenge. Although L4 slightly inhibited cell proliferation, it increased cell viability and decreased intracellular ROS levels in the lens epithelial cells.

RPS-009: Pancreatic mitochondrial complex I exhibits aberrant hyperactivity in diabetes

Yan, Liang-Jun; Wu, Jinzi; Luo, Xiaoting; Thangthaeng, Nopporn; Sumien, Nathalie; Chen, Zhenglan; Rutledge, Margaret A.; Jing, Siqun; Forster, Michael J.
liang-jun.yan@unthsc.edu

Purpose: The purpose of this study was to evaluate how pancreatic mitochondrial complex I responds to NADH/NAD^+ redox imbalance and the possible consequences of such response in diabetic pancreas.

Methods: Type 2 diabetic mouse models were obtained from Jackson Laboratory. Type 2 diabetic rat models and healthy young Sprague Dawley rats were obtained from Charles River. Type 1 diabetes in mouse and rat was induced by intraperitoneal injection of streptozotocin according to published methods. Pancreatic mitochondria were isolated by gradient centrifugation method and enzyme assays were determined spectrophotometrically or by in-gel activity staining.

Results: We found that pancreatic mitochondrial complex I showed aberrant hyperactivity in either type 1 or type 2 diabetes. Further studies focusing on streptozotocin (STZ)-induced diabetes indicate that complex I hyperactivity was accompanied by increased activities of complexes II to IV, but not complex V. Moreover, in diabetic pancreas, reactive oxygen species production and oxidative stress increased while mitochondrial ATP production decreased, which was accompanied by impaired pancreatic mitochondrial membrane potential and increased cell death. Additionally, cellular defense systems such as glucose 6-phosphate dehydrogenase, sirtuin 3, and NQO1 were found to be compromised in diabetes.

Conclusion: Our findings point to the direction that complex I aberrant hyperactivity in pancreas could be a major source of oxidative stress and β cell failure in diabetes. Therefore, inhibiting pancreatic complex I hyperactivity and

attenuating its ROS production by various means in diabetes might serve as a promising approach for anti-diabetic therapies, in particular, for type 2 diabetes.

RPS-010: The Role Of Mitochondria In Müller Glia Survival in Health and Disease
Nsiah, Nana Yaa; Inman, Denise M.
nyn0007@my.unthsc.edu

Purpose The importance of mitochondria to the energy production of Müller glia (MG), the main glial cells of the retina, is controversial. Previous studies showed MG are mainly glycolytic. Others challenge this view because MG are deficient in key glycolytic enzymes. Our goal is to potentially settle this debate by destabilizing the electron transport chain in MG mitochondria and assessing how retinal metabolism is negatively impacted.

Methods MG that lack oxidative phosphorylation in vivo through destabilization of Complex IV were generated using GLASTCreERT2::Cox10fl/fl transgenic mice. Mice received daily tamoxifen injections for 5 consecutive days beginning at P30. Confirmation of recombination of the floxed Cox10 locus and enzyme activity was performed using PCR analysis of genomic DNA isolated from the retina and sequential cytochrome c oxidase (COX)/succinate dehydrogenase (SDH) histochemistry, respectively. Cell lysates from primary Müller cells were used for western blotting and total protein analysis.

Results A 465 bp DNA fragment amplified from genomic DNA of mutant mice, with no corresponding fragment from control, confirmed Cox10 locus recombination. Sequential COX-SDH histochemistry shows promise, and is ongoing both in retinal sections and isolated MG. Total protein analysis, with normalization to the mitochondrial protein VDAC1, showed lower levels of cytochrome c oxidase protein from mutant mice compared to controls.

Conclusion Our results show that cre recombinase induction in GLASTCreERT2::Cox10fl/fl successfully inhibits cytochrome c oxidase activity in MG from adult mice. These findings will enable us to proceed with in vivo analyses of MG function and the impact of Complex IV instability on retinal metabolism.

RPS-011: Development and Validation of a Quantitative Analytical Method for Amphotericin B
Mans, Jaylen C; Dong, Xiaowei
jaylenmans@my.unthsc.edu

Purpose: Amphotericin B (AmB) is an antifungal drug that has been investigated for formulation improvements due to its poor oral absorption. Drug formulation research requires validated quantitative analytical techniques to accurately measure drug concentrations. For this reason, the objective of this work was to develop and validate a reverse phase high powered liquid chromatography (RP-HPLC) method for accurately measuring AmB concentration in drug formulations.

Methods: AmB concentrations were measured using a Waters 2695 HPLC System, Photodiode Array (PDA) Detector, and a Luna C18 column (5 μ, 250 $\times$ 4.6 mm). Our method consisted of a gradient elution using an organic mobile phase of Methanol/Acetonitrile/Tetrahydrofuran at 4:2:1 ratio strength (v/v/v) with 0.2%

Acetic Acid, and an aqueous phase of MilliQ water with 0.2% Acetic acid. The flow rate, injection volume, and wavelengths monitored were 1.0 mL min-1, 20 μ L, 303 and 407 nm, respectively. The RP-HPLC method was validated according to the International Conference on Harmonization (ICH) Q2B analytical procedure validation guidelines. To evaluate AmB stability, AmB standards were stored at room temperature, 4ºC, -20ºC and compared for relative AUC.

Results: Our AmB RP-HPLC method achieved the criteria for method validation. The linear concentration range was 0.25–100 μ g/mL with an R2 >0.999. The LOD and LOQ were 0.025 and 0.100 μ g/ml, respectively. Treatment of AmB standards with acidic, basic, oxidative, and thermal stressors resulted in degradation at 24 and 48 hours, which was successfully observed with our novel RP-HPLC method. AmB was found to be stable at -20ºC and 4ºC.

Conclusion: A novel RP-HPLC method was developed and validated as a quantitative analytical method to measure the concentrations of AmB. This quantitative method will provide reliable measurements of AmB in pharmaceutical formulations and further facilitate AmB formulation research to improve AmB drug therapies in the future.

RPS-012: The Role of Mitophagy in modulating RGC and glia homeostasis in Glaucoma

Fan, Yan; Inman, Denise
yan.fan@unthsc.edu

Purpose: Glaucoma is an age-related disease that leads to progressive optic nerve damage and accompanying visual field loss, caused by RGC death. Mitophagy, a subtype of autophagy that selectively degrades damaged mitochondria, is impaired during the pathogenesis of age-related neurodegenerative diseases, and leads to metabolic dysregulation, a major factor associated with RGC death in glaucoma. In this study, we aim to investigate the role of mitophagy in modulating RGC and glia homeostasis in glaucoma.

Methods We utilize mitoQC mice as a reporter to reveal mitophagy in RGCs, Müller glia, and optic nerve astrocytes under ocular hypertension, and with or without a ketogenic diet. Ocular hypertension is induced using intracameral injection of magnetic beads. After 4 weeks, retina and optic nerve are collected for analysis. RGCs are labeled with RBPMS, Müller glia with Vimentin, and optic nerve astrocytes with GFAP. Mitophagy is quantified respectively in RBPMS, Vimentin, or GFAP positive cells using the mtQC counter plugin in ImageJ. Meanwhile, spatial transcriptomics was performed using eyes from 12-month-old glaucoma DBA/2J (D2) and mice from the control strain DBA/2J-Gpnmb (D2G), with or without a ketogenic diet. The correlation of mitophagy and apoptosis-related genes in the D2 and D2G will be analyzed by Loupe Browser from 10X Genomics.

Expected Results Mitophagy will be reduced in RGCs of mitoQC mice under ocular hypertension. The ketogenic diet, which promotes mitochondrial biogenesis and compels mitochondrial respiration, will induce mitophagy to protect RGCs from apoptosis. Surrounding glia cells will show decreased GFAP expression and increased autophagy-related genes in mice on the ketogenic diet.

RPS-013: Allosteric Modulation of Small Molecule Drugs on ACE2 Conformational Change upon Binding to SARS-CoV-2 Spike Protein

Wang, Duen-Shian; Hayatshahi, Hamed S; Jayasinghe-Arachchige, Vindi M.; Liu, Jin
duen-shianwang@my.unthsc.edu

Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) has caused a worldwide pandemic (COVID-19). Drug repurposing studies, including drugs such as dexamethasone (DEX), chloroquine (CQ), and telmisartan (TLS), have been performed in COVID-19 clinical trials. DEX and CQ have been demonstrated in vitro to bind ACE2 receptor, a cellular entry receptor utilized by SARS-CoV-2. However, how DEX/CQ bind to ACE2 and their mechanisms of action are still unknown. Here we demonstrated that the small molecule drugs DEX, CQ, and TLS interfere with the interactions between SARS-CoV-2 spike protein and human ACE2 via binding to an allosteric site close to the viral spike protein binding region at the peptidase domain of ACE2, causing a conformational change of the ACE2. We defined four conformational states of ACE2 based on the two helices distances. Our molecular dynamics simulations suggested that binding to the viral spike protein shifted ACE2 conformation populations toward the "Closed" or "Semi-Open 2" conformation, enhanced by the Delta variant. The binding of the drugs to ACE2 rescues this conformation population shift allosterically to keep ACE2 in "Open" conformation mostly. Our findings provide a potential insight that modulating the conformation of ACE2 may prevent SARS-CoV-2 invasion due to unfavored poses for spike protein binding.

RPS-014: Optimization of CRISPR-Cas9 via the Synergy of MD Simulation and Machine Learning

Wang, Duen-Shian; Liang, Ivy; Liu, Jin
duen-shianwang@my.unthsc.edu

CRISPR-Cas9, a promising gene-editing tool, sheds light on gene therapy. The standard DNA cleavage of CRISPR-Cas9 is programmed by a guide RNA (gRNA) template. However, recent studies showed that Cas9 cleavage occurs even without guidance from the gRNA in the presence of $Mn2^{+}$ ions, implying the off-target effect of Cas9. Here, we report a mechanism of this RNA-independent off-target cleavage (RI-cleavage) elucidated by molecular dynamic (MD) simulations. We further used machine learning algorithms developed by our lab to facilitate the design of novel Cas9 variants to reduce such RI-cleavage. In this study, we revealed the possible mechanism of RI-cleavage and further engineered Cas9 to reduce RI-cleavage via the power of machine learning. Our research serves as an excellent example showing the potential in the synergy of MD simulation and machine learning to optimize CRISPR-Cas9.

RPS-015: Drug Delivery for Breast Cancer Health Disparities and Glaucoma Treatment

Rincon, Julio; Garrett, Meredith; Kastellorizios, Michail
Julio.Rincon@unthsc.edu

Dr. Kastellorizios' research group focuses on drug delivery and formulation science research with applications in cancer therapy, breast cancer health disparities, and glaucoma therapy.

Breast Cancer Health Disparities: African American women diagnosed with breast cancer are up to 1.6 times more likely to develop metastasis than other racial groups. Socioeconomic and physiological factors have been identified but the entire extend of this health disparity is yet unknown. Our objective is to develop a novel protocol to quantify structural differences in breast cancer tumors from African American women. Specifically, we look at the extracellular matrix, a network of fibers made primarily of collagen, that has been shown to be a factor in cancer cell metastasis. A custom-built instrument is used to obtain contact angles of droplets with anti-cancer nanomedicines on biopsies. Higher contact angles correlate to lower interactions with the tumor, which may contribute to a reduced clinical outcome. This project is funded by the Texas Center for Health Disparities, NIMDH 5U54MD006882-07 grant.

Intraocular Injections for Glaucoma: To prevent glaucoma progression and vision loss, intraocular pressure is regulated with lifelong therapies and requires strict patient compliance. A particular concern is the need to repeatedly apply medication daily or every few days. The objective of our research is to develop polymer-based drug depos that can be injected intraocularly and deliver an effective drug dose with a minimum duration of 30 days. Animal models are used to assess the pharmacokinetics (rat, rabbit) and pharmacodynamics (rat, mouse) of newly synthesized drug compounds formulated into long-acting injections. This project is in collaboration with the North Texas Eye Research Institute (Dr. Abe Clark) and the University of Texas at Austin (Dr. Stephen Martin). Funding is provided by the Harrington Discovery Institute, Gund-Harrington Scholar Program.

Population Health / Health Outcomes (IREB-230)

RPH-001: Budget Impact of Anti-epileptic Drugs and Oral Contraceptives: An Analysis of Outcomes and Cost

White, Annesha; Srinivasan, Meenakshi
annesha.white@unthsc.edu

Purpose: To show the impact of drug-drug interactions (DDIs) associated with co-administration of enzyme-inducing antiepileptic drugs (AEDs) and oral contraceptives (OCs) on the annual number of unintended pregnancies, their outcomes, and their associated costs in the United States (US).

Methods: A Microsoft Excel cost calculator model was developed to determine the impact of DDIs in women who take OCs as well as enzyme-inducing AEDs known to lower the effectiveness of the OC in preventing pregnancy. The model compared the number of unintended pregnancies, the expected pregnancy outcomes, and associated costs in women taking OCs and enzyme-inducing AEDs with a matched cohort of women who took OCs and enzyme-neutral AEDs that are known to not interact with OCs. The model took the perspective of payers in the US. Unintended

pregnancy rates, pregnancy outcomes, and cost inputs for the model were taken from published studies.

Results: The results of the analysis showed an estimated increase in the number of unintended pregnancies in the US of 458 for the estimated 65,332 women who were currently taking an OC plus an enzyme-inducing AED when compared with a matched cohort taking an OC plus an enzyme-neutral AED. These women could have reduced their risk of unintended pregnancy attributable to DDIs either by using an enzyme-neutral AED or by substitution of an alternative form of contraception such as a copper intrauterine device. Our analysis also showed that the unintended pregnancies resulted in added costs for a third-party payer.

Conclusions: Women needing treatment for epilepsy and wishing to avoid pregnancy should consider the potential for DDIs that might result in unintended pregnancies when discussing with their physician the selection of available contraception methods given the AEDs required to control their epilepsy.

RPH-002: Evaluation of Asthma-Chronic Obstructive Pulmonary Disease Exacerbation Treatment on Hospital Readmissions

Fokar, Aicha; Schillig, Jessica; Palasik, Brittany; Howard, Meredith
aichafokar@my.unthsc.edu

BACKGROUND/PURPOSE: Asthma/Chronic Obstructive Pulmonary Disease (COPD) Overlap Syndrome (ACOS) is a term for the overlapping of asthma and COPD. Studies in COPD often exclude patients that present with asthma-related symptoms, leading to a deficit in data on how to prevent ACOS hospitalizations. The purpose of this study is to identify characteristics of patients with ACOS admitted to the hospital with an exacerbation and to analyze inpatient treatment and readmission rates.

METHODS: This study is a retrospective, observational cohort study. Adult patients were included who were admitted for an asthma or COPD exacerbation and had a past medical history of COPD with asthma or ACOS. Exclusion criteria include patients who had other respiratory disorders, pulmonary infiltrates, and pregnancy. The primary outcome of this study is to assess the impact of inpatient antibiotic and corticosteroid administration on hospital readmission. The Chi-Square test will be used to determine association of inpatient medications on readmission.

RESULTS: To date,176 patients were reviewed and 61 patients met inclusion. Overall, 93% of patients were initiated on intravenous corticosteroids and the majority were tapered before discharge. 80% of patients were initiated on appropriate antibiotics. 59% were readmitted with a COPD exacerbation and had a mean time to readmission of 9 weeks. There was no association between inpatient steroid use ($p= 0.152$) or inpatient antibiotic use ($p=0.209$) and hospital readmission.

CONCLUSION: Patients with ACOS are high risk for hospital readmission. Appropriate inpatient treatment of COPD exacerbation with corticosteroids and/or antibiotics does not appear to be associated with reduction in hospital readmission.

RPH-003: Interactive Association of Chronic Illness and Food Insecurity with Emergency Room Visits among School-aged Children in the United States

Ghani, Farheen S; Manning, Sydney; Sambamoorthi, Usha
farheenghani@my.unthsc.edu

Objective: This study examined the prevalence of food insecurity among children aged 6-17 years and the interactive association of chronic conditions and food insecurity with healthcare utilization, specifically ER visits.

Methods: Data on children aged 6-17 (N = 5,518, representing 50,479,419 children) were obtained from the 2017 Medical Expenditure Panel Survey (MEPS). We measured food insecurity (Yes/No) using responses to a 10-item food security scale developed and validated by the USDA, adapted here for the MEPS 30-day window. Healthcare utilization consisted of cumulative ER visits in 12 months. Chi-square tests and adjusted Poisson regression were used to determine interactive associations of chronic conditions and food insecurity on ER visits. All analyses involved complex survey procedures.

Results: 20% of school-aged children had food insecurity; 21% had a chronic condition. After adjusting for age, sex, race, insurance coverage, poverty status, physical and mental health status, obesity, and region, we observed that children with chronic conditions and food insecurity had a higher number of ER visits (Incident rate ratio = 2.79, 95% CI = 1.892, 4.120), compared to children without food insecurity and chronic conditions.

Conclusions: 1 in 16 school-aged children had both a chronic condition and experienced food insecurity in the last 12 months. Food insecurity in children with chronic conditions was associated with more ER visits. Our findings suggest that policies and programs that provide linkages to community resources can help reduce food insecurity among children in the US and reduce healthcare utilization.

RPH-004: Multimorbidity and Whole Health among Adults in the United States: Evidence from the NHIS and BRFSS

Warner, Mayela; Neba, Rolake A; Manning, Sydney E; Sambamoorthi, Usha
mayelawarner@my.unthsc.edu

Background: Whole Health is an innovative framework that emphasizes a holistic approach of mind-body therapies, adequate sleep, emotional health, movement, and healthy diet along with medical care to improve health outcomes.

Objective: We examined the prevalence of whole health components and the association of multimorbidity with whole health among adults in the United States.

Methods: None of the commonly used nationally representative surveys collected information on all components of whole health. Therefore, we used data on adults (age > 18 years) from 2017 National Health Interview Survey (NHIS, N = 25,134) to measure mind-body therapies, adequate sleep, good emotional health, adequate movement and 2017 Behavioral Risk Factor Surveillance System (BRFSS, N = 347,029) to assess healthy diet.

Results: Prevalence of whole health components were: 24.4%, 63.9%, 78.4%, 23.8%, and 55.7% for mind-body therapies, adequate sleep, good emotional health, adequate movement, and healthy diet, respectively. Based on NHIS, only 3.4% adults had good health in all 4 components. A lower percentage of adults with multimorbidity used mind-body therapies (22.9%vs.25.2%), had adequate sleep (58.2% vs.67.1%), good emotional health (71.8%vs.82.1%); adequate movement

(16.2%vs.28.2%); and healthy diet (54.5%vs.56.5%) compared to those without multimorbidity (p < .001).

Conclusion: Seven in 10 adults had poor health in two or more components of whole health. Adults with multimorbidity were found to have poorer health in all components of whole health. As no one dataset provided information on all components of whole health, the call to action is for nationally representative data to collect information on all components with standardized measures.

RPH-005: Examining the Impact of COVID-19 on Diabetes: Medication Safety, Adherence and Patient Health Outcomes

Barnes, Haley J.; White, Annesha; Xiao, Yan
haleybarnes@my.unthsc.edu

Background: The objective of this study is to describe medication safety lessons learned in the management of diabetes in an underserved patient population during the COVID-19 pandemic.

Methods: This study involves an examination of deidentified claims data from HSC Health and JPS Health Clinics for the years 2019 - 2021. The data was divided into two cohorts: Pre-COVID (May 2019–April 2020) vs. COVID era (May 2020–July 2020). Outcomes to be compared between the cohorts include: Hemoglobin A1c (A1c) levels, fasting plasma glucose (FPG), postprandial glucose (PPG), systolic blood pressure (SBP), body mass index (BMI), change in insulin dosage, number of anti-diabetic drug changes, and medication adherence. All clinical thresholds were defined by the 2021 ADA Standards of Medical Care in Diabetes.

Results: Pending. Resulting analyses will offer insights on the following: 1) If COVID-19 contributed to the onset of diabetes; 2) If COVID-19 impacted access to insulin and other diabetes supplies; 3) If COVID-19 increased the quantity and longitude of gaps in medication/disease management; 4) If COVID-19 negatively affected the medication adjustment process. These important findings will shed light on the impact of COVID-19 on diabetes care and prompt value considerations for pharmacists, physicians and other health care professionals in their diabetic management.

Practice-Based Research (IREB-250)

RPBR-001: Time spent in INR Therapeutic Range in Pharmacist-Managed Warfarin Therapy vs Physician-Managed Warfarin Therapy

Ironbar, Catherine B; Bane, Ashley; Li, Yaze
atherineironbar@my.unthsc.edu

Warfarin, a rat poison, was studied as an anticoagulant for humans and in 1954 it was FDA approved making it the first oral anticoagulant. Warfarin's current FDA indications include: the prophylaxis and treatment of thromboembolic disorders (DVT/PE, AF, and mechanical valves) and it decreases the risk of death, recurrent myocardial infarction, and thromboembolic infarction in these patients. There is a boxed warning for major or fatal bleeding with warfarin and it is necessary for patients to have regular monitoring of INR, dose adjustments, and proper education.

The American College of Chest Physicians (ACCP) currently recommends a target INR of 2.5 (range 2.0 to 3.0) for DVT, PE, Atrial Fibrillation, and aortic valve replacement. The target INR of 3.0 (range 2.5 to 3.5) has been specified for patients who undergo mechanical mitral valves replacement. The aim of this study is to assess if there is a difference in time spent in TTR in a pharmacist-managed group and a physician-managed group regarding inpatient warfarin therapy.

Preliminary results included the Physician-Management patient group spent more TTR, multiple factors must be considered when reviewing the results. Overall, upon admission most patients in the Pharmacist-Management group came in with either a sub-therapeutic levels (60% vs 40%) or were warfarin naïve (27% vs 13%). There were fewer INR checks in patients being managed by physicians (3.8 average INRs per patient) vs the daily INR checks for patients being managed by pharmacists (6 average INRs per patient). Results from this study could affect how Medical Center Health System delegates dosing rights and pharmacy intervention within the hospital and could allow for pharmacy to play a larger role in the health care team setting for greater patient-centered outcomes.

RPBR-003: Evaluation of accuracy of explicit equation-based AUC calculation for Vancomycin dosing

Acuna, Valerie S; Moore, Marcus; Dulie Kom Nzia, Jeanne; Acebo, Jonathan; Chaturvedula, Ayyappa
valerieacuna@my.unthsc.edu

Vancomycin is one of the most widely used antibiotics in bacterial infections such as methicillin-resistant Staphylococcus aureus. However, there remains obstacles in monitoring its effectiveness otherwise known as therapeutic drug monitoring (TDM). TDM is vital since it increases the rate of clinical efficacy and decreases the rate of nephrotoxicity in patients receiving treatment with vancomycin. ASHP guidelines support the use of AUC/MIC in predicting effectiveness, furthermore they support the use of Bayesian dosing to attain AUC levels. However, implementing this method has been difficult and many institutions still rely on trough-only or the trapezoidal two-level method for monitoring vancomycin levels. This study aims to compare two manual calculation based trapezoidal methods of vancomycin AUC estimation and evaluate their accuracy in practice. To evaluate these two methods simulations, plotting, and calculations were performed using RStudio (version 1.1.456). Pharmacokinetic profiles of vancomycin (n=1000) were simulated following a loading dose and several maintenance doses using a previously reported population pharmacokinetic model. A total of 10 maintenance dose intervals were modeled to evaluate the accuracy before and after steady state was reached. The AUC estimated by the trapezoidal methods was comapared to the true AUC at each cycle. The results showed that in using both trapezoidal methods, there is error when comparing the calculated AUC to the true AUC at steady-state. Additionally, the results showed AUC can either be overestimated or underestimated depending on the method of calculation. These results may suggest that an additional correction factor may be implemented within the two trapezoidal methods to make them more accurate in estimating AUC for vancomycin.

RPBR-004: Applying MAP Bayes estimation for Therapeutic Drug Monitoring (TDM) in R with mrgsolve

Sule, Olagoke; Chaturvedula, Ayyappa
OlagokeSule@my.unthsc.edu

The Bayesian model is a statistical framework where prior information is updated with new information to derive posterior. In Bayesian statistics, a maximum a posteriori probability estimate (MAP) is an estimate of an unknown quantity that equals the mode of the posterior distribution. The MAP can be used to obtain a point estimate of an unobserved quantity (eg., individual pharmacokinetic (PK) parameter) based on empirical PK data and a population pharmacokinetic model. Our objective for the research APPE was to develop a ShinyApp prototype for vancomycin dosing. Previously published vancomyin population was used as prior model and coded into mrgsolve functions in R. A sample virtual patient PK profile was simulated using mrgsolve package in R. After obtaining PK concentrations of the sample individual, the mapbayes function was run, and individual PK parameters (clearance and volume of distribution) were optimized. Then the estimated parameters were used to simulate PK profiles at a certain dose level to verify if that dose level meets the threshold concentrations of efficacy. The above process was built into a ShinyApp for easier end-user access through graphical user interface (GUI). The ShinyApp allows the user to adjust the number of doses and the dosing interval so that pharmacists can visualize the PK profile and select appropriate dosing. This ShinyApp requires validation before any clinical use.

RPBR-005: Leading predictors of combination pain therapy among cancer survivors using a machine learning method

Xavier, Christy; Manning, Sydney; Rasu, Rafia; Sambamoorthi, Usha
christy.xavier@unthsc.edu

Background: Opioids are commonly used to manage cancer pain. Concomitant use of opioids with benzodiazepines (BZDs), non-steroidal anti-inflammatory drugs (NSAIDs), and skeletal muscle relaxants (SMRs) are associated with increased rates of falls and mortality among patients with cancer. We examined the leading predictors of combination pain therapy using machine learning approaches.

Methods: This is a retrospective cohort analysis of older adults (> 65 years old) cancer survivors (N = 2,673) with data from the largest national cancer registry SEER (5% cancer sample) linked to Medicare fee-for-service claims. Breast, cervical, colorectal, lung, melanoma, NHL, ovarian, pancreatic, prostate, thyroid, and uterine cancers were included. Combination pain therapy after cancer diagnosis was defined as having any prescriptions for opioids and/or NSAIDs, SMRs, BZDs, or gabapentin. Random Forest (RF) algorithm in R software was used for prediction. Model validity was assessed with sensitivity, specificity, and area under the curve. Leading predictors were identified with variable importance plots and gini-decrease.

Results: 37.4% had prescriptions for combination pain therapy; 13.7% had prescriptions for opioids only. Multivariate analysis revealed that multimorbidity, anxiety, and chronic pain conditions were the primary drivers for pain prescription use. The prediction had high specificity (0.99) and low sensitivity. The six leading

predictors were: social determinants of health (SDoH) at the county level (% college educated and % living in poverty), care fragmentation, race/ethnicity, marital status, and age. Analyses also revealed complex interaction patterns among care fragmentation and SDoH.

Conclusions: SDoH were the leading predictors of combination pain therapy. Optimal pain management strategies need to integrate clinical, health system factors and SDoH. Pharmacists and clinicians need to consider these factors to optimize care and improve outcomes.

RPBR-006: Intermittent and Continuous Infusion Vancomycin Dosing in Adult Cystic Fibrosis Patients

Lindley, Bryn E; Bhakta, Zubin; Gray, Kristine; Leclair, Laurie; Young, David
bryn.lindley@unthsc.edu

Cystic fibrosis (CF) is an autosomal recessive genetic disease characterized by lower airway obstruction, inflammation, and chronic pulmonary infections in which these patients experience recurrent acute pulmonary exacerbations (APE) and progressive decline in lung function. While the most efficacious intravenous (IV) vancomycin dosing strategy for the treatment of methicillin-resistant Staphylococcus aureus (MRSA) in CF patients is unknown, the Infectious Disease Society of America (IDSA) recommends dosing to a trough concentration of 15-20 ug/mL and area under the curve to minimum inhibitory concentration (AUC:MIC) 400-600 for the general population. The University of Utah Adult Cystic Fibrosis Program utilizes continuous infusion vancomycin for the treatment of APE secondary to MRSA with an observed trend towards decreased rates of adverse events and decreased total daily dose of vancomycin. This is an exploratory study describing intermittent and continuous infusion vancomycin. Included patients were 18 years and older with CF and admitted to University of Utah Hospital between May 11, 2014 and August 31, 2020 for treatment of APE and received IV vancomycin. The primary outcomes included the number of patients who return to their baseline forced expiratory volume (FEV1), the time to their next APE, vancomycin clearance rates, and the number of patients who achieved goal AUC:MIC targets. The safety outcomes included the rates of acute kidney injury (AKI) and the total daily vancomycin dose. To our knowledge, this was the first study describing both intermittent and continuous infusion vancomycin. The University of Utah Institutional Review Board has deemed this study exempt.

RPBR-007: Exploring Potential Pharmacist Roles in the Investment Space

Askew, Excellence; White, Annesha
excellence.askew@gmail.com

Pharmacists have the responsibility to assure safe and effective medication usage. In regards to the pharmaceutical industry, pharmacists conduct research to help develop new therapeutics, help manage clinical trials, and provide medical information and education, while engaging with key opinion leaders (KOLs). Pharmacists providing medical information and interpreting clinical trial results for investment firms is an innovative area that should be more closely explored. Equity researchers traditionally have a finance or business

background. The pharmaceutical and biotechnology sectors pose a unique challenge to traditional equity researchers because their products are scientifically based. In other sectors the analysts require knowledge of the general market, sales, marketing, and the profits and cash flow. Training for pharmacists includes marketing, accounting, reimbursement, informatics, and contract negotiation. In the pharmaceutical sector, analysts have the additional challenge of understanding science, regulatory processes, and the drug pipeline. Pharmacists being the medication experts could serve as excellent equity research analysts. The overall marketplace has changed due to the pandemic allowing for a more dynamic role for the pharmacist.

RPBR-008: Evaluation of a Nurse-Driven Heparin Infusion Titration Protocol in the Healthcare System

Pham, Ivy; Yang, HaNeul
IvyPham@my.unthsc.edu

Weight-based therapeutic unfractionated heparin continuous IV infusions are used for venous thromboembolism, atrial fibrillation or atrial flutter, or an acute coronary syndrome in the inpatient setting to manage coagulation state. Per 1998 College of American Pathologists, the therapeutic aPTT range for heparin infusions must be individualized based on its aPTT reagent lot numbers. Heparin infusion rate is adjusted per protocol by obtaining a series of partial thromboplastin time to achieve the target aPTT. This study aims to examine the usage of the current heparin infusion nomogram and nursing compliance with the dosing protocol within the healthcare system.

This retrospective analysis was conducted at a single-center community hospital. Adult patients 18 years or older from January 2020 through April 2020 who received an intravenous heparin drip for at least one day were included. Heparin dosing per indications, correct aPTT drawing time, patient's weight, appropriate nurse charting, and the first three aPTT were assessed.

The primary endpoint of this medication utilization evaluation is to determine if the nurse-driven protocol was properly followed and documented. The secondary outcome is whether the therapeutic aPTT levels were achieved within the first 24 hours of heparin initiation.

With the outcomes from this study, there were several opportunities identified for improvement. This data may present an opportunity for pharmacists to participate in managing anticoagulation and improving adherence to the dosing protocol for efficacy and safety.

RPBR-009: The Importance of Emergency Medicine Pharmacists: A Cost Avoidance Analysis

Castaneda, Andre T.
AndreCastaneda@my.unthsc.edu

The importance of Emergency Medicine Pharmacists (EMPs) has slowly become more recognized over recent years. Pharmacists provide a variety of services and recommendations in the field of emergency medicine, which can decrease the cost of therapy and improve outcomes for patients. A few of the services that EMPs provide

include direct patient care, resuscitation efforts, patient and caregiver education, medication therapy monitoring, and research/scholarly activities. This work has led to endorsements by other healthcare groups, such as the American College of Emergency Physicians (ACEP) and the American College of Medical Toxicology (ACMT), and the Institute of Medicine (IOM) now recommends that clinical pharmacists be present on any emergency medicine team. However, since EMP services are not billable, the cost savings for their services cannot be neatly identified. The purpose of this research is to show the importance of EMPs using a cost avoidance approach at a large pediatric medical center. This hospital documents nearly all services and interventions made by EMPs, and this data can be used to provide an estimate of cost avoidance using already published financial information.

Clinical Practice (IREB-250)

CP-001: COVID-19 mRNA Vaccine Induced Pericarditis: A Case Report
Davis, Kajohna H; Hulsizer, Abigail L
kajohnadavis@my.unthsc.edu

Pericarditis is characterized by swelling and inflammation of the outer lining of the heart, known as the pericardium. Acute pericarditis is commonly idiopathic in nature but rarely can occur secondary to viral infections and more rarely medications. In recent months, acute pericarditis cases across the United States have spiked significantly since the emergency use authorization (EUA) of messenger ribonucleic acid coronavirus disease 2019 (mRNA COIVD-19) vaccines including BNT162b2 and mRNA-1273/2. The following case report details an acute pericarditis episode as a potential result of mRNA COVID-19 vaccine administration.

A 19-year-old-adolescent Asian American male with no past medical history presented to the emergency department complaining of severe chest pain after receiving his second dose of the BNT162b2 COVID-19 vaccine three days prior. Cardiac biomarkers were elevated, and electrocardiogram (ECG) revealed trace ST elevations across multiple leads consistent with acute pericarditis. The patient was admitted for further evaluation and medical management with non-steroidal anti-inflammatories (NSAIDs), colchicine, and proton-pump inhibitors (PPIs) all of which led to rapid improvement of symptoms.

COVID-19 mRNA vaccines may play a role in inducing an inflammatory response within the outer lining of the heart. As the global pandemic continues and more vaccines are administered, it is important to identify which populations are at higher risks of developing pericarditis, discover the most effective treatment options, and evaluate the potential dangers of recurrence as multi-dose booster vaccines begin to seek approval.

CP-002: Casirivimab/Imdevimab Versus Bamlanivimab/Etesevimab
Dion, Nicole M; Lipscomb, Melissa M
nicoledion@my.unthsc.edu

The COVID-19 virus has caused hospital admission rates to soar. To reduce the number of hospital admissions, monoclonal antibodies (MAB's) are being used in certain patients with mild to moderate COVID-19 or exposure to COVID-19. At Baylor All Saints the two MAB's in use are casirivimab/imdevimab and bamlanivimab/etesevimab. These drugs have very similar uses, however, there are some key differences between them. In this poster we will highlight these key differences.

CP-003: Rethinking the Impact of Formulary Changes on Costs and Patient Health Outcomes: How to Communicate and Counsel

Kom Nzia, Jeanne Dulie; White, Annesha
jeanneduliekomnzia@my.unthsc.edu

Formulary changes occur regularly to achieve cost savings. National health care expenditure was over $3 trillion in 2015 and millions of patients are impacted by changes such as increased copayments, co-insurance, generic brands substitution or drug deletions. The impact on health outcomes may be positive or negative. For most health plans, patients are made aware of benefit structure changes by mail or email, but most patients do not read updates, some do not understand without assistance. Fifty percent of patients remain without treatment for months or completely stop treatment, refusing alternatives.

The objective of this study was to provide a comprehensive review of published studies regarding best practices in counseling patients upon changes to their formularies.

Systematic review of literature (2008-2020) was conducted on PubMed and Scopus. The key words included: “formulary changes”, “patient outcome"", “formulary restricted”, “patient counseling”, “formulary decision making”, “formulary limitation”. Study characteristics included author(s), source, study design, major findings, study quality.

A total of 72 articles were included. Formulary restrictions were shown as effective, however, literature on the humanistic aspects is lacking. Positive impact included improvements in intermediate outcomes. Negative impact included increased acute care events and side effects. While overall healthcare costs decreased, there were increased inpatient admissions, lab testing, and ambulatory procedures. The most important counseling aspects were medication adherence, treatment satisfaction, alternative therapies, and pharmacy costs.

Findings differed by type of payer (commercial vs. Medicare), disease state or drug class. Proper communication is the most important step in approaching patients to discuss changes to their formularies. Utilizing a comprehensive guidebook may result in positive health outcomes in terms of treatment continuation and compliance with new costs.

CP-004: The Emerging Role of the Pharmacist in Managing Poisoning Cases: A Systematic Review

Simpson, Payton O; White, Annesha
paytonsimpson@my.unthsc.edu

Introduction: In 2019, a total of 2,573,180 calls were made to poison control centers across the United States. This equates to 1 exposure every 15 seconds, and of the top 10 agents reported in exposures, 5 were pharmaceutical products or prescription medications. This presents the question, what went wrong in these cases? While many poisoning exposures are accidental, some can be attributed to either a lack of knowledge regarding the proper use of the product or improper storage. With prescription medications listed among the top agents, there is a growing need for pharmacists to prevent, and treat poison exposures.

Objective: The objective of this study was to review the literature and assess the role of the pharmacist in managing poisoning cases. This review aimed to analyze the pharmacist's specific role, associated duties, and necessary skills. A secondary objective was to analyze the literature for common practice sites of pharmacists and describe barriers to participation in poisoning cases.

Methods: A systematic review of the current literature was performed using PubMed and SCOPUS. The search included a combination of terms "pharmacist" and "poisonings." Articles dated 2000 to 2020 were included to reflect most current practice. Articles were excluded if they were not from the U.S., not directly related to poisonings, or if the full text was unavailable. Search results from each database were exported to Microsoft Excel and sorted for removal of duplicate citations. Articles were graded on the Oxford scale based on study design and quality of evidence. Data reported from each article was categorized by: study objective, intervention, practice site, pharmacists' role, and skills needed. Additionally, barriers or challenges to pharmacist participation in poisoning cases were documented.

CP-005: Defining and Enhancing Collaboration between Community Pharmacists and Primary Care Providers to Improve Medication Safety

Blythe, Rachel; White, Annesha; Xiao, Yan
rachelblythe@my.unthsc.edu

Introduction: Over 4 billion prescriptions are dispensed each year to patients in the United States, with the number of prescriptions among older persons continuing to increase. There is a growing recognition of pharmacists' potential in improving medication safety in community settings, in collaboration with physicians and other professionals. However, the nature of collaboration between community pharmacists and physicians has not been well defined and barriers and strategies to enhance such collaboration are not articulated, especially in consideration with growing roles of community pharmacists beyond dispensing.

Area covered: Appropriate search parameters were identified, and PubMed was selected as the most relevant database for this narrative review. Published studies were retrieved between January 2000 and December 2020. Search terms included key words: "patient safety," "medication safety, "collaboration," "primary care physician," and "community pharmacy." Resulting articles were grouped into four categories: defining collaboration, types of collaboration, barriers and solutions to collaboration and collaboration needs in delivering emerging pharmacist services.

Implications: It is important to understand the factors within a community pharmacy setting that either limit or facilitate community pharmacists in

participating in medication safety activities. This study adds to the current literature on barriers and facilitators by offering examples of types of collaboration as well as types of and communication that can elevate the partnership between physician and pharmacist.

CP-006: Updates on the Development of a Mobile-app: Innovation to Enable Communication between Patients, Pharmacists and Physicians

Vo, Elise; White, Annesha; Liu, Jin; Clark, Rachel
EliseVo@my.unthsc.edu

Purpose- Today, healthcare in the United States is a highly fragmented system with failure of care-coordination estimated to cost the healthcare system between $27.2 billion to $78.2 billion. Fax and phone based communication between pharmacists and physicians often results in delays in patient care. We aim to develop "HealthKnect", a web-based integrated platform to facilitate communication to help patients, pharmacists, and providers solve delays and miscommunication.

Methods- Market-research was conducted to identify available mobile applications focused on patient engagement with physicians and pharmacists. The desirable features of the proposed application were then identified. A wire-frame was developed to design the interface of the application. We are currently beta testing a functional web-based application among various stakeholders to gather feedback.

Results- The applications identified in the market-research was categorized as- (1) Tele-medicine and communication (2) E-prescription (3) prescription discounts and (4) Patient EHR portals. There was a lack of integrated platforms cutting across health systems and EHR barriers where patient-initiated communication could take place between physicians and pharmacists.

Conclusion- HealthKnect serves to eliminate the "silo-approach" to healthcare delivery which leads to poor information flows due to lack of care-coordination between physicians and pharmacists. The application serves to empower patients and include pharmacists in digital collaboration for patient-care.

CP-007: Exploring the Role of the Pharmacist in Hair Testing for Drugs of Abuse: Implications and Considerations

Duru, Chinonye; White, Annesha
chinonyeduru@my.unthsc.edu

Objective: The objective of the study was to explore the role of the pharmacist in hair testing, hair testing methods, types of hair testing, and hair texture as an implication for hair testing.

Methods: A systematic review of the literature was conducted by using Pubmed for studies published from 1988-2021. Search terms included 'Pharmacy and hair' and 'substance abuse', 'Pharmacy and hair' and 'substance abuse' and 'Naloxone', 'Pharmacist' and 'Hair Testing"", 'types of hair testing"" and 'substance use disorder', 'types of hair testing"" and 'substance use disorder', 'hair texture"" and 'substance use disorder', 'Pharmacist and hair' and 'substance abuse. A table was developed based on author and publication year, role of the pharmacist, hair testing types, and hair testing methods. The evaluation process was reported using the

Prisma flow diagram. The articles were graded using the Oxford for Evidence-based Medicine scale.

Results: Pending. A preliminary search yielded 75 articles in the literature.

Teaching and Education (IREB-270)

TE-001: Cultural sensitivity in interprofessional patient care

Antony, Sheena; White, Annesha; Gibson, Caitlin
sheena.antony@unthsc.edu

Purpose: ASHP and ACPE encourage adding components to the curriculum which promote cultural sensitivity. Cultural sensitivity interprofessional training is growing as an element of the curricula for many healthcare disciplines. Culturally sensitive care is associated with improved medication adherence, patient satisfaction, and health outcomes. However, there is a lack of evidence-based practices for how to execute this type of training. The primary objective is to assess student awareness and value for interprofessional collaboration to solve cultural sensitivity issues.

Methods: This study has been approved by Institutional Review Board. The Interprofessional Education (IPE) event will consist of pharmacy, physician assistant and social work students. The first component of the activity will be the patient panel. Patients will be recruited from the community to represent various special populations to speak about topics they feel future healthcare professionals should be aware of. The final piece will consist of students being divided into interprofessional teams where they will work together to complete a patient case centered around best practices for interviewing. After the IPE, students will complete a survey which will consist of Likert-type scales and open-ended questions to assess the primary objective. Descriptive and interferential statistics will be performed using Statistical Package for the Social Sciences (SPSS) version 25.0 (IBM Corp., Armonk, NY). Open ended questions will be assessed using content analysis.

TE-002: Evaluation of Students' Confidence and Competence of Over the Counter (OTC) Consult Skills

Killam-Worrall, Lisa J; Ssentamu, Frank; Patel, Dipa; Fix, Jennifer T.
lisa.worrall@unthsc.edu

Objective: This research study evaluates the effectiveness of OTC curriculum enhancements towards strengthening the students' application and development of consultation skills following the IPPE Community.

Methods: Survey instruments were constructed using Qualtrics survey tools to obtain feedback from preceptors and pharmacy students. Surveys were emailed directly to each participant with a stated response date. Identified participants were those who completed the IPPE Community in 2019 and 2020. The study included analysis of related competencies from student and preceptor evaluations.

Results: There were 118 completions of the student survey. Most students rated themselves as 80-100% in confidence (52.54%), competence (49.15%) and engagement (55.08%) in providing OTC consults after the IPPE Community rotation.

Some students rated themselves as 60-79% in confidence (38.98%), competence (43.22%) and engagement (38.14%). Students selected class lectures, IPPE OTC Consults and OTC OSCE as most instrumental in providing OTC Consults during IPPE Community. Overall, students rated themselves as meet expectations in counseling patients (89.12%) and triaging for self-care (92.27%) on the IPPE Community Student Final Self-Evaluation. Preceptors rated our students as very confident/comfortable and confident/comfortable with providing OTC consults. The preceptors also rated the students favorably on gathering information, recommending appropriate OTC products, and providing education regarding OTC and non-pharmacologic options. Overall, preceptors rated students as meets expectations in counseling patients (91.75%) and triaging for self-care (90.21%) on the IPPE Community Preceptor Evaluation of Student.

Conclusion: The surveys and evaluations revealed that the majority of students are confident, competent and engaged in providing OTC consults. Students rated the OTC curriculum enhancements as instrumental to their success in providing OTC consults.

TE-003: New Professional Training Programs in Drug Discovery and Development (DDD) to Promote Student Employment Competitiveness and Career Advancement

DDD Programs Committee and Office of Academic Communications, HSC College of Pharmacy
eric.cheng@unthsc.edu

New Certificate Program and Master of Science (MS) Degree Program in Drug Discovery and Development (DDD) have been developed by the HSC College of Pharmacy to promote student employment competitiveness and career advancement. These educational programs are designed for recent college graduates, current graduate or professional students, and other full-time or part-time students including working professionals, to seek a solid knowledge foundation about how drugs and medicines are discovered and developed. These programs will also increase the student's understanding of clinical, medical, legal and regulatory affairs related to the DDD process. MS-DDD program further provides students the opportunity to gain hands-on research, managerial and communication skills for real-world applications. Graduates from these programs will be more competitive in seeking entry-level employment or advancing their career in a variety of bio-pharmaceutical industry and non-industry settings.

All didactic courses of the DDD programs are delivered online; in addition, the MS-DDD program has a final in-person training course of Capstone Research or Internship Practicum that can be undertaken either on the HSC campus or at a remote site upon proper arrangement. Programs can be pursued either full time or part time.

Overall, those new DDD programs are accessible, affordable, flexible, and aimed at promoting student employment competitiveness and career advancement.

TE-004: The Impact of Quarantine on Pharmacy Students' Stress Level and Mental Health: A Regional Analysis

Nguyen, Quang V; Barnes, Haley; Muilenburg, Katherine; Garcia, Luis A; White, Annesha; Howell, Crystal
quangnguyen@my.unthsc.edu

Educators and student pharmacists adapted to online curriculum during the SARS-CoV-2 pandemic. The stress from COVID-19, quarantine, and virtual learning may impact student mental health. The magnitude of this stress may differ across the US due to some regions being affected more heavily by COVID-19 than others. We hypothesized there would be regional variation in pharmacy student stress before and during quarantine. During fall of 2020, US student pharmacists were invited to partake in an anonymous 40-question survey. The validated Perceived Stress Scale (PSS-10; Cohen, 1988) was incorporated to assess stress levels prior to and during quarantine. Additional demographic, quantitative, and qualitative free responses were captured, including CDC region. Blinded researchers (HB, QN) coded free response answers into common themes of stress while lead researcher (CH) adjudicated discrepancies. Descriptive and inferential statistics were analyzed using SPSS (Version 25.0, Armonk, NY). Analyses between PSS-10 and region prior to and during quarantine were made using Cochrane's Q test and Wilcoxon Signed-Rank and Friedman post hoc tests. 488 self-reported responses were received from 7 of 10 regions. Of these, 407 were eligible for analysis. All regions except region 9 showed an increase in PSS-10 scores during quarantine compared to before quarantine (6.2 ± 12.5; $p \leq 0.001$). Region 8 had the greatest magnitude (38.5%). 67% of subjects reported an increase in stress while 22% reported a decrease in stress, and 11% had no change in stress. 70 free responses were coded into five themes: mental compartmentalization (37%), learning environment (27%), technology academic isolation (14%), accessibility (13%), and personal isolation (9%). These results support our hypothesis that there is regional variation in student pharmacist stress before and during quarantine. Overall, these data suggest potential stressors of students that educators should consider in mental health outcome

TE-005: Managing Our Outcomes: An introduction to the UNTHSC chapters of Academy of Managed Care Pharmacy (AMCP) & International Society for Pharmacoeconomics and Outcomes Research (ISPOR)

Jodray, Megan; Barnes, Haley; Dulie, Jeanne; Lenear, Andrea; Nelson, Rebecca; Sole, Goke
meganjodray@my.unthsc.edu

Background: In 2017, the UNTHSC AMCP chapter and the ISPOR chapter merged to share our love of medication management and increasing quality of patient outcomes. Health outcomes research gives us insight into health gaps in population groups as well as to identify clinically safe and effective interventions. Managed care utilizes this evidence-based research to develop formularies, drug utilization reviews, medication therapy management (MTM) programs, and reduce waste. Health care fields rely on evidence-based medicine to guide their practice and utilize managed care to develop their formularies and MTM programs.

Objective: The mission of UNTHSC AMCP is to empower its members to serve society by using sound medication management principles and strategies to

improve health care for all. The mission of UNTHSC ISPOR is to promote health economics and outcomes research excellence to improve decision-making for health globally.

Results: AMCP/ISPOR is now 30+ student pharmacists strong with many alumni working in the fields of managed care, pharmacoeconomics, pharmacovigilance, and health outcomes. Over the last year alone, AMCP/ISPOR hosted 10 events consisting of 4 professional development meetings, 3 educational events, 1 service event, 1 pharmacy & therapeutics (P&T) competition, 1 pharmacy professional roundtable, and 1 research roundtable that helped all attending student pharmacists connect with research opportunities on campus.

Conclusion: UNTHSC AMCP/ISPOR is a great way to connect our student pharmacist population to non-traditional roles in pharmacy like regulatory affairs, medical writing, formulary management and more. Our members grow as successful leaders and advocates in the pharmacy profession. To join, find us on the UNTHSC Engage portal. Questions? Reach out to the 2021-2022 Presidents, Megan Jodray (megan.jodray@my.unthsc.edu) and Rebecca Nelson (rebecca.nelson@my.unthsc.edu).

TE-006: Lessons from the Field: Updates on the Development of a Pharmacy Faculty Stress Scale – Findings across Five Schools

White, Annesha; Wettergreen, Sara; Nandy, Karabi; Atanda, Adenike
annesha.white@unthsc.edu

OBJECTIVE: Pharmacy accreditation Standards note PharmD programs should ensure "assessments include measurements of perceived stress in faculty, staff, and students." Although validated stress instruments exist, there is none specifically for pharmacy faculty. The objectives are to present findings in developing a pharmacy stress scale using a pilot instrument and to highlight coping strategies.

METHODS: A Pubmed search was conducted, 40 articles were reviewed and 150 scale items from literature were categorized into constructs: 1) Support systems, 2) Mental health, 3) Physical health, and 4) Satisfaction. A resulting 10-question online survey was administered across five schools.

RESULTS: The 123 faculty who completed the survey comprised 57% females, 72% pharmacy practice dept., 31% assistant and 22% full professor rank. Sixty-six percent of participating faculty had children (18% one child, 27% two and 18% three children). Common examples of hobbies were nature-related activities, indoor/outdoor activities, health/fitness and sports. The majority had not used counseling services (61%) and half had a mentor (51%). When asked, "Do you have an existing diagnosis of either anxiety/depression?" 82% reported 'No.' On the other hand, when asked on a scale of 1 to 5 rate stress level (1=Low Stress, 5=High Stress), the mean was 3.59. The item with the highest stress rating was "I have too heavy a workload" (mean 3.57) and 34% felt fatigued and/or overwhelmed most days/daily. Common coping strategies were noted as having a pet (59% yes), exercising (45% most days/daily), good nutrition (68% most days/daily), use of humor (45% most days/daily), spirituality (34% most days/daily), emotional support from friends/relatives (35% most days/daily) and I buy myself something (32% most days/daily).

CONCLUSIONS: Preliminary findings are useful as indicators for targeted wellness initiatives. Next steps include survey administration to faculty at all U.S. pharmacy schools.

Service (IREB-270)

S-001: STUDENT PHARMACIST ORGANIZATIONS
Fix, Jennifer; Truong, Ninh; Dorsey, Jasmine
jennifer.fix@unthsc.edu
This poster seeks to provide a visual representation of service organizations available for student pharmacists at HSC College of Pharmacy.

S-002: Using Design Thinking to Develop and Assess a Work Life Journey Pharmacy Faculty and Staff Toolkit
White, Annesha; Ramanathan, Meenakshi; Palasik, Brittany; Coyle, Russell; Silk, Jonathan
annesha.white@unthsc.edu
Objective: The AACP Statement on well-being "encourages schools and colleges of pharmacy to proactively promote wellness to students, faculty, and staff." The objective of this study was to provide a resource document for a pharmacy faculty and staff Work Life Journey Toolkit using design thinking and assess its usefulness.
Methods: Best practices in the literature, including the five stages of design thinking were used to develop a toolkit. Six months after dissemination, an online 5-item survey was emailed to all pharmacy faculty and staff to obtain feedback. Responses were analyzed using descriptive statistics.
Results: There were several sequential steps to developing the toolkit: (1) a team of volunteers was charged with supporting faculty and staff work life journey initiatives; (2) the team discussed goals and interviewed faculty and staff on work life balance; (3) responses were summarized in a table highlighting common themes; (4) results of the literature search were combined with themes to generate a list of topics; (5) a website was the preferred platform to share information via links from the school's webpage. Follow-up presentations were offered over six months to highlight website topics via visual examples and activities. As a last step, a 5 item feedback survey was administered. Seventeen respondents agreed/strongly agreed that the Work Life Journey website is a comprehensive source of information (response rate 30%). Respondents suggested adding the topics emotional intelligence and faculty stories.
Conclusions: The literature is not extensive when considering the work life journey among pharmacy faculty and staff. This study addresses these gaps by offering a comprehensive list of topics using design thinking, a collaborative, human-centered approach to innovation.

THANK YOU SO MUCH FOR JOINING US TODAY!

We wish to extend a very special "Thank you" to all of our judges!

Paul Below, MBA, CRA
Director, Faculty Research Support Team
Division of Research and Innovation

Rance Berg, PhD
Associate Professor
Assistant Dean: Graduate Education & Admissions
IBC Chair
Microbiology, Immunology, and Genetics
Graduate School of Biomedical Sciences

Ryan Boyle, PharmD
Staff Pharmacist
Medical City Healthcare, Weatherford
Class of 2019

Mingju Cao, PharmD, RPh
Kinetiq Therapeutics

Kevin Gelston, BS
Scientist
CAGE Bio, Inc.

Stacey Gilbert, MBA (HA)
Senior Director, Population Health
Exact Sciences Corporation

Katrina Gordon, PhD
Manager, Discovery Center & Microscopy Core Facilities
Office of Research Development & Commercialization
Division of Research and Innovation

Elizabeth Hearn, PharmD
Assistant Professor
Department of Pharmacotherapy
College of Pharmacy

Michael Jann, PharmD
Professor
Department of Pharmacotherapy
College of Pharmacy

Harlan Jones, PhD
Director, Center for Diversity and International Programs (CDIP)
Associate Professor
Microbiology, Immunology and Genetics

Abhirup Mandal, PhD
Senior Scientist, Product Development R&D
CAGE Bio, Inc.

John McKenzie, MA, MS
Director of Educational Development
Division of Academic Innovation (Center for Innovative Learning)

Michelle Ndiulor, PharmD
Assistant Professor
Department of Pharmacotherapy
College of Pharmacy

Karissa O'Brien, MBA, CRA
Assistant Director Educational Programs
Office of Sponsored Programs

James "Jimmy" Renfro, M.Ed., NCC, ACC, CMCS
Director, Career Readiness Center

We also wish to express our sincere appreciation for all of our volunteers!

Thank you to all of our poster presenters! We are so proud of you.

Thank you to our table hosts and tour guides.

Thank you to Dean Madhavan for providing funding for this event.

Thank you to all of our event attendees for joining us to celebrate Pharmacy Week.

Sincerely,

The Showcase Event Organizers:

Krista Roberts
Brenda Sihotang
Austin Luna
Arnessa Blanks
Usha Sambamoorthi
Meredith Howard
Jerry Simecka
Rebecca Cunningham
Emanuel George
Donna Coyle
Guest Organizer Shea Patterson

Index of Poster Presenters

Presenter	*Poster #*	*Room #*
Acuna, Valerie S.	RPBR-002	IREB-250
Antony, Sheena	TE-001	IREB-270
Askew, Excellence	RPBR-006	IREB-250
Barnes, Haley J.	RPH-005	IREB-230
Blythe, Rachel	CP-005	IREB-250
Castaneda, Andre T.	RPBR-008	IREB-250
Cheng, Eric	TE-003	IREB-270
Davis, Kajohna H	CP-001	IREB-250
Dion, Nicole M.	CP-002	IREB-250
Duru, Chinonye	CP-007	IREB-250
Fan, Yan	RPS-012	IREB-260
Fix, Jennifer	S-001	IREB-270
Fokar, Aicha	RPH-002	IREB-230
Ghani, Farheen S.	RPH-003	IREB-230
Ironbar, Catherine B.	RPBR-001	IREB-250
Jayasinghe Arachchige, Vindi Mahesha	RPS-007	IREB-260
Jodray, Megan	TE-005	IREB-270
Killam-Worrall, Lisa J.	TE-002	IREB-270
Kom Nzia, Jeanne Dulie	CP-003	IREB-250
Kumari, Pratibha	RPS-006	IREB-260
Lindley, Bryn E.	RPBR-005	IREB-250
Mabry, Steve	RPS-003	IREB-260
Mans, Jaylen C	RPS-011	IREB-260
Mishra, Nigam M.	RPS-005	IREB-260
Nguyen, Quang V.	TE-004	IREB-270
Nsiah, Nana Yaa	RPS-010	IREB-260
Pham, Ivy	RPBR-007	IREB-250
Qunies, Alshaima'a M	RPS-001	IREB-260
Rincon, Julio	RPS-015	IREB-260
Shah, Brijesh	RPS-004	IREB-260
Simpson, Payton O	CP-004	IREB-250
Sule, Olagoke	RPBR-003	IREB-250
Vo, Elise	CP-006	IREB-250
Wang, Duen-Shian	RPS-013	IREB-260
Wang, Duen-Shian	RPS-014	IREB-260
Warner, Mayela	RPH-004	IREB-230
White, Annesha	S-002	IREB-270
White, Annesha	RPH-001	IREB-230
White, Annesha	TE-006	IREB-270
Wilson, Elizabeth Nicole	RPS-002	IREB-260
Xavier, Christy	RPBR-004	IREB-250
Yan, Liang-Jun	RPS-009	IREB-260
Zhang, Jinmin	RPS-008	IREB-260