

RHO ^{Rx}CHI post

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Moving Towards Provider Status: An Interview with Dr. Sandra Leal

By: Hayeon Na, Co-Copy Editor and Sang Hyo Kim, Staff Editor

In [Volume 1 Issue 1](#) of the *Rho Chi Post*, we were honored to have an interview with Dr. Sandra Leal, PharmD, MPH, FAPhA, CDE, and Director of Clinical Pharmacy at El Rio Health Center in Tucson, Arizona. She had started a petition to support recognition of pharmacists as healthcare providers (HCPs) under the federal law. The interview was about the importance of pharmacists gaining this status, and we asked a single question: "When you started pharmacy school, did you think you were going to be a healthcare provider? Please explain your answer and the reasoning behind your petition on [change.org](#)." (For those who are unfamiliar with the website, [Change.org](#) allows individuals to petition for different causes.) The push for HCP status has definitely gained more momentum since then, and the goal seems nearer than ever. To anticipate the implementation of the new law that many hope for, *RCP* decided to feature Dr. Leal once more to get an update on her views, with a focus on the future of the pharmacy after these changes are implemented.

Dr. Leal is involved with gathering support to obtain provider status for pharmacists under the law. Pharmacists shouldn't be content with the traditional role of only being the medication use experts who do not have roles in active disease management. By being proactive, pharmacists can change the stereo-



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type of being “medicine dispensers.” Dr. Leal wants all qualified pharmacists to work directly with patients and other healthcare providers to help optimize therapy before, during, and after the prescription is written. She started the petition on Change.org to recognize and spread awareness of pharmacists as healthcare providers. With over 22,600 signatures, the issue has expanded and has gained interest of different organizations and the media.

Due to the limitations in time and resources, pharmacists cannot properly partake in patient care—in practice setting, pharmacists and interns need to participate in all the areas of pharmacy practice which includes tasks like typing, counting, resolving insurance issues, and managing inventory. As if this were not enough, while the responsibility of pharmacists increases (e.g. immunizations), currently the reimbursement does not follow suit. It is important that pharmacists get compensated for their service and have enough resources to focus on tasks that utilize the six years’ education that they receive. This will inevitably prove to be a worthwhile investment, because pharmacists can aid in disease prevention, bridge the gap between the patients and prescribers through counseling and providing more frequent follow-up, and consequently, save money for insurance companies, the government, tax payers, and patients alike. Pharmacists are deemed the “most

approachable healthcare professionals.” As the group that holds this title, pharmacists can provide information both to and from patients, providing another stage for patient intervention.

For example, Dr. Leal has prescriptive authority under collaborative practice; by having prescriptive authority, she can take immediate action without having to get clearance from the doctor on issues that are routine or that warrant immediate attention. This speeds up the intervention process tremendously, and saves time and money for both the healthcare professionals and the institution.

However, these kinds of improvements on the current patient care model will place more responsibility and task burden on the pharmacists and thus cannot be implemented without due compensation. According to Dr. Leal, recognition and compensation is essential to spreading this model sustainably. It is about time that pharmacists get the chance to utilize the patient care knowledge that they acquire with due respect and reimbursement. We thank Dr. Sandra Leal for her contribution to the *Rho Chi Post*, and we hope that this interview can provide insight to others who are following this issue.

[Read the Full Interview on Page 21](#)

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“Cowcatcher” Enzyme Catching Medical Attention

By: Ansel Oommen, BS Candidate c/o 2014

DNA damage is the driving force behind aging, and, on a more serious note, the development of cancers.¹ While the stresses of life can be taxing on cells, the human body possesses a remarkable repair mechanism to remedy them. Researchers from the University of Texas Medical Branch have now discovered how that mechanism, which involves an enzyme called NEIL1, may prove to be useful in the fight against cancer and other age-related disorders such as Alzheimer’s and Parkinson’s disease.²

In the findings published in the Proceedings of the National Academy of Sciences, the researchers aptly describe the enzyme as a “cowcatcher” after an old device fixed to the front of locomotives.³ Similar to this device, which works by clearing the track of obstructions like cows, the enzyme searches for genetic errors and clears them.

The lead author Dr. Sankar Mitra explains, “basically the replication train is coming and the cowcatcher is in front to see if any damage is present. If it finds such damage, the train moves backward, you repair it, and the train starts moving forward again.”³ The process of cell replication is risky yet essential to most biological processes. When DNA replicates, its stable double helix structure is unwound by a collection of proteins called the “pre-replication complex.” Two of the components of this complex are NEIL1 and its closely related cohort, NEIL2. The complex splits the DNA into two strands to be used as templates in the formation of the new DNA for the daughter cells.

The necessary separation of DNA strands exposes the body’s genetic blueprint, rendering it vulnerable to toxic insults from reactive oxygen species (ROS), which are natural byproducts of respiration. Each attack on the genome by the ROS can lead to mutations, and over time, these uncorrected mutations can manifest in a clinical disorder such as cancer. The

free radicals modify the four bases that make up DNA to produce base lesions. This can prevent the DNA from triggering a stop to replication, which may make the cells immortal. The newly discovered NEIL1, at the forefront of the pre-replication complex, locates these lesions and binds to them on the DNA to signal a halt to replication.^{2,3} By doing so, the two strands are realigned, allowing for repairs to be made. Afterwards, NEIL1 simply detaches from the DNA. And in the event that NEIL1 is unavailable, NEIL2 serves a similar function.⁴

There are promising clinical ramifications to the discovery of this enzymatic activity. Suppressing the expression of NEIL1 can make it more difficult for cancer cells to defy standard therapies. Without the ability to repair their genomes, the rapidly dividing cancerous cells become much more vulnerable to the genotoxic effects of ionizing radiation and antineoplastics. This can be especially important in preventing relapses that occur when cancer cells become resistant to therapy. Conversely, boosting the expression of the enzyme can help combat ROS induced damages commonly seen in the geriatric population, particularly in those who suffer from neurodegenerative diseases.

It is not surprising that the “cowcatcher” has garnered attention from both the media and the medical community. However, more research is needed to realize the full potential of this discovery. For now, Mitra says “we don’t know how to increase the level of this enzyme; however, there are ways to increase its expression.”² With that hope, the researchers continue to explore cellular genome repair processes to further unlock the mystery behind cancer.

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Nature's Remedy... in a More Palatable Dosage Form

By: Davidta Brown, Staff Editor

Pathogenic bacteria have been enemies to human health for centuries. As recently as last month, the Centers for Disease Control published an 80-page document informing the public about America's biggest microbial threats. Most of the pathogens on the list exhibit antibacterial resistance. One particular bacterial species, ranked at threat level "Urgent" and causing an average of 250,000 infections and 14,000 deaths per year, is known as *Clostridium difficile*.¹ While the bacterium has not been shown to have antibiotic resistance, its rapid spread makes the pathogen a source of concern to healthcare providers in institutional settings.

C. difficile is an anaerobic, gram-positive bacillus -type bacterium that is capable of forming spores.¹ *C. difficile* infections are typically spread through these spores, often on the hands of healthcare personnel who have come into contact with surfaces contaminated with fecal matter.² Alarming, infection with this bacteria is most common in individuals who have recently received medical care, usually in the form of hospital admittance, and who have been treated with antibiotics for an unrelated infection. There is also a disproportionate age distribution when it comes to *C. difficile* infections and how severe symptoms are; Almost half of all *C. difficile* infections are in people over the age of 65, but this age bracket also shows 90% of the cases of death or

complications from the infection.¹

Traditionally, *C. difficile* is treated with a 10-day course of metronidazole, vancomycin, or fidaxomicin.² In some individuals, however, the antibiotics only provide temporary relief, while leaving some unfortunate to suffer from recurring bouts of colitis and "antibiotic-associated diarrhea."

In the past twenty years or so, a new option for these patients, Fecal Microbiota Transplantation (FMT), has proven to be extremely successful in preventing the return of *C. difficile*. In the new treatment, healthy donor provides a fecal transplant. The reasoning behind the novel treatment is fairly intuitive. Patients suffer from infections only after their natural flora of commensal gut bacteria have been eliminated by antibiotics. If the appropriate bacteria populations were to be re-established, they would consume enough of the resources in the internal environment to prevent *C. difficile* from gaining a foothold. In essence, the bad bacteria would be starved out by the good bacteria.

Fecal Microbiota Transplantation has shown almost unheard-of success rates as a method of halting recurrent *C. difficile* infections. In several studies, FMT by colonoscopy or enema has had clinical success rates of up to 95% in patients with recurring colitis. Even more promising, 91% of patients who had undergone one round of FMT had no incidence of re-

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lapse, even after three months had passed since treatment administration.³ In this way, FMT has proven to be not only an efficacious therapy, but one in which the benefits of a single treatment are maintained over long periods of time.

Until now, the major disadvantage of FMT (besides initial aversion to the concept) has been the method by which the treatment is administered. As previously mentioned, enema, gastroscopy, and endoscopy methods have all been utilized. Additionally, oral suspensions and infusion via nasoenteric tubes have also been employed.⁴ Understandably, these dosage forms can be difficult for patients, though many who turn to FMT are desperate for any cure.

In response to the difficulty these patients face, Canadian infectious disease specialist, Dr. Thomas Louie, has added simple oral capsules to the variety of methods by which patients may receive FMT.⁵ To prepare the doses, bacterial samples are collected, filtered, and concentrated on site, and then packaged into gelatin capsules for easy transport to the lower intestines. Patients come for FMT treatment on an empty stomach and ingest an average of 24 to 30 capsules.⁵ The burden of taking so many capsules in a single sitting has typically been seen as an improvement over the alternatives, and the long-term benefits have been deemed well worth the inconvenience.

So far, the single dose has proven to be as effective as the more traditional FMT methods, but the new dosage form still needs to undergo the required clinical trials before conclusive evidence of its success

can be given. However, at this early stage, the future of gut flora repopulation as a treatment for gastrointestinal disease appears promising. In the long run, bacterial “gardens” will be cultivated in bulk and distributed when necessary. But for now, scientists are content with taking the solution nature has offered and simply changing its packaging.

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Middle East Respiratory Syndrome (MERS)

By: Uzma Toppa, PharmD Candidate c/o 2014

Middle East Respiratory Syndrome, also known as MERS, is a viral respiratory illness caused by a coronavirus called MERS-CoV. It was first reported in humans in Saudi Arabia in 2012. According to the World Health Organization (WHO), from September 2012 to September 2013, there have been a total of 130 laboratory confirmed cases of infection with MERS-CoV, including 58 deaths, in eight countries.¹ A breakdown is seen in Table 1. All cases have been linked, either directly or indirectly, through travel or residence in Saudi Arabia, Qatar, Jordan, and the United Arab Emirates. The virus was first identified in samples obtained from a Saudi Arabian businessman who died from acute respiratory failure.¹

Table 1: Number of cases and deaths associated with MERS²

Country	Cases	Deaths
France	2	1
Italy	1	0
Jordan	2	2
Qatar	5	3
Saudi Arabia	108	47
Tunisia	3	1
United Kingdom	3	2
United Arab Emirates	6	2
Total	130	58

The virus spreads through close contact, but the exact mechanism is unknown. The Centers for Disease Control (CDC) is still trying to better understand how the virus spreads, the risks associated with it, and how to prevent it. According to scientists in a new study published in *The Lancet*, the Middle East respiratory syndrome is most likely transmitted from animals to humans.³ Researchers used DNA analysis to

analyze the MERS-CoV genomes from 21 patients infected with MERS throughout Saudi Arabia. Their findings showed that the virus has been transmitted from an animal reservoir to humans and identified camels as possible carriers of the virus.³ Further research is still being conducted.

Saudi Arabia is visited by millions of people a year, especially Muslims carrying out their pilgrimages of Umrah and Hajj. This is something to consider especially now after 3 million people from around the world will be returning home after visiting Mecca, the holy city of Saudi Arabia, for the annual Hajj pilgrimage.⁴ Thousands of Muslims continue to visit Mecca throughout the year for Umrah. The CDC does not recommend that travel plans be canceled because of MERS but does encourage special populations, such as children under the age of 12, elderly over the age of 65, pregnant women, and persons with chronic diseases or weakened immune systems, postpone their pilgrimage this year.² The CDC and WHO have issued travel information in order to protect those who do choose to travel.^{2,5} It is important for countries to make this information available to all people including travelers and public health officials.

Most patients infected with MERS experienced fever, cough, and shortness of breath. Gastrointestinal symptoms, such as diarrhea and vomiting, were also seen. CDC recommends that patients be evaluated for MERS if they develop pneumonia or acute respiratory distress requiring hospitalization within 14 days after traveling to the Arabian Peninsula or coming into close contact with a recent traveler from the area who has fever and acute respiratory illness.^{1,2,5}

The CDC recommends that U.S. travelers to countries in the Arabian Peninsula or neighboring countries* protect themselves by washing their hands often, especially after coughing and sneezing, and trying to avoid contact with people who are sick.^{2,4,5} People are also recommended not to touch their

eyes, nose, or mouth while in public places to avoid transmission of the disease. If travelers experience any fever or shortness of breath during their trip or within 14 days of returning, they should seek medical help immediately and notify any practitioner of their recent travel.^{2,5}

Human to human transmission of MERS-CoV has been documented in several cluster cases, such as among family members and within health care facilities. It is important to make all travelers aware of the virus and how to minimize risks of contracting it. Health care officials in all countries should prepare for the return of these travelers by increasing awareness.

*Countries considered in the Arabian Peninsula and neighboring include: Bahrain, Iraq, Iran, Israel, Jordan, Kuwait, Lebanon, Oman, Palestinian territories, Qatar, Saudi Arabia, Syria, the United Arab Emirates (UAE), and Yemen.²

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Advancements Towards a Malaria Vaccine

By: Sang Hyo Kim, Staff Editor

A new experimental vaccine, PfsPZ, offers great promise as a cure for malaria. PfsPZ demonstrated 100% success in protecting subjects from this mosquito-borne tropical disease, which affects about 200 million people and causes 660,000 death annually.^{1,2}

Historically, it has been known that sustained immunity for malaria could be achieved by exposing human to the bites of irradiated, infected mosquitoes.³ However, such methods would take up to 1,000 bites from insects overtime to build a high level of immunity, thereby serving as an impractical method of widespread protection.²

Though there are several current vaccine trials for malaria, the PfsPZ vaccine proved to be the most remarkable. When comparing the PfsPZ vaccine to other malaria vaccines, the PfsPZ appeared to protect much more of the trial population. For example, during Phase III human trials, the leading vaccine RTS,S only showed to protect approximately one half of volunteers against malaria infection two to three weeks after the last vaccine dose, and 22% of volunteers five months after the last dose. Furthermore, when making the RTS,S vaccine, it only has a single surface of a protein from the sporozite.³The PfsPz vaccine, however, showed a much greater success by using a whole Plasmodium falciparum

sporozite, an immature stage of parasite that has been weakened by irradiation, in order to create the vaccine.³

Unlike other vaccines which are administered intradermally and intramuscularly, PfsPZ is given intravenously. This trial examined the number of doses needed to gain full effect, and it was found that PfsPZ was most successful if four to five doses were administered. Six volunteers who were administered five doses showed 100% protection when exposed to the microscopic parasite.³ In addition, six out of the nine volunteers who were administered four doses were protected from the disease. A major flaw in this study, however, was that there were very few participants and it is therefore difficult to extrapolate this data to the general population.³

Despite positive results, researchers are a long way from creating a vaccine. Dr. William Schaffner, head of the preventive medicine department at Vanderbilt University's Medical School, says that future studies need to involve larger groups in field conditions, and examinations of how long the vaccines stave off infection are needed.¹ Additionally, multiple intravenous doses, unlike other vaccines, requires sterile conditions, trained medical personnel, and follow-up.⁴ Therefore, this can become a problem when trying to administer the vaccine in countries where malaria is prevalent. Another factor that has to be

considered is whether this vaccine can cover different strains of malaria. In the trial, the same strain that was used to make the vaccine was the same strain that the infected mosquitoes were carrying. Regardless of these setbacks, it is important to recognize that these studies do offer promising results that we might soon have a vaccine for malaria.

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Accepting the Mantle: The 2013 White Coat Ceremony

By: Davidta Brown, Staff Editor

Every year in late October, the third year pharmacy students at the College of Pharmacy and Health Sciences attend a ceremony that marks their entry into the first professional year of their education. For these students, the White Coat Ceremony represents a coming of age and a full acceptance of the responsibilities of their chosen profession. The Ceremony, in which eager young students are each given the professional pharmacist's white coat by an experienced member of the faculty, overflows with ritual and meaning. As in years past, the St. John's tradition has once again led a group of third year students over the threshold, installing them in a new role in the fabric of society.

The White Coat Ceremony is both celebratory and reflective in nature. Throughout the special occasion, students are asked to contemplate their achievements to date, and gaze prospectively at the challenges and duties that lie ahead. This year, on the brisk evening of October 23rd, the Class of 2017 followed the footsteps of countless pharmacy students before them, and received the white mantle that would mark them out as individuals who had chosen a life of professional service.

The 2013 White Coat Ceremony began with the pharmacy students filing into the auditorium of Marillac Hall; the tension of suppressed chatter and curious anticipation filled the room as proud friends and family photographed memoirs and video-recorded

memories. Senior Associate Dean Brocavich provided a brief introduction, which was then followed by a prayer by Assistant Dean Etzel. The Dean of the College of Pharmacy and Health Sciences, Dean DiGate, welcomed all of the students, faculty, and guests present. Provost Mangione then offered remarks alluding to the importance of the tradition.

A thought-provoking keynote address, delivered by St. John's alumnus and current Dean of the Temple University School of Pharmacy Dr. Peter Doukas, invited students to keep their minds open to new and unexpected experiences. In addition, he advised the third year students to make the most out of the opportunities they are given while at St. John's College of Pharmacy and Health Sciences. Dr. Doukas invoked the significance of the transformation that the students were to undergo, stating, "You will be moving from a condition of receiving, of absorbing and reflecting, towards a condition of giving...". For these students, receiving the coat meant that one would henceforth be bound to the rest of mankind by the responsibilities of healing and of caring. As the students reflected on the new depth of their relationship to other people, particularly to future patients, they were also asked to understand the weight of their connection to those who had gone before them, the ghosts who had paved the way, and were told as they commemorated the milestone, "the spirits of your ancestors celebrate through you."



Josil Abraham, Rachel Abramov, Rucha Acharya, Elizabeth Aguilar



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Does Moxifloxacin Increase the Risk of Dysglycemia?

By: Nathan Trustman, PharmD Candidate c/o 2014, AMSCOP at LIU

The antibiotic class known as the fluoroquinolones is widely used in both outpatient and inpatient settings. They provide bactericidal effects by inhibiting DNA gyrase and topoisomerase IV enzymes in bacteria. The systemic agents that are most commonly used in clinical practice include ciprofloxacin, levofloxacin, and moxifloxacin. All of these agents penetrate into the lungs, soft tissues, bones, and urinary tract (with the exception of moxifloxacin, which does not concentrate well in the urine), to effectively fight bacterial infections. Common side effects include gastrointestinal effects (e.g. nausea, vomiting, diarrhea), headache, and skin rashes, while less common but more dangerous adverse events include QTc prolongation, seizures, and tendonitis.¹ Another serious adverse effect linked to the quinolone class is dysglycemia (either hyper- or hypoglycemia). Fluoroquinolones are thought to cause hypoglycemia by binding and inhibiting ATP-sensitive potassium channels of the beta-cells in the pancreas, leading to an increase in insulin secretion.^{2,3} Hyperglycemia, on the other hand, may be secondary to a quinolone-induced release of histamine and epinephrine, and a decrease in serum insulin concentration.² Much research has been performed to evaluate the specific effects of moxifloxacin on blood glucose levels.

Moxifloxacin was FDA-approved in 1999 for the treatment of acute bacterial sinusitis, community acquired pneumonia, and infections of the skin and soft tissues.¹ As previously discussed, dysglycemia is a quinolone class effect and moxifloxacin is no exception. A study by Chou HW et al. compared the outpatient use of various antibiotics (including ciprofloxacin, levofloxacin, and moxifloxacin) and the incidence of hospitalizations due to dysglycemia. An episode of dysglycemia was considered related to antibiotic use if it occurred within 30 days after the first dose. The results revealed an association between moxifloxacin use and a significantly higher risk of hypoglycemia (adjusted

odds ratio (AOR), 2.13; 95% CI, 1.44-3.14) and hyperglycemia (AOR, 2.48; 95% CI, 1.50-4.12) compared to a macrolide control. Additionally, the moxifloxacin-related hypoglycemia rate was higher in patients receiving insulin (AOR, 2.28; 95% CI, 1.22-4.24).⁴

Case reports have also been published describing moxifloxacin as the culprit of dysglycemia episodes. In one case report, a 66 year old diabetic male was treated with moxifloxacin 400 mg IV daily for a suspected pneumonia. Approximately 16 hours after the moxifloxacin dose, the patient developed tremors and sweating. The patient's blood glucose level had dropped to 58 mg/dL. The patient was treated with 10% dextrose IV, but the blood glucose levels did not improve over the next 3 days. However, once moxifloxacin was discontinued on the fourth day, the patient's blood glucose level improved within the next 24 hours.³

Dysglycemia may occur more readily with quinolones in comparison to other antibiotic agents.^{4,5} However, whether moxifloxacin causes a higher incidence of dysglycemia compared to other quinolones remains unclear. The risk may be lower with ciprofloxacin, but the clinical significance of this finding is unknown.^{4,5} Elderly patients with diabetes who are being treated with insulin and/or a sulfonylurea are at an increased risk of hypoglycemic episodes secondary to quinolone use.^{2,3} This is an adverse effect that pharmacists should be aware of when dispensing and counseling patients on these agents. Pharmacists can help educate physicians about the risk of fluoroquinolone-induced dysglycemia and, if warranted, recommend alternative options especially for the diabetic patient population.

“Hyperglycemia, on the other hand, may be secondary to a quinolone-induced release of histamine and epinephrine, and a decrease in serum insulin concentration.”

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Zecuity™: Novel Treatment Option for Migraines

By: Arya Mathew, PharmD Candidate c/o 2014

About 12% of the U.S. population suffers from migraines, affecting adult women three times more than adult men. Migraines are returning attacks of moderate to severe, throbbing or pulsing pain, usually on one side of the head. Along with the severe pain, migraine sufferers can also experience photophobia, sonophobia, and nausea that can lead to vomiting.¹ In short, migraines have the potential to seriously impact one's quality of life.

Sumatriptan iontophoretic transdermal system (Zecuity™) is a new option on the market to treat migraine headaches. It is the first drug in its class of serotonin receptor agonists to be designed into a battery-operated patch.² The transdermal system uses electrical currents to move 6.5mg of drug into the body over a four hour time period. There is a small computer chip that helps monitor and regulate the electrical charge to ensure the efficiency of dosing.² Zecuity™ is about eight inches long and four inches wide, and can be wrapped around either the upper arm or thigh.

According to the package insert, Zecuity™ must be applied and activated within fifteen minutes of launching assembly. Once applied, the activation button must be pushed and a red light will turn on. When the red activation light turns off, the patch has stopped working and can be safely removed. The patch should remain in place and stay dry for the full four hours or until the red activation light turns off. If the migraine still has not resolved, a second patch may be applied to a different site, no sooner than two hours after the termination of the first patch. Only two patches may be used within a 24-hour period.⁴

The most common adverse effects associated with sumatriptan iontophoretic (Zecuity™) are application-site pain, paresthesia, pruritus, warmth, discomfort,

and erythema after removal of the patch. In two long-term, open-label studies, 99 out of the 662 participants withdrew from the study due to an adverse drug reaction (ADR), which were most commonly contact dermatitis and application-site pain. Some serious side effects of Zecuity™ include heart attack, stroke, arrhythmias, angina, allergic contact dermatitis, anaphylactic reactions, and serotonin syndrome. There is also the likelihood of developing medication overuse headaches from using sumatriptan iontophoretic (Zecuity™) too often. It has not been tested in children and is Pregnancy Category C.⁴

Sumatriptan iontophoretic (Zecuity™) is contraindicated in patients who have a history of heart disease or stroke, peripheral vascular disease, coronary artery disease, transient ischemic attack, uncontrolled blood pressure, basilar migraines, ischemic bowel disease, Wolff-Parkinson-White syndrome or other disturbances of heart rhythm. The patch should not be used within 24 hours of another 5-HT₁ agonist, such as another "triptan," or an ergotamine-containing medication. Hypersensitivity to components of the patch, severe hepatic impairment, allergic contact dermatitis, or use of a monoamine oxidase-A inhibitor (MAOI) two weeks prior to starting therapy with Zecuity™ are contraindicated when using the patch. Concomitant use of sumatriptan iontophoretic with selective serotonin reuptake inhibitors (SSRIs), serotonin norepinephrine reuptake inhibitors (SNRIs), tricyclic antidepressants (TCAs), or MAOIs increase the risk of developing serotonin syndrome.⁴

Zecuity™ is an innovative delivery system of a well-established migraine medication. It can better serve those who are afflicted with migraines but cannot swallow medication or cannot absorb the

drug due to vomiting. Some drawbacks to the patch are time required for assembly, duration of therapy, application site reactions, and the social inconvenience wearing a large patch. Nonetheless, this new patch may be the treatment of choice for patients who are looking for new way to manage the debilitating pain of migraines.

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Ceftriaxone Induced Hemolytic Anemia

By: Samad Tirmizi, PharmD Candidate c/o 2014

Hemolytic anemia (HA) is a type of anemia that occurs due to the breakdown of red blood cells. It is classified as intrinsic and extrinsic according to causative factors. Medication induced hemolytic anemia is an example of extrinsic, while genetic predisposition is an intrinsic factor. Drug induced hemolytic anemia can be further broken down into either non-immune-mediated or immune-mediated.¹ In the case of nonimmune-mediated HA, hemolysis results from oxidant injury. Ceftriaxone-induced HA is an example of immune-mediated hemolytic anemia, since the etiology involves an antigen-antibody reaction. The anemia results when red blood cells are perceived by the body as antigens and subsequently destroyed. Antibodies are formed against the drug-membrane complex (neoantigen). Erythrocyte injury is primarily mediated by the compliment system, a system derived from innate immunity. To test this occurrence the Direct Coombs Test, also known as a direct antiglobulin test (DAT) is implemented in such patients. This is used to test if complement system factors or antibodies are bound to the surface of an RBC.²

Patients with drug-induced hemolytic anemia may present immediately upon initiation of therapy or several weeks to months after. Patients with hemolytic anemia often present with dark urine, general weakness, low hemoglobin, dizziness, and renal failure.³ Reports of pediatric patients show that they present with hemoglobin levels under 5 g/dL, poten-

tial renal failure, and intravascular hemolysis.³ Tests for antibodies are performed to see whether the anemia is drug induced or secondary to other causes.⁴

Ceftriaxone-induced hemolytic anemia was first reported in 1987 in southern California.⁵ The laboratory found extravascular red cell destruction associated with IgG-mediated antibodies. Ceftriaxone has become the second most prevalent cause of drug-induced immune hemolytic anemia (DIIHA), superseded only by cefotetan. According to a report published by the American Society of Hematology, there were 99 reported cases of DIIHA associated with cephalosporin from 1971 to 2008.⁵ Ceftriaxone accounted for 29 of these cases, ten of which resulted in death. Five of the 47 cases of cefotetan-induced DIIHA resulted in death. This implicates ceftriaxone in causing the highest rate of fatality amongst cephalosporins and drugs in general.^{6,7}

Hemolytic anemia is often resolved soon after the implicated drug is discontinued, and in most cases steroids are not required.⁵ However, cefotetan is an exception, as hemolytic anemia in these patients continues for a longer than expected duration even after drug discontinuation. Cefotetan binds strongly to red blood cells and this complex can be detected in the serum for up to 98 days. Serology testing is conducted to test for ceftriaxone-mediated immune response by detecting immune complexes.^{8,9}

The clinical and laboratory findings in ceftri-

axone DIIHA differ dramatically from other associated drugs, such as cefotetan. The American Red Cross Blood Services studied blood samples from 53 patients with IHA and/or a positive DAT due to second- and third-generation cephalosporins from 1984 to 1999. Of the 53 patients, 43 were due to cefotetan, eight due to ceftriaxone, one due to cefotaxime, and one due to cefoxitin. Table 1 shows that among the patients with ceftriaxone-induced hemolytic anemia, five were tested, and none had antibodies for IgA & IgM.⁸ Of the eight ceftriaxone induced hemolytic anemia patients tested for IgG antibodies, six were shown to be positive. However, among those with cefotetan induced hemolytic anemia, two out of 27 patients had IgM antibodies, 12 out of 27 patients had IgA antibodies, and 43 out of 43 tested for IgG had positive antibodies.⁸ It is noteworthy that the study did not list in their methods why certain patients received some antibody tests and not others.

TABLE 1. Results of DATs*

Drug	Number of patients	DAT			
		Anti-IgG	Anti-C3	Anti-IgM	Anti-IgA
Cefoxitin	1	1/1	0/1	NT	NT
Cefotaxime	1	1/1	1/1	NT	NT
Ceftriaxone	8	6/8	7/7	0/5	0/5
Cefotetan	43	43/43	37/43	2/27	12/27

* Values given as number positive/number tested.

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Figure Source: Arndt PA, Leger RM, and Garratty G. Serology of antibodies to second- and third-generation cephalosporins associated with immune hemolytic anemia and/or positive direct antiglobulin tests. *Transfusion*. 1999;39:1239-46

It is also unusual that ceftriaxone antibodies do not react with drug-treated RBCs and are only detected via the immune-complex method, which includes the serum, the drug, and RBCs. Furthermore, RBC-bound complement was detected in all patients with DIIHA caused by ceftriaxone.⁸ It is also significant that children afflicted with hemolytic anemia have a higher fatality rate (58%) than adults (27%). They suffer immediate hemolysis within a 5 to 30 minute time frame compared to an onset of days in adults.¹⁰

In summary, ceftriaxone has been implicated in numerous cases of DIIHA, and it appears to be the

second most common drug to cause DIIHA after cefotetan.⁹ Children have a higher mortality rate than adults. Though there have been *in vitro* tests that recommend avoiding a cephalosporin in such patients, it is unknown if the *in vitro* data correlates to *in vivo* reactivity.¹¹ More studies need to be conducted regarding cephalosporin induced hemolytic anemia, and care should be taken when prescribing certain cephalosporins to the pediatric population. Most importantly, patients with a history of DIIHA to one cephalosporin should avoid cephalosporins altogether as there is potential for cross-reactivity, even if minimal.

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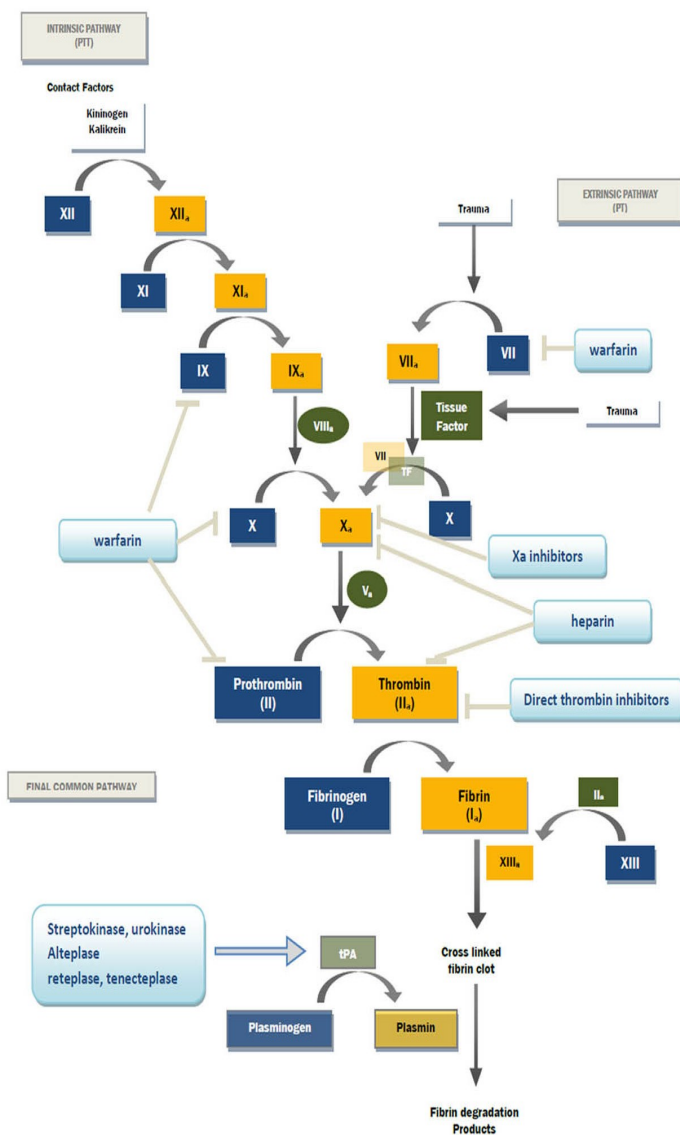
RHO CHI POST CLINICAL CORNER

ANTICOAGULANTS & ANTIPLATELET AGENTS

REVIEW OF ANTICOAGULANT PHARMACOLOGY

By: Aleena Cherian, Co-Copy Editor [Graphics-focused]

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Adapted from:
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OVERVIEW OF AGENTS THAT ACT ON THE COAGULATION CASCADE	
HEPARIN Unfractionated Heparin (UFH)	Prevents thrombus formation by accelerating the action of circulating antithrombin III, a proteolytic enzyme that inactivates factor Ia (thrombin), factor IXa and factor Xa; and catalyzes the interaction with coagulation factors Unpredictable activity due to binding with many proteins that may neutralize activity Therapeutic Laboratory Monitoring: activated partial thromboplastin time (aPTT), factor Xa (alternative option)
LOW MOLECULAR WEIGHT HEPARINS (LMWH) Enoxaparin Dalteparin Tinzaparin	Active against both factor Xa and factor IIa, inhibiting both the action and generation of thrombin (do not interact with thrombin) Advantages over UFH include lower rate of heparin induced thrombocytopenia (HIT), higher bioavailability and less plasma protein binding Therapeutic Laboratory Monitoring: anti-Xa levels (special circumstances)
FACTOR Xa INHIBITORS	Inhibits factor Xa (in the coagulation cascade)
Fondaparinux	(indirect Xa inhibitor) Synthetic pentasaccharide that requires antithrombin for its activity, given subcutaneously
Rivaroxaban Apixaban	Direct factor Xa inhibitors that work independently of antithrombin, given orally
DIRECT THROMBIN INHIBITORS (DTI)	Direct inhibitors of the thrombin molecule in the coagulation cascade Therapeutic Laboratory Monitoring: Ecarin clotting time (ECT; not widely used clinically), thrombin time (TT)
Bivalrudin Lepirudin Desirudin	Bivalent DTIs (bind both to the active site and exosite 1)
Argatroban Dabigatran	Univalent DTIs (bind only to the active site)
VITAMIN K ANTAGONIST Warfarin	Interferes with the synthesis of Vitamin K dependent coagulation proteins (clotting factors II, VII, IX, X and Protein C & S) in the liver Inhibits the supply of available Vitamin K to serve as cofactor in protein production and indirectly slows rate of synthesis Therapeutic Laboratory Monitoring: International Normalized Ratio (INR)
THROMBOLYTIC AGENTS Alteplase Reteplase Tenecteplase	Activate the conversion of plasminogen to plasmin (catalyze formation of fibrin degradation products)

Reviewed by: Dr. T Jodlowski and Dr. K Patel

Review of Anticoagulant, Antithrombotic and Antiplatelet Agents

ANTICOAGULANTS

AGENT		USUAL ADULT DOSING RANGE <i>[FDA Approved Indications]</i>	RISKS/TOXICITIES
HEPARIN	Unfractionated Heparin (UFH)	<p>Unstable Angina (UA)/NSTEMI and STEMI 60 units/kg bolus then 12 units/kg/hr IV PCI: Initial bolus of 50-70 units/kg (if planning GPIIb/IIIa inhibitor) or 70-100 units/kg (no GPIIb/IIIa inhibitor) Venous thromboembolism (VTE) Treatment: 60-100 units/kg IV bolus, then 12-18 units/kg/hr IV (depending on indication) Venous thromboembolism (VTE) prophylaxis: 10,000 to 15,000 units SC in divided doses (Common dosing regimen 5000 q8-12h)</p>	<p>Adverse Drug reactions (ADR): bleeding, hypersensitivity, thrombosis, thrombocytopenia</p> <p>Contraindications (C/I): HIT, hypersensitivity, active bleeding, hemophilia, and severe thrombocytopenia</p>
	Enoxaparin (Lovenox®)	<p>Deep Vein Thrombosis (DVT) Treatment: 1mg/kg SC every 12h or 1.5 mg/kg SC daily (+30mg IV bolus in STEMI) DVT Prophylaxis 30 mg BID or 40mg SC daily <i>Various dosing regimens for surgical and medical prophylaxis</i></p>	<p>C/I: Active bleeding, history of heparin-induced thrombocytopenia, severe bleeding risk, recent stroke</p> <p>Precautions: Avoid if CABG surgery is planned Renal insufficiency prolongs half life: may require dose reduction or use of alternative agent</p> <p>Black Box Warning (BBW): epidural or spinal hematomas may occur in patients who are anticoagulated with LMWH/heparinoids and are receiving neuraxial anesthesia or undergoing spinal puncture</p>
	Dalteparin (Fragmin®)	<p>Unstable Angina (UA) /non-Q wave MI 120 units/kg SC q 12 + ASA VTE Treatment (extended duration, cancer patients) 100-200 units/kg SC q12 DVT Prophylaxis 2500-5000 units SC q24 <i>Various dosing regimens available for surgical prophylaxis</i></p>	
Tinzaparin	<p>DVT Treatment (with or without PE): 75 IU/kg SC daily</p>		
FACTOR X _a INHIBITORS	Fondaparinux (Arixtra®)	<p>DVT Prophylaxis: 2.5 SC daily DVT/PE Treatment: 5-10 mg SC daily</p>	<p>ADR: bleeding complications, mild local irritation C/I: Active bleeding, severe bleeding risk Avoid if CABG is planned within 24 hours Black Box Warning (BBW): epidural or spinal hematoma risk</p>
	Rivaroxaban (Xarelto®)	<p>Nonvalvular Atrial Fibrillation 15-20 mg once daily with evening meal VTE Treatment 15 mg BID with food (x21 days) then 20 mg orally daily VTE Risk Reduction 20 mg once daily with food DVT Prophylaxis (Surgical) 10 mg once daily with or without food</p>	<p>ADR: Bleeding C/I: liver disease with bleeding risk Drug interactions: with 3A4 inhibitors and p-glycoprotein inhibitors/inducers</p>
	Apixaban (Eliquis®)	<p>Nonvalvular Atrial fibrillation 2.5-5 mg orally twice daily</p>	<p>ADR: Bleeding, increased risk of stroke with discontinuation C/I : active bleeding disorders Reduce dose with: any 2 of the following: ≥ 80y, ≤60kg or SCr ≥1.5 mg/dL, or with concomitant dual P-GP and 3A4 inhibitor</p>
DIRECT THROMBIN INHIBITORS	Bivalirudin (Angiomax®)	<p>PCI/PCTA: 0.1-0.75 mg/kg IV bolus ± 0.3 mg/kg IV bolus, then 0.2-1.75 mg/kg/h IV Intended for use with 300-325 mg aspirin daily</p>	C/I: Active bleeding, severe bleeding risk
	Desirudin	<p>DVT Prophylaxis: 15-75 SC q12 (for up to 12 days)</p>	Black Box Warning (BBW): epidural or spinal hematoma risk
	Argatroban	<p>HIT (Prophylaxis or treatment of thrombosis) 2-10 mcg/kg/min IV (adjusted based on aPTT) HIT in PCI: bolus 350 mcg/kg (over 3-5 min) then 25-40 mcg/kg/min (adjusted based on ACT)</p>	Patients may exhibit elevated INR
	Dabigatran (Pradaxa®)	<p>Nonvalvular Atrial Fibrillation 75-150 mg orally BID</p>	<p>Caution in patients >75y or underweight Requires gastric acidity : antacids may decrease serum concentration Drug Interactions: with P-gp inhibitors/inducers</p>
VITAMIN K ANTAGONIST	Warfarin (Coumadin®)	<p>2-10 mg orally daily (may vary) Target INR: 2-3 (may vary)</p>	<p>ADR: bruising, bleeding, skin necrosis, purple toe syndrome, hypersensitivity</p> <p>C/I: pregnancy category X * readily crosses placenta Many food/drug interactions</p>

Reviewed by: Dr. T Jodlowski and Dr. K Patel

THROMBOLYTICS/FIBRINOLYTICS				
AGENT	USUAL ADULT DOSING RANGE	RISKS/TOXICITIES		
Alteplase (Activase®)	Intravenous (IV) infusion of 60 mg over the first hour and then 40 mg at 20 mg/h.	ADR: bleeding disorders, hypersensitivity C/I: suspicion or recent history of intracranial/intraspinal hemorrhage, uncontrolled HTN, active internal bleeding, known bleeding (use of oral anticoagulants, administration of heparin within 48h following stroke, platelet count <100,000)		
Retepase (Retavase®)	Two IV bolus injections of 10 units each, 30 min apart			
Tenecteplase (TNKase®)	Single IV bolus of 0.5 mg/kg, should not exceed 50 mg			
ANTIPLATELET AGENTS				
	AGENT	PHARMACOLOGY	USUAL ADULT DOSING RANGE	RISKS/TOXICITIES
SALICYLATE	Aspirin	Irreversibly and nonselectively inhibits COX-1 within platelets, preventing the formation of thromboxane A ₂ and diminishing platelet aggregation	81-325 mg dependent on tolerability	ADR: hemorrhagic stroke GI bleed C/I: hypersensitivity, active bleeding, severe bleeding risk
	Ticlopidine (Ticlid®)	Thienopyridines: irreversible blockade of platelet P2Y12 component of ADP (adenosine diphosphate) receptor, with no effect on prostaglandin mechanism	250 mg PO BID	Life threatening hematologic ADR: neutropenia/ agranulocytosis, thrombotic thrombocytopenia purpura, aplastic anemia
P2Y12 INHIBITORS	Clopidogrel (Plavix®)		Loading dose: 300-600 mg Then 75 mg PO daily	ADR: Thrombocytopenic purpura, bleeding BBW: Efficacy affected by 2C19 inhibition- diminished effectiveness in poor metabolizers Drug interactions: with CYP2C19 inhibitors
	Prasugrel (Effient®)		Loading dose: 60 mg once Then 10 mg+ aspirin 81-325 mg/day	ADR: Significant bleeding (caution in patients with risk factors for bleeding) C/I: active bleed, history of TIA or stroke, undergoing CABG Reduce dose to 5mg if patient is <60 kg : due to bleed risk
MISC. VASODILATORS	Ticagrelor (Brilinta®)	Nucleoside analog: reversible block of P2Y12 component of ADP receptor	Loading dose: 180 mg PO Maintenance dose: 90 mg q12 use with aspirin 75-100 mg (maintenance dose of aspirin > 100 mg reduces effectiveness)	ADR: Bleeding (do not use with active bleed/ history of ICH/ CABG) Bradycardia, dyspnea, Gynecomastia in men Drug interactions: 3A4 interactions
	Dipyridamole (multiple brands)	Coronary vasodilator that inhibits uptake of platelet adenosine and blocks cAMP degradation by inhibiting PDE (↑ intracellular cAMP, ↓TXA ₂ , ↓platelet adhesion)	Persantine® (IR) 75-100 mg PO q6hr as adjunct to warfarin Aggrenox® [25 mg ASA + 200 mg ER dipyridamole] 1 capsule BID	ADR: GI complaints, dizziness, orthostasis
	Cilastazol (Pletal®)	Inhibits platelet PDE III with vasodilatory effects for reduction of symptoms of intermittent claudication ; also causes ↓TG and ↑HDL	50-100 mg PO BID	ADR: Headache, GI (abnormal stools, diarrhea, dyspepsia, abdominal pain) C/I: heart failure Caution in patients with cardiac history and/or other PDE III inhibitors Drug interactions with 3A4 & 2C19 inhibitors (consider dose reduction to 50 mg)
GLYCOPROTEIN RECEPTOR ANTAGONIST	Abciximab (ReoPro®)	Blocks GPIIb/IIIa receptor complex on platelets, leading to ↓ platelet aggregation stimulation by blocking binding of fibrinogen to vWF, and thus preventing thrombus formation Abciximab: chimeric monoclonal antibody platelet effects persist 24-48 hrs after D/C Eptifibatide/Tirofiban: interact with AGA sequence of fibrinogen (do not block the vitronectin receptor.) , platelet effects persist ~4hrs	Abciximab: 0.25 mg/kg IV bolus then 10mcg/min IV x12-24 hr (platelet effects last longer- 24-48hr after D/C)	ADR: Bleeding C/I: Active bleeding, Thrombocytopenia, Prior stroke, Renal dialysis (eptifibatide)
	Eptifibatide (Integrilin®)		Eptifibatide: 180mcg/kg IV bolus 1-2x then 2 mcg/kg/min IV x 18-24h	
	Tirofiban (Aggrastat®)		Tirofiban: 0.4 mcg/kg/min IV x 30 min then 0.1 mcg/kg/min IV	

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Reviewed by: Dr. T Jodlowski and Dr. K Patel

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Quote of the Month

By: Melissa Roy, Co-Copy Editor [Graphics-Focused]



“ Life is full of give and take. Give thanks and Take nothing for granted ”

Linda Poindexter

Inspirational Quotes | Rx | Rho Chi Post 2013

The Third Wheel or the Steering Wheel? Pharmacists on the Healthcare Team

By: Joshua Bliss, PharmD Candidate c/o 2016

Doctor - a word often utilized by both professionals and the general public alike to describe a physician. "Doctor" finds its origins in the Latin word for "teacher." The word "physician," however, carries a more complex origin. It is derived from Latin's "physicum," meaning remedy.¹ In Luke 4:23 of the Bible, "Viciſion heale thy ſelfe" or "physician, heal thy ſelf" can be found in a parable utilized to explicate the fundamental philosophy of managing one's own faults before attempting to correct the faults of others. "Physician" eventually came to refer to a university-educated person who prescribed drugs. It is also interesting to note that "surgeons" were seen as inferior to physicians for some time. Surgeons worked with their hands and knives while physicians diagnosed and provided therapeutic remedies, a much more respected methodology.¹ Today, we are subjected to a world of immense and unprecedented complexities, especially in regards to healthcare. The expansion of healthcare is tremendous and exponential. In the United States, healthcare costs are rising, and the number of people in need of healthcare will continue to grow as the baby boomer population ages to retirement.

The future of healthcare is blurred by the unresolved ideologies so overtly apparent in Congressional debate over the controversial Affordable Care Act. Many of these issues are highly subjective and inconclusive in the face of stark healthcare insufficiency. Through the trees of subjectivity, a forest of underutilization of non-physician healthcare professionals is manifested. The pharmacist stands as one of the most underutilized healthcare professionals currently practicing in the institutional setting. A plethora of studies have revealed the utility of pharmacists in improving patient health outcomes in the community setting, including the now famous Asheville study.² The public, healthcare providers, insurance companies, and the US government have recognized

the value of community pharmacist expansion insofar as improving healthcare outcomes and trimming costs.³ This same philosophy can be carried over to the institutional setting, where the pharmacist stands as an incredibly valuable asset to the healthcare team.

A recent study presented at the American Society of Health-System Pharmacists Summer Meeting in June 2013 elucidates the value of increasing pharmacist involvement in patient care.⁴ In this study, physicians at Mission Hospital in Asheville, NC followed a conventional routine for two weeks while researchers recorded data on prescribing errors, drug costs per discharge, and the use of pharmacy consults. After the first two weeks, pharmacists joined physicians on a mutual and equal practicing basis for another two-week period, where the same data parameters were recorded. The results showed that a smaller percentage of patients receiving team-based care were readmitted to the hospital within 30 days. The pharmacist team saved \$62.60 per discharge, which extrapolated to over \$2.5 million in annual savings for Mission Hospital. The pharmacist-physician team model was found to increase clinical interventions, decrease readmission rates, increase drug savings, and improve physician satisfaction.⁴

Another four-week study conducted by Patel et al.⁵ focused on pharmacists' clinical efficacy in rounding with a physician versus indirect clinical intervention work. Pharmacists either physically rounded with the physician or worked from a computer making clinical interventions. The results of this study were surprising, as they evinced a dichotomous philosophy on the optimal utility of pharmacists. Physical rounding carried with it a greater percentage (93%) of interventions being accepted by the physician (as opposed to just 76% of interventions made by pharmacists not rounding). However, the non-rounding pharmacists were able to conduct a

higher number of interventions per day and save approximately \$300 more per intervention compared to the rounding pharmacist. It was argued that the pharmacist was better utilized clinically when not present during the physician's physical assessment, where the pharmacist was limited in scope of practice. In any case, the pharmacist was able to save the hospital an average of \$16/hour/pharmacist due to clinical interventions made as part of the pharmacist-physician team.⁵ Whether or not the healthcare team should include the pharmacist on physical assessment rounds remains up for debate. There are a many studies evincing the best use of pharmacists directly on the floors.

The Hospital of the University of Pennsylvania (HUP) conducted an efficacy analysis of its pharmacist-patient connection program.⁶ HUP pharmacists meet with patients within 24 hours of admission and review current medication regimens, as well as determine the level of knowledge the patient has about his or her medication therapy. In this way, the pharmacist is able to establish an integral relationship with the patients and build trust, the cornerstone of a successful patient-practitioner relationship. The utility and value of the pharmacist as a more integrated part of the healthcare team was made clear. One example cited by HUP is a case in which a patient had been admitted and discharged from two hospitals within the past two months. Upon building a relationship with the pharmacist, the patient explicated that she had limited physical ability to travel to any pharmacy near her residence and thus had not taken her medications since her last discharge. The pharmacist worked directly with the unit's social worker to find a pharmacy in the patient's neighborhood that offered delivery services. Before this pilot program began at HUP, pharmacists reported 7000 interventions per year. With this new program, pharmacists now report 8200 interventions per month! Patient satisfaction surveys correlated with this tremendous success as well.⁶ Other studies showing the efficacy of pharmacists being included as a central player on

the healthcare team include improvements in hypertension management and reduction in adverse drug events.⁷

Healthcare is manifesting itself as a great challenge of the 21st century. The United States is experiencing an increasingly older population, a future of economic uncertainty, and a predicted physician shortage in the magnitude of thousands. Solutions that have been proposed include opening new medical schools and increasing admission percentages. Once again, we are failing to see the forest through the trees. The pharmacist, with an advanced education and clinical residency opportunities, stands as the obvious solution to the impending shortage of physicians. By welcoming the pharmacist as a more integral part of the institutional healthcare team, quality of care will increase while simultaneously decreasing overall costs. The evolution of the role of the pharmacist is analogous to the once superiority complex evident in the relationship between physicians and surgeons. Today, pharmacists offer a different, complementary, and integral form of healthcare practice that can be expanded significantly. As in the Book of Luke parable, "Vicion heale thy selfe," perhaps our healthcare team needs to manage its own faults before attempting to treat the patients we all work so diligently for.

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Moving Towards Provider Status: An Interview with Sandra Leal

By: Hayeon Na, Co-Copy Editor and Sang Hyo Kim, Staff Editor

You mentioned in your article in 2011 that there are reimbursement issues with not being recognized as a HCP (healthcare provider). What do you think are some other challenges of not being recognized as a HCP? How would being recognized as HCPs change things for pharmacists? Do you think this change is close to happening?

"The biggest challenge of not being recognized as a provider is the lack of a widespread sustainable business model that allows for expansion of care and access to patients as usual care. Recognition would allow for patients to more routinely receive comprehensive interventions by pharmacists. I believe that at this moment there has been a lot of momentum built on pursuing provider status by national and state organizations. This is critical to making this change happen and it is the closest that I have seen to having consensus about getting this done."

We are often faced with patient resistance. While the majority of patients and other HCPs trust pharmacists, some others dismiss them as "prescription fillers." (In a recent visit to a nurse practitioner, I was asked why I had to go to school for six years "just to fill prescriptions"). In the effort to be recognized as HCPs, what do you think pharmacy

students and pharmacists can do to change this atmosphere?

"Pharmacists, residents and students need to show the level of clinical expertise they can offer. Often pharmacists are limited in the amount of time they can spend with a patient because they have to fill prescriptions to maintain a sustainable business model. By having provider recognition, that model can shift to clinical care as opposed to product dispensing. I believe that patients would significantly benefit if the profession took that shift. Until that happens, pharmacists need to be vocal and advocate for positions that maximize their education."

"Pharmacists, residents and students need to show the level of clinical expertise they can offer."

What resources are out there for pharmacists/pharmacy students who want to become clinical pharmacists and/or help optimize pharmacotherapy along with MDs and other HCPs?

What advice do you have for students who want to get involved?

"There are many ways that pharmacists and pharmacy students can enhance their clinical skills. One that comes to mind is residency training if that is an option. If that is not the case, then pursuing trainings in areas of interest are available from multiple organizations. For example, APhA offers immunization training and diabetes certificates."

Other options include obtaining board certification or other types of certification like a CDE (certified diabetes education) from organizations like ASHP. Another way would be to volunteer with organizations such as community health centers or colleges of pharmacy to train students or create journal clubs to develop clinical opportunities to practice.”

Considering the current PharmD program, what additional service can we offer when we are recognized as HCPs? Legislation to give pharmacists HCP status AND limited prescribing authority has been introduced in California. Do you think other states should follow suit?

“I strongly believe all states should pursue provider status while still advocating for federal change. The more states that get involved the more information we will be able to pull from to show outcomes data, improve patient care with integration of clinical pharmacy services. I believe that pharmacists have an opportunity to improve public health and be a primary care provider for people that are already having access to care issues. There is a shortage of primary care providers now that will only worsen with time.”

What does it mean to work as a pharmacist with prescriptive authority? What do you do differently on a daily basis? What are some anecdotes you can share about the challenges and rewards of your position? As discussed in the previous question, what do you see as the limit to your practice, and how do you negotiate this?

“The benefits of having prescriptive authority under collaborative practice is that I can take action immediately as I am seeing a patient versus having to call a provider to recommend what we should do. This is very gratifying because the actions that I am taking are resulting in improved health outcomes of the pa-

“I strongly believe all states should pursue provider status while still advocating for federal change.”

tients that I serve. My area of specialty is diabetes, and I find that patients need a lot of help with this very complicated condition with multiple comorbidities and medications. Having the pharmacy

background lets me make interventions through a different skill set than a nurse or physicians; this contributes significantly to improving a patient’s health. The greatest limitation that I am experiencing is diffi-

“Having the pharmacy background lets me make interventions through a different skill set than a nurse or physicians”

culty in spreading the model that we have because there is a limit in direct revenue stream to fund the clinical pharmacist in this type of role.”

What advantage does collaborative practice have over the traditional setting?

“Historically, pharmacists have had to call and make recommendations on a patient’s medication regimen. By having collaborative practice, the changes can be implemented immediately as opposed to waiting for authorization of things that are routine and correct or are urgent.”

As you mentioned in your 2011 article, the “reality is that you are liable no matter what.” But of course, there are bound to be pharmacists who do not agree and are reluctant to gain the “added responsibility.” If some pharmacists want to “opt out,” what would they do when pharmacists are finally recognized as HCPs?

“Not all practice sites will require the same levels of clinical pharmacy intervention. I am sure that those pharmacists do not want added responsibility can continue to practice as they do now as those positions will not fully go away.”

Where do you think the pharmacists who are currently practicing fit in? How? Would we have a division of “regular pharmacists” and “HCP pharmacists?” Would the PharmD program change? Would further education be required for pharmacists who are currently practicing?

“I believe that like other providers, pharmacists who want to practice in more advanced areas would have to be credentialed by health plans with privileges associated with the site they practice, much like a primary doctor cannot perform surgery; a surgeon has privileges and is credentialed based on their additional training. Additional training will be deter-

BACK TO COVER

mined based on the site, scope of practice and other similar but important factors.”

How has your Director-At-Large position at ASHP helped this cause? In what ways has your perspective on pharmacists’ ability to integrate with other professionals? If pharmacists were recognized everywhere as HCPs, how do you think the services should be divided between other health-care providers and pharmacists? How can the inevitable “power struggle” between pharmacists and other HCPs be delicately negotiated? (For example, nurses and nurse practitioners have definite roles. Where would pharmacists stand? Can we become patient educators as well as “prescription fillers”?) Affordable Care Act (ACA) is going into effect next year; considering the shortage of primary care doctors in America, what role can pharmacists play to improve the situation?

“There are numerous examples of how pharmacists are working in teams with other providers where there is not a power struggle but a realization that each profession is contributing based on their expertise. I believe that when other providers and patients understand the training that we have and what our contributions result in; they will understand the value of clinical pharmacy services. That has been my experience so far.”

What can we do to facilitate this understanding?

“Communicate with patients every opportunity we have. A lot of times we are behind a counter, which limits us from being able to directly communicate with patients. In an ideal world, pharmacists would talk to every single patient whether a medication is new or just being refilled, just to touch base about simple things like adherence. This is a good time to also have a conversation about things such as the education pharmacists must go through, the years of experience, the role that pharmacists can play as advocates for good patient care. These are just a few examples of what the possibilities are for a pharmacist to be very proactive in getting the message out. The same would be true in communicating

with providers. It is key to always make them aware of how team based approach can and will result in better care for the patient.”

What “goal” should community pharmacists have in caring for the patients? What is your ideal neighborhood pharmacy? Your ideal hospital pharmacy and clinical pharmacists? The pharmacists’ tasks?

“I believe pharmacists should be advocates for their patients, so that the patient has the best outcome possible. A pharmacist in any setting should make sure that they are contributing before, during and after the prescription is written to improve the health of the patient.”

If we are recognized as HCPs, how would everyday tasks change? Should there be more or less technicians in pharmacies? How would the roles of technicians, interns, and other members of the pharmacy?

“I think that there should be enough technicians, interns and residents to free up the pharmacists to be able to have time to thoroughly review the medication regimen with the patient. With the improving technology, accesses to EHR as well as access to lab values with Smartphones are becoming more realistic. We have to be prepared to utilize this information in a way that improves the patient’s experience and results in optimization of a regimen to improve health. There are also many opportunities for patient education, counseling and adherence interventions that could be achieved if the pharmacist had time to do that. Again, the limit in time is primarily due to the lack of reimbursement for those types of intervention.”

What kind of interventions should pharmacists and pharmacy interns make in community setting? Students are sometimes exposed to more updated/current news because of faculty who try to provide information that will be of help in the future. How can pharmacy students and interns “step up” to help both patients and pharmacists?

“In a community setting pharmacists can make numerous interventions such as teaching a patient how to

“Communicate with patients every opportunity we have.”

OPINIONS

test their blood glucose and helping them understand goals. Pharmacists could perform point of care test for routine chronic care conditions such as diabetes, dyslipidemia and hypertension. Pharmacists can set up vaccination clinics, smoking cessation clinics, or weight education clinics. The possibilities are endless! Pharmacy students provide a workforce that is engaged and eager to learn. Students that have rotated at our site, for example, go to other sites and describe what we do and often times they try to implement some of the interventions they learned."

We are often limited by the access we have to demonstrative tools. In community practice, it is often frowned upon to show that with a real glucometer. Do you think this concern is valid? Would pushing for more educational tools from manufacturers and pharmaceutical companies be practical and helpful?

"If an employer frowns upon using a real glucometer the problem is with the employer. This is where I would petition for that to change so that you can do your job better. I think that educational tools are also great, but a lot of times those tools do not necessarily provide information for those with low health literacy and does not use language that is appropriate for the patient."

All of these questions are based on the new legislation that pharmacists hope will be implemented. This will be an arduous process that may take years. How do you think the pharmacy profession has changed over the years? What do you foresee in the future?

"I think that the training for pharmacists has become more focused on case discussion and clinical interventions. Also, I have seen more emphasis on residency training and board certification for practice in clinical settings. Again, I believe technology will offer even more opportunities for interventions."

Pharmacists' responsibility as healthcare providers is increasing without reimbursement or increase in salary. Pharmacists administer flu and pneumonia vaccines without being paid extra. This increases

the liability of pharmacists without equal increase in reward. What changes like these are seen right now? Do you think this will help your cause or hurt it?

"I think that increased workload without compensation will aggravate pharmacists and their employers. I hope this will push pharmacists and many chain pharmacies to demand payment for these types of services. Otherwise we will continue to give our services away for free while other providers get paid to do the same thing. Why do we allow this?"

In the past few years, Medicare has been hiring pharmacists and pharmacy interns to provide remote patient MTM (over the phone) in accordance with the Medicare Prescription Drug, Improvement, and Modernization Act of 2003. Many interns partake in this, and community pharmacists are curious about this opportunity. Currently, the counseling points and services are limited, but further changes may come along.

Because pharmacists and interns are paid "per case" for MTM, ensuring high quality of care is difficult. Do you think monitoring will be necessary later if we earn HCP status?

"Healthcare reform is targeting outcomes measures improvement for reimbursement. I believe that healthcare is getting scrutinized more and more to justify interventions that work. The key is to compensate those interventions that work, like clinical pharmacy services, and not those that have been compensated for years without accountability."

So would this mean that we should measure the methods for their effectiveness in improving outcome, then put a value accordingly?

"Yes. This can be done in numerous ways. With healthcare reform accountable, quality care is the new objective. Pharmacists and other providers will be measured on being able to meet those objectives. I do not doubt that we can achieve that, but we have to petition to get credit for what we do; this way, we can create and spread sustainable models."

"I hope this will push pharmacists and many chain pharmacies to demand payment for these types of services."

There may be challenges to putting value according to effectiveness, because it will take a long time to gather proof that pharmacist intervention improves patient outcomes. However, if and when the criteria and rewards are determined, there will be a logical evolution.

On the other hand, trying to see if providers are 'actually doing their jobs' would probably be impossible. Even though we have systems to check whether any HCP is doing his or her job, there are always those who are not recognized for the good he/she does, and those who do not put enough effort into their trade as they should."

Do you think there are system of checks and balances that are not in practice yet? What improvements can be made, if any?

"I think that a lot of opportunities still await.

Medication reconciliation outcomes and documenting and preventing adverse drug events are just two of many areas in which much work needs to be done. There is no better opportunity for pharmacists to step in and own those areas. Other areas include pharmacist integration into primary care, where pharma-

cists can continue to be the most accessible health-care provider."

How are you pushing provider status in Arizona?

"We are working with a state representative and our state pharmacy association to look at the language in our state and other states that have receive or are in the process of receiving provider status to introduce our own legislation."

Being a pharmacist is a full-time profession that leaves little time for other commitments such as family. As someone who is

actively involved in so many aspects of the profession, how do you balance your responsibilities as a practitioner, board member, director, and an individual apart from all this?

"My family is my first priority and I allocate my time to that first. The rest of my responsibilities

are integrated with my areas of interest so it makes it easy to be active in efforts that I feel very passionate about."

The Rho Chi Post would like to thank Dr. Sandra Leal for sharing her time and expertise!

"Even though we have systems to check whether any HCP is doing his or her job, there are always those who are not recognized for the good he/she does, and those who do not put enough effort into their trade as they should."

Remember, you do not have to be a member of the Rho Chi Honors Society to write for the Rho Chi Post.

Got something interesting to say?

Want to publish your poster presentation? Want to review a new drug on the market?

Then write to us at RhoChiPost@gmail.com

Visit our website:

<http://rhochistj.org/RhoChiPost/Topics/>

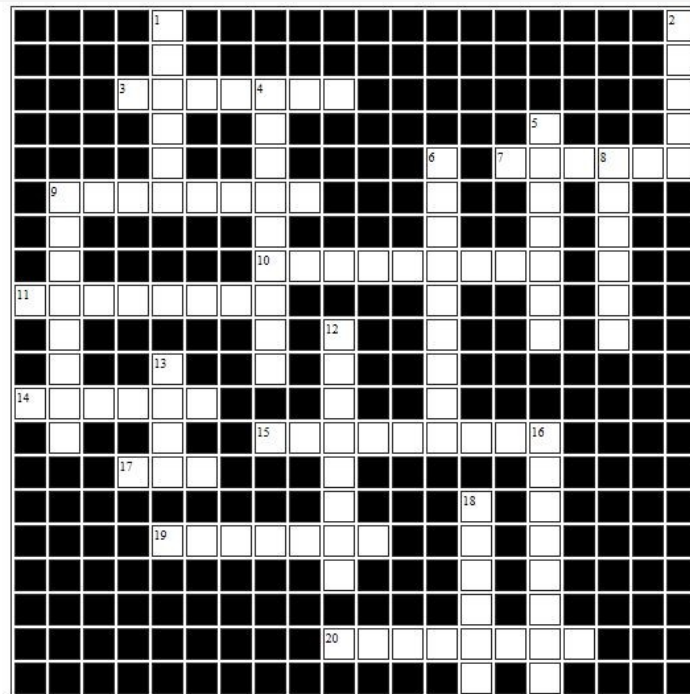
RHO CHI POST

Are You Smarter than a 6th Year?

Crossword Puzzle: Drug Top 200 Challenge

Tamara Yunusova, Senior Staff Editor

How well do you know the Top 200? For each generic name listed below, find the corresponding brand name in the puzzle. Note: This puzzle contains brand names only. Good luck!



PUZZLES

Across	Down
3. Enalapril	1. Sildenafil
7. Insulin Glargine	2. Pioglitazone
9. Clonidine	4. Codeine + APAP
10. Oxycodone	5. Mometasone
11. Quetiapine	6. Promethazine
14. Methylprednisolone	8. Fenofibrate
15. Albuterol	9. Celecoxib
17. Ethinyl Estradiol + Drospirenone	12. Allopurinol
19. Ezetimibe + Simvastatin	13. Carisoprodol
20. Lansoprazole	16. Levofloxacin
	18. Tamsulosin

Answers



By Frances Trosa
PharmD Candidate
Class of 2015

Many drugs
LOOK – ALIKE
OR
SOUND– ALIKE

causing them to be
easily mixed up in
practice.

Can **YOU** match these
facts with the correct
medication?

Answers

Matching Column: Look-Alike Sound-Alikes

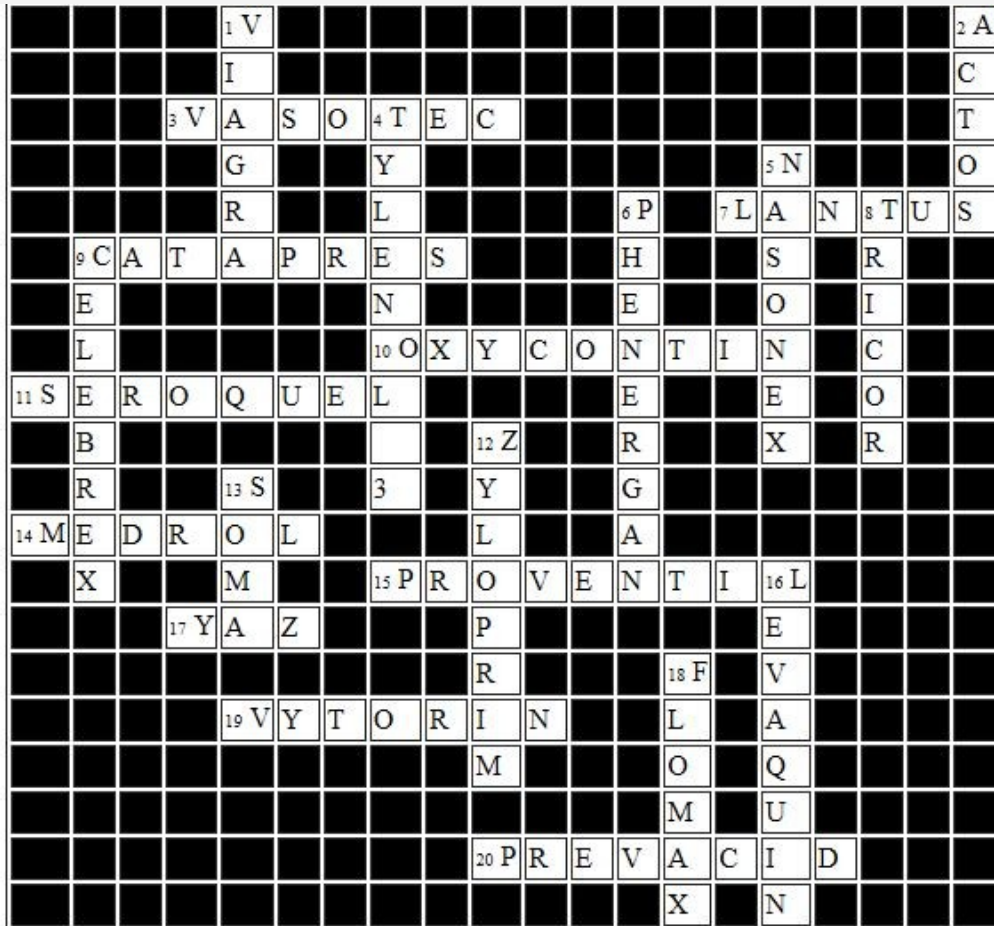
- | | |
|--|---|
| <ol style="list-style-type: none"> Due to its very rapid onset of action, this hypnotic must be taken immediately before bedtime Patient or caregiver must monitor for extrapyramidal symptoms This topical preparation is a super high potency corticosteroid A vitamin D analog indicated in secondary hyperparathyroidism Monitoring parameters include aPTT to ensure the drug is within therapeutic levels and platelet count in patients at risk for HIT A rapid – acting insulin and is therefore usually administered shortly before mealtimes An intermediate – acting insulin which contains neutral protamine Hagedorn A monoclonal antibody which works by inhibiting TNF - alpha This drug decrease systemic resistance by its direct vasodilator effects on the arterioles This drug should be avoided in the elderly population due to its anticholinergic side effects | <ol style="list-style-type: none"> Haldol Humira Humulin N Hydroxyzine Hydralazine Halcion Humalog Hectorol Heparin Halobetasol |
|--|---|

PUZZLES

How Did You Do???

Answers to Word search & Look Alike and Sound Alike

1. F 2. A 3. J 4. H 5. I 6. G 7. C 8. B 9. E 10. D



PUZZLES

Do you enjoy our puzzles?

Send us a suggestion for a brainteaser at

rhochis@gmail.com

We will feature your work in our next issue!

RHO CHI POST: EDITORIAL TEAM



@ Katharine Cimmino (5th Year, STJ; Editor-in-Chief)

I have always been an avid reader and writer. As a member of the Rho Chi Post I am able to merge my passions with the professionalism that comes with aspiring to be a healthcare provider. I am eager to be a part of a publication that promotes my interests and vocation.



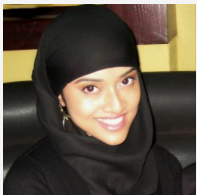
@ Bharat Kirthivasan (PhD Candidate, STJ; Co-Copy Editor [Content-Focused])

I am a doctoral candidate in Industrial Pharmacy researching nanoparticles for delivery to the brain. The only thing I enjoy more than reading a well-written piece of work is writing it. I am glad to work for the Rho Chi Post, and I encourage others to do the same.



@ Hayeon Na (5th Year, STJ; Co-Copy Editor [Content-Focused])

Hello! My name is Hayeon Na. I am a 2015 PharmD Candidate and one of the Copy Editors for the Rho Chi Post. I hope the information I present will be helpful, or at least interesting. If you have any comments regarding my contribution, feel free to contact me at any time!



@ Tasnima Nabi (4th Year, STJ; Co-Copy Editor [Content-Focused])

Writing has always been my greatest outlet for experience and knowledge, through which I hope to keep you engaged and informed. It is imperative to keep up with our changing profession and community, and I look forward to bringing pertinent information to the newsletter.



@ Aleena Cherian (6th Year, STJ; Co-Copy Editor [Graphics-Focused])

The Rho Chi Post has been a source of current information and great advice to students and professionals in this evolving profession. After years of experience in media and graphics-related work, it is now my privilege to be a part of this endeavor as a Co-Copy Editor. I hope you learn as much from future editions of the newsletter as I have, and I welcome your feedback!



@ Melissa Roy (5th Year, STJ; Co-Copy Editor [Graphics-Focused])

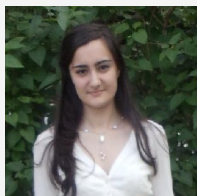
We as future healthcare professionals owe it to our patients and ourselves to become aware and current on the events affecting our profession. The Rho Chi Post is our way to learn new things and stay in touch with the pharmacy world, on- and off-campus. I have gained so much from reading previous publications and feel privileged to have the opportunity be a part of the team. Feel free to reach out to me with suggestions and comments.



@ Erica Dimitropoulos (5th Year, STJ; Senior Staff Editor)

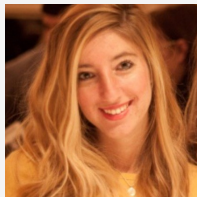
As busy student pharmacists, we often fail to keep current with healthcare developments. My aim is to sort through the news and provide quick updates that are important to our profession. Feel free to contact me if there are any topics you would like to see covered in the next issue!

RHO CHI POST: EDITORIAL TEAM



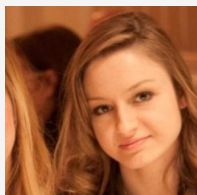
@ Tamara Yunusova (3rd Year, STJ; Senior Staff Editor)

My name is Tamara Yunusova, and I am a 3rd year Pharm D candidate at St. John's University. I enjoy articulating information in a captivating and insightful way. I hope to make this publication more informative, student-friendly, and innovative.



@ Beatrice Popovitz (5th Year, STJ; Staff Editor)

I am eager to relay current information on interesting topics making waves in the world of healthcare pertinent to the advancement of our profession. As student pharmacists, we are molding the future of our profession, and the Rho Chi Post facilitates the cultivation of a relationship (between students, faculty, and other members of the healthcare community) to share ideas and spread awareness of various issues. Feel free to contact me if you would like to



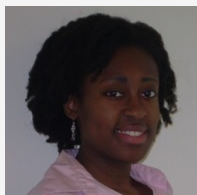
@ Ada Seldin (5th Year, STJ; Staff Editor)

I am thrilled to have become a new member of the Rho Chi Post team. I hope to further strengthen the goals of this newsletter and make a lasting contribution. It is important, as future pharmacists, to collaborate with our peers, as well as accomplished professionals in the field. Rho Chi Post provides a vehicle to voice our opinions and share relevant news.



@ Sang Hyo Kim (2nd Year, STJ; Staff Editor)

Advancements of technology and developments of new medicines, prolonging the lifespan and improving the quality of life, have increased the geriatric population. In years to come, pharmaceutical industries and healthcare systems will persistently work to find solutions to changing demands and new problems of the society. Through the Rho Chi Post, I wish to learn, educate, and prepare myself and others for the future.



@Davidta Brown (3rd Year, STJ; Staff Editor)

My two great loves are innovative science and quality writing, and the Rho Chi Post is an insightful combination of both. As an editor, I look forward to bringing relevant information and fresh perspectives to the student and faculty of St. John's University, as well as to making the Rho Chi Post a newsletter that offers something new to every reader.



@ You!

We are always looking for creative and motivated students to join our team!

If you are interested in becoming an editor for the Rho Chi Post, please visit:
<http://rhochistj.org/RhoChiPost/EditorApplication>

EDITORS

RHO CHI

The Rho Chi Society encourages and recognizes excellence in intellectual achievement and advocates critical inquiry in all aspects of Pharmacy.

The Society further encourages high standards of conduct and character and fosters fellowship among its members.

The Society seeks universal recognition of its members as lifelong intellectual leaders in Pharmacy, and as a community of scholars, to instill the desire to pursue intellectual excellence and critical inquiry to advance the profession.

THE RHO CHI POST

MISSION

The Rho Chi Post is a monthly, electronic, student-operated, dean-approved publication that aims to promote the pharmacy profession through creativity and effective communication. Our publication is a profound platform for integrating ideas, opinions, and innovations from students, faculty, and administrators.

VISION

The Rho Chi Post aims to become the most exciting and creative student-operated newsletter within St. John's University College of Pharmacy and Health Sciences. Our newsletter continues to be known for its relatable and useful content. Our editorial team continues to be known for its excellence and professionalism. The Rho Chi Post essentially sets the stage for the future of student-operated publications in pharmacy.

VALUES

Opportunity, Teamwork, Respect, Excellence

GOALS

1. To provide the highest quality student-operated newsletter with accurate information
2. To maintain a healthy, respectful, challenging, and rewarding environment for student editors
3. To cultivate sound relationships with other organizations and individuals who are like-minded and involved in like pursuits
4. To have a strong, positive impact on fellow students, faculty, and administrators
5. To contribute ideas and innovations to the Pharmacy profession

CURRENT EXECUTIVE BOARD



Zinnia, Majd, Moisey, Elissa, and Anh at the 2013 Induction Ceremony

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Vice President: **Majd Ahmad**
Secretary: **Elissa Tam**
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Historian: **Zinnia L. Yu**

Faculty Advisor: **S. William Zito, PhD**

UPCOMING EVENTS

Nov 20-22: ASCP Annual Meeting & Exhibition
Seattle, Washington

Nov 21: Webinar: Biopharmaceutics of Non-orally Administered Drugs

Dec 8-12: The Midyear
Orlando, Florida

Feb 24-26: 49th AAPS Arden Conference
Rockville, Maryland