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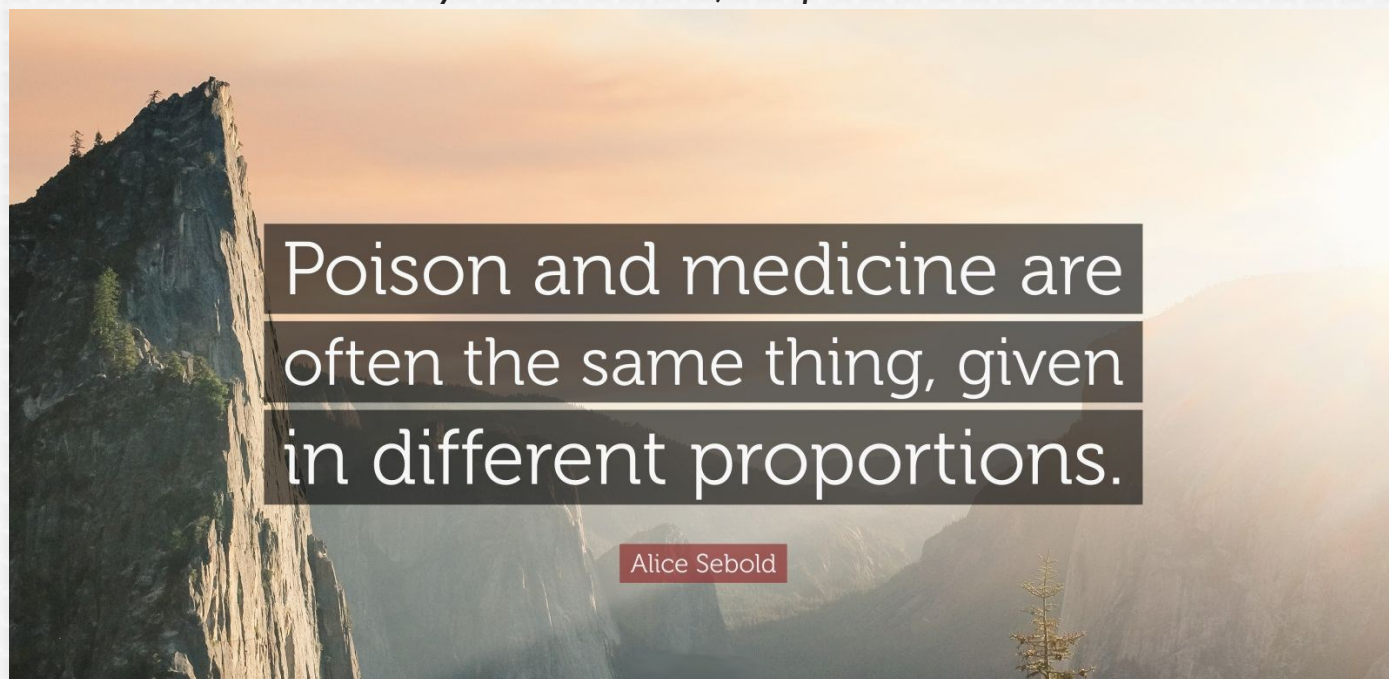
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QUOTE OF THE MONTH

By: Matthew Kahn, Graphics Editor



A review on potassium iodide in radiological disasters

By: Victoria Hom, PharmD Candidate c/o 2018

This year marked the 31st anniversary of Chernobyl, the worst nuclear disaster in history due to a malfunctioned reactor operated by inadequately trained staff. The accident's explosion released a large plume of iodine-131, one of many radioactive substances, into the atmosphere, which prompted an evacuation around the Belarus-Russia and Ukraine region. Within ten days, about thirty-one clean-up workers died with thousands more expected from the high levels of radiation.¹ Studies suggest that the radioiodine exposure led to a striking increase of thyroid cancer in young children - as much as a hundred-fold increase when compared to pre-disaster rates.² Additionally, despite being far from the disaster site, high levels of radioactive material were detected over other parts of Northern Europe.

Poland was a country that responded quickly to the thyroid cancer crisis by dispensing a nationwide supply of potassium iodide (KI). The rationale was to saturate the thyroid gland with non-radioactive iodine, thereby preventing the uptake of radioactive iodine. However, the evidence in support of this use of potassium iodide was arguably indirect and controversial. Critics questioned the spike in thyroid cancer shortly after the Chernobyl incident, challenging that the dramatic increase in rates may have resulted from intensive screening.³ Other studies presented evidence that the risk of thyroid cancer increases with increasing doses of radiation – suggesting that Poland's dose was lower, hence a lower incidence of thyroid cancer was recorded.⁴ The distance factor of Poland from

Chernobyl coupled with restriction of possibly radioactive -infected milk and vegetables also undermined the association between low incidence of thyroid cancer in Poland and KI administration. In fact, there was higher reduction in radioiodine exposure attributed to the diet restriction compared to the reduction by potassium iodide administration.⁵ Studies also stated that there was no significant increase in thyroid cancer occurrences in Polish children that did not receive the drug. However the difference in occurrence when compared to Belarus in Russia remained significantly high.⁵ A more thorough literature review into thyroid cancer incidences and the results of potassium iodide use may help shed more light on these controversies.

Regardless of the controversy associated with the use of potassium iodide after Chernobyl, its widespread administration demonstrated its safety and tolerability during radiological emergencies. It was even shown to be safe in children and pregnant or lactating women. Its safety coupled with its low cost makes it an ideal drug to stockpile for these situations.² Some common side effects including rashes and swelling of the salivary glands proved to be mild and not clinically significant.²

Over 30 years after Chernobyl, we are better prepared for nuclear disasters. Since potassium iodide is most efficacious when administered within three to four hours after exposure to radioiodine, local city governments are sure to keep a sufficient supply ready near nuclear power plants.⁶

In fact, New York State has a supply of potassium iodide

for people living within a 10-mile radius of nuclear power plants. More information on its availability and distribution is usually provided in annual emergency planning booklets distributed by local governments and power companies.⁶ These protocols were also established for the Fukushima Daiichi Nuclear Power Plant prior to its nuclear disaster in March 2011. Unfortunately, Japanese government officials failed to organize for the potassium iodide distribution until five days after the accident; at that point, the pills had little effect.⁷ Luckily, the dose of radiation was not nearly as high as that of Chernobyl so there were less casualties.⁸ But regardless of the levels of radiation, countries should do as Poland did. Be proactive and not reactive.

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Biosimiliars: how will they effect the pharmacoeconomics of health care?

By: Kenny Chan, PharmD

Competition is the greatest driver of innovation and cost savings. The U.S. health care system relies heavily on generic medications to reduce the cost of drug spending. Since the Hatch-Waxman Act of 1984, generic versions of chemically synthesized, “small molecule” drugs have dominated the market and contributed to over 80% of all prescribed drugs. In 2014 alone, generics saved consumers about \$254 billion.¹ When the Hatch-Waxman Act was conceived to stimulate generic drug growth, the class of drugs called “biologics”, which are derived from living cells and include vaccines, monoclonal antibodies and certain proteins, was inconsequential compared to small molecule drugs. Today, biologics account for more than 15% of U.S. drug expenditures and worldwide sales exceed \$150 billion annually.² In the coming years, the patents on many of these biologics including Herceptin®, Aranesp®, Humira® and Avas-tin®, will expire, creating a wave of manufacturing opportunity for generic drug manufacturers. The Biologics Price Competition and Innovation Act (BPCIA) was introduced in 2009 to decrease biologic drug cost by encouraging the production of generic biologics called, biosimilars.

Biosimilars are biologic drugs that are proven to be as safe and effective as the parent biologic drug. Traditionally, biologics are approved by the FDA under the Biologics License Application (BLA). The BLA is a lengthy approval process that grants biologics 12-year marketing exclusivity, patent protection, and nondisclosure of proprietary data. In an effort to speed the development of biosimilars, the Affordable Care Act (ACA) introduced an “abbreviated pathway that will depend on existing data” to approve biosimilars as follow up versions of marketed biological drugs with “no clinically meaningful differences” from the original product.³ The abbreviated pathway, known as the abbreviated Biologics License Application (aBLA) was implemented by the FDA in 2012 under the BPCIA. Biosimilar drugs under the aBLA are granted interchangeability with biologics and a shortened approval process. However, they relin-

quish exclusivity, patent licensing and must disclose proprietary data if challenged. Because biosimilars extrapolate and “piggy back” off the originator biologic data, they bypass costly drug development phases and are typically priced 15-30% less than the originator biologic.⁴

In September 2015, Novartis launched the United States’ first biosimilar drug Zarxio®, its generic form of Amgen’s white blood cell-boosting product Neupogen®, at a 15% discount under the aBLA. The 15% discount is the same price gap set when Zarxio® launched in Europe in 2009. The price gap has since widened to around 25%.⁵ As a point of comparison, when the first generic copy of a small-molecule drug reaches the market, there is characteristically about a 30% drop in brand price; that reduction often reaches 80% as additional generic versions appear.⁶ Biologics have a lower price gap upon introduction than generics because they are much more complex and require extensive clinical trials to gain regulatory approval. One year after approval, biologics typically retain at least 90% of the original price and after 4 years, 80%.⁷ It typically costs \$100 million to \$200 million and requires eight to ten years to develop a biosimilar drug. By comparison, it takes only \$1 million to \$5 million and three to five years to develop a generic drug.⁸ In addition to greater investments, biosimilars must forgo a more vigorous approval process than small molecule generics.

Unlike small molecule generics, biosimilars are required to go through extensive post-marketing surveillance and clinical trials to demonstrate their safety, effectiveness and interchangeability with the originator biologic. Because of the complexity of biologic drugs and risk for immunogenicity, there is no blanket approval process for biosimilars. Each biosimilar will have its own unique set of guidelines under the aBLA based on drug class. Many of these abbreviated biosimilar guidelines, including those for monoclonal antibodies, have yet to be defined in the aBLA, prompting manufacturers to utilize the BLA instead.⁹

Under the BLA, similar biologics are priced as brand drugs and do not necessarily lower drug cost. For example, the interferon (IFN) β -1a products Avonex® and Rebif®, and IFN β -1b product Betaseron®, have all enjoyed price increases of greater than 10% for the last several years despite their clinical similarities.⁷ Furthermore, the BLA protects similar biologics from litigation by protecting proprietary data. The aBLA pathway on the other hand, exposes biosimilar manufacturers to infringement suits by requiring the full disclosure and publication of the biosimilar dossier. Recently, Novartis was locked in litigation with Amgen over its biosimilar Zarxio® and has agreed to delay its marketing despite FDA approval. The additional approval requirements, lack of well-defined guidelines, and legal framework dampen the already soft outlook on biosimilars.

As the biological share of the total pharmaceutical market increases, the high cost of brand biologics places additional burden on payers. The average annual brand biologic costs \$34,550 and far surpasses the price of small molecule generics. Moreover, the rate of biologic price increase far exceeds the rate of inflation. In 2010, biopharmaceuticals experienced a 9.2% price increase compared to a 0.3% increase in the Consumer Price Index.⁹ Medicaid rebate data have increased from 15% to 23% to compensate for biologic inflation.⁹ The combination of rising prices of brand biologics paired with a finite payer budget put biosimilars in a place to decrease U.S. drug costs, albeit at a lesser rate than generics.

Generic competition leads to greater cost savings. However, in the case of biosimilars, the FDA does not provide adequate legal framework, incentive, or well defined parameters for biosimilars under the aBLA. As a result, biosimilar manufacturers are utilizing the BLA to produce similar biologics instead of biosimilars under the aBLA. These similar biologics behave as brand biologics and do not decrease prices to the extent that small molecule generics do to brands. Until the FDA can provide a comprehensive aBLA pathway with more attractive incentives, biosimilar production will be delayed, thus mitigating their maximum cost saving potential. Healthcare has a lot to gain from biosimilars, but currently lacks the infrastructure to nurture a healthy market.

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Lifitegrast: an alternative treatment for dry eye disease

By: Vicky Liu, PharmD Candidate c/o 2018

On July 11, 2016, lifitegrast (Xiidra®), the first lymphocyte function-associated antigen 1 (LFA-1), was approved by FDA for the treatment of the signs and symptoms of dry eye disease. The risk for patients to develop dry eye syndrome increases with age, occurring in 5% of adults ages of 30 and 40 and 10-15% of adults over the age of 65. Untreated dry eye disease can cause pain, ulcers, or scars in the cornea, leading to difficulty in performing daily activities and decreased tolerance to dry areas.¹

Keratoconjunctivitis sicca, commonly known as dry eye disease (DED), is a group of symptoms that consists of visual disturbances, eye discomfort, and dryness that is caused by tear film instability. The mechanism of DED is through an increase in osmolarity of the eye's tear film and inflammation of its ocular surfaces and lacrimal glands. Studies have suggested that the inflammation is caused by CD4+ helper T-cells releasing pro-inflammatory cytokines and chemokines, directly damaging ocular tissues.² Thus, lifitegrast was developed to inhibit T-cell activation from causing the inflammation cascade.

Lifitegrast binds to the LFA-1, a cell surface protein on leukocytes, and inhibits the interaction of LFA-1 with its cognate ligand: intercellular adhesion molecule-1 (ICAM-1). This is crucial because many patients with DED present with an overexpression of ICAM-1. Because lifitegrast blocks the interaction between LFA-1 and ICAM-1, the immunological synapse will not form and T-cells will not be activated to target tissues, such as the eye.³

OPUS-3 was a phase III randomized, double-blinded, placebo-controlled trial that reported the use of lifitegrast for DED. Patients 18 years and older with Schirmer tear test (without anesthesia) scores ≥ 1 and ≤ 10 mm, corneal fluorescein staining scores ≥ 2.0 (0-4 scale), eye dryness scores (EDS) ≥ 40 (0-100 visual analogue scale), and histories of artificial tear use within 30

days of study entry were part of the inclusion criteria for OPUS-3. The primary outcome was the difference in EDS from baseline to day 84, and study results demonstrated that patients taking lifitegrast demonstrated statistically significant results compared to the placebo group. The results from the 84th day were as follows: treatment effect, 7.16 (95% confidence interval, 3.04-11.28; $P = 0.0007$). In addition to improvement of eye dryness, other symptoms such as itchiness (nominal $P = 0.0318$), foreign body sensation (nominal $P = 0.0418$), and eye discomfort ($P=0.0048$) were alleviated more with the intention-to-treat group than those in the placebo group. For adverse events, more than 5% of patients had instillation site irritation and reactions, categorized as mild to moderate severity. Notably, the most common non-ocular adverse event was dysgeusia (unusual taste sensation), which occurred in 12.9% of the participants.⁴

The American Academy of Ophthalmology has not updated its guidelines on DED since 2013 to include lifitegrast. However, lifitegrast may be a suitable alternative to treat patients with dry eye disease.

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Two hepatitis C drugs approved for pediatric use

By: Anna Diyamandoglu, PharmD Candidate c/o 2020

Hepatitis C is an infectious disease which is caused by the hepatitis C virus (HCV) and is characterized by inflammation of the liver. Its effects on the body range from a mild illness that lasts several weeks to a chronic illness that attacks the liver and affects a patient's life long-term. Acute hepatitis C infection has the propensity to become chronic and does so in 75-80% of patients.¹ It is primarily spread through direct contact with the blood of an infected individual. During initial infection, symptoms are expressed very mildly if at all. In fact, a patient can live for years with the illness without experiencing any symptoms, a characteristic which contributes to its lethality. Complications of the disease include cirrhosis, a condition which the liver slowly breaks down and is replaced with scar tissue making it unable to function normally, liver failure, a result of cirrhosis, and liver cancer.¹

The only FDA approved medications used to treat hepatitis C were pegylated interferon (Peg-IFN) and ribavirin (RBV) until very recently.² These two medications were used in combination in order to increase the likeliness of getting rid of HCV from the body even though they often induced side effects that would force the patients to discontinue their therapy.² Between 2011 and 2016, the FDA approved nine additional medications for the specific use of treating HCV including protease inhibitors boceprevir (Victrelis®) – voluntarily dis-

continued by Merck in 2015, telaprevir (Incivek™) and simeprevir (Olysio®); polymerase inhibitor sofosbuvir (Sovaldi®), enzyme inhibitor ledipasvir/sofosbuvir (Harvoni®); combination medication ombitasvir, paritaprevir, ritonavir (Viekira Pak™) which can be given without ribavirin thereby avoiding its negative side effects; anti-viral enzyme inducers ombitasvir, paritaprevir, ritonavir (Technivie™) and daclatasvir (Daklinza™); phosphoprotein/protease inhibitor elbasvir, grazoprevir (Zepatier®); and oral combination medication sofosbuvir, velpatasvir (Epclusa®) which is the first HCV therapy that treats all genotypes of the disease.²

While there have been tremendous strides in terms of increasing available therapies for adult HCV patients, the same could not be said for pediatric patients with the disease until this year. In April 2017, the FDA approved two of the aforementioned medications which had originally been used to treat adults, sofosbuvir and ledipasvir/sofosbuvir, for the treatment of pediatric HCV patients between the ages of 12 and 17.³ The efficacy of these two medications was established from clinical trial data which displayed that after treatment with sofosbuvir and ledipasvir/sofosbuvir, at least 97% of pediatric patients aged 12 or older with varying genotypes of HCV showed no detection of the virus. This concept is called sustained virologic response (SVR).

When the HCV virus is undetectable 12 weeks or more after completing treatment, a sustained virologic response has been achieved. These results are similar to those found in clinical trials which tested the efficacy of the same medications in adult HCV patients.³ This marks the first direct-acting antiviral treatments approved for children and adolescents with HCV.³ In the FDA's press release statement regarding the recent approval, the importance of this development in pediatric HCV therapy was emphasized. The director of the Office of Antimicrobial Products in the FDA's Center for Drug Evaluation and Research, Dr. Edward Cox, M.D, stated that it would "help change the landscape for HCV treatment by addressing an unmet need in children and adolescents."⁴

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The function and efficacy of pimavanserin (Nuplazid®) in the treatment of psychosis associated with Parkinson's Disease

By: Jonathan Mercado, PharmD Candidate c/o 2019

In April 2016, the FDA approved the first drug specifically indicated for the symptoms of psychosis associated with Parkinson's disease (PDP).¹ Currently, clozapine and quetiapine are used off label to treat symptoms associated with Parkinson disease such as voices in patients' heads, various hallucinations and delusions. In Parkinson Disease, hypersensitization of dopaminergic receptors causes external stimuli to be received improperly, therefore impairing serotonin, the mood stabilizing neurotransmitter in the brain.² Pimavanserin acts as a 5HT_{2A} inverse agonist that can act as an antagonist of 5HT_{2A} and suppress the receptor's signaling.² The off-label medications mentioned function via a similar critical mechanism of action against serotonin, one of the most negatively affected neurotransmitters by Parkinson's disease.

Several placebo-controlled and double-blinded phase III randomized clinical trials took place to demonstrate the efficacy of pimavanserin. One in particular, sponsored by the manufacturer Acadia Pharmaceuticals Inc®, studied a large sample size, with 90 patients in the placebo group and 95 in the pimavanserin group, and used the Scale for the Assessment of Positive Symptoms for Parkinson's disease (SAPS-PD).³ SAPS-PD has a list of 9 symptoms that are measured in severity from a scale of 1 to 5.³ These symptoms are evaluated with scores from anywhere between 0 (meaning no symptoms) to 45 (maximum severity of all symptoms). As the most recent phase III clinical trial completed since the drug's approval, pimavanserin 40 mg tablet, taken once daily, was given to the experimental group and compared to the placebo group. Both groups spent the first two weeks of the six week trial taking a placebo, and only afterwards was pimavanserin given to the experimental group in order to limit the placebo effect. The primary outcome measure analyzed was antipsychotic efficacy and the reduction in patients' SAPS-PD score. Of the 90 patients analyzed in the placebo group, there was a mean change from baseline of -2.73.³ Of the 95

patients analyzed in the experimental group there was a mean change from baseline of -5.79. Thus, pimavanserin had a -3.06 difference from the placebo with a 95% confidence interval (-4.91 to -1.20).⁴ The experiment shows more than a 3-point difference between groups, achieving the desired 5% significance level. Although the sample size was smaller than planned, the outcomes are significant. After conducting the final analysis using a MMRM method instead of a t-test, power was shown to be higher despite the marginally smaller sample size.³

Although pimavanserin does provide a notable reduction in symptoms and significant help in those with low SAPS-PD scores (between about 1, a single minor symptom, and 7, the higher end of pimavanserin's potential), pimavanserin only decreased scores 3 to 5 points in higher score patients which is insignificant. At this point in time, however, pimavanserin is recommended as first-line treatment for all patients with PDP at a dose of 34 mg once daily, with no titration.⁴ It holds a place above clozapine because it lacks the notorious potential side effects associated with clozapine, specifically the ability to cause severe neutropenia and progress patients into an immunocompromised state. Patients taking clozapine require close monitoring to prevent complications which involves weekly complete blood counts (CBCs) for the first six months, and biweekly tests afterwards. Other side effects include orthostatic hypotension and sialorrhea. Using clozapine requires the prescriber, pharmacy, patient and distributor to enroll into a REMS (Approved Risk Evaluation and Mitigation Strategies) program to ensure all parties are aware of the drug's potential and it is safe for the patient.⁵

Quetiapine is less favored over pimavanserin, although it does not require any monitoring and has significantly less side effects, because it is considered unreliable for this particular indication.⁴ After compiling and analyzing data from 6 randomized control trials with sample groups ranging from 8-30 patients, depending

on the trial, quetiapine has consistently shown to be only marginally better than the placebo and occasionally even performing worse.⁶ Using the Brief Psychiatric Rating Scale (BPRS), which rates 16 different symptoms of psychosis on a 7-point scale, treatment with quetiapine had mean changes as notable as -2.2 points or as counter-effective as +3.9 points.^{6,7} The remarkable variability and minimal positive change produced by quetiapine makes it an option worth attempting in patients with minor symptoms of psychosis in Parkinson's disease to avoid complicated therapy, but it does not have consistency in outcomes when compared to the other options.

Over the years that pimavanserin has been studied, it has shown to have no significant long-term effects, no increase in mortality, and good tolerability with patients.⁸ However, pimavanserin can prolong QT-intervals. Therefore, health care providers should check for drug interactions with other drugs that can prolong QT intervals.⁴ Pimavanserin has not been shown to increase mortality, but like most antipsychotics it should be closely monitored in geriatric patients with dementia.⁸ It can lead to orthostatic hypotension in patients prone to hypotensive episodes. Side effects are confusion (6%), nausea (7%), and peripheral edema (7%) in many cases.⁹ A major downside is that it is currently only available as the brand name drug, NuplazidTM, manufactured by Acadia Pharmaceuticals Inc[®] so it is very costly. The cost of a month supply of pimavanserin 17 mg is \$2560, whereas a 30-day supply of clozapine 25 mg tablets is \$132 and quetiapine 25 mg tablets is \$120.¹⁰

Pimavanserin is the definitive first-line treatment for patients with PDP but providers should have realistic therapeutic expectations. It holds many advantages over the off-label medications such as clozapine and quetiapine, but it has the potential to cause QT prolongation. Since the drug is still only available as the brand, the financial status of the patient should also be considered. As always, a patient-centered approach is necessary. Pimavanserin is expected to be implemented more in therapy as healthcare providers become more familiar with the drug. It will have a meaningful impact in practice by providing an improvement in patients' health and opening the gates to further research for drugs that have the same low side effect profile achieved by pimavanserin.

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Goodbye pharmacists, hello robots?

By: Katherine Russo, PharmD Candidate c/o 2021

“Treat the whole patient and not the whole in the patient”

– Unknown

From the new temporal scanner thermometers in your local pediatrician’s office, to needle-free diabetes care at home, to medication dispensing boxes in hospitals, the ever-evolving world of technology is no stranger to the healthcare industry. What does this mean for patients, doctors, and pharmacists? Will robots be the future of all healthcare professions?



Figure 1

Defined as, “a reprogrammable, multifunctional manipulator designed to move material, parts, tools, or specialized devices through various programmed motions for the performance of a variety of tasks”, robots are the future of health care as providers are seemingly being replaced. Not only are robots being introduced for surgery, but one could expect, “a version of IBM’s Watson that can cross-check symptoms with medications with a patient’s history and come up with an array of possible diagnoses ranked by likelihood”.² The switch to robots in place of doctors has some people wishing it would happen sooner while others are more hesitant.

In many aspects, replacing humans with robots will allow for improvement of patient safety. One of the most highly regarded machines is what doctors and pharmacists refer to as Automated Dispensing Cabinets, or ADCs (Figure 1).³ Most commonly found in hospitals, ADCs are “computerized drug storage devices or cabinets that allow medications to be stored and dispensed near the point of care, while controlling and tracking drug distribution”.⁴

These machines reduce the pharmacist’s dispensing time as well as decrease administration errors, and “automated dispensing machines eliminate the dispensing of unused “as-needed” (prn) doses, thereby decreasing the potential for administration errors that can arise if more doses than needed are dispensed and available for administration”.⁵ In addition to its safety benefits, Automated Dispensing Cabinets also making the billing process easier and more accurate. Through computer interface technology, ADCs can be linked with external databases, such as the facility’s billing system, to provide accurate information of medication name and quantity to enhance efficiency of billing patients and insurance companies.⁶

The Bureau of Labor Statistics states that, “employment of pharmacists is projected to grow 3 percent from 2014 to 2024, slower than the average (7%) for all occupations. Increased demand for prescription medications will lead to more demand for pharmaceutical services. However, employment of pharmacists in traditional pharmacies is projected to decline slightly.⁷ This reduced employment of pharmacists could be attributed to the increase of technology in the pharmacy field.

The pharmacist is not only responsible for the medication behind the counter but also the medication out on the floor. Robotic machines may make filling prescriptions

safer and more efficient, but it does not cover a majority of what a pharmacist does. Pharmacist responsibilities include patient counseling, providing OTC medication information, serving as a triage in the community to refer patients to other health services as needed, immunization provider, chronic disease management services (i.e. blood pressure) and many other responsibilities.

So pharmacists, if you're nervous, you shouldn't be. Geoff Colvin, author of both *Talent is Overrated* and *Humans Are Underrated*, states, "If your job does not have human behavior in its function, then you will be quite surprised to hear that you are replaceable by a machine".⁸

Pharmacists may not have physical storage capacities comparable to these robots, but they have qualities that robots will never have, "Computers and robots cannot show empathy, compassion, sympathy or collaboration".⁸ As a current pharmacy student, direct patient care is a valuable skill instilled in us from day one. Part of being a pharmacist is interpersonal communication with patients. If pharmacists are replaced by machines, patients are losing a key part of what they are paying for and also what is expected of pharmacists. *Pharmacy Times* contributor Beth Lofgren, PharmD. points out that, "A computer is simply unable to replace human interaction. Pharmacists bring more value to the health care table than functions that can be performed by robots".⁸ If more pharmacists are let go there will not be enough left for patients to receive counseling on medications or to simply ask questions, leaving America uneducated about the medications they take. With robots replacing doctors and their diagnoses, patients will want to speak to a medical professional about their course of treatment, making pharmacists the most accessible healthcare provider. As pharmacists are being turned to more often, it is now a crucial time for pharmacist provider status to be established.

While some pharmacists are still fearful about what these new technologies hold for human workers, pharmacists need not fear. Robots may be able to dispense medications or pull up an answer faster than the human

brain, but they can't take away our emotions and personal qualities. For centers, medicine has involved patient-doctor and patient-pharmacist communication, so why change that? Like the old saying says, "If it ain't broke, don't fix it".

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Puzzle: Hypertension & Heart Failure Medication Matching

By Matthew Kahn, Graphics Editor

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Lisinopril, Enalapril, Quinapril, Captopril	A. ACE Inhibitors
Furosemide	B. Alternative to ACEIs, when patients display intolerance
Valsartan, Losartan	C. Lasix®
Metoprolol succinate	D. Non-Selective Beta Blocker
Propranolol	E. Beta Blocker with intrinsic sympathomimetic activity (ISA)
Pindolol	F. Entresto®
Diltiazem, Amlodipine	G. Selective Beta Blocker
Ivabradine	H. Used only in Stage D heart failure, to improve perfusion
Sacubitril + Valsartan (Combination medication)	I. Inhibits the 'funny channel' in the heart, reducing heart rate
Dopamine, Dobutamine	J. Calcium Channel Blockers

How well do **YOU** know your hypertension & heart failure medications?

Match the drugs on the left with the characteristics on the right.

Answers

on next page

Lexi-Comp Online™, Lexi-Drugs Online™, Hudson, Ohio: Lexi-Comp, Inc.

Puzzle: Hypertension & Heart Failure Medication Matching

Answers

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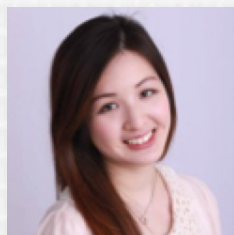
Lisinopril, Enalapril, Quinapril, Captopril	A. ACE Inhibitors
Furosemide	C. Lasix®
Valsartan, Losartan	B. Alternative to ACEIs, when patients display intolerance
Metoprolol succinate	G. Selective Beta Blocker
Propranolol	D. Non-Selective Beta Blocker
Pindolol	E. Beta Blocker with intrinsic sympathomimetic activity (ISA)
Diltiazem, Amlodipine	J. Calcium Channel Blockers
Ivabradine	I. Inhibits the 'funny channel' in the heart, reducing heart rate
Sacubitril + Valsartan (Combination medication)	F. Entresto®
Dopamine, Dobutamine	H. Used only in Stage D heart failure, to improve perfusion

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Lexi-Comp Online™, Lexi-Drugs Online™, Hudson, Ohio: Lexi-Comp, Inc.

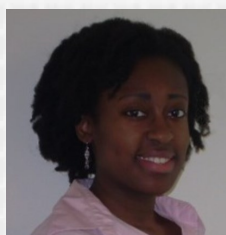
RHO CHI POST: TEAM MEMBERS



@ Karen Lin

6th Year, STJ; Editor-in-Chief

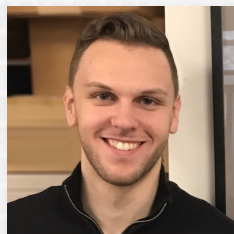
The Rho Chi Post allows me to have an appreciation for interactive pharmacy learning as well as the art of writing. With each newsletter, my goal is to provide current information to readers who come across the Post. As an editor, I hope to make the newsletter one-of-a-kind and motivate and influence writers to explore science with their creative talents.



@ Davidta Brown, PharmD

Graduate Copy Editor [Content-Focused]

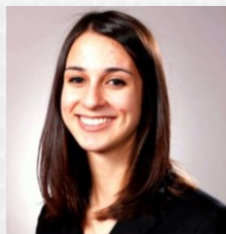
My two great loves are innovative science and quality writing; the Rho Chi Post is an insightful combination of both. As an editor, I look forward to bringing relevant information and fresh perspectives to the student and faculty of St. John's University, as well as to making the Rho Chi Post a newsletter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



@ Matthew Kahn

5th Year, STJ; Graphics Editor

I've always loved graphic design, so I was thrilled at the opportunity to be a part of the Rho Chi Post team and contribute to future publications. I'm excited to explore new ways to make the Post even better, and also to be continuously exposed to new ideas in the pharmaceutical field.



@ Nicollette Pacheco, PharmD

Graduate Editor [Graphics-Focused]

As a member of the Rho Chi Post team, I have a vast appreciation of what it means to be a pharmacist in the rapidly evolving world of healthcare. As a graduate editor, I will continue to bring my passion for science and creativity to the Rho Chi Post.



@ Sang Hyo Kim

6th Year, STJ; Section Editor: Puzzles

Advances in technology and medicine, as well as improved quality of life, have prolonged lifespans and increased the geriatric population. Pharmaceutical industries and healthcare systems persistently work to find solutions to changing demands and new problems of the society. I wish to learn, educate, and prepare myself and others for the future.



@ Bharat Kirthivasan, PhD

Graduate Copy Editor [Content-Focused]

I received my doctorate 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.

RHO CHI POST: TEAM MEMBERS



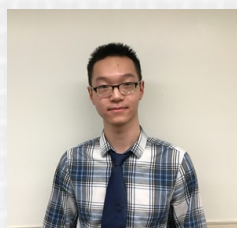
@ Jack (Hongkai) Bao
5th Year, STJ; Staff Editor

In my 3rd year of pharmacy school, I was introduced to the Rho Chi Post, an award-winning newsletter run by students. My involvement began by simply reading monthly articles, but as time passed, my passion for writing grew. Coupled with my interest in pharmacy, I made the initiative to apply for a position. Now, as a team member, I believe that the Post is a great way for students and faculty to stay up to date concerning pharmacy news.



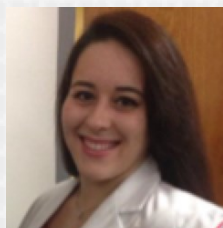
@ Mei Fung
6th Year, STJ; Staff Editor & RCP Website Liaison

It's always interesting to see how the healthcare field evolves and all the advancements in pharmacy come to fruition. I joined the Rho Chi Post because it brings together a variety of these topics with distinguishing perspectives from our peers in pharmacy practice. I am ecstatic to join the team in continuing Rho Chi Post's endeavors in promoting the profession.



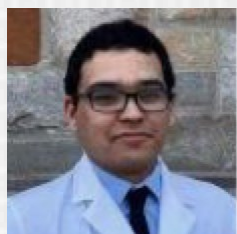
@ Alex Chu
5th Year, STJ; Staff Writer

With a constantly evolving healthcare field, it is imperative that we keep ourselves up to date with the latest news. This is what led me to join the Rho Chi Post, which constantly comes out with interesting and informative topics. It is an honor to write for the Rho Chi Post, and I wish to contribute innovative and intriguing articles to this newsletter.



@ Gabrielle Flavoni
6th Year, STJ; Staff Writer

Writing has always been an enormous passion of mine, and I'm blessed to join such an amazing team that encourages me to explore it. As a new Staff Writer for the Post, my goal is to aid others in staying up-to-date about the pharmacy world, while also utilizing a creative outlet to make an impact on those around me.



@ Jonathan Mercado
5th Year, STJ; Staff Writer

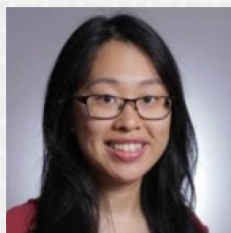
The Rho Chi Post breaks barriers for students that want a glimpse of their future and acts as an inspiration to work harder to achieve their goals. It is an embodiment of the motivation and intelligence that drives pharmacy students to be the most informed and capable professionals they can be. I am glad to a part of that mission and to channel my passion and interests through this newsletter.



@ Katharine Russo
3rd Year, STJ; Staff Writer

In my first two years as a pharmacy student, I was exposed to numerous opportunities to write medical based articles for classes and clubs. This is what first sparked my interest in health care literature and I look forward to being a Staff Writer for the Rho Chi Post in hopes of being able to share my passion and enthusiasm in writing health-care related publications.

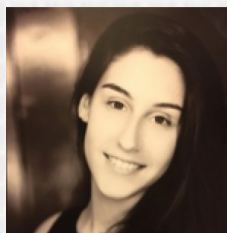
RHO CHI POST: TEAM MEMBERS



@ Vicky Liu

6th Year, STJ; Staff Writer

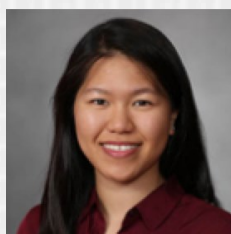
As a Staff Writer, researching and writing articles about current medicine gives me the opportunity to explore and understand more about pharmacy. I hope that my readers will also feel the same excitement as I do when I learn new things about medicine.



@ Anna Diyamandoglu

4th Year, STJ; Staff Writer

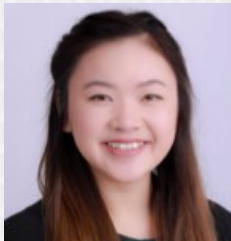
Throughout my time in the PharmD program, my understanding of pharmacy as a profession has evolved and deepened as much as my desire to create awareness, particularly to non-science students, about the diverse role pharmacy plays in various healthcare and non-healthcare settings. I have always had an affinity for writing and am looking forward to combining my interests in literary composition and pharmacy to write relevant pieces for Rho Chi Post which both pharmacy students and non-pharmacy students alike will find relatable and take an interest in.



@ Angela (Yan Yi) Chan

6th Year, STJ; Staff Writer

Being part of the Rho Chi Post would help me build experience with writing and reading research articles that would be helpful in my future to stay updated in the innovative world of health. I look forward to being a part of such a great team.



@ Amy Nguyen

4th Year, STJ; Events and Social Media Manager

Because the pharmaceutical industries and healthcare systems are constantly changing and evolving, it's important to stay up to date on such topics. The student-run Rho Chi Post brings such relevant issues with a creative twist to the table. As the Events and Social Media Manager, I hope to create more outreach events geared towards showcasing the importance and benefits of the Post to students, alumni, and faculty of St. John's University and from other campuses.



@ Nicole Cheung

6th Year, STJ; Finance and Outreach Manager

As the Finance and Outreach Manager for the Rho Chi Post, I will act as the primary liaison and collaborate with the Graphics Editor to present information promoting our newsletter to other Rho Chi chapters. Using my experience of applying for NIH and Novo Nordisk Grants, I will assist with writing up proposal budgets as well as maintain accurate financial records. I am proud of our student-operated newsletter publication, and look forward to expanding our organization and network to create more educational workshops and further promote the pharmacy profession.

MISSION

The Rho Chi Post is an award-winning, monthly, electronic, student-operated, faculty-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

To provide the highest quality student-operated newsletter with accurate information

To maintain a healthy, respectful, challenging, and rewarding environment for student editors

To cultivate sound relationships with other organizations and individuals who are like-minded and involved in like pursuits

To have a strong, positive impact on fellow students, faculty, and administrators

To contribute ideas and innovations to the Pharmacy profession