

RHO_{Rx}CHI post

VOLUME 4, ISSUE 12



- IN THE NEWS / POLITICS
- LOCAL EVENTS
- CLINICAL ARTICLES
- PROFESSIONAL ADVICE / OPINIONS
- PUZZLES
- CURRENT EDITORIAL TEAM

AN AWARD-WINNING, STUDENT-OPERATED NEWSLETTER BY THE
ST. JOHN'S UNIVERSITY COLLEGE OF PHARMACY AND HEALTH SCIENCES' RHO CHI BETA DELTA CHAPTER

Inside This Issue

Hyperkalemia	1
Lidocaine Patch	3
Stiolto	4
Opinion: Lethal Injections	6
Puzzle: Brand-Generic	7
Puzzle Answers	8
Quote of the Month	8
Editorial Team	9
Upcoming Events	11
About Us	11

Sodium Zirconium Cyclosilicate: A Novel Potassium Binder

By: Andrew Leong, Staff Writer

Hyperkalemia is defined as a serum potassium level of greater than 5.0 mmol/L.¹ In a majority of cases, the cause is renal in nature with over half of all patients with hyperkalemia suffering from chronic kidney disease.² Other causes include an increase in diet potassium, tumor lysis syndrome, and medications such as spironolactone and ACE-inhibitors. Without treatment, hyperkalemia can lead to life-threatening cardiac arrhythmias.

Currently, there are two types of treatment for hyperkalemia. One type temporarily shifts extracellular potassium to intracellular spaces. This includes insulin, beta-2-adrenergic agonists, and calcium.³ The other type seeks to remove potassium from the body by binding to it to form a complex, which is then excreted. In the United States, sodium polystyrene sulfonate (SPS) is the only binder we use in the treatment of hyperkalemia. It non-specifically binds to a number of critical ions besides potassium, including magnesium and calcium. The drug is also often concurrently used with sorbitol, an osmotic laxative. When used together, a patient will often have unwanted diarrhea and, worse, be at risk of colonic necrosis, a potentially fatal adverse effect associated with severe gastrointestinal bleeding.

ZS Pharma, a pharmaceutical company, plans to add a new agent—one that does not have the aforementioned concerns of its predecessors—to the list of treatments for hyperkalemia. The new agent, sodium zirconium cyclosilicate (ZS-9), is a non-absorbed cation exchanger that entraps excess potassium ions throughout the GI tract.⁴ On April 15, 2015, the company announced publications for ZS-9 in two peer reviewed medical journals. These publications articulate the results and analysis of their phase 2 and 3 trials.⁵

The phase 2 trial was published in *Kidney International* on February 4, 2015. It was a randomized, double-blind, placebo-controlled trial that sought to show that ZS-

Article continued on page 2

Single Line Stories

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BACK TO COVER

9 is safe and efficient for the treatment of hyperkalemia in patients with stage 3 chronic kidney disease. Along with the placebo group, there were three other treatment groups: 0.3 grams, 3 grams, and 10 grams. The results of the study demonstrated that ZS-9 dose-dependently reduces serum potassium. The primary efficacy endpoint—the rate of serum potassium decline in the first 48 hours—was met in the 3 gram group ($P = 0.048$) and the 10 gram group ($P < 0.0001$) compared to placebo. At 38 hours, the 10 gram group had a reduction average of 0.92 ± 0.52 mEq/L. Moreover, ZS-9 was found to be well-tolerated. Adverse effects were transient and did not require treatment and included mild constipation, nausea, and vomiting. Diarrhea was only observed in two patients. Although, this being a phase 2 trial, sample sizes were small (12 - 30 per group).⁶

The phase 3 trial was published in *The New England Journal of Medicine* on April 16, 2015. It was a multicenter, two-stage, double-blind trial that sought to further the goals of the phase 2 trial by increasing the sample size (753) and exploring other doses (1.25, 2.5, 5, or 10 grams). The results solidified that ZS-9 dose-dependently reduces serum potassium. At 48 hours, there were reduction averages of 0.46 mmol/L (95% confidence interval [CI], -0.53 to -0.39) in the 2.5 gram group, 0.54 mmol/L (95% CI, -0.62 to -0.47) in the 5 gram group, and 0.73 mmol/L (95% CI, -0.82 to -0.65) in the 10 gram group, as compared with a reduction average of 0.25 mmol per liter (95% CI, -0.32 to -0.19) in the placebo group ($P < 0.001$ for all comparisons). The reduction average from baseline at 1 hour after the first 10 gram dose of ZS-9 was 0.11 mmol/L (95% CI, -0.17 to -0.05), as compared to an increase of 0.01 mmol/L (95% CI, -0.05 to 0.07) in the placebo group ($P = 0.009$). Regardless of the severity of hyperkalemia or the presence other comorbidities, all three dosage groups reached normal serum potassium levels within 48 hours ($P < 0.001$ for all comparisons with placebo). Additionally, in the subgroup of patients with diabetes, heart failure, and $eGFR < 60$ mL/min/1.73m², normal serum potassium levels were achieved, on average, within 4 hours ($P < 0.001$).⁷

The company also published another phase 3 trial, known as HARMONIZE (HyperkAlemia Ran-

doMized interventiON multi-dose ZS-9 maintE-nance), in *The Journal of the American Medical Association* on November 17, 2014. The trial, as the name suggests, sought to show the long-term efficacy of ZS-9 as opposed to the short-term focus of the other trials. The trial was split first into a 48-hour open-label, acute phase; patients that achieved normokalemia were then entered into a double-blind, randomized, placebo-controlled maintenance phase for 28 days. The acute phase results solidified past results: a significant change in potassium (-0.2 mEq/L; 95% CI, -0.3 to -0.2) was noted 1 hour after the first 10 gram dose compared with baseline ($P < 0.001$). At 2 and 4 hours after the first dose, mean change in potassium was -0.4 mEq/L (95% CI, -0.5 to -0.4) and -0.5 mEq/L (95% CI, -0.6 to -0.5), respectively ($P < 0.001$ for both time points). The maintenance phase demonstrated that all three doses (5, 10 and 15 grams) maintained mean potassium at lower levels than placebo over the 28 day course ($P \leq 0.0001$ for all doses); 80%, 90%, and 94% of patients, respectively, maintained normokalemia. The most common adverse effects patients experienced were anemia, constipation, edema, hypokalemia, nasopharyngitis, and upper respiratory tract infections.^{8,9}

ZS-9 seems to be a promising alternative to SPS—one that does not induce diarrhea or colonic necrosis. ZS Pharma plans to conduct longer term safety and tolerability study while it waits for FDA approval in the first half of 2016.¹⁰

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Lidocaine Patch: A Topical Analgesic for Treatment for Postherpetic Neuralgia

By: Irene Li, PharmD Candidate c/o 2016

Postherpetic neuralgia is the most common chronic complication of herpes zoster that affects one million people annually in the United States.¹ It is defined as dermatomal pain lasting at least 90 days after the appearance of an acute herpes zoster rash. The rash is usually unilateral. Although the most common sites are the face, back, and neck, it can involve any area. Itchiness, pain, or tingling occurs continuously or intermittently for two to three days at an area before the presentation of the rash. New lesions then appear over a period of three to five days. Within seven to ten days, the rash dries over with crusting. Some risk factors for postherpetic neuralgia include the older age, those with multiple chronic diseases, and rash and pain during the acute phase.² Since there is currently no cure for postherpetic neuralgia, treatment is primarily based on symptom control, which may require treatment for many years. Topical analgesics are considered to be first-line treatment for postherpetic neuralgia.

The use of topical analgesics is especially recommended for those who have more than one chronic health condition, cardiovascular and gastrointestinal risk factors, for those who suffer from renal or hepatic organ dysfunction, as well as the elderly.³ Topical analgesics limit many drug-drug interactions and bypass first pass metabolism. Compared with opioids, which have side effects such as constipation and sedation, the most common adverse effect of topical analgesics is minor local irritation. It is also important

to differentiate between topical and transdermal medications. Topical medications are applied to the affected area and provide a local effect, preventing the occurrence of systemic side effects.³ Transdermal medications are not required to be applied on the area of pain and are systemically absorbed.

Lidocaine 5% patch is approved for treatment of postherpetic neuralgia.⁴ It alleviates local pain by blocking voltage-gated sodium channels, which are upregulated during chronic inflammation. Up to three patches can be applied daily to intact skin areas for up to 12 hours.⁵ When removing the patch, patients should remember to fold the adhesive sides of the patch to each other before disposal.⁴ A meta-analysis pooled 12 randomized double-blind studies of at least two weeks duration comparing topical lidocaine with placebo or another active treatment for neuropathic pain.⁶ Most of the studies reflected third tier evidence, which means that there was a high risk of bias due to small study size or incomplete outcome assessment, or both. Only one multiple dose study reported that the primary outcome, $\geq 50\%$ or $\geq 30\%$ pain intensity reduction, was obtained. Although there has been case reports that show benefits with lidocaine patches in neuropathic pain, more randomized clinical trials need to be conducted in this patient population.⁷

Although postherpetic neuralgia is debilitating and painful, healthcare professionals may consider the use of lidocaine given its minimal systemic side

BACK TO COVER

effects, ease of administration, and bypass of the first pass metabolism.

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Stiolto™ Respimat® Enters Market

By: Sylva Ohanian, Staff Writer

Chronic obstructive pulmonary disease (COPD) is a serious yet treatable lung disease, which affects 210 million people worldwide and is expected to be the third leading cause of death in the world by 2030.¹ Symptoms, such as wheezing and coughing, can negatively impact breathing, especially during daily activities.^{1,2} Acute exacerbation of symptoms is a hallmark of COPD that weakens quality of life and decreases overall health status. In order to prevent such exacerbations, treatment should be initiated as early as possible when patients are not in the end stage of the disease, during which disability is already substantial.³

In May of this year, the U.S. Food and Drug Administration (FDA) approved Stiolto™ Respimat® (Boehringer Ingelheim), a once-daily maintenance, oral inhalation spray for COPD. It is indicated for the long-term treatment of airflow obstruction in patients with COPD, including chronic bronchitis and/or emphysema. However, it is not approved for the treatment of acute deterioration of COPD or asthma.^{1,4} In fact, a boxed warning on the label states that long-acting beta-agonists, such as olodaterol, increase the risk for asthma-related death and that the safety and efficacy of using Stiolto™ Respimat® in patients with asthma has not been established.^{4,5}

Stiolto™ Respimat® is the only COPD treatment

that combines tiotropium and olodaterol.¹ Both active ingredients are also marketed separately by Boehringer Ingelheim as maintenance treatments for COPD. Olodaterol, present in Striverdi® Respimat®, is a long-acting beta-2 agonist with a fast onset of action, improving airflow in less than five minutes of the first dose. On the other hand, tiotropium, available as Spiriva® Respimat® and Spiriva® Handihaler®, is a long-acting anticholinergic.^{1,4,5}

Tiotropium-olodaterol approval was given mainly based on data from Phase III TONADO™ 1&2 trials, which studied 5,162 COPD patients.^{1,5} Trials 1 and 2 were 52-week, replicate, randomized, double-blind, active-controlled, parallel group trials, which assessed Stiolto™ Respimat® (1029 patients) against tiotropium 5 mcg (1033 patients) and olodaterol 5 mcg (1038 patients). All products were administered once-daily in the morning via Respimat® inhaler. The primary endpoints of the trials included change from baseline in FEV₁ AUC 0-3 hr and trough FEV₁ after 24-weeks of treatment. Stiolto™ Respimat® established significant improvements with both primary endpoints as compared to olodaterol or tiotropium monotherapy.⁵

For the change from baseline in FEV₁ AUC 0-3 hr endpoint, Stiolto™ Respimat® demonstrated a mean difference of 0.117 L (95% CI: 0.094 – 0.140) and

0.123L (95% CI: 0.100 – 0.146) from tiotropium 5 mcg and olodaterol 5 mcg in trial 1, respectively, as well as 0.103L (95% CI: 0.078 – 0.127) and 0.132L (95% CI: 0.108 – 0.157) from tiotropium 5 mcg and olodaterol 5 mcg in trial 2, respectively. Moreover, for the second primary endpoint of trough FEV₁ after 24-weeks of treatment, Stiolto™ Respimat® established a mean difference of 0.071 L (95% CI: 0.047 – 0.094) and 0.082L (95% CI: 0.059 – 0.106) from tiotropium 5 mcg and olodaterol 5 mcg in trial 1, respectively, as well as 0.050L (95% CI: 0.024 – 0.075) and 0.088L (95% CI 0.063 – 0.113) from tiotropium 5 mcg and olodaterol 5 mcg in trial 2, respectively.⁵ The most common side effects reported during the trials were nasopharyngitis, cough, and back pain.^{4, 5}

Although trials display impressive numbers and hopeful results, the true test of efficacy will come when Stiolto™ Respimat® is initiated in all patient populations for years to come. Nonetheless, with the addition of this new drug, physicians and healthcare professionals are given one more option in reaching an optimal treatment plan with their patients.

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Submit your health-related short stories, poems, illustrations, diagrams, photographs, or any other creative pieces

Send it to our editors at RhoChiPost@gmail.com and we will feature it in our next issue!

Should Pharmacists Provide Drugs for Lethal Injections?

By: Svetlana Akbasheva, Staff Editor

This March, both the International Academy of Compounding Pharmacists (IACP) and American Pharmacists Association (APhA) updated their official positions regarding the pharmacist provision of drugs for lethal injections as part of executions.^{1,2} The IACP stated that “while the pharmacy profession recognizes an individual practitioner’s right to determine whether to dispense a medication based upon his or her personal, ethical and religious beliefs, IACP discourages its members from participating in the preparation, dispensing, or distribution of compounded medications for use in legally authorized executions.”¹ Six days after this announcement, the APhA issued a statement that “[it] discourages pharmacist participation in executions on the basis that such activities are fundamentally contrary to the role of pharmacists as providers of health care.”²

Currently, 32 states as well as the federal government implement capital punishment, with lethal injections serving as the standard method of execution.³ However, corrections facilities have faced difficulty in obtaining drugs for lethal injections in recent years as a result of shortages and pharmaceutical company opposition to the use of their drugs for this purpose. In response, many state officials have turned to compounding pharmacies to obtain these drugs.⁴

There is no question that the death penalty is a very controversial subject in the United States and worldwide. By providing drugs for lethal injection, pharmacists are not only helping perpetuate this practice but we are also influencing the public’s perception of our profession. Compounding and dispensing drugs for lethal injections goes against the essential nature of the pharmacy profession. As medication therapy experts, our job is to apply our knowledge of therapeutic dosing and adverse effects of drugs to treat disease states, not to manipulate this information to overdose drugs for their toxic effects. We are concerned with two major aspects of drug therapy – safety and efficacy. This is the opposite of the aim of lethal injections, which is deathly toxicity. You never see an FDA indication in a drug’s prescribing information stating, “For lethal injection: X

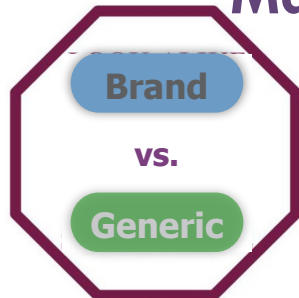
dose.” Providing drugs for lethal injection goes beyond simple off-label use into a questionable land of politics, ethics, and the law.

Another issue is that shortage of the standard drugs historically used for lethal injections – a combination of a barbiturate/anesthetic, a paralytic, and potassium chloride to induce cardiac arrest – has led to the use of experimental concoctions that could lead to excessive suffering or even be ultimately ineffective.⁵ There is no evidence-based medicine here and no regulation, two factors that are at the core of the pharmacy profession. At least until these two factors are incorporated, if ever, it seems that there should be no role for pharmacists in the provision of drugs for lethal injections.

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Matching: Brand-Generic Names



By: Sang Hyo Kim
Section Editor

Can **YOU**
match the
generic
medication to
the correct
brand name?

Answers
on next page

- | | |
|-----------------------|---------------|
| 1) Warfarin sodium | A) Keppra® |
| 2) Levetiracetam | B) Jantoven® |
| 3) Carbidopa-levodopa | C) Klonopin® |
| 4) Clonazepam | D) Sinemet® |
| 5) Clonidine | E) Synthroid® |
| 6) Levothyroxine | F) Catapres® |
| 7) Naloxone | G) Narcan® |
| 8) Digoxin | H) Lasix® |
| 9) Furosemide | I) Protonix® |
| 10) Pantoprazole | J) Lanoxin® |

How Did You Do???

Answers to Brand-Generic Matching

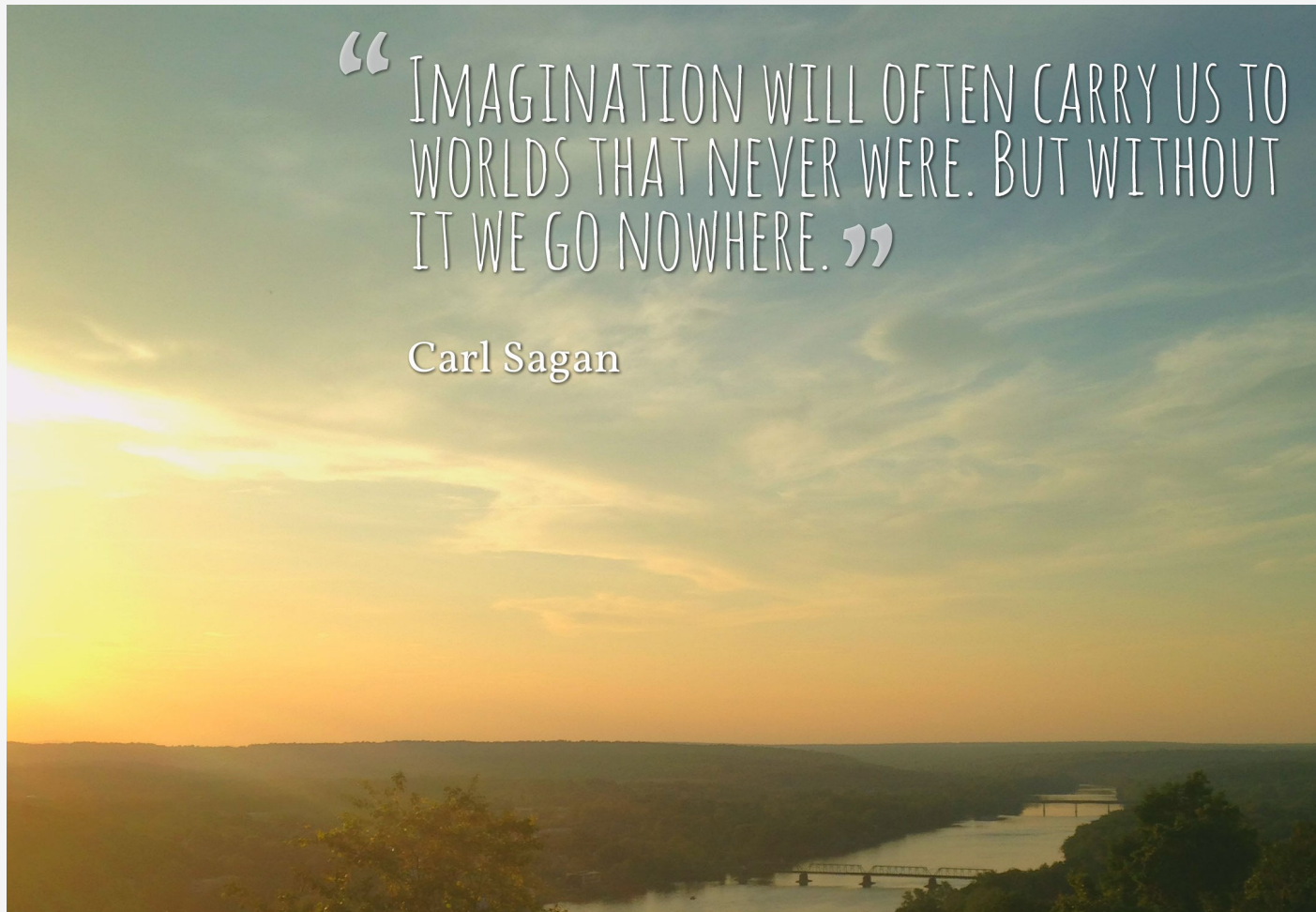
1) B 2) A 3) D 4) C 5) F 6) E 7) G 8) J 9) H 10) I

Quote of Month

By: Nicollette Pacheco, Staff Editor [Graphics-focused]

“IMAGINATION WILL OFTEN CARRY US TO
WORLDS THAT NEVER WERE. BUT WITHOUT
IT WE GO NOWHERE.”

Carl Sagan



PUZZLES

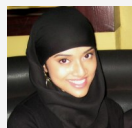
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We will feature your work in our next issue!

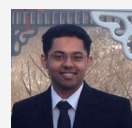
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@ Tasnima Nabi (6th Year, STJ; Editor-in-Chief)

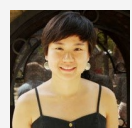
Writing has always been my greatest outlet for experience and knowledge, through which I hope to keep you engaged and informed. It is imperative to keep up with our changing profession and community, and I look forward to bringing pertinent information to the newsletter.


@ Katharine Cimmino (PharmD; Graduate Copy Editor [Content-Focused])

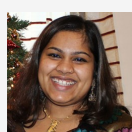
I have always been an avid reader and writer. As a member of the Rho Chi Post I am able to merge my passions with the professionalism that comes with aspiring to be a healthcare provider. I am eager to be a part of a publication that promotes my interests and vocation.


@ Bharat Kirthivasan (PhD; Graduate Copy Editor [Content-Focused])

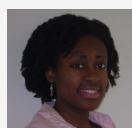
I received my doctorate in Industrial Pharmacy researching nanoparticles for delivery to the brain. The only thing I enjoy more than reading a well-written piece of work is writing it. I am glad to work for the Rho Chi Post, and I encourage others to do the same.


@ Hayeon Na (PharmD; Graduate Copy Editor [Content-Focused])

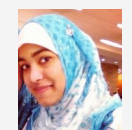
Hello! My name is Hayeon Na. I am one of the Graduate Copy Editors for the Rho Chi Post. I hope the information I present will be helpful, or at least interesting. If you have any comments regarding my contribution, feel free to contact me at any time!


@ Melissa Roy (PharmD; Graduate Copy Editor [Graphics-Focused])

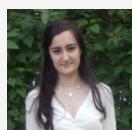
We as future healthcare professionals owe it to our patients and ourselves to be aware and current on the events affecting our profession. The Rho Chi Post is our way to learn new things and stay in touch with the pharmacy world, on- and off-campus. Feel free to reach out to me with suggestions and comments.


@ Davidta Brown (5th Year, STJ; Copy Editor [Content-Focused])

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.


@ Fatema Elias (6th Year, STJ; Copy Editor [Content-Focused])

I am honored to be a part of the Rho Chi Post team. In this age of technology and the continuously changing healthcare profession, I hope to engage like-minded students and professionals. Writing is something that I hold dear to my heart and I hope with this newsletter we can all stay well informed, interested, and educated.

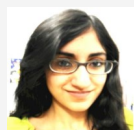

@ Tamara Yunusova (5th Year, STJ; Section Editor: Clinical)

My name is Tamara Yunusova, and I am a 5th 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.


@ Sang Hyo Kim (4th Year, STJ; Section Editor: Puzzles)

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.

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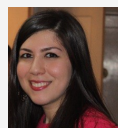
@ Azia Tariq (5th Year, STJ; Section Editor: News)

The Rho Chi Post is a prominent and highly esteemed resource for pharmacy students and professionals. I am privileged to be a part of the team and hope to contribute informative and engaging pieces to the newsletter.



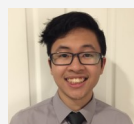
@ Nicollette Pacheco (5th Year, STJ; Staff Editor [Graphics-Focused])

As a new member of the Rho Chi Post team, I have a vast appreciation of what it means to be a future pharmacist in the rapidly evolving world of healthcare. I am looking forward to being on the team as a graphics-focused staff editor, and I hope to bring my passion for science and creativity to the Rho Chi Post.



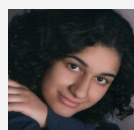
@ Svetlana Akbasheva (6th Year, STJ; Staff Editor [Content-Focused])

I am very excited and honored to be part of the Rho Chi Post! In a profession that is constantly evolving with new developments, it is so important to remain informed and current. The Rho Chi Post helps do just that, and I look forward to contributing to this unique publication.



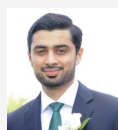
@ Andrew Leong (6th Year, STJ; Staff Writer)

Students have to do more than what is required of us in classes to truly learn about our profession. That's why I joined the Rho Chi Post. This publication represents a channel by which our team members, faculty, and readership can share information - something I believe is important in this ever-changing pharmacy world.



@ Sylva Ohanian (5th Year, STJ; Staff Writer)

The Rho Chi Post is a refreshing outlook on our profession. I am thrilled and grateful to be able to work with the other members in continuing its success, and hopefully to bring greater attention to it, which it deserves.



@ Fawad Piracha (6th Year, STJ; Finance and Outreach Manager)

I am delighted to join the editorial team. I have the firm intention of broadening readership and facilitating growth of the Rho Chi Post.



@ Joshua Bliss (6th Year, STJ; Social Media Manager)

By providing student-organized, reliable healthcare information, the Rho Chi Post helps us all in fulfilling our education both in and out of the classroom. Education is the tool we use to set paths for our futures, and every chance to expand our education is a chance at building a better future. I am honored to be a part of the Rho Chi Post & look forward to the future!



@ You!

We are always looking for creative and motivated students to join our team!
If you are interested in becoming a Rho Chi Post editorial team member, please visit:
<http://rhochistj.org/RhoChiPost/Application>

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 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

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



Michael, Lina, Julia, Jessica, Davidta, Zachary at the 2015 Induction Ceremony

President: Michael Bosco

Vice President: Lina Lin

Secretary: Jessica Langton

Treasurer: Julia Kamuda

Historian: Davidta Brown

Media Relations Coordinator: Zachary Piracha

Chapter Advisor: S. William Zito, PhD

UPCOMING EVENTS

PAINWeek 2015

September 8-12; Las Vegas, NV

Coagulation Symposium at Cedars-Sinai

September 12; Los Angeles, CA

Diabetes Masters Series

September 13; Rochester, NY

World Congress and Exhibition on Antibiotics

September 14-16; Las Vegas, NV

National Vaccine Advisory Committee Meeting

September 15-16; Washington, DC

Inaugural International Cancer Immunotherapy Conference: Translating Science into Survival

September 16-19; New York, NY