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

Inside This Issue

Tasimelteon (Hetlioz®): First FDA Approved Pharmacologic Agent for Treatment of Non-24 in Completely Blind Individuals

By: Beatrisa Popovitz, Senior Staff Editor

On January 31st 2014, the FDA announced the release of a revolutionary new drug, tasimelteon (Hetlioz®). Tasimeleton is the first developed treatment of non-24-hour sleep-wake cycle syndrome in blind individuals.[1] Formulated by Vanda Pharmaceuticals Inc., this melatonin receptor agonist works by binding to and activating the MT_1 and MT_2 melatonin receptors in the brain, thereby promoting the release of melatonin and in turn, a normal circadian rhythm.[2] Prior to the approval of this pharmacologic agent, melatonin was a common treatment option for blind individuals.[3]

Non-24-hour sleep-wake cycle syndrome is a circadian rhythm disorder in which the body's natural 24-hour circadian rhythm or "biological clock" does not operate on a normal schedule. Those with the disorder tend to have longer than average circadian rhythms, usually lasting 25 to 26 hours and resulting in unusual sleep times and unbalanced sleep-wake patterns. Although rare in the general population (0.03% incidence rate), non-24-hour sleep-wake cycle syndrome is very common in the blind; over 50% of blind individuals live with this condition.[3,4] The high incidence of this condition in the blind population is mainly attributed to the effect of sight on the synchronization of circadian rhythm. Light signals the brain to become aware of the time of day. Without light, the body's natural clock runs with a compilation of extra minutes, eventually leading to a reverse circadian rhythm. As a result, individuals can find themselves asleep during the day and awake at night, as melatonin (normally released by the body in the evening) is released during the day, and cortisol (normally released during the day) is released at night.[5] Overall, those suffering

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Single Line Stories

-Special thanks to Mohammad A. Rattu, PharmD for updating our website! Check it out at: www.rhochistj.org/RhoChiPost-

- Congratulations to Beatrisa Popovitz on becoming a Senior Staff Editor! -

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The Surgeon General's 2014 Report on Smoking

By: Ada Seldin, Staff Editor

Since the first release of the Surgeon General's Report on smoking 50 years ago, it has become clear that smoking results in premature death and a myriad of diseases, affecting almost every organ system. Public health initiatives to increase awareness, prevent initiation, and promote smoking cessation have been marginally successful. However, the tobacco epidemic continues to claim millions of lives, and more aggressive strategies are necessary to halt its progression. If smoking persists at the present rate among young adults in the U.S, 5.6 million people currently under the age of 18 are projected to die prematurely from smoking-related illnesses. Evidence revealed in the 2014 Surgeon General's Report expands the ever-growing list of smoking-related health consequences. Smoking affects almost every organ system in the body and leads to some of the deadliest chronic diseases, such as cancer, cardiovascular disease, and COPD. After more than 50 years of research, we are still discovering new ways in which first and second-hand exposure to tobacco smoke adversely impacts one's health. The humanistic and economic burden of tobacco use is both devastating and avoidable.[1]

Lung cancer, attributed to smoking, is the cancer with the highest mortality rate in both men and women. However, reducing the risk of developing lung cancer from tobacco consumption is an uphill battle. Researchers compared the data from two prospective studies carried out by the American Cancer Society (Cancer Prevention Study I (1959-1972) and CPS-II (1982-present)) to those from five contemporary studies (2000-2010), and observed an increase in lung cancer cases among smokers, while lung cancer incidence remained unchanged over the years in the non-smoking group. Interestingly, the increase in lung cancer incidence paralleled a decrease in the number of cigarettes consumed per person and the prevalence of smoking. Between Cancer Prevention Study I and the contemporary studies, the relative risk of developing lung cancer in female smokers as compared to nonsmokers increased almost tenfold from 2.7 to 25.7. Similarly, the relative risk in the male population doubled from 12.2 to 25.0 between the first and last studies. The risk of developing COPD from smoking has also risen in the last 50 years, despite the fact that smokers are consuming fewer cigarettes. These seemingly counter-intuitive observations can be explained by a change in the composition of cigarettes over the years. The specific design changes that are responsible are hypothesized to be the ventilated filters and the tobacco-specific nitrosamines. This theory is supported by the simultaneous shift in the type of lung cancers appearing in modern-day smokers. While the incidence of squamous cell carcinoma, once the most frequently diagnosed lung cancer in smokers, has declined to mirror the decrease in the prevalence of smoking, adenocarcinoma of the lung has emerged, which may be attributed to the change in the composition of cigarettes.

Since the last Surgeon General's Report, it has come to light that smoking precipitates hepatocellular carcinoma, colorectal adenomatous polyps, and colorectal cancer. And although it is inconclusive, evidence suggests that smoking may cause breast cancer. One thing that is clear is that smoking elevates the risk of dying from cancer and other diseases in cancer patients and survivors.[1]

Evidence revealed in the 2014 Surgeon General's Report expands the ever-growing list of smoking-related health consequences.

Second-hand smoke is a major player in cardiovascular disease, another leader in smoking-related casualties. This year's report estimates that the exposure to second-hand smoke increases the risk for stroke by 20-30%. On a more positive note, however, evidence suggests that the implementation of laws banning indoor smoking and mandating smoke-free environments has a causal relationship with a lower incidence of coronary events among people under the age of 65. An analogous conclusion may be made regarding cerebrovascular events, but further investigation is necessary. In previous reports,

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smoking was shown to increase the risk of complications associated with diabetes, such as blindness, kidney disease, and amputations. Now, smoking has been identified as a major risk factor for type 2 diabetes mellitus. Current smokers have a 30-40% higher chance of developing diabetes, with the probability increasing in a dose dependent manner with the number of cigarettes smoked.[1]

Smoking cigarettes alters immune function, activating certain aspects of immunity while suppressing others. Rheumatoid arthritis, an autoimmune disorder, and pulmonary infections such as tuberculosis are linked to smoking. And continuing to smoke while being treated for rheumatoid arthritis lowers the effectiveness of TNF-α inhibitors, a class of therapeutic agents commonly used. Smoking also seems to be detrimental in Crohn's disease, but actually protective in ulcerative colitis.[1]

According to recent data explored by the Surgeon General's report, the reproductive system is just as severely affected as other organ systems. Several congenital malformations, including orofacial clefts, clubfoot, gastroschisis, and atrial septal heart defects, and ectopic pregnancy (implantation of the fetus outside of the uterus) can be attributed to maternal smoking in early pregnancy. Ectopic pregnancy is a fatal complication for both the fetus and the mother, and must be aborted. Nicotine can also contribute to preterm deliveries and stillbirths. Exposure to nicotine during critical periods of fetal and adolescent brain development has been shown to produce lasting effects on the brain. Moreover, a correlation has been found between erectile dysfunction and smoking. [1]

Finally, cigarette use is affiliated with age-related macular degeneration (AMD). Although smoking cessation may reduce the risk of AMD, the benefits may not be seen until 20 years after quitting. Still, the most alarming fact is that the relative risk of dying from cigarette smoking has increased over the last 50 years. This may be because smokers suffer from diminished overall health, which manifests itself not only in countless diseases, but also in the decrease in the ability to recooperate from routine health events such as surgeries or pneumonia.[1]

In an era during which so much attention is given to cost containment, the high healthcare costs associated with cigarette smoking is more than noteworthy. The annual costs stemming from cigarette smoking exceed $289 billion and include a minimum of $130 billion in direct medical costs, as well as over $155 billion in lost productivity due to premature death from both first and second-hand smoke. With so many members of the society interested in promoting smoking cessation, one factor to take into consideration is that there are disparities in tobacco use among racial and ethnic groups as well as educational level and socioeconomic status. Thankfully, tobacco control measures and litigation against tobacco companies have reduced the prevalence of cigarette smoking among adults from 42% in 1965 to 18% in 2012. There are presently more former smokers in the U.S than current smokers. Nonetheless, because rate of regression in the prevalence of smoking has slowed, projections of the near future using today's models indicate that the prevalence of smoking among adults in 2050 may still be as high as 15%. The plateau effect in the regression of smoking may be related to the changes in tobacco products that are in use, such as cigars and roll-your-own cigarettes using pipe tobacco. The Surgeon General's review of scientific evidence has thus expanded to include these products.

In order to end the smoking epidemic, "end game" strategies have been proposed, which include reducing the nicotine content to make cigarettes less addictive and creating greater restrictions on sales, even going so far as banning entire categories of tobacco products. Electronic cigarettes, produced by over 250 companies, have gained a foothold in the market, but much remains to be learned about their potential toxicity and health effects. Meanwhile, the U.S Department of Health and Human Services has prepared a framework for coordinating efforts to reduce the rate of smoking in adults and youth to 10% in 10 years. "Ending the Tobacco Epidemic: A Tobacco Control Strategic Action Plan for the U.S Department of Health and Human Services" seeks to counteract the tobacco industry marketing with consistent national anti-smoking media campaigns, raising the average excise cigarette taxes, increasing the FDA regulation of tobacco products, and expanding access to counseling and medications to all smokers under the Affordable Care Act. Smoking is an epidemic. And just as worldwide eradication of smallpox and polio was achieved through focused,

goal-oriented efforts, eliminating smoking-related morbidity and mortality should follow the same approach.[1]

SOURCES:

1. The health consequences of smoking —50 years of progress: a report of the surgeon general. U.S. Department of Health and Human Services· CDC website. http://www.cdc.gov/tobacco/data_statistics/sgr/50th-anniversary/index.htm Published 2014. Accessed on Feb. 6, 2014.

NEWS

Tasimelteon (Hetlioz®): First FDA Approved Pharmacologic Agent for Treatment of Non-24 in Completely Blind Individuals (Continued)

By: Beatrisa Popovitz, Senior Staff Editor

from non-24 have difficulty falling asleep and staying awake, and possess a general feeling of grogginess and sluggishness. This disorder interferes with from non-24 have difficulty falling asleep and staying awake, and possess a general feeling of grogginess and sluggishness. This disorder interferes with daily life activities and has a negative impact on overall performance, productivity, and mood.

Tasimelteon's effectiveness was established and evaluated in two "randomized double-masked, placebo-controlled, multicenter, parallel-group studies" in 104 totally blind individuals with non-24 hour sleep-wake cycle disorder. In Study 1 (SET), 84 patients randomly received either 20 mg tasimelteon or placebo every night for up to 6 months, while 20 participants in Study 2 (RESET, a randomized withdrawal trial that assessed maintenance) received either 20 mg tasimelteon or placebo for 3 months. Patients in the latter group then either received placebo or continued the active drug treatment, for 2 months.[2] The primary endpoints were duration and timing of nighttime sleep and daytime naps, as well as entrainment rate of circadian rhythm. Significant improvement was seen with the use of tasimelteon in comparison to placebo.[6]

Significant improvement was seen with the use of tasimelteon in comparison to placebo.

The most commonly reported side effects include headaches, nightmares, elevated alanine aminotransferase enzymes, upper respiratory tract infections, and urinary tract infections, with a possible increased risk of adverse events in persons 65 and older. The drug has been designated Pregnancy category C. CYP1A2 and 3A4 are the major isoenzymes involved in tasimelteon metabolism, and thus its use should be avoided with strong CYP1A2 inhibitors like fluvoxamine and with strong CYP3A4 inducers like rifampin due to increased exposure/greater risk of adverse drug reactions, and decreased exposure/decreased efficacy. No dose adjustment has been deemed necessary in renal impairment or in mild or moderate hepatic impairment.[2]

Tasimelteon is available as a 20 mg oral capsule to be taken on an empty stomach at bedtime, at approximately the same time each night. Vanda Pharmaceuticals anticipates releasing the product to the public by the spring of this year![2]

SOURCES:

1. Clarke T. UPDATE 2-U.S. FDA approves Vanda's circadian rhythm drug Hetlioz. Thomson Reuters, 31 Jan. 2014. Web. 12 Feb. 2014. <UPDATE 2-U.S. FDA approves Vanda's circadian rhythm drug Hetlioz>.
2. Prescribing Information. Vanda Pharmaceuticals Inc, Jan. 2014. Web. 12 Feb. 2014. <http://www.hetlioz.com/Content/HetliozPI.pdf>.
3. Non-24 hour sleep wake syndrome. American Sleep Association. N.p., Sept. 2007. Web. 12 Feb. 2014. <http://www.sleepassociation.org/index.php?p=non24hour>.
4. Non-24 Q&A - circadian sleep disorders network. Non-24 Q&A - Circadian Sleep Disorders Network. Circadian Sleep Disorders Network, 08 Nov. 2013. Web. 14 Feb. 2014. <http://www.circadiansleepdisorders.org/docs/N24-

QandA.php>.
5. What Is Non-24?. About Non-24 A Circadian Rhythm Disorder. Vanda Pharmaceuticals Inc, Dec. 2013. Web. 12 Feb. 2014. <http://www.non-24.com/about-non-24.php>.
6. FDA approves Hetlioz: first treatment for non-24 hour sleep-wake disorder in blind individuals. U.S. Food and Drug Administration, 31 Jan. 2014. Web. 12 Feb. 2014.<http://www.fda.gov/newsevents/newsroom/pressannouncements/ucm384092.htm>

NEWS

New Legislation Redefines Oversight for Compounding Pharmacies

By: Davidta Brown, Senior Staff Editor

As the world of healthcare and its provision evolves, laws which organize and oversee the ways that patients receive health services must develop at the same pace. Last November, a new bill establishing clearer protocol for the compounding and tracking of medications became national law. The Drug Quality and Security Act intends to answer some of the questions unearthed nearly two years ago about the extent to which compounding pharmacies should be regulated.

The Drug Quality and Security Act is divided into two sections, Title I being "Drug Compounding" and Title II, "Drug Supply Chain Security."[1] In the first segment, which amends the Food, Drug, and Cosmetic Act, compounding facilities are given the option to register with the government, in which case they would be called "outsourcing facilities," and would receive a special license.[1,2] Outsourcing facilities must adhere to the standards created in this legislation, but are otherwise "exempt from new drug requirements, labeling requirements, and track-and-trace requirements" on what they produce.[1] Among the regulations which outsourcing facilities must obey is a requirement to re-register annually with the Secretary of Health and Human Services and to report biannually on production and on any adverse events.[1,2]

Under Title I, the HHS Secretary is also responsible for publishing a list of drugs that may present risks to the patient when they are compounded.[1] What is to be done with the list once it is compiled remains unclear, but outsourcing facilities under regulation would assumedly receive further instructions regarding these substances. State boards of pharmacy receive the new duty of reporting any disciplinary actions taken against a compounding facility, or any suspicions of poor adherence to the Food, Drug, and Cosmetic Act, to the Secretary's office.[1,2]

The focus of Title II is the establishment of an electronic identification and tracking system for drug packages, a procedure that is to be gradually introduced over the next ten years.[1-3] In order to ease the exchange of information between manufacturers, wholesale distributors, dispensers, and others along the drug supply chain, the Secretary of Health and Human Services will implement standardized documentation as well as procedures for sharing said documentation.[1] In addition, individual drug packages will receive a unique identifier, such as a bar code that can be read electronically, so that each package can be monitored as needed.[3] Currently the tracking system is still being conceived, but the law anticipates its implementation in the next few years. In the event of a tainted or otherwise harmful drug, this new system would theoretically allow an individual shipment of drugs or sterile compounded materials to be traced from the patient to its source, thus helping prevent additional harm.

In summary, the Drug Quality and Security Act addresses the questions of who oversees medium-sized compounding facilities and of how to monitor drugs that are shipped across state lines. Title I of the new legislation places the Secretary of Health and Human Services in the role of a supervisor for compounding facilities, and Title II creates the means to potentially follow one harmful package of drugs from the patient, all the way back to the compounder or manufacturer.

Even before the Drug Quality and Security Act was officially signed into law on November 27th, it received a significant amount of positive feedback. Among those who expressed support for the legislation while it awaited Congressional approval were the American Society of Health System Pharmacists, Pfizer, and the Generic Pharmaceutical Association.[4]

A statement from the National Community Pharmacists Association, another early supporter, expressed an appreciation for the Drug Quality and

Security Act's consideration for small business pharmacies, which often "struggle to meet many regulatory requirements and can ill afford needless new mandates."[4] For these supporters, the voluntary outsourcing facility licensing system is an ideal compromise between ensuring high standards of quality and preventing smaller establishments from being regulated out of the market completely.

However, it is possible that this leniency will weaken the law to the point of ineffectiveness. If the majority of large compounders nationwide decide not to register, all of the regulations and compounding policies created by the law will amount to a tree falling in a forest unheard.

A solution to this hypothetical dilemma has been described as a "market-based response," and calls on healthcare providers to be a pillar in support of tighter standards.[5] Providers who demand that their sterile compounded products only come from licensed outsourcing facilities would more effectively guide compounders toward this choice than any law ever could. On the other hand, if the consumers of compounded prescriptions only sought the lowest costs, compounders that elected not to register with the HHS Secretary would be at a great advantage.

It is evident, then, that pharmacists and healthcare providers have as much liberty to influence the Drug Quality and Security Act as the legislation has to affect them. Dispensers and recipients of compounded medications are given the choice to accept the standards established under the law, or to continue adhering to the older regulations. In an attempt to maintain the delicate balance between regulation and freedom, the Drug Quality and Security Act creates new rules, but leaves the decision between new and old regulations up to healthcare providers.

SOURCES:

1. Library of Congress. Drug quality and security act. 2013. Congress.gov Website. Available at: http://beta.congress.gov/bill/113th-congress/house-bill/3204. Accessed February 26, 2014.
2. H.R. 3204: drug quality and security act. Govtrack.us Website. Available at: https://www.govtrack.us/congress/bills/113/hr3204/text. Published November 21, 2013. Accessed February 26, 2014.
3. Drug supply chain security act: title II of the drug quality and security act of 2013. US Food and Drug Administration Website. Available at: http://www.fda.gov/drugs/drugsafety/drugintegrityandsupplychainsecurity/drugsupplychainsecurityact/default.htm. Updated February 19, 2014. Accessed February 26, 2014.
4. Broad range of stakeholders agree: bipartisan, bicameral drug quality and security act will improve drug safety, should be enacted as soon as possible. US Senate Committee on Health Education Labor and Pensions Website. Available at: http://www.help.senate.gov/newsroom/press/release/?id=049ab377-a426-4dd1-90dd-b9b770de7a65. Published September 28, 2013. Accessed February 26, 2014.
5. Outterson K. The drug quality and security act – mind the gaps. N Engl J Med. 2014;370:97-99. doi: 10.1056/NEJMp1314691. Accessed February 26, 2014.

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NEWS

New Strides in Lupus Treatment

By: Daniel Mathan, PharmD Candidate c/o 2016, Anita Kachappilly, PharmD Candidate c/o 2016, & Amrita Singh, PharmD

Systemic lupus erythematosus (SLE) is a debilitating autoimmune disease that affects multiple organs in the body and can potentially become life threatening.[1] The incidence of SLE is about 50 cases for every 100,000 people; it is predominantly seen in women and is more common in African Americans, Hispanics, and Asians. Diagnosis is typically made between the ages of 15 to 45. While the etiology of this disease is not completely understood, genetics and environmental factors, including exposure to certain medications, are thought to be the main causative factors.

Manifestation of symptoms and progression of disease severity is primarily patient specific. SLE involves the formation of antibodies against the patient's own antigens as well as unusual immunologic function. The overabundance of autoantibodies results from hyperactive B-lymphocytes. These antibodies are generally formed against different nuclear components of the body such as RNA, DNA, and histones, which are essential parts of chromatin and nucleosomes. As a result, the body's immune system attacks its own tissues and causes detrimental effects. Thus, disease presentation often depends on which areas of the body are affected and the extent of organ dysfunction.[2]

A highly definitive marker commonly used to diagnose SLE is the level of antibodies to double stranded DNA (dsDNA). Since leukopenia, anemia, and thrombocytopenia are common features of SLE, obtaining complete blood counts is also important when monitoring patients. Other pertinent labs include levels of general markers of inflammation such as C-reactive protein and erythrocyte sedimentation rate. Because significant protein loss may occur from complications such as nephrotic syndrome or enteropathy, serum albumin levels may also be obtained.[1] Since the progression of this disease is different for each patient depending upon which organ systems are affected by the autoantibodies, no set recommendations on how often blood tests should be performed exist. However, there are many other signs and symptoms that can be used to diagnose SLE. Some symptoms are nonspecific and include weight loss, fever, and fatigue. Other symptoms are mainly musculoskeletal , including arthritis, malaise, and myalgia. The most iconic sign is the butterfly rash, which spans over the bridge of the nose and cheeks. Other disorders precipitated by SLE include renal impairment, hematological disorders, oral ulcers, and cardiac and pulmonary problems.[2]

Since there has been no cure established for SLE, providers must create a treatment regimen aimed at symptomatic relief. The goals of these regimens are to prevent flares, treat the flares that occur, and to lessen organ damage and any associated complications. They also must personalize treatments according to each patient's needs, health goals, age, gender, and lifestyle.[3] A combination of immunosuppressive, supportive, and symptomatic drugs have been shown to provide the best therapeutic outcomes in preventing the worsening of this disease. As of now, only a few medications have been approved by the FDA for the treatment of SLE, namely aspirin, prednisone, hydroxychloroquine, and belimumab.[4] Aspirin is an NSAID used as symptomatic relief to treat pain, swelling, and fever. Antimalarials, such as hydroxychloroquine, have been found to not only treat malaria, but also relieve many of the symptoms of lupus. Prednisone is a corticosteroid that helps to reduce inflammation associated with this disease process. Lastly, belimumab is a B-lymphocyte stimulator (BLyS) protein inhibitor approved in March 2011 that attenuates the number of abnormal B-cells present in the body. The major downside to this medication is that it has not yet been proven effective for African and African-American patients.[3] This further substantiates the fact that this disease manifests differently in different patients.

Due to the debilitating effects of this disease state and the lack of sufficient medications for treatment, a new drug, rigerimod (Lupuzor™) was put on fast track approval status by the FDA. Rigerimod is a 21 amino acid long peptide fragment of the spliceosomal U1-70K small nuclear ribonucleoprotein. In

clinical trials, this peptide has shown to significantly relieve signs and symptoms in patients with SLE. While the mechanism of action is not completely understood, rigerimod is known to regulate the immune system in patients with lupus by altering the activity of important inflammatory cells responsible for causing this disease. For example, rigerimod inhibits T cell response to self-peptides present on cell surface molecules, specifically major histocompatibility complexes (MHC).[5]

Phase II, open label, clinical trials conducted to establish the efficacy of rigerimod and further assess its safety profile were conducted in twenty patients across two centers in Bulgaria. The primary objective was to determine the association between rigerimod administration and disease markers of SLE, specifically anti-dsDNA antibody levels. Statistically significant reductions in this primary marker were observed in groups receiving both the 200 µg and 1000 µg dose every two weeks. Interestingly, more patients in the 200 µg as compared to the 1000 µg group saw a reduction in anti-dsDNA (7 out of 10 patients versus 1 out of 10 patients, respectively). In addition, statistically significant reductions in SLE Disease Activity Index scores and a decrease in the mean level of the acute phase reactant C-reactive protein by about 55% in the 200 µg group and about 2% in the 1000 µg group was also detected. In regards to safety analysis, no serious adverse events were documented during the study period and the incidence of non-serious adverse events was 45%, all of which were indicated to be mild in nature. The only drug related event was mild erythema at the injection site, which resolved within one hour.[6]

In addition, a randomized, double-blind, placebo-controlled Phase IIb clinical trial was conducted to evaluate treatment outcomes from rigerimod (Lupuzor™). This multi-center study was conducted in four countries and included over one hundred patients. Results from this study indicated that rigerimod dosed at 200 µg subcutaneously every 4 weeks significantly decreased the autoimmune disease activity in SLE patients being treated with standard of care (primarily steroids). Furthermore, a statistically significant increase in SLE Responder Index in the treatment group versus the placebo group was noted. Significant adverse events were not reported. [5]

Rigerimod (Lupuzor™) is an innovative treatment for lupus 14 years in the making. So far it has completed Phase I, IIa, and IIb studies, and is now preparing for the final phase of testing, Phase III studies with Special Protocol Assessment and Fast Track designation.[7] Special Protocol Assessment means that the FDA will approve the drug as long as the clinical trials are conducted exactly as promised with evident data as proof.[8] Fast Track designation accelerates the process of development and reviews of the drug that treats a condition that has an "unmet medical need." This protocol will allow for patients to have access to the new drug earlier than if the review process had gone at its regular rate.[9]

Rigerimod (Lupuzor™) is an innovative treatment for lupus 14 years in the making.

In summary, rigerimod has significant potential to improve treatment outcomes in patients suffering from SLE and its success following availability on the market is highly anticipated.

SOURCES:

1. Schur PH, Wallace DJ. Overview of the therapy and prognosis of systemic lupus erythematosus in adults. In: UpToDate, Pisetsky DS. (Ed), UpToDate, Waltham, MA, 2013.
2. Delafuente JC, Cappuzzo KA. Delafuente J.C., Cappuzzo K.A. Chapter 96. Systemic Lupus Erythematosus and Other Collagen-Vascular Diseases. In: DiPiro JT, Talbert RL, Yee GC, Matzke GR, Wells BG, Posey L. DiPiro J.T., Talbert R.L., Yee G.C., Matzke G.R., Wells B.G., Posey L eds. Pharmacotherapy: A Pathophysiologic Approach, 8e. New York, NY: McGraw-Hill; 2011. http://accesspharmacy.mhmedical.com.jerome.stjohns.edu:81/content.aspx?bookid=462&Sectionid=41100875. Accessed April 14, 2014.
3. Handout on Health: Systemic Lupus Erythematosus. National Institute of Arthritis and Musculoskeletal and Skin Diseases. May 2013. http://www.niams.nih.gov/Health_Info/Lupus/#Lupus_6. Accessed April 14, 2014.

4. Resman-Targoff BH. Chapter 69. Systemic Lupus Erythematosus. In: DiPiro JT, Talbert RL, Yee GC, Matzke GR, Wells BG, Posey L. eds. *Pharmacotherapy: A Pathophysiologic Approach, 9*e. New York, NY: McGraw-Hill; 2014.http://accesspharmacy.mhmedical.com/content.aspx?bookid=689&Sectionid=48811477. Accessed April 14, 2014.
5. Zimmer R, Scherbarth HR, Rillo OL et al. Lupuzor/P140 peptide in patients with systemic lupus erythematosus: a randomised, double-blind, placebo-controlled phase IIb clinical trial. Ann Rheum Dis. 2012;72(11): 1830-5. http://ard.bmj.com/content/72/11/1830.full.pdf+html. Accessed March 24, 2014.
6. Muller S, Monneaux F, Schall N et al. Spliceosomal peptide P140 for immunotherapy of systemic lupus erythematosus: results of an early phase II clinical trial. Arthritis Rheum. 2008;58(12): 3873-83. http://onlinelibrary.wiley.com/doi/10.1002/art.24027/pdf. Accessed March 24, 2014.
7. Lupuzor™-treatment for lupus. ImmuPharma Web site. http://www.immupharma.org/lupuzor. Accessed April 14, 2014.
8. Guidance for Industry Special Protocol Assessment. U.S. Food and Drug Administration. May 2002. http://www.fda.gov/downloads/Drugs/Guidances/ucm080571.pdf. Accessed April 14, 2014.
9. Fast Track, Breakthrough Therapy, Accelerated Approval and Priority Review. U.S. Food and Drug Administration. June, 26 2013. http://www.fda.gov/forconsumers/byaudience/forpatientadvocates/speedingaccesstoimportantnewtherapies/ucm128291.htm. Accessed April 14, 2014.

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The 2014 Rho Chi Society Beta Delta Chapter Induction Ceremony

By: Tasnima Nabi, Co-Copy Editor [Content-focused]

On January 23rd, St. John's University College of Pharmacy and Health Sciences inducted the 2014 Beta Delta Chapter members of Rho Chi Society. The annual induction ceremony took place at the Hillcrest Jewish Center. The inductees include 4th year Pharm.D. students in the top 20% of their class as well as graduate students pursuing a pharmaceutical study with a GPA 3.5 or higher. This year, the Beta Delta Chapter proudly inducted 59 4th year students and three graduate students.

The ceremony commenced with a warm welcome to the attending students, friends, and family from Moisey Rafailov, the 2013 Rho Chi President. Moisey then introduced Dean DiGate as our keynote speaker. Although Dean DiGate is new to our University, he has held many esteemed positions in other universities. A Ph.D. in Biology, Dean DiGate served as Provost of the University of the Sciences in Philadelphia, as the Dean of the Philadelphia College of Pharmacy, and as a Professor in and Chairman of the Department of Pharmaceutical Sciences at the University of Maryland School of Pharmacy. Dean DiGate shared his college experiences with us and how inspired he was by new medical and scientific advancements. He reinforced the importance of passion in our personal and professional lives and explained how we are to make the most of each opportunity. He concluded by reciting Robert Frost's "The Road Not Taken" and wholeheartedly congratulated us on our accomplishments. At the conclusion of his speech, the previous executive board presented him with a plaque to thank him for sharing his time, knowledge, and advice with us all.

The night concluded with Dr. Zito, faculty advisor of Rho Chi, who greeted everyone and said the initiation ritual. Each inductee stood before the podium and was handed his/her certificate and insignia pin. Next, previous executive board members read aloud the history, mission, values, and duties of the Rho Chi Society and its members. After the inductees agreed to join the society, Dr. Zito asked the new elected officers to step forward and take their oath of office. After a round of applause, the inductees dispersed to enjoy dinner with friends, family, and faculty. The Rho Chi induction ceremony was a great start to the new school semester, with a promise to uphold the honor expected from each member of the society.

Words from the 2014 Executive Board Members of the Beta Delta Chapter:

Tyler Valente, President: As President of Rho Chi, my goal is to spread knowledge and extend recognition of our Honor Society throughout St. John's University. One way we intend to increase awareness and excitement is by holding programs that target first- and second-year students in the Pharmacy program. I hope these programs will inspire students to study hard and strive to become Rho Cho inductees when they're in their fourth year, as well as to encourage them to become active on campus and in the community.

Fawad Piracha, Vice President: As a new inductee, I want to help stimulate intellectual inquiry and academic advancement by imparting information about pharmacy practice. Through workshops, academic and professional oriented lectures, and community service projects, the executive board intends to promote the advancement of the pharmacy profession, which is expanding. It is the responsibility and obligation of executive board members to promote and encourage Rho Chi Society inductees to engage in activities that serve the purposes of the profession of pharmacy.

Tasnima Nabi, Secretary: I am excited to uphold the honor and to fulfill the responsibilities of Secretary for Rho Chi. It is incumbent that the executive board and all active members of the society promote the highest ideals of our profession. Service is an important tenet to our society, university, and profession, and the executive board looks forward to planning unique and engaging events to enhance our education and serve our community.

Anthony Nania, Treasurer: My vision for Rho Chi is to promote unity and leadership throughout the profession of pharmacy. We are the next generation of

pharmacists, and it is our responsibility to continue advancing the career in a constantly evolving digital era. Rho Chi is built on pursuing intellectual excellence, fostering fellowship, and setting examples of utmost character and conduct. A key to accomplishing the mission of Rho Chi is to continue learning and teaching others. Through hosting communal events and meetings on campus, Rho Chi will present forums for discussion, learning, and inquiry. As acting treasurer, I will work hard to "restock the woodpile" and further build up the funding accessible to Rho Chi. I will work to balance our spending and ensure that our funds are managed in an efficient and organized manner in order to host the numerous events and functions our executive board has planned.

Sara James, Historian: I look forward to not only being a part of this prestigious academic honor society, but also playing an active role in instilling within its members the desire to continue their goal of achieving intellectual excellence and the furthering the profession of pharmacy. Along with the rest of the executive board, I plan on highlighting the important principles of scholarship and service in the events that Rho Chi will plan and sponsor.

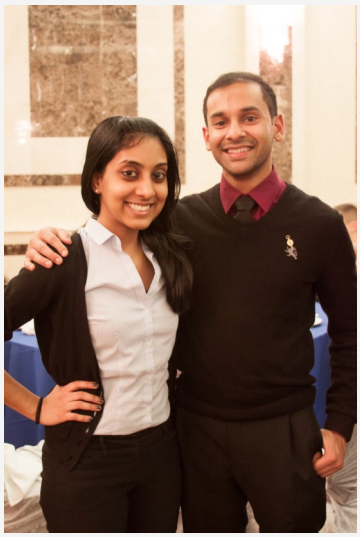
Joshua Bliss, Media Relations Coordinator: I am a 4th year PharmD candidate and an Ozanam Scholar. Integrating service and acknowledging social justice issues within healthcare is my passion and my calling. I have studied abroad, traveled to various states, Puerto Rico, and Ecuador, where I performed service work and individual research on social justice issues. As acting Media Relations Coordinator for Rho Chi, I will ensure that our events and goals are well received by our members and the public. The Beta Delta Chapter is unique as it is the only chapter connected to a Vincentian University. My goal as an executive board member is to develop new initiatives geared more towards healthcare and its role in social justice. It is an integral part of who we are as Rho Chi members and healthcare professionals.

Previous executive board (top row) with the new executive board (bottom row)
Top: Anh Nygyun, Moisey Rafailov, Elissa Tam, and Zinnia Yu
Bottom: Sara James, Anthony Nania, Tyler Valente, Tasnima Nabi, Fawad Piracha, Joshua Bliss

Previous executive board members with Dean DiGate

Previous executive board members Anh and Zinnia with Sara James, 2014 Rho Chi Historian, and Rehnuma Imani, 2014 Rho Chi Inductee

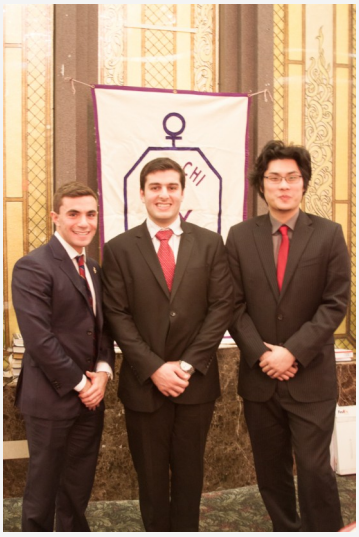
2014 Rho Chi Inductees (left to right): Menatalla, Noranne, Tasnima, Shereen, Rana, and Zaiba



Bethsy Jacob, former Rho Chi Historian (2012), and Bejoy Maniara, 2014 Rho Chi Inductee

Katharine Cimmino, Rho Chi Post Editor-in-Chief, and Tasnima Nabi, Rho Chi Post Co-Copy Editor [Content-focused] and Rho Chi Secretary

2014 Rho Chi Inductees (left to right): Michael LoCascio, Allison Weber, Karissa Johnson, and Anthony Yam



2014, 2013, and 2012 Rho Chi Presidents

Aleena Cherian, Rho Chi Post Co-Copy Editor [Graphics-focused] and former Rho Chi Treasurer (2012), and Katharine Cimmino, Rho Chi Post Editor-in-Chief

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CLINICAL

Riociguat (Adempas®) New Drug for Pulmonary Hypertension

By: Hayeon Na, Co-Copy Editor (Content-Focused)

On October 8th of 2013, Bayer's new drug riociguat (Adempas®) was approved for the treatment of patients whose pulmonary hypertension (PH) belongs in WHO groups 1 and 4.[1] Riociguat (Adempas®) is a soluble guanylate cyclase (sGC) stimulator, and currently the only one of its kind on the market.

Pulmonary hypertension is high blood pressure in the pulmonary arteries, veins, or capillaries which transport blood to and from the lungs. PH is a syndrome of restricted blood flow to these vessels, and can lead to shortness of breath during routine activities, and may limit all physical activity as it worsens.[2] In poorly managed PH, the resulting increase in vascular resistance leads to right heart failure. Due to the high pressure, the blood cannot be transported easily, and the right ventricle that pump the blood to these arteries becomes fatigued and weak.[3] This eventually results in right heart failure, the major cause of death in patients with PH.[3]

In patients with PH, the average blood pressure is higher than 25mmHg in the pulmonary arteries, whereas the normal pressure is 8-20mmHg at rest.[2] Multiple etiologies have been identified including genetics, coronary artery disease, chronic obstructive pulmonary disease (COPD), and thrombosis.[3] Pathogenic pathways that have been implicated in PH involves the genetic and molecular processes of the smooth muscle cells, endothelial cells (cells lining the interior of vessels), and adventitia (the outer most layer of connective tissue).[3]

PH is categorized into six groups based on its specific characteristics, such as its pathology, pathobiology, genetics, epidemiology, and risk factors.[4] According to the European Society of Cardiology and the European Respiratory Society (ESC/ERS), the six groups are as seen in Table 1.[4]

These groups specify what "kind" of PH the patient has, which helps determine the treatment course.

On the other hand, PH is also divided into four functional classes through the New York Heart Association (NYHA) scale (1-4, with 4 being the worst) and the World Health Organization (WHO) scale (I-IV, with IV being the worst).[3] The classes stratify the functional class, a measure of the limits that the disease poses onto the patients. In practice, the NYHA scale and the WHO functional class scale are used interchangeably to categorize patients into functional classes. One aspect to note is that although the two scales are almost identical, the WHO functional classes factors in syncope or near-syncope into consideration due to its importance in the prognosis of patients with PH .[5] The following table that describes the functional assessment categories is reprinted from the American College of Chest Physicians (ACCP) guidelines on pulmonary arterial hypertension (PAH).[6]

Table 1: Classification of Pulmonary Hypertension[4]

	Category
Group 1	Pulmonary arterial hypertension (PAH)
Group 1'	Pulmonary veno-occlusive disease and/or pulmonary capillary hemangiomatosis
Group 2	Pulmonary hypertension due to left heart disease
Group 3	Pulmonary hypertension due to lung diseases and/or hypoxia
Group 4	Chronic thromboembolic pulmonary hypertension
Group 5	PH with unclear and/or multi-factorial mechanisms

A. New York Heart Association functional classification*
Class 1: No symptoms with ordinary physical activity.
Class 2: Symptoms with ordinary activity. Slight limitation of activity.
Class 3: Symptoms with less than ordinary activity. Marked limitation of activity.
Class 4: Symptoms with any activity or even at rest.
B. World Health Organization functional assessment classification
Class I: Patients with PH but without resulting limitation of physical activity. Ordinary physical activity does not cause undue dyspnea or fatigue, chest pain, or near syncope.
Class II: Patients with PH resulting in slight limitation of physical activity. They are comfortable at rest. Ordinary physical activity causes undue dyspnea or fatigue, chest pain, or near syncope.
Class III: Patients with PH resulting in marked limitation of physical activity. They are comfortable at rest. Less than ordinary activity causes undue dyspnea or fatigue, chest pain, or near syncope.
Class IV: Patients with PH with inability to carry out any physical activity without symptoms. These patients manifest signs of right-heart failure. Dyspnea and/or fatigue may even be present at rest. Discomfort is increased by any physical activity.

*From Diseases of the Heart and Blood Vessels: Nomenclature and Criteria for Diagnosis of the Heart and Great Blood Vessels. 6th ed. New York, NY: New York Heart Association/Little Brown, 1964.

The current treatment is based on rectifying the imbalance between the constrictive and dilatory effects on the pulmonary vessels; however, the American College of Cardiology Foundation and American Heart Association (ACCF/AHA) 2009 Guidelines notes that the imbalance in the remodeling of the

vessels with excessive proliferation has been recognized as an important factor in disease progression and treatment.[3] The current therapy includes the use of anticoagulants, diuretics, oxygen therapy, and digoxin as background therapies for management of signs and symptoms in patients without contraindications. Candidates for long-term calcium channel blocker (CCB) therapy may receive these drugs for dilation of the vessels. Those who cannot use CCBs, or are unresponsive, receive oral endothelin receptor antagonists (ERAs) or Phosphodiesterase-5 (PDE-5) inhibitors, and/or inhaled or injected prostanoids.[3]

Riociguat (Adempas®) is approved for two indications: Persistent/recurrent Chronic Thromboembolic Pulmonary Hypertension (CTEPH, or WHO Group 4) after surgical treatment or inoperable CTEPH to improve exercise capacity and WHO functional class, and Pulmonary Arterial Hypertension (PAH or WHO Group 1) to improve exercise capacity, improve WHO functional class, and to delay clinical worsening.[7,8] It is a stimulator of the cardiopulmonary enzyme soluble guanylate cyclase (sGC), which is also a receptor of nitric oxide. Nitric oxide (NO) is a vasodilator that relaxes the smooth muscles of the blood vessels and helps balance blood pressure. Upon binding, the NO-sGC catalyzes the synthesis of cyclic guanosine monophosphate (cGMP), a signaling molecule that is a major factor in the regulation of vascular tone, proliferation, fibrosis and inflammation. By stimulating the sGC, riociguat (Adempas®) targets the factors associated with pulmonary hypertension, such as endothelial dysfunction, impaired synthesis of nitric oxide and inadequate stimulation of the NO-sGC-cGMP pathway. Riociguat (Adempas®) works in two ways: it stabilizes the bond between NO and sGC and thus sensitizes sGC to endogenous NO, and it also directly binds sGC at a different binding site than NO. The resulting increase in cGMP leads to vasodilation.[7]

Riociguat (Adempas®) comes in tablets of different strength ranging from 0.5 mg to 2.5 mg. The therapy is typically initiated at 1 mg by mouth three times daily. This may be increased by 0.5 mg at a time, though not more often than every two weeks, until a satisfactory therapeutic effect is achieved and if it is tolerated at a systolic blood pressure of 95mmHg or higher. The effects of the drug at doses higher than 2.5 mg three times daily have not been established, and should be closely monitored by the prescriber.[7] If doses are missed for three days or more, re-titration is required.[7] Patients should be monitored for blood pressure, significant peripheral edema, pulmonary function, bleeding, and exercise tolerance to assess the effectiveness and the safety of the medication.

The pharmacokinetics of riociguat (Adempas®) is dose proportional from 0.5 mg to 2.5 mg. It has an oral bioavailability of 94%, reaches the peak plasma concentration within 1.5 hours, and has a volume of distribution at steady state of 30 L. It is highly protein bound (95%) and has an elimination half-life of about 12 hours.[7]

Riociguat (Adempas®) has many sources for drug -drug interactions. It is a substrate of P-glycoprotein (P-gp) and Breast Cancer Resistance Protein (BCRP), both of which may function as drug efflux pumps in excretion of drugs.[7] When taken with drugs that may induce or inhibit P-gp or BCRP, the plasma concentration of riociguat (Adempas®) will most likely be altered.[7] The drug is mainly cleared by enzymes cytochrome P-450 monooxygenase (CYP) 1A1, 3A, 2C8 and 2J2. The major metabolite M1 is catalyzed by CYP1A1, which is inducible by polycyclic aromatic hydrocarbons such as those present in cigarette smoke or charred food.[7] The product's package insert notes that in regular smokers (the frequency and amount of cigarettes was unspecified), the plasma concentration of the drug is reduced to almost 50% in patients with PAH.[7] Patients who smoke may receive more than 2.5 mg per dose to match the therapeutic plasma concentration in non-smokers, and when patients stop smoking, practitioners should consider reducing the dose.[7]

Concomitant use of strong CYP or P-gp/BCRP inhibitors (e.g. ritonavir, ketoconazole) will increase drug exposure, so an initial dose of 0.5 mg three times daily should be considered, as opposed to the normal 1 mg initiation dose.[7] On the other hand, strong CYP3A inducers such as St. John's Wort or rifampin will decrease the exposure so a dose increase should be considered.[7] Antacids (i.e. magnesium hydroxide and aluminum hydroxide) will decrease the absorption of the drug and should not be taken within an hour of taking riociguat (Adempas®).[7]

Absolute contraindications to consider when prescribing and dispensing the agent include pregnancy, and co-administration of nitrates, nitric oxide (NO)

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donors, and PDEIs (specific and non-specific). Riociguat (Adempas®) is pregnancy Category X, which means that the drug will almost certainly cause fetal abnormalities and should not be used in pregnant women because "the risks involved in use of the drug in pregnant women clearly outweigh potential benefits."[9] Because it is Category X, the drug has a risk evaluation and mitigation strategies (REMS) program in place. "The FDA Amendments Act of 2007 gave FDA the authority to require a REMS from manufacturers to ensure that the benefits of a drug or biological product outweigh its risks."[8] All patients who are female have to enroll in the REMS program regardless of their reproductive potentials.[7] Prescribers and pharmacies also must enroll in the program to prescribe and dispense the medication. Patients who have reproductive potential must follow a strict requirement for contraceptives as outlined by the medication guide, and must also take a pregnancy test each month from the start of therapy until one month after discontinuation.[7]

In studies such as PATENT-1, serious adverse effects shown were hypotension and bleeding.[11] If the patient cannot tolerate the hypotensive effects, the dose should be reduced.[7] On the other hand, riociguat (Adempas®) did not cause priapism (a painful erection not associated with sexual stimulation),[12] blue vision, or hearing loss that are usually associated with PDE-5 inhibitors (e.g. Sildenafil (Revatio®)) due to their selectivity for PDE-5 and PDE-6. Patients who are currently taking PDE-5 inhibitors who do not like the aforementioned adverse effects may consider using riociguat (Adempas®) for its FDA approved indications.

At $100/tablet, riociguat (Adempas®) certainly is not cheap. The cost of treatment is $108,000/year; however, Bayer AG does offer a co-pay support program, which may cover up to 100% of the co-pay in some cases.[13]

For many who have failed other therapies and for whom operations were fruitless, riociguat (Adempas®) may offer some relief for both pretreated and treatment naïve patients.[11] Currently the agent has limited indication, limited access, high price, and its pregnancy Category X, and is not the mainstay of the market. However, the medication may suit those who find the other therapies ineffective or their side effects bothersome.

SOURCES:

1. U.S. Food and Drug administration. News & Events. FDA Website. http://www.fda.gov/newsevents/newsroom/pressannouncements/ucm370866.htm Updated October 8th, 2013. Accessed February 9th, 2014.
2. National Heart, Lung, and Blood Institute. What is Pulmonary Hypertension? National Institute of Health. http://www.nhlbi.nih.gov/health/health-topics/topics/pah. Accessed February 9th, 2014.
3. McLaughlin VV, Archer SL, Badesch DB, et al. ACCF/AHA 2009 Expert Consensus Document on Pulmonary Hypertension. *J Am Coll Cardiol*. 2009;53:1573-619.
4. Galie N, Hoeper MM, Humbert M, et al. Guidelines for the diagnosis and treatment of pulmonary hypertension. Eur Heart J. 2009;30:2493-2537.
5. Mathier MA. The classification of pulmonary arterial hypertension. Medscape Multispecialty. http://www.medscape.org/viewarticle/544175. 2006. Accessed ebruary 27th, 2014.
6. Rubin LJ. Diagnosis and management of pulmonary arterial hypertension: ACCP Evidence-Based Clinical Practice Guidelines. Introduction. *Chest*. 2004;126:7S-10S. http://journal.publications.chestnet.org/issue.aspx?issueid=22012. Accessed February 27th, 2014.
7. Adempas® [package insert]. Barmen, Germany: Bayer AG; 2013.
8. Lexi-Comp Online™ , Riociguat: Lexi-Drugs Online™. Hudson, Ohio: Lexi-Comp, Inc.; February 9th, 2014.
9. Chemical Hazards Emergency Medical Managment. FDA Pregnancy Categories. U.S. Department of Health & Human Services. http://chemm.nlm.nih.gov/pregnancycategories.htm. Accessed February 9th, 2014.
10. U.S. Food and Drug Administration. Approved Risk Evaluation and Mitigation Strategies. http://www.fda.gov/drugs/drugsafety/postmarketdrugsafetyinformationforpatientsandproviders/ucm111350.htm. Accessed February 14th, 2014.
11. Ghofrani H, Galie N, Grimminger F, et al. Riociguat for the Treatment of Pulmonary Arterial Hypertension. *N Engl J Med*. 2013;369;4: 330-40.
12. American Urological Association. Priapism. American Urological Association. https://www.auanet.org/education/guidelines/priapism.cfm. Accessed February 9th, 2014.
13. Bayer AG. Adempas®: Aim Patient Support Program. Bayer AG. http://www.adempas-us.com/aim-patient-support-program/. Accessed February 9th, 2014.

RHO CHI POST CLINICAL CORNER

Pharmacologic Agents Used in Parkinson's Disease

By: Aleena Cherian Co-Copy Editor (Graphics-Focused) & Beatrisa Popovitz, Senior Staff Editor

Agent(s)	Class/Mechanism	Indication/ Place in Therapy	Common Side Effects	Usual Starting Dose
Levodopa-Carbidopa *(Sinemet®, Sinemet® CR)*	**Levodopa** circulates in plasma to the BBB: converted by striatal enzymes to dopamine **Carbidopa** inhibits peripheral plasma breakdown of levodopa by inhibiting decarboxylation (increasing available levodopa at blood brain barrier)	May be used first line (older patients)	Long-term use associated with dyskinesias and motor fluctuations (on-off, wearing off) Other: nausea (minimized by taking with food), loss of appetite, orthostasis, confusion, somnolence, hallucinations, constipation, dry mouth, headache	25/100 mg PO TID *also available in 50/200 sustained release formulation *max dose : 8 tablets/ day (200 mg carbidopa/2000 mg levodopa)
Pramipexole *(Mirapex®)* Ropinirole *(Requip®)*	**Dopamine agonist:** stimulate dopamine activity on the nerves of striatum and substantia negra	May be used first line, especially in patients <50 years old May be added to levodopa to reduce off-time, improve symptoms or manage dyskinesias	Lower risk of dyskinesia, wearing off and on-off fluctuations than levodopa/carbidopa Higher risk of hallucinations, sleepiness, edema, uncontrollable urges to gamble	Pramipexole 0.125 mg PO TID Ropinrole 0.25 PO TID *also available in XL formulations
Selegiline *(Eldepryl®, Zelapar®)* Rasagiline *(Azilect®)*	**Selectively inhibits monoamine** oxidase (MAO-B) which plays a major role in the metabolism of dopamine May also increase dopaminergic activity by interfering with dopamine reuptake at synapse	May be used first line Can be added to levodopa to reduce off-time	May be orthostasis and hallucinations and/or worsen dyskinesias, especially with levodopa Risk of serotonin syndrome Other: nausea, dry mouth, constipation, lightheadedness, agitation, insomnia, vivid dreams	Selegiline: 5 mg PO daily Rasagiline 0.5-1mg po daily

Reviewed by: Dr. T Jodlowski and Dr. J Beizer

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Agent(s)	Class/Mechanism	Indication/ Place in Therapy	Common Side Effects	Usual Starting Dose
Amantadine *(Symmetrel®)*	**Antiviral (Influenza A treatment and prophylaxis)** Antiparkinsonian activity may be due to blocking reuptake of dopamine into presynaptic neurons or by increasing dopamine release from presynaptic fibers	Can be used first -line or added to levodopa for dyskinesias (used infrequently due to CNS side effects)	Cognitive impairment, confusion, insomnia, hallucinations	100 mg BID Renal Adjustment: CrCl 30-50ml/min: 200mg on day 1, then 100mg/day CrCl15-29 ml/min: 200mg on day 1, then 100mg on alternate days CrCl<15ml/min: 200mg once a week
Entacapone *(Comtan®)* Tolcapone *(Tasmar®)*	**COMT Inhibitors** Inhibits catechol-O-methyl transferase which is involved in degradation of neurotransmitters	Adjunct to levodopa-carbidopa; not for monotherapy	Addition of COMT inhibitor may increase levodopa-carbidopa SE Gastrointestinal effects (diarrhea) Entacapone – urine discoloration Tolcapone- requires liver function test monitoring (**BBW)**- rarely used	Entacapone 200 mg PO (with levodopa) Tolcapone: 100 mg PO TID Combination product: Stalevo® entacapone + carbidopa/levodopa
Trihexyphenidyl *(Artane®)* Benztropine *(Cogentin®)*	**Anticholinergic agent**	Initial monotherapy or adjunct, especially younger patients with tremors	Risk of cognitive impairment and confusion: caution in patients >60y Dry mouth, urinary retention, constipation, drowsiness	Trihexyphenidyl: 1 mg PO BID Benztropine 0.5 mg PO BID
Apomorphine *(Apokyn™)*	**Non-ergoline dopamine agonist** Stimulates postsynaptic D2 type receptors in the brain	Symptomatic treatment of *on-off episodes* in advance disease	Must administer with antiemetic to prevent nausea and vomiting Yawning, dyskinesias, dizziness, runny nose, edema, sweating, flushing pallor Warnings: hypotension, syncope, QT prolongation, cardiac events, hallucinations, psychosis, excessive sleepiness	Available as 10 mg/mL 2mg subcutaneously (0.2 mL test dose) titrated to a maximum recommended dose of 6 mg (0.6 mL)
Rotigotine Transdermal System *(Neupro®)*	**Non-ergoline dopamine agonist** with specificity for D_3, D2 and D1-dopamine receptors Stimulates postsynaptic dopamine D2 type auto receptors in substantia nigra in brain	Treat signs/ symptoms of idiopathic Parkinson disease	Application site reactions, dizziness, somnolence, N/V, anorexia, Increased risk of hallucinations in patients with advanced-stage Parkinson's To discontinue treatment, reduce the dose gradually until complete withdrawal	2mg/24 hours (initially for early stage disease) 4mg/24 hours (advanced stage disease), increase by 2mg/24 weekly up to a maximum of 8mg/24h

Reviewed by: Dr. T Jodlowski and Dr. J Beizer

SOURCES:

Lexi-Drugs Online. Hudson (OH : Lexi-Comp, Inc. 2013)
Sinemet® CR (carbidopa-levodopa sustained release formulation). Whitehouse Station, NJ: Merck; 2009
Apokyn™ (apomorphine hydrochloride) [package insert] Louisville, KY: US WorldMeds;2012
Neupro (rotigotine transdermal system) [package insert] Smyrna, GA: UCB, Inc; 2012
Hickey P and Stacy M. Available and emerging treatments for Parkinson's disease: a review. *Drug Des Devel Ther*. 2011;5:241-254
Requip® (Ropinirole) [package insert] Research Triangle Park, NC: GSK; 2012
Jankovic J, Poewe W. Therapies in Parkinson's disease. *Curr Opin Neurol*. 2012 Aug;25(4):433-47
Zelapar® (selegeleine hydrochloride tablet) [package insert] Aliso Viejo, CA: Valeant; 2009
Kaakkola S. Clinical pharmacology, therapeutic use and potential of COMT inhibitors in Parkinson's disease. *Drugs* 2000;59(6):1233-50

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CVS Pharmacy Takes Tobacco Off the Shelves

By: Ada Seldin, Staff Editor

CVS, the largest chain pharmacy in the United States, has announced that it will stop selling cigarettes and other tobacco products in its 7,600 retail stores on October 1, 2014. As such, CVS will be the first chain pharmacy in the U.S to remove tobacco products from its shelves. In the words of Larry J. Merlo, President and CEO of CVS Caremark, "the sale of tobacco products is inconsistent with our purpose."[1] This bold move may reduce cigarette consumption, as well as the organization's associated revenues. CVS is projected to lose $1.5 billion in tobacco sales and an additional $500 million in sales of other items to cigarette buying patrons. However, CVS executives assure shareholders that planned alternative ventures are expected to offset the profitability impact.[2] In addition, because cigarette packs are taxed at a rate of $5.85 in New York City, a large portion of the sales of cigarettes does not translate into profits for the company.

Perhaps coincidentally, CVS Caremark's announcement came just a month after the Surgeon General released the 2014 report on smoking, marking 50 years of progress.

Perhaps coincidentally, CVS Caremark's announcement came just a month after the Surgeon General released the 2014 report on smoking, marking 50 years of progress. One of the endgame strategies proposed in the report was greater restriction on sales, including bans on entire classes of tobacco products. The actions of CVS follow this strategy and thus further the Surgeon General's ultimate goals. The prevalence of smoking has declined from 42% in 1964 to the current 18%. However, it has remained relatively stagnant since 2002.[3] The drastic action of CVS displays the approach needed to eradicate the smoking epidemic.

President Obama, Health and Human Services Secretary Sebelius, as well as prominent figures from the American Cancer Society and American Medical Association, commend CVS for safeguarding their clients' health.[1] The paradox of selling cigarettes in pharmacies has long been disputed. In 2010, the American Pharmacists Association urged pharmacies to stop selling tobacco products and suggested that state boards refuse to renew licenses of pharmacies that did not comply with these standards. Other health-related organizations have lobbied for similar ends. As pharmacies are becoming more clinically oriented, offering wellness programs, patient counseling, and even primary care services from clinicians, selling cigarettes in the same establishments is ever more contradictory. Pharmacists provide nicotine replacement products and advice that empowers people to quit, and physicians in retail clinics treat chronic diseases with causal relationships to tobacco consumption, while cigarettes remain readily available behind the counter. CVS decided that exiting the tobacco market was vital to promoting health and revamping its image, sending a powerful message to other chain and supermarket pharmacies.[4] Whether the true motives behind CVS's actions were altruistic in nature, a ploy to earn good publicity, or a mixture of the two, the end result is unmistakably positive.

CVS also announced that it will launch a smoking cessation program in the spring. This program will provide pharmacy and Minute Clinic customers with smoking cessation treatment and information, including online resources. Members of CVS Caremark pharmacy benefit management will also be eligible for additional services.[1]

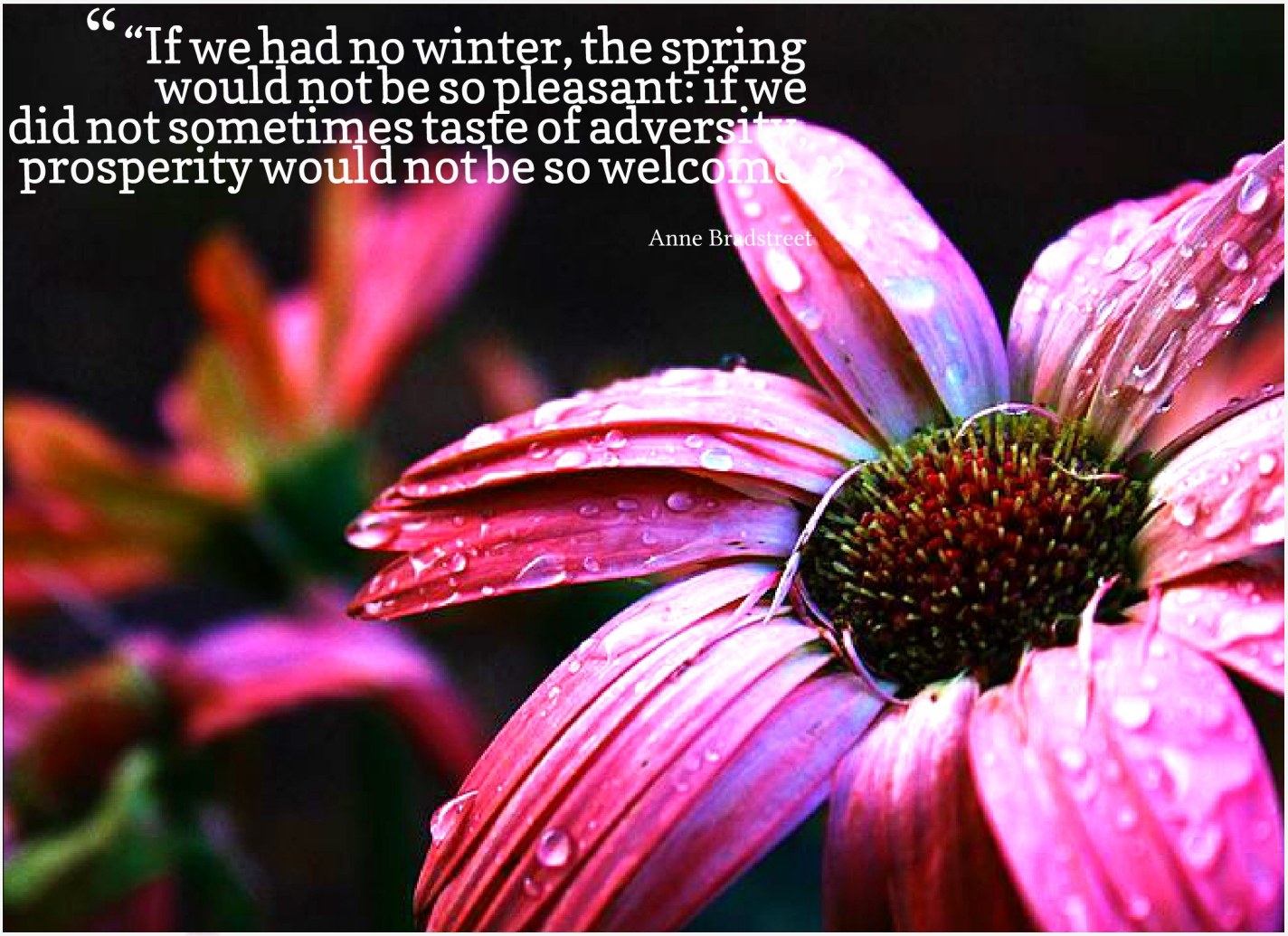
Whether other retail giants will follow suit is still unclear. According to representative Jim Graham, Walgreens continues to evaluate the pros of providing consumers what they want versus the negative impact of these products on their health.[1] Removing cigarettes from the shelves at CVS may or may not cause many people to quit, but it does send a clear message that smoking is inconsistent with healthy living. Furthermore, if other large pharmacies partake in the ban, the accessibility to tobacco products will be significantly reduced.

SOURCES:
1. Landau, E. CVS stores to stop selling tobacco. CNN Health. http://www.cnn.com/2014/02/05/health/cvs-cigarettes/ Updated February 5, 2014. Accessed March 1, 2014.
2. CVS Caremark to stop to stop selling tobacco at all CVS/pharmacy locations. CVS Caremark Website. http://info.cvscaremark.com/newsroom/press-releases/cvs-caremark-stop-selling-tobacco-all-cvspharmacy-locations Updated February 5, 2014. Accessed March 1, 2014
3. The health consequences of smoking —50 years of progress: a report of the surgeon general. Atlanta, GA: U.S. Department of Health and Human Services· CDC website. http://www.cdc.gov/tobacco/data_statistics/sgr/50th-anniversary/index.htm Accessed on Feb. 6, 2014.
4. Brennan, T. Ending sales of tobacco products in pharmacies. JAMA Online First. http://jama.jamanetwork.com/article.aspx?articleid=1828530. Updated February 5, 2014. Accessed March 1, 2014.

Quote of the Month

By Melissa Roy Co-Copy Editor (Graphics-Focused)

OPINIONS



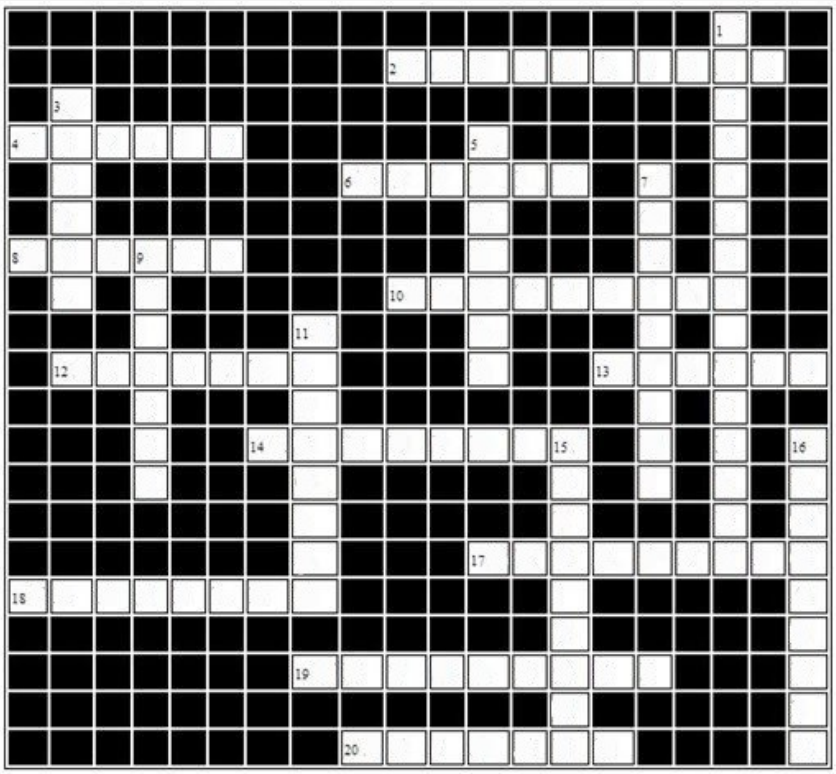
RHO CHI POST

Are You Smarter than a 6th Year?

Crossword Puzzle: Drug Top 200 Challenge

By: 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!



Across

2. Methotrexate
4. Famotidine
6. Terazosin
8. Ibandronate
10. Mupirocin
12. Risedronate
13. Irbesartan
14. Quinapril
17. Fentanyl
18. Tizanidine
19. Methadone
20. Rabeprazole

Down

1. Benzonatate
3. Ferrous Sulfate
5. Finesteride
7. Albuterol + Ipratropium
9. Sumatriptan
11. Polyethylene Glycol
15. Clotrimazole + Betamethasone
16. Nifedipine

Answers

PUZZLES

Matching Column: Look-Alike Sound-Alikes

By Sherine Jaison
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

1. **An antibiotic used for the treatment of UTIs caused by E. coli, S. aureus, Enterococcus, Klebsiella and Enterobacter**	A. Namenda
2. **Used for complete or partial reversal of opioid drug effects and management of opioid overuse**	B. Nortriptyline
3. **Used in combination with triamcinolone for the treatment of cutaneous candidiasis**	C. Nevirapine
4. **An NNRTI that can be used in pregnancy that is contraindicated in moderate to severe hepatic impairment**	D. Niacin
5. **Commonly seen side effect with the medication is flushing which can be reduced by titration or by taking aspirin before the medication**	E. Nitrofurantoin
6. **Used to treat angina and is contraindicated in patients on PDE-5 inhibitors**	F. Nystatin
7. **Commonly used antidepressant that can also be used in combination with fluphenazine to treat Irritable bowel syndrome and diabetic neuropathy**	G. Nitrogylcerin
8. **A penicillin used to treat osteomyelitis, septicemia, endocarditis and CNS infection**	H. Naloxone
9. **Commonly seen as a OTC medication to treat redness of eye due to irritation**	I. Naphazoline
10. **An NMDA receptor antagonist used to treat Alzheimer's disease**	J. Naficillin

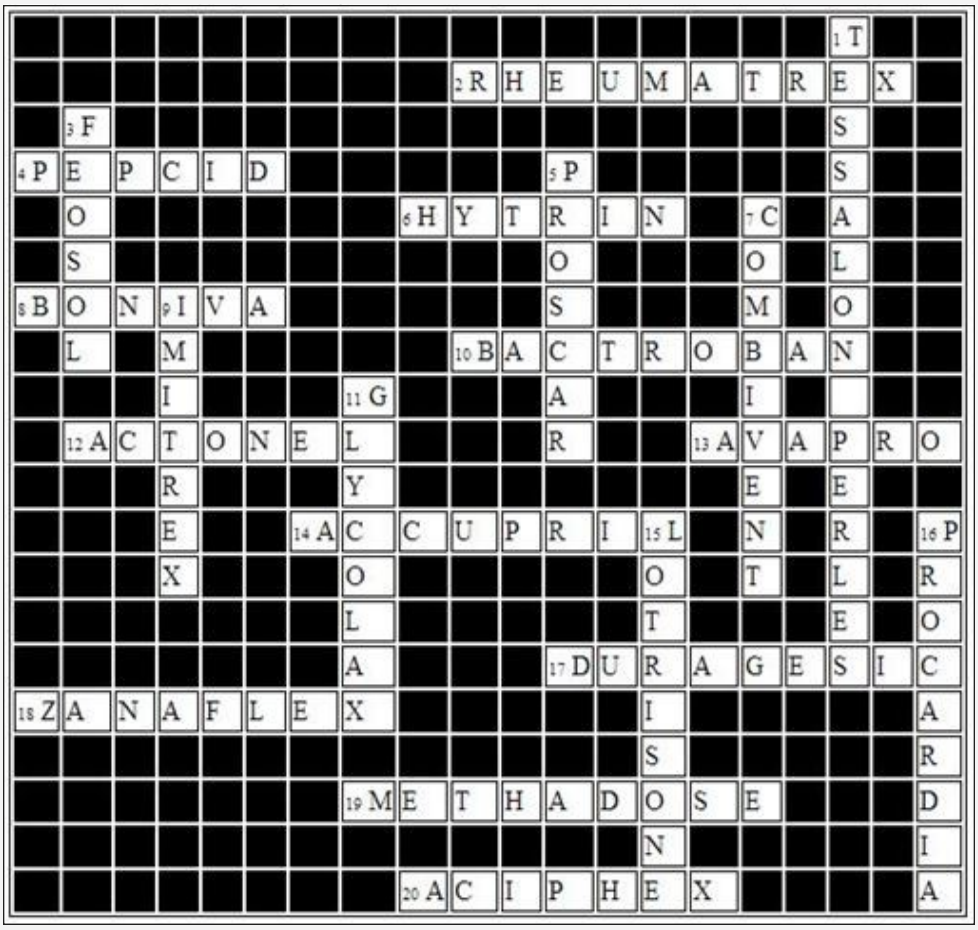
Lexi-Comp OnlineTM , Lexi-Drugs OnlineTM , Hudson, Ohio: Lexi-Comp, Inc.; January 1st, 2014

PUZZLES

How Did You Do???

Answers to Crossword & Look Alike and Sound Alike

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



Do you enjoy our puzzles?

Send us a suggestion for a brainteaser at

RhoChiPost@gmail.com

We will feature your work in our next issue!

RHO CHI POST: TEAM MEMBERS

EDITORS

@ 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.

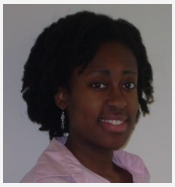
@ Erica Dimitropoulos ***(5th Year, STJ; Co-Copy Editor [Content-Focused])***
As busy student pharmacists, we often fail to keep current with healthcare developments. My aim is to sort through the news and provide quick updates that are important to our profession. Feel free to contact me if there are any topics you would like to see covered in the next issue!

@ 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.

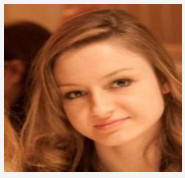
RHO CHI POST: TEAM MEMBERS

@ 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.



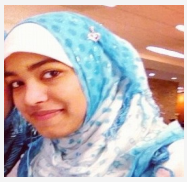
@Davidta Brown ***(3rd Year, STJ; Senior Staff Editor)***
My two great loves are innovative science and quality writing, and the Rho Chi Post is an insightful combination of both. As an editor, I look forward to bringing relevant information and fresh perspectives to the student and faculty of St. John's University, as well as to making the Rho Chi Post a newsletter that offers something new to every reader.

@ Beatrisa Popovitz ***(5th Year, STJ; Senior 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.

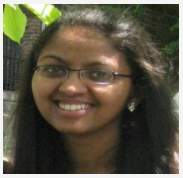


@ Ada Seldin ***(5th Year, STJ; Staff Editor)***
I am thrilled to have become a new member of the Rho Chi Post team. I hope to further strengthen the goals of this newsletter and make a lasting contribution. It is important, as future pharmacists, to collaborate with our peers, as well as accomplished 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.



@ Fatema Elias ***(4th Year, STJ; Staff Writer)***
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.



@ Sherine Jaison ***(5th Year, STJ; Staff Writer)***
I find the Rho Chi Post extremely informative and am eager to join the team. I hope my articles will enlighten you about the recent developments in the field of pharmacy and will help you to be a well-informed healthcare provider.

@ *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, 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

Anthony, Tyler, Sara, Tasnima, Joshua, Fawad at the 2014 Induction Ceremony

President: **Tyler Valente**
Vice President: **Fawad Piracha**
Secretary: **Tasnima Nabi**
Treasurer: **Anthony Nania**
Historian: **Sara James**
Media Relations Coordinator **Joshua Bliss**
Faculty Advisor: **S. William Zito, PhD**

UPCOMING EVENTS

Apr 30-May 4: NYSCHP Annual Meeting
Saratoga Springs, New York

May 18: Commencement Day
St. John's University

May 17-20: NABP Annual Meeting
Phoenix, Arizona

Jun 15-19: DIA Annual Meeting
San Diego, California