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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

The Dangers of Intrathecal Baclofen

By: Ada Seldin, Staff Editor

Intrathecal baclofen (ITB) is indicated for the treatment of intractable spasticity caused by spinal cord injury, multiple sclerosis, spinal ischemia or tumor, transverse myelitis, cervical spondylosis, cerebral palsy, and degenerative myelopathy.[1] Baclofen inhibits both monosynaptic and polysynaptic reflexes at the spinal cord level by decreasing excitatory neurotransmitter release from primary afferent neurons. An analog of gamma-aminobutyric acid (GABA), the drug may act as an agonist at GABAb receptor sites.[2] Activation of the G protein-coupled GABAb receptors on presynaptic terminals leads to a decrease in calcium influx, and therefore a decrease in neurotransmitter release.[3]

The intrathecal route of administration allows for the achievement of therapeutic cerebrospinal fluid (CSF) concentrations while maintaining a safe plasma concentration. To achieve the same CSF levels by oral administration, the plasma concentration would be increased 100-fold. Continuous infusion of intrathecal baclofen generally produces antispastic effects six to eight hours after initiation, reaching its peak effect at 24 to 48 hours. Continuous delivery of baclofen is accomplished via the use of a surgically implanted pump into the abdomen.[2]

Prior to pump implantation, patients must demonstrate a positive clinical response to a bolus dose of intrathecal baclofen (Lioresal®). During this screening phase, 50 mcg of baclofen in 1 ml is injected into the intrathecal space over at least one minute, and the patient is observed for the next four to eight hours. A positive response is defined as a significant decrease in muscle tone, and in frequency and/or severity of spasms. If the response is subclinical, a second bolus injection of 75 mcg in 1.5 ml may be administered 24 hours after the first, and finally a third at 100 mcg in 2 ml, another 24 hours later.

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NEWS

Scientists Finally Discover How HIV Progresses to AIDS

By: Sabrina Ahmed, PharmD Candidate c/o 2017

Over the decades, one of the biggest mysteries encountered by researchers has been why so many CD4 T-cells die when one is infected with Human Immunodeficiency Virus (HIV).[1] CD4 T-cells are an integral part of the immune system as they locate pathogens and signal other immune cells for the destruction of the pathogen. The HIV attacks these cells, and as the number of CD4 T-cells are depleted, the patient becomes more susceptible to "opportunistic infections," or infections that he or she would normally be able to fight off. Typically, a healthy individual has a CD4 T-cell count of between 500-1500 cells/mm^3. HIV treatment begins when a patient's CD4 T-cell count drops below 350 cells/mm^3 and an individual is considered to have AIDS when this count becomes 200 cells/mm^3 or fewer.[2] While treatment with antiretroviral drugs (ARVs) has helped HIV patients live longer by keeping the disease in a period of latency, a new drug has shown promise in aiding patients when the HIV virus starts killing off these T-cells rapidly.[3]

Researchers at Greene laboratory at Gladstone Institute of Immunology and Virology have revealed that the other 95% of T-cell death, including that of the resting cells, is caused by a process called pyroptosis.

Why CD4 T-cells die so rapidly in HIV infections has never been properly understood, but researchers have speculated that a specific type of apoptosis is involved.[1] Scientists have known that some T-cells become virus-replicating units while the rest of the T-cells become resting cells, which are infected by HIV that do not replicate the virus. Researchers proposed that the infected T-cells either died from having too much of the virus in them, causing the T-cells to burst, or from the immune system's innate suicide signals that prevent further spread of the virus. The former occurs in replicating cells, and the latter occurs in resting CD4 T-cells. Scientists believed the majority of CD4 T-cell deaths results from those that actively replicate the virus. However, the number of infected cells is too low to account for the high death toll of CD4 T-cells in HIV patients.[4] They were aware that a small fraction of T-cells underwent a "capsase-3-mediated" apoptosis, but this process only accounted for about 5% of the total CD4 T-cell deaths, which includes both resting and replicating cells.[1] Researchers at Greene laboratory at Gladstone Institute of Immunology and Virology have revealed that the other 95% of T-cell death, including that of the resting cells, is caused by a process called pyroptosis.[1,5] This process is mediated by capsase-1, an enzyme that initiates inflammatory responses, which is triggered by an abortive viral infection, when the infected cell is not able to replicate the virus. In pyroptosis, a type of programmed cell death that results in a severe inflammatory response, pro-inflammatory cytokines are released, attracting more CD4 T-cells to the site and prompting these cells to undergo pyroptosis as well. This causes a large number of CD4 T-cells to die. The discovery of the mechanism of pyroptosis has helped explain the two hallmark signs of AIDS, which are CD4 T-cell depletion and chronic inflammation.[1]

While most studies that dealt with infected CD4 T-cells haven't been able to explain the death of resting CD4 T-cells, the discovery of pyroptosis in HIV progression has shed light on the this matter. The scientists at Gladstone started looking for ways to halt pyroptosis by studying the spleen, tonsil, and lymph-node tissue samples from HIV-infected patients. This revealed that in the cells that experience abortive infection, there are fragments of HIV DNA

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left behind, which trigger pyroptosis. Researchers manipulated genetic information in the CD4 T-cells in spleen and tonsil tissues to determine what part of the cell recognizes the HIV DNA fragments and prompt caspase-1 to initiate cell suicide and the accompanying inflammation.[5] Analyzing the DNA of the T-cells using mass spectroscopy and using the process of elimination yielded a protein called IFI16 to be the target for this process.[4] In the presence of HIV DNA fragments, IFI16 sends signals to caspase-1, which activates pyroptosis.[5]

The discovery of the exact mechanism by which resting CD4 T-cells undergo pyroptosis may be integral in slowing down the progression of HIV. Once the body detects the deaths of these CD4 T-cells, it produces more T-cells. Unfortunately, the body cannot keep up with the rate of loss of the cells, which leads to the onset of AIDS, and rendering the patient vulnerable to opportunistic infections. To our advantage, a new anti-inflammatory drug under clinical trials targets pyroptosis. Vx-765, under development by Vertex Pharmaceuticals, may be able to block the enzyme caspase-1 and halt T-cell death.[3,6] Phase 2 trials have been proposed in which the drug and ones similar to it will be tested for its ability to block inflammation and pyroptosis in infected hosts. While it will take many years before this drug may be considered an option of HIV therapy, being able to find agents that target the pathway shows promise.

HIV virus quickly develops drug resistance to traditional ARVs; however, anti-inflammatory drugs like VX- 765 would target the host's pathway instead of the virus, bypassing the mechanism of resistance. Furthermore, the anti-inflammatory drug could act as a bridge therapy for those who do not have access to ARVs. Targeting pyroptosis could also delay the onset of age-related diseases such as dementia, heart attacks, and cancer that are exacerbated by inflammation.[6] Reduced inflammation would also slow down the expansion of the latent virus in the body, leading to slower progression of HIV to AIDS.[5] Drugs such as VX-765 may stop the "body's own destructive response to HIV," according to Dr. Kathryn Monroe, one of the two leading authors of the study at Gladstone lab.[6]

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Evzio™ – New Naloxone Auto-Injector For Opioid Overdose

By: Diana Gritsenko, PharmD Candidate c/o 2015

NEWS

Drug overdose is a serious problem in the United States. In 2010, drug overdose caused more deaths among adults within the ages of 25 and 64 years than motor vehicle accidents. The Center for Disease Control (CDC), ran an analysis that showed drug overdose death rates have been steadily rising since 1992, with a 102% increase from 1999 to 2010.[1] This increase in overdose related deaths runs parallel with a 300% increase in the sale of prescription painkillers (opioids) since 1999.[2] To help control and lower the risk of death, the Food and Drug Administration (FDA) approved naloxone hydrochloride auto-injector, Evzio™, as a take-home antidote for opioid overdose. It was granted a fast-track designation under the FDA's priority review program, which was created in order to expedite the review of drugs that fill an unmet medical need.[3]

Naloxone hydrochloride is an opioid antagonist that has a great affinity for the mu, kappa, and sigma receptors in the central nervous system. It is used for the reversal of life-threatening respiratory depression caused by opioid overdose and has become standard treatment. The previously existing forms of naloxone, such as Narcan, had to be administered by trained medical personnel typically in the emergency department or an ambulance. Now, patients, family members, and caregivers can administer naloxone by the intramuscular or subcutaneous route to both adults and children.[3]

Drug overdose is a serious problem in the United States. In 2010, drug overdose caused more deaths among adults within the ages of 25 and 64 years than motor vehicle accidents.

Each prescription of Evzio™ will come with two Evzio™ auto-injectors (0.4mg naloxone each) and a black-and-white trainer that can be used over 1,000 times for practice. Although the Evzio™ device comes with an automated voice that instructs users on how to administer the medication, practice with the trainer is still recommended. Certain opioids may have a longer half-life than that of naloxone. Therefore, it may be necessary to administer naloxone every 2-3 minutes while waiting for emergency medical help to arrive. For this reason, patients are encouraged to speak to their prescribers regarding a refill of their prescription even if they have only used one auto-injector.[4]

There are a few considerations that should be addressed with Evzio™. Evzio™ is administered to both adult and pediatric patients in the same way as an EpiPen®- through the anterolateral aspect of the thigh. However, in pediatric patients under the age of one, it is necessary to pinch the thigh muscle while administering the drug in order to ensure that the drug is deposited into the muscle.[4] In patients who are opioid dependent, abrupt reversal may precipitate a severe opioid withdrawal. Although opioid withdrawal in general is not life threatening, it is very uncomfortable. Patients can experience agitation, anxiety, muscle aches, insomnia, sweating and a host of other symptoms.[5] A final consideration involves those patients who present with opioid overdose due to buprenorphine, pentazocine, or other partial opioid agonists. In these patients, the administration of naloxone may produce an incomplete reversal of respiratory depression. Additionally, larger doses and longer duration of administration of naloxone are required for buprenorphine, due to its long duration of action and subsequent slow dissociation from the opioid receptor.[4]

Evzio™ is the first handheld auto-injector made available to patients and caregivers for the treatment of opioid overdose. While it may be too early to assess the impact of this medication, it is important to counsel patients and their loved ones on the signs/symptoms of opioid overdose, the proper administration of the medication, and the importance of seeking emergency medical help.

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New Considerations for Testosterone Therapy

By: Jenny Park PharmD Candidate c/o 2015

Testosterone is a hormone essential to male development. However, treatment of testosterone deficiency is FDA approved only when accompanied with another medical condition such as failure of testicles to produce testosterone due to chemotherapy or even genetic conditions.[1] In 2011, 5.3 million prescriptions for testosterone were written in the United States. Treatments for low testosterone are now at an estimated $2 billion a year in the U.S. Up to 25% of testosterone prescriptions are written without the healthcare provider checking a man's testosterone level.[2] Testosterone therapy is prescribed to men in order to increase hormone levels and improve sex drive, bone density, and muscle mass. However, the benefits and risks of long-term testosterone therapy are not well known. Testosterone therapy may be associated with a higher risk of heart attack, stroke, and death.[3] The FDA has launched an investigation to weigh the benefits against the risks after two large new studies—"Association of Testosterone Therapy With Mortality, Myocardial Infarction, and Stroke in Men With Low Testosterone Levels" and "Plos One Study"—linked prescription testosterone therapy to an increased risk for cardiovascular events.[4]

The FDA was prompted to reassess the cardiovascular safety of testosterone therapy by an observational study of U.S. Veterans published in the Journal of the American Medical Association (JAMA) in November 2013.[1,4] The men included in this study had low serum testosterone (<300 ng/dL) and underwent coronary angiography (imaging of the blood vessels of the heart) in the Veterans Affairs (VA) system between 2005 and 2011. The subjects of the study were a mix of people who received testosterone treatment and those who did not. The study published in JAMA reported a 30% rise in the risk for stroke, heart attack (MI) and death in men 60 or older who were prescribed testosterone. Of the 7,486 patients who did not receive testosterone therapy, 681 died, 420 had MIs, and 486 had strokes. Among 1,223 patients receiving testosterone therapy, 67 died, 23 had MIs, and 33 had strokes.[4] *Prima facie*, it appears as if the group receiving testosterone had fewer adverse consequences, but these numbers are confounded by the fact that the men who received testosterone were more likely to be younger and to have fewer comorbidities than those who did not receive testosterone. Therefore, after considering the inherently increased risk of adverse outcomes for older patients and those with comorbidities, it was concluded that testosterone therapy increased the risk of adverse outcomes among the men in the VA health care system. [4]

In the PLOS ONE study, the researchers compared rates of heart attacks in 55,593 middle-aged and older men in the 90 days after they received a new testosterone prescription with rates during the year prior to the initial prescription. Also, pre- and post-prescription heart attack rates were compared to a control group of 167,279 men who were treated for erectile dysfunction with sildenafil (Viagra®) and tadalafil (Cialis®). It was found that men who received testosterone therapy, the risk for non-fatal heart attack jumped by 36% in the 90 days after starting the use of testosterone. Among men age 65 an older, rate of heart attack soared by 219% in 90 days among those who received testosterone therapy, whether or not they had a history

of heart disease. In men under 65, those with a prior history of heart disease had nearly tripled the 90-day heart attack risk. Regardless of these cardiovascular related events, physicians should always talk about the risks and benefits and long term effects of taking any hormonal therapy in order to better educate their patients.

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Pharmacy Lobby Day

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

During Pharmacy Lobby Day, pharmacists and students from all over New York gather at the capitol in Albany to meet with various members of Congress to discuss the state of pharmacy. This year, similar to previous years, a group of students and faculty from St. John's University trekked up to Albany to make their voices heard. The opening session of Lobby Day was filled with inspiring speeches and words of encouragement from various members of Congress and PSSNY. Participants were separated into over 50 different groups and given various appointment times to meet with members of Congress. Here, they were able to convey concerns about various bills that would affect the future of pharmacy and healthcare as a whole.

I was a part of a group of students who were meeting with Congress members from Brooklyn and Orange County. It was an amazing experience to meet with our own congress members who, before then, were mere names on placards that littered streets and yards around election months. Of the two meetings, one was actually with my own town's congressman, James Skoufis. Congressman Skoufis left a lasting impression – he was both courteous and eager to be involved in any effort that helped our district. He was truly interested in the laws that were directly affecting pharmacists, local independent pharmacies, and patients. He promised his support in Congress for the four major bills that we brought to his attention during the meeting.

At each meeting, we went over the four major bills that are currently affecting the face of Pharmacy. The first piece of legislature brought up was the Fair Generic Pricing Legislature, a bill of particular interest to those practicing in community pharmacies. The purpose of the bill is to enforce transparency on the part of pharmacy benefit managers (PBMs) and to demand more timely and properly handled adjustment of generic pricing disputes.

In normal situations, the prices of generic medications decrease over time. Recently however, there have been a slew of shortages and warehouse back orders of medications that have caused the cost of medications to skyrocket. Pharmacies are seeing prices jump by over 100-200% in a matter of days. However the reimbursement from insurance agencies is still based on the lower cost causing pharmacies to eat up the cost, fight with the insurance companies for proper reimbursement, or turn away their patients. Larger chains are able to afford the cost difference, or have their legal team fight for proper reimbursement. However, independent pharmacies are the suffering; they are forced to turn away their patients, leaving them without medication until the reimbursement can be adjusted, or sending them to another pharmacy altogether.

If this bill is passed it will require weekly updates on changes to the maximum allowable cost list, the ability to retroactively receive reimbursement on prescription claims, and create some much needed fairness in the contractual relationship between community pharmacies and PBMs.

The second topic discussed was regarding the Anti Mandatory Mail Order legislation (AMMO), which was passed in assembly in 2013. The original piece of legislature had several terms and conditions which had to be met in order for community pharmacies to be qualified to provide service to patients, as opposed to forcing the patient to rely on Mail Order. Some of the terms and conditions included having a nurse on site 24/7 even though most pharmacies are not open 24 hours. It also required pharmacies to pay obscene amounts to be certified by various institutions to be included in the "in-network"

pharmacy list of the various insurance companies. The hope of this revision is to address the inequities brought on by the strenuous? Terms and conditions and ensure that the patient and their needs are given primary importance, and that they have the right to choose whether they want to use mail order or their local pharmacy.

The third bill discussed was the Immunization Authority Legislation, which was originally passed in 2008. Currently; the bill only allows pharmacists to administer immunization against the flu, pneumonia, shingles and meningitis. With the expansion of this bill, pharmacists will also be able to administer Tdap (combined Tetanus, Diphtheria and Pertussis vaccines). The bill will also eliminate the need for a patient specific order to be provided for the shingles vaccine, and most importantly eliminate the various sunset dates on the existing law and make pharmacist immunization authority permanent.

St. John's students and faculty representing New York State pharmacists at Lobby Day.

It is a widely accepted fact that pharmacists are the most easily accessible healthcare professionals in the country, which makes pharmacists the most obvious choice for public health initiatives such as immunizations. Pharmacists are trained to immunize, have a vast knowledge of medications, are always available to the public to answer any questions or concerns and New York is actually among one of the last states to not permanently authorize pharmacists to administer vaccinations.

The last piece of legislature is the expansion of pharmacist authority for collaborative drug therapy management (CDTM). This law plays the biggest role in allowing for the expansion and betterment of healthcare and the profession of pharmacy. CDTM allows for pharmacists and physicians/ nurse practitioners to work together to manage drug therapy and overall patient care to ensure that the best regimen is selected for the patient and that patient care is optimized.

The current law only allows for CDTM to occur in teaching hospitals and is also due to sunset this year; the hope is for the bill to be renewed and possibly to increase the reach of the law to include pharmacists outside of teaching hospitals. Collaborative therapy is the most efficient and effective way of guaranteeing optimal healthcare. Each member of the healthcare team brings a different perspective and insight, which when combined together allows for the best treatment regimens, better outcomes, and a decrease in hospital readmissions. CDTM will play a key role in creating a better and healthier future for the American public.

The importance of Lobby Day is often underplayed. It is an opportunity to make our voices heard, and fight for what we believe is vital to the prosperity of our profession and healthcare as a whole for the state of New York. People will constantly complain about the lack of change and oppressive laws and regulations, but are unwilling to make an effort to change the situation in their favor. By attending Lobby Day students are displaying that they want change, are willing to speak up, and make the effort to see that change occur. The congressmen and senators are placed in office by the votes of the people, so they have an obligation to work for the people and fight for their beliefs. Each and every law that was discussed and highlighted during Lobby Day will impact how the graduating classes of pharmacy school's will practice; it will determine the future pharmacist's role as healthcare providers and vital members of society. We can either sit back and let things happen to us, or stand together and speak up for ourselves, our profession and above all our patients.

CLINICAL

The Dangers of Intrathecal Baclofen Continued

By: Ada Seldin, Staff Editor

Once the pump is implanted, the agent should be titrated, beginning at an initial daily dose (over 24 hours) of twice the screening dose that produced a positive response. If the therapeutic response lasted for more than 8 hours in the screening phase, the titration dose should be limited to the screening dose. In either case the dose should not be increased in the first 24 hours. Afterwards, the daily dose is slowly increased by 10-30% every 24 hours for adults with spasticity of spinal cord origin and by 5-15% for adults with spasticity of cerebral origin to achieve a desired clinical effect. Maintenance doses usually fall between 300 mcg and 800 mcg per day in patients with spasticity of spinal cord origin and between 90 mcg and 703 mcg to treat spasticity of cerebral origin. During periodic refills of the pump, the daily dose should be increased by no more than 40% in spinal cord spasticity and 20% in cerebral spasticity.[2]

In 2008, Baclofen (Lioresal®) ranked third amongst all prescription drugs for reported serious, disabling, and fatal injuries. These may have been caused by complications in the catheter that delivers the drug directly to the CSF. Medtronic, which markets the delivery system—Synchromed® pump and delivery catheters—as well as the medication, issued an urgent safety alert warning healthcare providers and patients that sudden discontinuation of baclofen can result in substantial morbidity and mortality.[4] Symptoms of withdrawal include high fever, altered mental status, exaggerated rebound spasticity and muscle rigidity. In rare cases, symptoms can progress to rhabdomyolysis, multiple organ-system failure, and death. Abrupt drug discontinuation is mainly attributed to disconnection or blockade of the catheter to the pump, low volume in the pump reservoir, and end of pump battery life.[2] One of the changes that may indicate such a complication is a sudden increase in the required therapeutic dose.

Another risk of intrathecal baclofen administration is the potential for overdose. Overdose of intrathecal baclofen can produce drowsiness, lightheadedness, dizziness, respiratory depression, and seizures. In an acute, large overdose, patient may be driven into a coma. Multiple factors, including pump malfunction, improper refilling procedures, and dosing error, can lead to overdose. The following are some case reports of what may result in an overdose.

Due to its design, one model of the Medtronic SynchroMed® infusion pump demands special care to be taken during refills to avoid potentially fatal consequences. The pump has two access ports: one central injection port leading to the drug reservoir, and a peripheral port that leads directly into the catheter connected to the intrathecal space. The latter is mainly used for myelography, removal of CSF, or catheter troubleshooting. In an attempt to curb errors, Medtronic provides distinct kits with instructions and warnings for each port. The refill kit (for the central port) contains a thicker needle that is not compatible with the catheter port, which will only accept a thinner needle. However, the warnings written on the packaging may be overlooked, resulting in using the catheter kit for refills instead of the designated refill kit. Doing so would introduce large doses of drug directly into the CSF, resulting in overdose. The FDA has received reports of fatal overdoses of concentrated morphine through the catheters of these pumps.[5]

Errors can also occur in the programming of the pumps. SynchroMed II® pumps have several programming options, one of which is the "flex mode," permitting programmable dosing variations throughout the day depending on the severity of symptoms. In early 2010, a physician accidentally changed the total daily delivery of baclofen instead of the morning bolus dose he had intended to increase, which lead to an overdose for the patient who was suffering from muscle spasticity. This resulted in 13 days of hospitalization for persistent weakness in his legs.[6]

Another case of baclofen overdose sheds light on the potential for erroneous calculations if the drug remaining in the space between the reservoir and catheter access port is not taken into account. A 45-year-old woman had her pump and catheter emptied of baclofen 2000 mcg/mL in order to adjust the dose to 1000 mcg/mL. Because the subsequent priming bolus did not account for the baclofen remaining

in the space between the reservoir and catheter access port, an overdose occurred.[7] In the event of an overdose, the baclofen solution should be removed from the pump as soon as possible and the patient should be intubated, if necessary, until the drug is cleared. The mean CSF clearance of intrathecal baclofen is 30 ml/hr. If lumbar puncture is not contraindicated, 30-40 mL of CSF can be withdrawn to reduce the baclofen concentration in the CSF.[2]

Although intrathecal baclofen is effective in increasing the functionality and quality of life of patients with spasticity, 20-30% of these patients experience complications, including overdose, withdrawal, equipment protrusion, CSF leaks, and infections. A retrospective study conducted at the New York University Langone Medical Center (NYULMC) on 87 patients undergoing ITB pump-related procedures concluded that many of the associated complications were preventable with better patient selection, surgical technique, and post-operative follow-up.[8] As with any medication, it is important to be mindful of potential dangers that may present itself at any point.

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RHO CHI POST
CLINICAL CORNER

Common Combining Terms, Prefixes & Suffixes

By: Beatrice Popovitz, Senior Staff Editor

COMMON MEDICAL ABBREVIATIONS			
CARDIOLOGY		**DIGESTIVE**	
ACS	Acute coronary syndrome	BE	Barium enema
AFib	Atrial fibrillation	FOBT	Fecal occult blood test
AV	Atrioventricular	GERD	Gastro esophageal reflux disease
BP	Blood pressure	IBS	Irritable bowel disease
CABG	Coronary artery bypass graft	PEG	Percutaneous endoscopic gastrostomy
CAD	Coronary artery disease	RLL	Right lower lobe
CBC	Complete blood count	RML	Right middle lobe
CCU	Coronary care unit	RUL	Right upper lobe
CHF	Congestive heart failure	URI	Upper respiratory infection
CPK	Creatine phosphokinase	**OPTHALMIC/OTIC**	
CRP	C reactive protein	ARMD	Age related macular degeneration
DVT	Deep vein thrombosis	IOP	Intraocular pressure
ECG,EKG	Electrocardiogram	OSA	Obstructive sleep apnea
ECHO	Echocardiogram	AOM	Acute otitis media
HCT	Hematocrit	EENT	Eyes, ears, nose, and throat
Hgb	Hemoglobin	ENT	Ears, nose, and throat
MI	Myocardial infarction	OM	Otitis media
PT	Prothrombin time		
PTCA	Percutaneous transluminal coronary angioplasty	**NERVOUS**	
RESPIRATORY		AD	Alzheimer's disease
ABGs	Arterial blood gases	PD	Parkinson's disease
CF	Cystic fibrosis	TIA	Transient ischemic attack
COPD	Chronic obstructive pulmonary disease	ALS	Amyotrophic lateral sclerosis
CT	Computed tomography	CP	Cerebral palsy
CXR	Chest radiograph (xray)	**ENDOCRINE**	
LLL	Left lower lobe	DM	Diabetes mellitus
LUL	Left upper lobe	FBS	Fasting blood sugar
OSA	Obstructive sleep apnea	HbA1C	Glyosylated hemoglobin
PE	Pulmonary embolism	T4	Thyroxine level
PFTs	Pulmonary function tests	**ONCOLOGY**	
RLL	Right lower lobe	Ca	Carcinoma
RML	Right middle lobe	Chemo	Chemotherapy
RUL	Right upper lobe	Dx	Diagnosis
URI	Upper respiratory infection	Mets	Metastasis
URINARY		Px	Prognosis
BUN	Blood urea nitrogen	XRT	Radiation therapy
HD	Hemodialysis		
SG	Specific gravity		

CLINICAL

Reviewed by: Dr. S. William Zito

CLINICAL

CARDIAC	
Angi/o	Vessel
Aort/o	Aorta
Arteri/o	Artery
Phleb/o, ven/o	Vein
Ventricul/o	Ventricle
Isch/o	Deficiency, blockage
Thromb/o	Clot
Ather/o	Yellowish, fatty plaque
Brady-	Slow
Tachy-	Fast
-apheresis	Removal
-odynia	Pain
-sclerosis	Hardening
-poiesis	Formation
RESPIRATORY	
Pleur/o	Pleura
Pneum/o, Pneumat/o, Pneumon/o, Pulmon/o	Lung, air
Sept/o	Septum
Thorac/o	Thorax (chest)
Trache/o	Trachea
Nas/o, Rhin/o	Nose
Capn/o	Carbon dioxide
Orth/o	Straight
Spir/o	Breathing, breathe
Py/o	Pus
Tachy-	Fast
-algia	Pain
-ectasis	Dilation, expansion
-pnea	Breathing
-rrhagia	Rapid blood flow
-stenosis	Constriction, narrowing
DIGESTIVE	
An/o	Anus
Antr/o	Antrum
Or/o, Stomat/o	Mouth
Proct/o, Rect/o	Rectum
Gastr/o	Stomach
Abdomen/o, Celi/o, Lapar/o	Abdomen
Cholangi/o Chol/e	Bile duct Bile, gall
Col/o, Colon/o Enter/o	Colon (large intestine) Colon (small intestine)
Hemi-	Half
-pepsia	Digestion

NERVOUS	
Encephal/o	Brain
Myel/o	Spinal cord
Neur/o	Nerve
Radic/o, Radicul/o, Rhiz/o	Nerve root
Esthesi/o	Sensation, sensitivity, feeling
Phas/o	Speech
Poli/o	Gray matter
-iatry	Treatment, specialty
-ictal	Seizure, attack
-paresis	Slight paralysis
OPTHALMIC/OTIC	
Ocul/o, Opthalm/o	Eye
Cor/o, Core/o, Pupil/o	Pupil
Dacry/o, Lacrim/o	Tear, tear duct
Retin/o	Eyelid
Sclera/o	Sclera
Blephar/o	Eyelid
Cry/o	Cold
Dipl/o	Two, double
Ton/o	Pressure, tension
Aur/i, Aur/o, Ot/o	Ear
Vestibul/o	Vestibule
-opia	Vision
-plegia	Paralysis
ENDOCRINE	
Aden/o	Gland
Cortic/o	Cortex
Acr/o	Extremities, height
Calc/i	Calcium
Dips/o	Thirst
Kal/i	Potassium
Natr/o	Sodium
-drome	Run, running
URINARY	
Cyst/o, Vesic/o	Bladder
Pyel/o	Renal pelvis
Nephr/o, Ren/o	Kidney
Azot/o	Urea, nitrogen
Lith/o	Stone, calculus
-megaly	Enlargement
-ptosis	Drooping, sagging
-trophy	Nourishment, development

Reviewed by: Dr. S. William Zito

COMMON DRUG ABBREVIATIONS		OTHER PRESCRIPTION ABBREVIATIONS	
APAP	Acetaminophen	SSRI	Sliding scale regular insulin
ARA A	Vidarabine	SSI	Sliding scale insulin
ARA C	Cytarabine	AD, AS, AU	Right ear, left ear, each ear
ASA	Aspirin	OD, OS, OU	Right eye, left eye, each eye
AZT	Zidovudine (Retrovir)	D/C	Discharge or discontinue
BC	Birth control	HS	Half strength
CPZ	Compazine	hs	At bedtime
DM	Dextromethorphan	qd/QD	Every day
DPT	Demerol-phenergan-thorazine	od, OD	Once daily
HCT	Hydrocortisone	qod	Every other day
HCTZ	Hydrochlorothiazide		
MgSO4	Magnesium sulfate		
MS, MSO4	Morphine sulfate		
MTX	Methotrexate		
PCA	Procainamide		
PTU	Propylthiouracil		
T3	Tylenol with codeine No. 3		
ZnSO4	Zidovudine (Retrovir)		
"Nitro" drip	Nitroglycerin infusion		
"Norflox"	Norfloxacin		
"IV Vanc"	Vancomycin		

MUSCULOSKELETAL	
Cost/o	Rib
Crani/o	Skull
Humer/o	Humerus
Lumb/o	Lumbar region of the spine
Mandibul/o Maxilla/o	Mandible (lower jawbone) Maxilla (upper jawbone)
Patell/o	Kneecap
Phalng/o	Fingers or toe bones
Rachi/o	Spine
Radi/o	Radius (lower arm bone)
Arthr/o	Joint
Chondr/o	Cartilage
Sym-, Syn-	Together
Supra-	Above
-asthenia	Weakness
-clasia, -clasis, -clast	Break
-physis	Growth
-schisis	Split, fissure

CLINICAL

SOURCE:
LaFleur Brooks, Myrna, RN, BEd, and Danielle LaFleur Brooks, MEd, MATLA. *Exploring Medical Language , A Student-Directed Approach.* 7th ed. St. Louis: Mosby Elsevier, 2009. Print.

Reviewed by: Dr. S. William Zito

I Have a Problem

By: Sang Hyub Kim, DPM Candidate c/o 2018, New York College of Podiatric Medicine

I was diagnosed with ulcerative colitis in 2009. For the past five years, I have literally taken tons of immunosuppressant medications, ranging from corticosteroids (prednisone), to chemotherapeutics (6-Mercaptopurine) in an effort to suppress the inflammation in my colon. Currently, I inject adalimumab (Humira®) into my thigh every two weeks, hoping for a remission.

Ulcerative colitis (UC) is an autoimmune disease that triggers inflammation in the large intestine, causing ulcers and open sores. In severe cases, scar tissues may form and the infected colon must be surgically removed and replaced via a colostomy. During a colostomy, a surgeon creates a stoma, a hole that connects an organ to the outside environment, in the healthy section of the colon to bypass the rectum and anus. As a result, a patient who undergoes a colostomy must wear an ostomy pouching system to collect intestinal waste.

UC is a chronic illness. Unlike other conditions affecting the gastrointestinal (GI) system, like the stomach flu virus or diarrhea, UC persists forever and cannot simply be cured with an antidiarrheal medication (e.g. loperamide) or a healthy diet. It is a physiological problem and must be medically monitored and properly controlled with prescribed medications and physician's visits.

Along with Crohn's disease, ulcerative colitis is classified as an Irritable Bowel Disease (IBD). Crohn's disease manifests the same signs and symptoms as UC, but it affects the entire GI tract, from the mouth to the anus. IBD is sometimes called an "invisible illness," for a patient can appear physically normal and even be happy, but is using the bathroom more than ten times a day, often discharging mucous and bloody diarrhea behind closed doors.

Personally, I have found UC to be socially debilitating as a result of its flare-ups and inflammation. It is hard for me to simply enjoy a beautiful day or to take a stroll in the park without worrying about where the bathroom is. Especially in public places, such as subways or the mall, with no access to a bathroom, I find it difficult to control my bowel movements and many times defecate in my pants. Moreover, the numerous side effects of the drugs I am taking, ranging from nausea to insomnia can sometimes drain my life, causing lethargy, apathy, and hopelessness.

Unlike HIV or cancer, there is a relatively small amount of government funding and support for IBD. Moreover, there is no conclusive scientific research on the relationship between a diet and IBD. Current research states that IBD can be triggered by both genetics and environmental factors such as stress, sleep, diet, infection, or unknown causes. However, physicians and scientists still cannot pinpoint to one source or cure for IBD. There are still a great deal of studies to be done on its cause, treatment, and remission.

Although there is no permanent solution now for IBD, there has been significant progress and development in treatment of IBD in recent

Despite the lack of clear answers, I am still optimistic about the future of patients dealing with IBD. Although there is no permanent solution now for IBD, there has been significant progress and development in treatment of IBD in recent years. Living in the United States in this particular generation, I am privileged to administer adalimumab. There are additional medications, such as intravenous infliximab (Remicade®) and oral mesalamine (Pentasa®) to experiment with in the future. Through writing about IBD and speaking directly to IBD patients in various support groups, I hope to continue to raise social awareness. With persistent education and fundraisers, future generations of IBD patients can hopefully have an easier time coping medically, mentally, and socially.

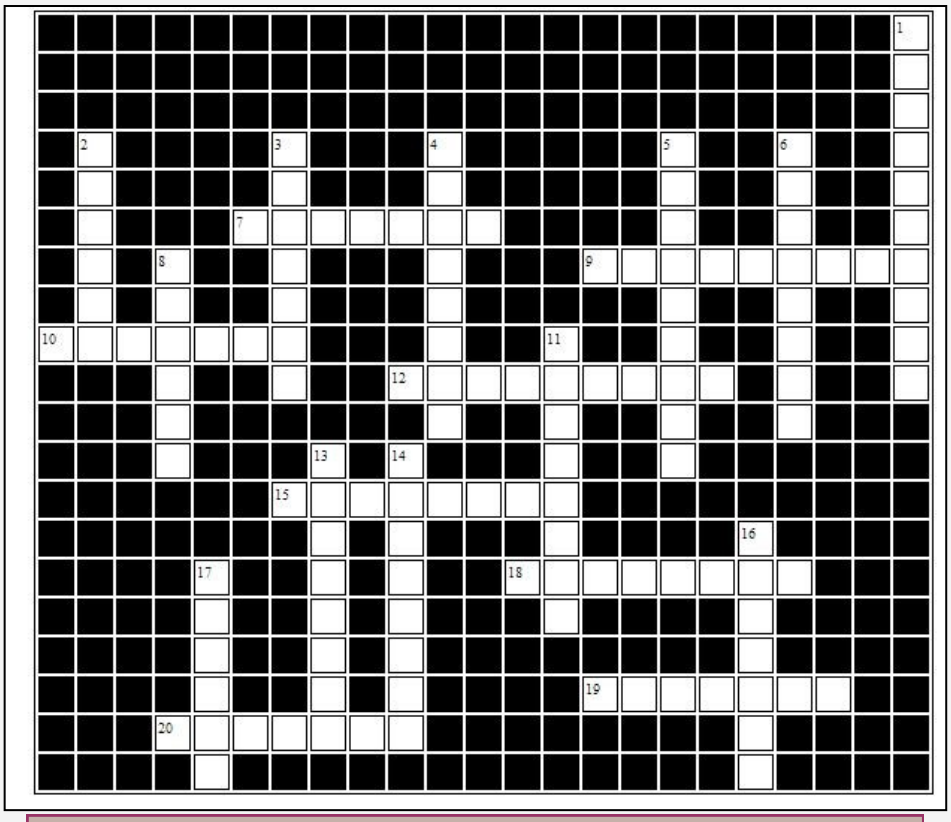
RHO CHI POST

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

7. Dutasteride
9. Hydroxychloroquine
10. Nortriptyline
12. chlorpheniramine + hydrocodone
15. Oxybutynin
18. Baclofen
19. Ketoconazole
20. Moxifloxacin

Down

1. Hydralazine
2. Levetiracetam
3. Vardenafil
4. Phenazopyridium
5. Atomoxetene
6. Benzatropine
8. Moxifloxacin
11. Phenytoin
13. Lidocaine patch
14. Pantoprazole
16. Colchicine
17. Cefuroxime Axetil

Answers

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

Matching Column: Look-Alike Sound-Alikes

1. A medication that can cause fluid retention and is contraindicated in congestive heart failure
2. A medication that is not recommended in patients above 75 because of increased chance of bleeding and in patients who weigh less than 60kg
3. Used to treat abnormal uterine bleeding because of hormonal imbalance
4. A proton pump inhibitor that can also be used for the prevention of GI bleeding in patients receiving antiplatelets
5. A medication used to treat allergic conjunctivitis
6. A HMG-CoA inhibitor that is contraindicated in patients with active liver diseases
7. A yellowish tinge of the skin or sclera while on this medication may indicate accumulation due to impaired renal function and the need to discontinue therapy
8. An SSRI that is also marketed as Brisdelle to treat the vasomotor symptoms of menopause
9. A protease inhibitor that is approved in ages 3 and up and is coadministered with norvir
10. A combination medication used to treat H.Pylori infection

A. Paroxetine

B. Prasugrel

C. Pravastatin

D. Prezista

E. Pantoprazole

F. Progesterone

G. Prevpac

H. Patanol

I. Pioglitazone

J. Pyridium

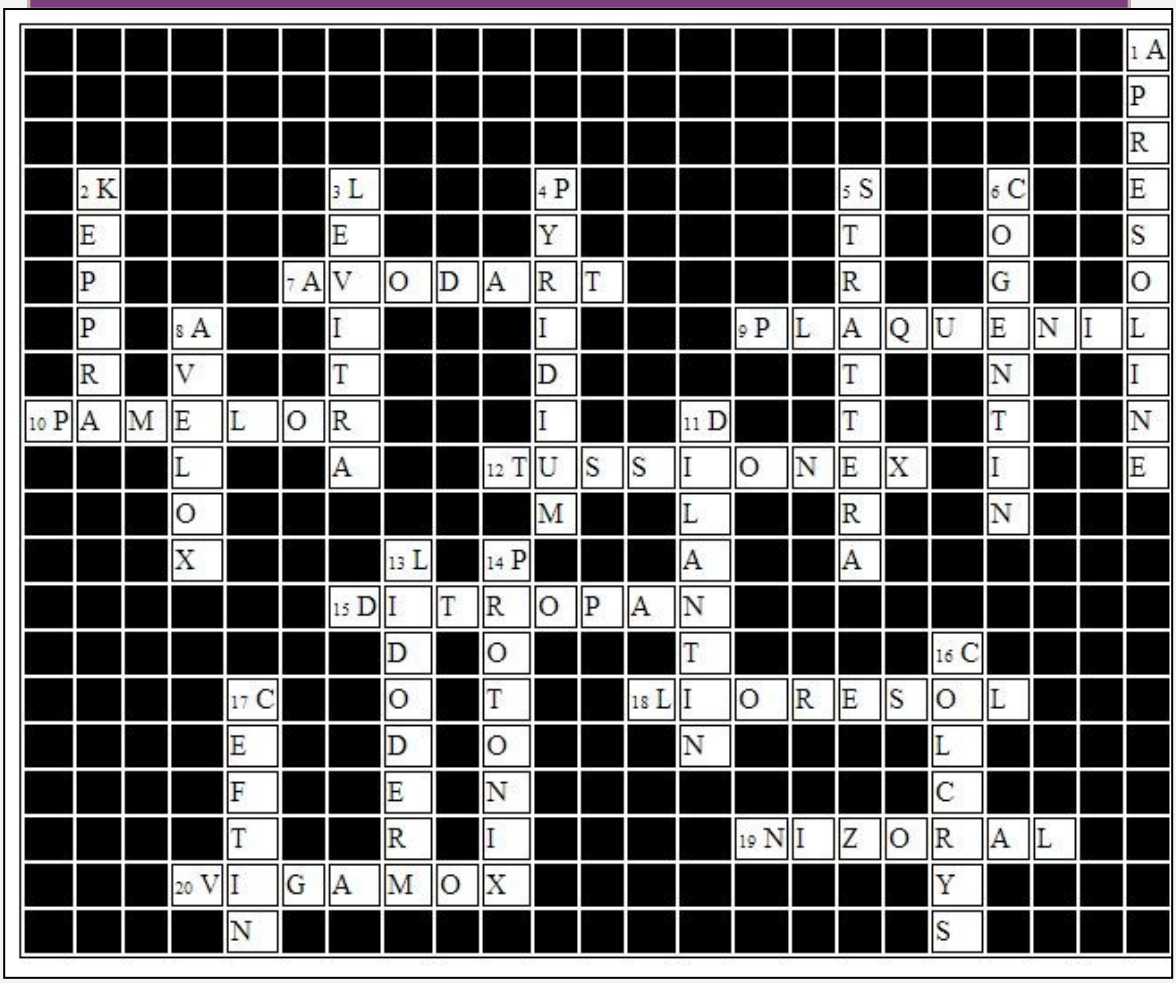
Lexi-Comp OnlineTM , Lexi-Drugs OnlineTM , Hudson, Ohio: Lexi-Comp, Inc.; January 1st, 2014

PUZZLES

How Did You Do???

Answers to Crossword & Look Alike and Sound Alike

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



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

@ Katharine Cimmino ***(6th 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, 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 ***(6th 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 ***(5th 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.

EDITORS

@ Erica Dimitropoulos ***(6th 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 ***(PharmD, 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!

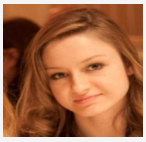
@ Melissa Roy ***(6th Year, STJ; Co-Copy Editor [Graphics-Focused])***
We as future healthcare professionals owe it to our patients and ourselves to become aware and current on the events affecting our profession. The Rho Chi Post is our way to learn new things and stay in touch with the pharmacy world, 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 ***(4th 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.

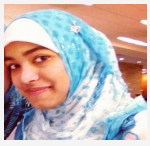
@Davidta Brown ***(4th Year, STJ; Senior Staff Editor)***
My two great loves are innovative science and quality writing, and the Rho Chi Post is an insightful combination of both. As an editor, I look forward to bringing relevant information and fresh perspectives to the student and faculty of St. John's University, as well as to making the Rho Chi Post a newsletter that offers something new to every reader.

@ Beatrisa Popovitz ***(6th 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.



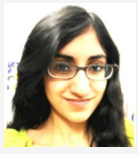
@ Ada Seldin ***(6th Year, STJ; Staff Editor)***
I am thrilled to have become a new member of the Rho Chi Post team. I hope to further strengthen the goals of this newsletter and make a lasting contribution. It is important, as future pharmacists, to collaborate with our peers, as well as accomplished professionals in the field. Rho Chi Post provides a vehicle to voice our opinions and share relevant news.

@ Sang Hyo Kim ***(3rd 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 ***(5th 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 ***(6th 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.



@ Azia Tariq ***(4th Year, STJ; Staff Writer)***
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.

?

@ *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

Jul 7-8: Novel Cancer Therapeutics Summit
Boston, MA

Jul 9-11: Infectious Diseases World Summit
Boston, MA

Aug 20-22: National Pharmacy Preceptors Conference
Washington D.C.

Sept 17-19: Current Topics in Healthcare: Series XIX
Las Vegas, NV