# RHO VOLUME 2, ISSUE 10

A STUDENT-OPERATED NEWSLETTER BY THE

ST. JOHN'S UNIVERSITY COLLEGE OF PHARMACY AND HEALTH SCIENCES' RHO CHI BETA DELTA CHAPTER

#### Inside This Issue

Public Health Degree	1
Superbug	4
Vaccine Costs	6
Compounding	7
PSSNY Convention	9
HIMSS Conference	11
Opioid Overdose	14
Quote of the Month	15
HCV Enigma	16
Genetic Testing	20
Journey to a PharmD	22
Crossword Puzzle	23
Look-Alike Sound-Alike	24
Puzzle Answers	25
Editorial Team Bios	26
Upcoming Events	28
About Us	28

#### Faculty Spotlight: Dr. Heather Mavronicolas Forges the Path for Public Health Degree

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

The College of Pharmacy and Health Sciences has officially launched a Master of Public Health (MPH) degree program and accepted applications for Fall 2013. Public Health has become an increasingly important area of study over the years as our country experiences rising numbers of chronic disease, health care costs, and health disparities. Public health professionals promote healthy lifestyles and disease prevention through planning, monitoring, and evaluating. Ensuring proper public health in communities also increases access to health care.

Heather Mavronicolas, PhD, MPH, has a dual appointment as the Director of the Master of Public Health degree program and Assistant Professor-Industry Professional at St. John's University. Before joining St. John's University in October 2012, she was the Director of Quality Management and Special Projects for the New York City Department of Health and Mental Hygiene's HIV Care, Treatment, and Housing Program. She coordinated and oversaw the quality management contract and program conducted through the New York State Department of Health AIDS Institute. She reviewed work plans, budg-

ets, scope of services, and updated the quality management contract annually. Dr. Mavronicolas also supported planning for regional quality learning networks. She conducted research that informed planning for Ryan White Part A-funded services in New York City, a program that offers HIV-related services to uninsured and underinsured patients. The research included an analysis of disparities in community viral load in NYC,



#### Single Line Stories

- Welcome to our new editors! -

- Follow us on Twitter @RhoChiPost and on Facebook: FB.com/RhoChiPost -

#### WWW.RHOCHISTJ.ORG

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

VOLUME 2, ISSUE 10 Page 2

and a study that examined collaborative practice amongst HIV primary care providers and case managers in NYC.

RHOCH post

Prior to holding prestigious positions, Dr. Mavronicolas was involved in public health efforts. One experience that resonates with her is a volunteer community sanitation project in rural Paraguay that she participated in at the young age of 17. Dr. Mavonicolas spent her summer in a town with no running water and electricity. Here, she oversaw latrine construction for the town and often participated in "charlas", or health education talks. The experience was very humbling and it made her critically think about poverty and social justice. After obtaining her undergraduate degree in International Relations, Dr. Mavoronicolas took her experiences and knowledge a step further and chose to pursue public health. She wanted to make a difference on local and global levels, and she knew that public health would be the ideal path.

When asked to define public health, Dr. Mavronicolas quoted C. E. A. Winslow: Public health is

"the science and art of preventing disease, prolonging life, and promoting health and efficiency through organized community effort for the sanitation of the environment, the control of communicable infections, the education of the individual in personal hygiene, the organization of medical and nursing services for the early diagnosis and preventive treatment of disease, and for the development of the social machinery to insure everyone a standard of living adequate for the maintenance of health, so organizing these benefits as to enable every citizen to realize his birthright of health and longevity."<sup>1</sup>

Public health professionals work to improve and protect the health of populations by performing an array of essential public health services, evaluating population-based health services, researching new solutions to health problems, and educating a community about health issues. She further explained that public health is grounded in science, embraces a social justice philosophy, focuses on prevention, and that government plays a large role. **BACK TO COVER** 

Dr. Mavronicolas explained that public health protects the health of communities and responds to public health issues. Public health also prevents epidemics and the spread of disease, assures the quality of health services, promotes and encourages health behavior, and protects against environmental hazards.<sup>2</sup> There are a vast number of conditions that influence health and well-being, which both contribute to life expectancy, quality of life, mortality, and health disparities. Some of the public health challenges that New York State faces include high rates of cardiovascular disease, low graduation rates, and a high percentage of children in poverty. Health disparities are marked in New York City with respect to HIV/AIDS mortality, childhood mortality, diabetes hospitalization rates, pneumonia hospitalization rates, and teenage pregnancies.

When asked why she chose to join St. John's University, Dr. Mavronicolas explained that the University's Vincentian values, commitment to service learning, diversity, and prime location in the heart of Queens, all are invaluable qualities that will help the MPH program grow and prosper. She also added that the program will integrate the University's Vincentian mission to address poverty and social injustice.

The mission of the MPH program at St. John's University College of Pharmacy and Health Sciences is "to promote public health, with the goal of empowering individuals to work with both local and global communities to improve health, prevent disease, and protect the public."<sup>3</sup> It is a 45-credit graduate program that offers coursework and fieldwork experience (internship) with concentrations in community health and global health. Fulltime students can complete the program in two years, and part-time students can complete the program in up to five years.

An MPH degree will offer graduates significant career opportunities. Public health professionals are in high demand and can work in various settings and disciplines. For instance, public health professionals with a concentration in global health can work as in-field consultants, researchers, program managers and administrators, health educators, and health policy analysts. Professionals with VOLUME 2, ISSUE 10 Page 3

a concentration in community health can work in private and public settings as program planners, community health educators, outreach specialists, health promotion coordinators, and health advisors. The range of career opportunities is tremendous and the degree is a great addition to the vast array of programs that the St. John's University College of Pharmacy and Health Sciences offers. With a Masters in public health, people can go off in any direction to help improve the health of local, national and global communities.

Dr. Mavronicolas' qualifications and past experiences show how dedicated and passionate she is about public health. Her knowledge will allow St. John's University to develop a program that is uniquely intertwined with its own mission. The addition of the MPH program will surely strengthen St. John's University's Vincentian values.

#### Sources:

1. Winslow CEA. "The Untitled Field of Public Health." *Mod Med.* 1920;2:183-191.

2. "Public Health in America." *health.gov.* May 1, 2008. Available at: http://www.health.gov/phfunctions/public.htm. Accessed July 2, 2013

3. "About the Program." St. John's University. Available at: http://www.stjohns.edu/academics/ graduate/pharmacy/departments/pas/ master\_of\_public\_health\_/about\_the\_program\_. Accessed July 2, 2013

COLLEGE

## For More Information Visit: http://www.stjohns.edu/mph

For any Questions, Contact Heather Mavronicolas, PhD, MPH Tel: (718) 990-8456 E-mail: <u>mavronih@stjohns.edu</u>

## Get your writing published. Submit your articles to the Rho Chi Post!

RHOCH post

Want to write, but need some ideas? Visit our website:

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

**\*\*Register for an account to use this feature\*\*** 

St. John's University

**OF PHARMACY AND HEALTH SCIENCES** 



## Superbug Makes Super Waves in Hospitals Across America

By: Beatrisa Popovitz, Staff Editor

NEWS

For the past decade, antibiotic resistant bacteria have been a growing concern in healthcare. Over the last few months, there has been a great deal of media attention surrounding strains of drug resistant bacteria in hospitals across the United States. Most recently, there has been an increased effort to raise awareness of deadly infections attributed to carbapenem-resistant Enterobacteriaceae (CRE), and an urgency to implement a public health intervention that prevents and retards the spread of infection. Dr. Tom Frieden, the director of the Centers for Disease Control and Prevention, described CRE bacteria as a triple threat through resistance, mortality, and spread of disease.<sup>1</sup> They are resistant to all or nearly all antibiotics, they have high mortality rates, killing one in every two patients with CRE bloodstream infections, and they easily transfer antibiotic resistance to other bacteria, making spread of infection all the more frequent and dangerous.<sup>2</sup>

Enterobacteriaceae, like Klebsiella and E. coli, are components of the body's natural gut flora, but have the potential to cause infection in other organs and organ systems outside of the gut region. In addition, certain types of bacteria may become resistant to antibiotics via various mechanisms, such as genetic mutation or attainment of antibacterial resistance from other bacteria via the conjugation process, which transfers genes encoding for antibacterial resistance from one bacterium to another.<sup>3</sup> This antibiotic resistance is largely attributed to the growing trend of overuse and misuse of antibiotics. The reason why this deadly CRE infection is dominant in healthcare settings like hospitals and nursing homes is due to the fact that it targets individuals who are already being treated for other conditions. Thus, the greatest risk lies with patients on long-term antibiotic treatments. The CRE find invasive gateways through the lungs, urinary tract, and bloodstream, rendering patients who are on ventilators, bladder catheters, or IV catheters susceptible to CRE infection.<sup>5</sup> Also, CRE spread easily via person-to-person contact within the healthcare setting.

Despite the fact that the CDC has recently found growing concern for CRE infections, this infection is not an uncommon phenomenon in our nation's healthcare history. In the past decade, healthcare facilities in 42 states have been linked to CRE infections. In the past year, approximately 4% of hospitals and about 18% of long-term acute care hospitals in the United States had at least one patient with a CRE infection.<sup>6</sup> The former statistic increased by 3% since 2001.<sup>1</sup> The increase in prevalence and the dire consequences of the CRE infections have led the CDC to implement serious precautionary and preventative measures, including healthcare provider adherence to the 2012 CRE Toolkit.

This Toolkit provides healthcare providers a guided approach to prevention and handling of CRE infection cases in their healthcare facilities. Some key recommendations include the enforcement of infection control precautions, grouping infected patients together, using antibiotics wisely, and screening patients to determine if they may be carrying CRE.<sup>7</sup> Access to the Toolkit can be found on the CDC's website. In addition, the website also features an extensive display of information concerning health care provider detection of CRE infections. Prevention is most often stressed because CRE are resistant to a wide range of antibiotics, which limits treatment options. CRE may however show susceptibility to a couple of antibiotics, and treatment is usually given on a case-by-case basis.8

New advancements in technology, such as germzapping robots, are rolling into healthcare facilities fully loaded in the war against superbugs that are difficult to treat. These germ-zapping robots have the ability to sterilize hospital surfaces and sanitize rooms by delivering ultraviolet light or hydrogen peroxide vapors. These machines can surely disinfect, but are rather costly, fairly new, and have not yet been proven to completely prevent infections and/or deaths.<sup>9</sup> In addition, it is much easier to combat bacteria like *Clostridium difficile* as opposed to Methicillin-resistant *Staphylococcus Aureus* (MRSA) and CRE, so the cost-effectiveness of acquiring such machinery in healthcare facilities is often questionable.

For now, awareness and prevention appear to be the most underscored methods of combating infections caused by the CRE superbugs. Healthcare professionals, patients, and associated staff in Page 5 VOLUME 2, ISSUE 10

healthcare facilities are urged to take part in the initiative to halt the spread of these infections by practicing proper sanitizing techniques and adhering to CDC guidelines.

#### Sources:

RHOK

 Shelton DL. Antibiotic-resistant bacteria called CRE small in number but seen as deadly threat. Chicago Tribune Website. 19 March 19, 2013. Available at: <http:// articles.chicagotribune.com/2013-03-19/health/ctmet-superbugs-cre-20130319\_1\_carbapenemresistant-urinary-tract-infections-antibiotic-resistantbacteria>. Accessed May 29 May, 2013.
New CDC vital signs: lethal, drug-resistant bacteria spreading in U.S. healthcare facilities. Centers for Disease Control and Prevention Website. March 13,. 2013. Available at: <http://www.cdc.gov/media/ dpk/2013/dpk-vs-hai.html>. Accessed May 29,2013.

3. General Background: About Antibiotic Resistance. Tufts University Website. 2012 29 May 2013. Available at: <a href="http://www.tufts.edu/med/apua/">http://www.tufts.edu/med/apua/</a> about\_issue/about\_antibioticres.shtml>. Accessed May 29, 2013

4. Grady D. Deadly bacteria that resist strongest drugs are spreading. The New York Times Website.

March 5, 2013. Available at: <a href="http://">http://</a> www.nytimes.com/2013/03/06/health/deadlydrug-resistant-infections-rise-in-hospitals-reportwarns.html?\_r=0>. Accessed on May 29, 2013. 5. Carbapenem-resistant Enterobacteriaceae (CRE). Centers for Disease Control and Prevention Website. May 9, 2013. Available at: <a href="http://www.cdc.gov/">http://www.cdc.gov/</a> hai/organisms/cre/>. Accessed May 29, 2013 6. Making health care safer. Centers for Disease Control and Prevention Website. March 5, 2013. Available at: <a href="http://www.cdc.gov/vitalsigns/HAI/">http://www.cdc.gov/vitalsigns/HAI/</a> CRE/index.html>. Accessed May 29, 2013 7. "CDC: action needed now to halt spread of deadly bacteria." Centers for Disease Control and Prevention Website. March 5, 2013. Available at: <http://www.cdc.gov/media/releases/2013/ p0305\_deadly\_bacteria.html>. May 29, 2013. 8. General information about CRE. Centers for Disease Control and Prevention Website. March 5, 2013. Web. Available at: <a href="http://www.cdc.gov/">http://www.cdc.gov/</a> hai/organisms/cre/cre-patientgeneral.html>. Accessed May 29, 2013. 9. Stobbe M. Germ-zapping 'robots': hospitals combat superbugs. Yahoo! News Website. April 29,

2013. Available at: <a href="http://news.yahoo.com/germ-zapping-robots-hospitals-combat-superbugs-140922678.html">http://news.yahoo.com/germ-zapping-robots-hospitals-combat-superbugs-140922678.html</a>>. Accessed May 31, 2013.

## Went to an event on your campus? Saw or learned something interesting?

## **SUBMIT YOUR PHOTOGRAPHS AND ARTICLES!**

Send them to our editors at RhoChiPost@gmail.com

and we will feature your work in our next issue!

NEWS

VOLUME 2, ISSUE 10 Page 6

RH

#### Lower Vaccine Costs for Developing Nations

By: Steve Soman, PharmD

NEWS

India has become a powerhouse in pharmaceutical manufacturing, often supplying generic alternatives at a fraction of the brand name cost to the developing world. Cheaper alternatives make costly drugs more affordable for poorer nations and NGOs.<sup>1</sup> Indian manufacturer Biological E. Limited, a biotech firm based in Hyderabad India, signed a deal with GAVI Alliance (formerly known as the Global Alliance for Vaccines and Immunisation), a bulk purchasing organization for poorer nations, to sell its five-vaccines-in-one product for a half the price. GAVI stated that the pentavalent vaccine will cost \$1.19 per dose, compared to \$2.17 per dose that they paid in 2012, potentially saving it up to \$150 million over the next four years.<sup>2</sup> The pentavalent vaccine protects against diphtheria, tetanus, whooping cough, hepatitis B and Haemophilus influenzae type B (Hib).<sup>2,3,4</sup>

Already, this news has a profound impact around the world. In Haiti, the vaccine can save the lives of 3,000 children every year.<sup>3</sup> The ability of GAVI to acquire these products at a reduced price may enable it to distribute these products at a lower cost or for free in the poorest of nations such as in wartorn Somalia.4 "The pentavalent vaccine is essential to fight childhood illness and reduce child mortality," says Jeannot François, Director of the Ministry of Health's Expanded Programme on Immunization. François continues, "Although it is too soon to measure the impact, early results show that communication and social mobilization have been effective, since many parents are now interested in a vaccine that was previously available only in the private sector. Now it is available free of charge for everyone."3

Availability of the vaccine at discounted prices allows poorer nations to subsidize costs for its citizens, enabling millions of poverty stricken families to vaccinate their children. In the case of Haiti, the free vaccine will enable infants to get vaccinated at 6, 10 and 14 weeks of age, as three doses are required to achieve lifelong immunity.<sup>4</sup> In Haiti alone, the Ministry of Health hopes to vaccinate approximately 288,000 children under the age of 1, and thus significantly reduce child mortality from preventable diseases.<sup>3</sup>

The reduction of price by Biological E. Limited enables organizations like GAVI to procure and distribute these vaccines to vast regions of the world at a fraction of the cost, and to cure people from diseases. The reduced cost of production and labor has resulted in Indian companies expanding rapidly into western markets as well as seen by some well known generic Indian manufactureres such as Sun Pharmaceuticals, Abbott Labs, Dr. Reddy's Laboratories, Ranbaxy, Lupin, Aurobindo, Cadila Healthcare, Jubilant Lifesciences, and Glenmark Pharmaceuticals.<sup>5</sup> Similar actions from various Indian manufacturers , such as CIPLA, continue to solidify India's position as the "pharmacy of the third world nation" while saving countless lives.<sup>1</sup>

#### Sources:

 Lofgren, H. Pharmaceutical companies putting health of world's poor at risk. Guardian News UK. July 26, 2012. Available at: http:// www.guardian.co.uk/global-development/povertymatters/2012/jul/26/pharmaceutical-companieshealth-worlds-poor-risk. Accessed June 6, 2013.
Indian Supply Drives Down the Cost of Childhood Vaccine. MedScape Pharmacists News. April 19, 2013. Available at: http://www.medscape.com/ viewarticle/802799. Accessed June 6, 2013.
New vaccine protects Haitian children from five diseases. World Health Organization. April 2013. Available at: http://www.who.int/features/2013/ haiti\_pentavalent\_vaccine/en/index.html. Accessed June 6, 2013.

4. Bile, K. Introduction of Hepatitis B and Haemophilus Influenzae Vaccines in Somalia. Hiiraan Online News. May 19, 2013. Available at: http:// hiiraan.com/op4/2013/may/29427/ introduc-

tion\_of\_hepatitis\_b\_and\_haemophilus\_influenzae\_va ccines\_in\_somalia.aspx. Accessed June 6, 2013. 5. APGENCO. List of Short Listed Pharmaceutical Companies. June 30, 2013. http:// www.apgenco.gov.in/administrator/uploadedfiles/ Pharmaceutical%2082%20Companies.pdf

VOLUME 2, ISSUE 10 Page 7



#### Compounding at a Crossroad: New Boundaries in the Aftermath of Tragedy?

By: Davidta Brown, Staff Editor

The debate on the nature of compounding practice and the extent to which it ought to be regulated has come to the forefront of public attention. Those who regularly follow American news and politics are familiar with the series of events that have led to the present discussion on reforming compounding regulation- mishaps and tragedies draw attention of both the media and the people to a previously overlooked aspect of American society, prompting calls for reform and new legislation. Often, the earnest desire for change today, when a fresh incident demands attention, is forgotten tomorrow. However, sometimes the mistakes of the past lead to lasting reforms, and the meningitis outbreak last Fall may fit this category. The well-publicized lapse in sterile procedures led to hundreds of cases of recurring illness and nearly fifty deaths across the nation. As a result, many believe that increased federal oversight is necessary to prevent future tragedy.

For those who support stronger regulation, an essential feature of the current debate over compounding pharmacy oversight is the gap in surveillance created by the rapid growth of compounding businesses in the last 10 to 20 years. There have always been the small "mom-and-pop" pharmacies that compound formulations one at a time as requested by a specific prescription. On the other end are the major drug manufacturers who mass-produce the one-size-fits-all medications that physicians prescribe. Now a new group has arisen- one that fits neither classification. These are the compounders that were once small businesses, but who now face overwhelming demand and may produce medication in anticipation of a prescription. These compounding pharmacies may also ship their formulations to customers in other states. This creates a level of complexity since different states often have unique regulations and procedures with regards to training pharmacy inspectors and handling sub-par pharmacy locations.<sup>1</sup> The New England Compounding Center (NECC), whose sterile injections were the source of the fungal meningitis outbreak that began in October 2012, was one of these indistinct, neither big nor small entities, and is now receiving close scrutiny.

After evaluating the events that took place at the NECC, the Senate Committee on Health, Education, Labor, and Pensions approved a new bill in late May that would, in theory, close the regulatory gap by defining three distinct types of compounding pharmacies.<sup>3</sup> As described by an article in *DIA Daily*, the bill would allow small compounding pharmacies to continue being regulated by state pharmacy boards and require large drug manufacturers to be regulated by the FDA. A third group, compounding manufacturers, would include compounders that produce sterile products without a prescription and ship across state lines.<sup>5</sup> The Pharmaceutical Compounding Quality and Accountability Act, which can be viewed in its entirety at

www.help.senate.gove/imo/

#### <u>me-</u>

<u>dia/052213 S. 959 Compounding KER13207.pdf</u>, would require said compounding manufacturers to register with the FDA and undergo regular inspections.<sup>2</sup>

The new act would signify a drastic departure from current federal regulation of compounding pharmacies, which is minimal. At present, the FDA defers regulation of compounders to state pharmacy boards, with federal involvement "anticipated" in the case of a necessary investigation. <sup>7</sup> Any federal oversight that does exist is present in Section 127 of the Federal FDA Modernization Act of 1997, which clarifies pharmacy compounding as a distinct practice, and exempts compounded drugs from some of the misbranding and approval requirements that exist for manufactured medications. <sup>4</sup>

Not surprisingly, this proposed legislation has not been welcomed unanimously, though disagreement seems to come from two opposing perspectives. Some, typically Republicans and compounding lobbyists, say that additional federal oversight is not the solution, and that the current system of regulation would have prevented the shipping of tainted drugs from the NECC, if pre-established protocols had been enforced.<sup>1</sup>

Others argue that the proposed legislation does not do enough to screen compounding manufacturers for safety. For example, the Pharmaceutical Com-

pounding Quality and Accountability Act excludes pharmacies that ship oral formulations and topical products, such as creams and gels. In addition, it has been argued that the bill does not provide a nationally applicable definition of "compounding manufacturer," which may leave room for intrastate interpretation and interstate confusion.<sup>5</sup> Finally, some suggest that if the definition of a compounding manufacturer is limited to compounders that ship drugs between states, there will be a loophole for those that produce massive amounts of medication, but sell exclusively to consumers within their home state. This perspective maintains that large-scale, intrastate compounders carry significant risk of harm if they are not regulated, and that state pharmacy boards may be unable to provide adequate surveillance.<sup>2</sup>

In addition to the bill proposed by the Senate sub-committee, other solutions have been suggested. One proposition involves the creation of a "Do Not Compound" list of medications, which compounding pharmacies would be completely prevented from producing.<sup>2</sup> This idea is generally unpopular, perhaps because it is viewed as an inappropriate and unjustified limitation on the practice of compounding imposed by an authority unfamiliar with the profession.

Another suggestion is to categorize all compounding pharmacies as manufacturers and subject them all to the same federal regulations.<sup>5</sup> In the event of an investigation, this method would facilitate the acquisition of company records by the FDA which, at present, sometimes needs a search warrant before such information can be obtained.<sup>2</sup> However, opponents of this proposition argue that improved federal access to records and regulatory processes would make *state* investigations more difficult, thus implying that the regulation of compounding should be a responsibility of the states.

Viewed from both political and historical perspectives, the compounding pharmacy debate is yet another manifestation of the tension between state and federal governments, as well as of the continual evolution in their respective responsibilities. Incidentally, this is not the first time that the question of who ought to regulate compounding pharmacies has been discussed. The 2002 Supreme Court case Thompson v. Western States Medical Center ruled that compounded drugs could be excluded from federal oversight.<sup>6</sup> However, current events could allow one

#### VOLUME 2, ISSUE 10 Page 8

RHO

to surmise that the old regulations are insufficient.

Originating as local healers concocting treatments on a need-basis, and now serving as a distinct branch in the practice of pharmacy, compounding pharmacy has come a long way to find itself at the present fork in the road. Whether the decision made today is for stricter federal regulation or for increased state surveillance, or even if no decision is made at all and the issue gets dismissed with the passage of time, there is no doubt that public trust in the institution of compounding pharmacy will be sincerely affected. And as pharmacy is a profession built strongly on patient trust, future developments in this debate will doubtlessly be of interest to all those involved in pharmacy practice.

#### Sources:

1. Associated Press. Oversight scant at specialty pharmacies nationwide: Report. Cbsnews.com. http:// www.cbsnews.com/8301-204\_162-57579549/oversight -scant-at-specialty-pharmacies-nationwide-report/. Published April 15, 2013. Accessed May 29, 2013. 2. DIA. HELP Committee Makes Progress on Draft Compounding Bill. DIA Daily. 2013. http:// mailview.bulletinhealthcare.com/mailview.aspx? m=2013051001dia&r=6020914-2eaf. Published May 10, 2013. Accessed May 29, 2013. 3. DIA. Senate Panel Advances Compounding-Pharmacy Oversight Bill. DIA Daily. 2013. http:// mailview.bulletinhealthcare.com/mailview.aspx? m=2013052301dia&r=6020914-43ba. Published May 23, 2013. Accessed May 29, 2013. 4. Lam C. Clemens R, Perkins D, Richmond F, eds. Pharmacy compounding – regulatory issues. http:// regulatory.usc.edu/Articles/PharmacyCompounding. Accessed June 26, 2013. 5. Sun, L.H. Senate panel approves tighter oversight of compounding pharmacies, but bill is under fire. The Washington Post. 2013. http://www.washingtonpost.com/ national/health-science/senate-panel-approves-tighteroversight-of-compounding-pharmacies-but-bill-underfire/2013/05/22/21869ac2-c303-11e2-9fe2-6ee52d0eb7c1\_story.html. Published May 22, 2013. 6. The Oyez Project at IIT Chicago-Kent College of Law. Thompson v. Western States Medical Center. http:// www.oyez.org/cases/2000-2009/2001/2001\_01\_344. Updated April 26, 2013. Accessed May 29, 2013. 7. US Food and Drug Administration. Compliance Policy Guidance for FDA Staff and Industry Sec. 460.200 Pharmacy Compounding. Washington, DC: US Food and Drug Administration; 2002. http://www.fda.gov/ICECI/ ComplianceManuals/CompliancePolicyGuidanceManual/ ucm0 74398.htm. Updated January 10, 2010. Accessed June 26, 2013.

#### **PSSNY Convention**

By Taryn Mondiello, PharmD Candidate Class of 2015

From June 7<sup>th</sup> to June 9<sup>th</sup>, pharmacists from all over New York State gathered at the LaGuardia Marriott in East Elmhurst for the 135th annual PSSNY summer convention. The Pharmacists Society of the State of New York, better known as PSSNY, was founded in 1879 and is the largest pharmacy organization in New York State. It is the umbrella organization of 12 different affiliates, including the New York City Pharmacists Society, Long Island Pharmacists Society, and societies from different regions all over the state. PSSNY's mission is to "consider and discuss matters of pharmaceutical interest with a view to the elevation and extension of pharmaceutical knowledge among pharmacists of the State of New York."1 The aim of the society is to "unite the pharmacists of the state for mutual assistance, encouragement, and improvement in order to maintain the standard of pharmacy practice at a high professional and ethical level."1 PSSNY's House of Delegates, which represents pharmacists from all over New York State, makes the society's policies. PSSNY also lobbies in Albany to preserve and expand pharmacists' rights.

This year's convention was held in New York City for a second time, and there was a great turnoutbringing together over 250 registrants and 49 exhibitors to East Elmhurst. The weekend was filled with multiple CE classes, meetings, and exhibits. Of course, the convention was not just about work and business but also about fun and socialization. On Friday night, a Mets game was scheduled, although it was cancelled due to rain. The next evening, over 130 guests danced the night away on a dinner cruise to Manhattan. And finally on the last night, the installation dinner inducted a new Executive Director, Tracey Russell. With the former Executive Director's resignation several months ago, the PSSNY Board of Directors had the difficult task of choosing a new Executive Director in between all of the convention activities.

Pictures of Event on Page 11

Page 9

RHO

**VOLUME 2, ISSUE 10** 

Arguably one of the most exciting events of the weekend was Friday's Student Pharmacists Jeopardy tournament that was centered on "self care and OTC medication." Students and faculty from pharmacy schools all over the state competed, including St. John Fisher, University of Buffalo, Albany College of Pharmacy, Long Island University, and our own St. John's University. Our team, headed by Associate Clinical Professor Dr. Mantione, held the lead the entire game. When the last question—"This is the organization that controls the advertising of non-prescription drug products"—was answered with "What is the FTC?" St. John's took home the prize with the final score of 13,000 points.

For many pharmacy students who are intimidated by the idea of joining professional organizations, it is important to note that PSSNY is not just for established pharmacists. Students can join PSSNY in their subsidiary organization, Student Pharmacists Society of the State of New York (SPPSNY), via the PSSNY website. It is never too early to get involved, as exemplified by several St. John's pharmacy students who volunteered to help with registering guests and distributing convention materials. As one of the students who participated in the event, I thought that it was quite an experience to see pharmacy in action. To see all that goes on behind the scenes of dispensing drugs, mainly PSSNY's hand in legislation, was educational. Even as students, it is important to be involved in organizations such as PSSNY not only for networking and socializing, but to really understand the ways in which students like us can unify to represent ourselves and the impact we can make on the future of our profession.

#### Source:

1. PSSNY Purpose. Pharmacist Society of the State of New York Inc. 2012. Available at: http:// www.pssny.org/displaycommon.cfm? an=1&subarticlenbr=2. Accessed July 1, 2013

For updates like our Facebook page:

https://www.facebook.com/RhoChiPost

#### **PSSNY Convention Pictures**

VOLUME 2, ISSUE 10 Page 10

RHC



St. John's University pharmacy students volunteering at the convention: from rear left to front right: Jenny Yoon (5<sup>th</sup> year), Renee Choi (5<sup>th</sup> year), Taryn Mondiello (5<sup>th</sup> year), Jeet Patel (5<sup>th</sup> year), Rincy Johnson (Class of 2013 graduate), and Marie Huang (Class of 2013 graduate)



St. John's University team warming up before the competition: from left to right—Vincent Certa (6<sup>th</sup> year), Dr. Mantione (faculty), Marie Huang (class of 2013 graduate), and Yining Shao (6<sup>th</sup> year).



St. John's University Jeopardy Champs pose with their plaque: from left to right Vincent Certa (6<sup>th</sup> year), Yining Shao (6<sup>th</sup> year), Dr. Mantione (faculty), and Marie Huang (class of 2013 graduate)

Photographs published for this article are approved by and are the sole property of College of Pharmacy and Health Sciences, and the Rho Chi Post.

All Rights are reserved.

It is unlawful to use these images without expressed written consent.

You can obtain use agreements by contacting the author and our staff editors at RhoChiPost@Gmail.com

St. John's University COLLEGE OF PHARMACY AND HEALTH SCIENCES

EVENTS

Pictures of Event on Page 14

Page 11 VOLUME 2, ISSUE 10

RHO<sup>P</sup>x

#### **The HIMSS Conference**

Tina Chang & Helen Dong PharmD Candidates Class of 2014

Ever been to a conference where all you do is tweet all day? That's exactly what we did at the New York State Healthcare Information and Management Systems Society (HIMSS) conference, where this year's focus was on the role of health information technology in disaster preparation. Using the social media page *Twitter*, we documented key ideas and facts that were discussed throughout the day.

This year, the New York State HIMSS conference was held at Lighthouse International in Midtown Manhattan (yes, the place they do screenings for Oscar-nominated films). The conference began with breakfast, a keynote presentation, and a stimulating panelist discussion on lessons learned from Superstorm Sandy. The groups then broke for lunch, in which they were given plentiful food for thought during discussions on pharmacy careers with Erin Mullen, president of RxResponse and Darren Triller, senior director of Health Care Quality Improvement at IPRO. After lunch, the conference broke up into three separate tracks: Pharmacy, Physician, and Technology.

#### Getting Down to Business with Health Information Technology

Dave Whitlinger, Executive Director of New York eHealth Collaborative, delivered the keynote speech on the Statewide Health Information Network of New York (SHIN-NY); the objective of SHIN-NY is to create a unified statewide network for Health Information Exchange (HIE) in order to improve continuity of patient care. After Director Whitlinger spoke, panelists from New York University (NYU), Federal Emergency Management Agency (FEMA), and Mount Sinai Medical Center facilitated a discourse on lessons learned from Superstorm Sandy. They all emphasized the need for redundancy and testing to prepare for future disasters. The panelists also discussed the importance of having multiple contingency plans for unpredictable situations and concluded that effective communication is the most crucial component in coordinating disaster response.

For instance, when NYU Hospital had to be evacuated in the wake of Superstorm Sandy, Mount Sinai opened new units to accommodate the influx of patients. Accommodations included using backup procedures to ensure standardization of care among patients of both hospitals. Pharmacists contributed by converting all orders to paper orders and entering them into the system so physicians that were not employed by Mount Sinai could prescribe for patients that were displaced there. As a result, this standardization prevented discrepancies in care by using pharmacists at the front line. In the end, the success of the response to Sandy was due to communication and cooperation among all members of the interdisciplinary team.

#### Pharmacists' Role in Emergencies

Later that afternoon, we attended the pharmacy breakout session and heard from the New York State Dental Association (NYSDA), Dr. Erin Mullen of RxResponse, and St. John's very own Dr. Vibhuti Arya. Besides learning some fun facts about dentistry and using teeth to identify dead bodies, we discussed the importance of electronic records and off-site storage of important information, particularly in times of disasters when physical records can be completely destroyed. Pharmacist Erin Mullen then took the stage to discuss the importance of pharmacies in disasters. She suggested that every pharmacy is the "face of community healthcare," as pharmacists are helpful during and after disasters due to their accessibility.

VOLUME 2, ISSUE 10 Page 12

RH

EVENTS

Dr. Arya further built upon Dr. Mullen's ideas by elaborating on what the pharmacy profession offers during disasters. For example, she discussed Point Of Dispensing sites (PODs), which can dispense emergency medications free of charge to victims during times of disaster. In addition, she talked about the Public Health Emergency Response Network Pharmacy Programs (PHERNs), which would guarantee a supply of certain medications in community pharmacies in the event of an emergency. This initiative, led by the NYC Health Department, is still in its infancy, but is currently under development. Dr. Arya also brought to light the availability of immunization and emergency response training offered to pharmacists. Thus, the main message that afternoon was that pharmacists need to be more involved in developing protocols to create a true interdisciplinary care plan that will help communities in need.

#### **Lessons Learned**

The HIMSS conference gave behind-the-scenes insight on how emergencies are handled, both locally from hospitals' perspectives, and federally from FEMA's perspective. Furthermore, it allowed us to see how health information technology (HIT) can be integrated in developing effective response systems in case of such emergencies. The conference also revealed a gap in delivering adequate health care during disaster situations, and the opportunity for pharmacist participation. We hope to hear more from the pharmacy community regarding these topics and how pharmacists can be a part of the evolving role of HIT and its use in providing integrated, team-based care. The ultimate goal is to ensure that patients get the most out of their care. Pharmacists have the capacity to make major contributions to public health. Emergency preparedness is one significant aspect and an example of how pharmacists can get involved and help influence the level of response of local, state, and federal entities at times of crisis.

#### Have an upcoming event and want to tell people about it?

Send us the advertisement for your student organization and we will feature it in our upcoming issue!

#### Send them to our editors at RhoChiPost@gmail.com

EVENT

#### **Pictures From The HIMSS Conference**

VOLUME 2, ISSUE 10 Pag

RHC





Pharmacists present on how to handle emergency situations.



Yum! Some of the delicious food the conference served!



From left to right: Dr. Arya's students: PharmD candidates c/o 2014 Mandy Zheng, Helen Dong, and Tina Chang; Dr. Darren Triller, PharmD (Senior Director, Health Care Quality Improvement at IPRO), Dr. Vibhuti Arya, PharmD (Assistant Clinical Professor, St John's University and Primary Care Information Project, New York City Department of Mental Health and Hygiene) Joy Lee, PharmD (Pharmacist, Geriscript Pharmacy).

Photographs published for this article are approved by and are the sole property of College of Pharmacy and Health Sciences, and the Rho Chi Post.

All Rights are reserved.

It is unlawful to use these images without expressed written consent.

You can obtain use agreements by contacting the author and our staff editors at RhoChiPost@Gmail.com

## Share your Rotation Experiences!

### Encounter any interesting drug information questions?

Write about them and send them to us at

rhochipost@gmail.com

Page 14 VOLUME 2, ISSUE 10

RHO<sup>R</sup>

#### **Understanding Opioid Overdose**

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

Although opioid analgesics are among the most effective drugs to treat pain, they are associated with a growing number of public health issues including addiction and severe, often fatal, overdoses. The recent increase in incidences of opioid overdose is directly correlated to rapidly increasing and widespread use of these drugs throughout the nation, both for medical and nonmedical purposes.<sup>1,2</sup> Opioid overdose accounts for at least 16,000 deaths annually in the United States.<sup>3</sup> Since 2003, more unintentional opioid overdose deaths have occurred than those of heroin and cocaine combined.<sup>1</sup> Pharmacists can play a key role in identifying patients at risk, recognizing the most common symptoms of overdose, and educating both prescribers and the public on the risks and appropriate management of overdose.

Opioid analgesics increase activity at mu, delta, and kappa opioid receptors throughout the human body.<sup>4</sup> The mu opioid receptor, the primary site of action for morphine and other opioid analgesics, is responsible for the majority of the clinical effects caused by opioids, including mediating nociception, respiratory response, and gut motility.<sup>4,5</sup> Receptor desensitization and therefore tolerance occurs when prolonged opioid exposure necessitates larger doses to have the same clinical effects.<sup>2</sup>

The classic toxidrome of opioid overdose is apnea, stupor, and miosis. Other clinical findings may include renal failure, hypothermia, absent or hypoactive bowel sounds, rhabdomyolysis, hypothermia, hepatic injury, and compartment syndrome.<sup>2,5</sup> A respiratory rate of 12 breaths per minute or less, especially along with miosis or stupor, strongly suggests acute opioid poisoning. In these patients, restoration of ventilation and oxygenation should be the primary objective, as achieved by mechanical stimuli or masks.<sup>2</sup>

Naloxone, a competitive mu receptor antagonist, is the key pharmacologic therapy in acute overdose.<sup>3</sup> Its fast onset after parenteral administration allows for rapid reversal of adverse effects.<sup>4</sup> The initial empiric dosing of naloxone is 0.04 mg, titrated in small increments every two minutes as needed to a maximum of 15 mg; however, the effective dose may depend on the amount of opioid consumed, the patient's weight, the degree of penetration of the analgesic into the CNS, and many other factors.<sup>2</sup> The achieved reversal is often transient, and a continuous naloxone infusion may be required for recurrent respiratory depression. All patients should be monitored for four to six hours after their last naloxone dose.<sup>2,4</sup> Thus, a critical role of pharmacy professionals is to educate prescribers on the transient duration of naloxone, the need for repeated dosing and potentially initiating an infusion, and on the appropriate observation period. Another option for reversal includes activated charcoal, although it is only effective when administered to patients within an hour of ingestion and offers no clinical benefit outside this window.<sup>2</sup>

From a public health perspective, several strategies for prevention of opioid abuse have been recommended by the CDC. This includes using prescription data and insurance restrictions to track and reduce "doctor shopping" (the use of multiple providers for the same medication), multiple early refills, and other inappropriate use of opioid prescriptions. The CDC also recommends improving legislation to enforce existing laws, such as those against doctor shopping or regulating clinics that distribute controlled prescriptions. Pharmacists can furthermore play a vital role in the education of medical professionals to improve current medical practices in prescribing opioids.<sup>1</sup> Furthermore, although the use of naloxone is currently reserved for emergency departments and inpatient units, recent federal initiatives have also explored training nonmedical personnel to recognize symptoms of overdose, and to reverse symptoms using first aid techniques and emergency naloxone supplies.<sup>3</sup> All public health measures must balance the need to minimize abuse by providing appropriate medical care to those that legitimately require access to these medications. Opioid analgesic overdose is life-threatening and is a public health issue where pharmacists should take responsibility and educate both patients and clinicians on the risks, strategies for prevention, and appropriate methods of management.

## VOLUME 2, ISSUE 10 Page 15

#### Sources:

 Centers for Disease Control and Prevention. CDC grand rounds: prescription drug overdoses—a U.S. epidemic. Morb Mortal Wkly Rep MMWR. 2012;61:10-13.

Boyer EW. Management of Opioid Anagelsic
Overdose. N Eng J Med. 2012; 367:146-55.
Beletsky L, Rich J, Walley A. Prevention of fatal

opioid overdose. JAMA. 2012;308:1863-1864. 4. Trescot A, Datta S, Lee M, Hansen H. Opioid Pharmacology. Pain Phys Journal. 2008. 11: S133-153. 5. Glapsy J. Opioids. In: Ma O, Cline D, Tittinalli J et al. Emergency Medicine Manual. 6<sup>th</sup> ed. New York, NY: McGraw-Hill; 2004 6. Hovestreydt L. Opioid overdose: what hospital pharmacists should know. US Pharm. 2013; 38 (4):Epub.

#### Quote of the Month

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



St. John's University COLLEGE OF PHARMACY AND HEALTH SCIENCES

VOLUME 2, ISSUE 10 Page 16

RHO

#### Solving the HCV Enigma: Current and Future Drug Therapy for Hepatitis C

By: Tamara Yunusova, Senior Staff Editor

Approximately 3.2 million Americans have chronic hepatitis C infection.<sup>1</sup> While acute cases are not common, rates of chronic hepatitis C continue to surge due to the recent discovery of the virus in 1989 and consequently, the establishment of a test screening for HCV antibodies in 1992.<sup>1</sup> HCV has spawned much attention over the years and as a result, numerous therapies have been developed. An understanding of HCV structure, replication, and assembly has revealed a vast array of targets for drug therapy. Apart from the viral RNA which is cleaved into 10 distinct polypeptide units, over 11 proteins assemble to form a replication complex. Current therapy, which consists of a combination of Peg-Interferon and Ribavirin for genotype 2 or 3 patients and triple therapy for patients with genotype 1, is efficacious but the adverse side effects and complex dosing regimens continue to present a great challenge. With the recent development of protein inhibitors, misense oligonucleotides, polymerase inhibitors, and interferon-free drug cocktails, the pharmaceutical industry has made great strides in hepatitis C drug therapy.

HCV is a positive single-strand RNA virus that replicates in the liver. Replication is rapid, producing average serum HCV RNA levels of one to two million genome equivalents per milliliter.<sup>1</sup>Current research shows that there are six variants of the virus. The most common genotypes in the United States are genotype 1 (approximately 75% of cases), genotype 2 (approximately 15% of cases) and genotype 3 (approximately 5% of cases).<sup>1</sup>

Although the details behind the hepatitis C virus mechanism of action are not fully understood, research studies provide an overview of the viral composition, replication, and assembly. The positive single-stranded RNA of HCV encodes a poly-protein which is then cleaved into 10 discrete polypeptide units.<sup>3</sup> Structural proteins consist of two glycoproteins and a core protein which mediates and directs the assembly of new virions.<sup>3</sup> The nonstructural proteins (NS2, NS3, NS4A, NS4B, NS5A, and NS5B) assemble to form a membrane-bound replication complex with the viral RNA.<sup>3</sup> Following replication, the newly formed virion is packaged into lipid droplets and released from cells as lipoviral particles.<sup>3</sup>

While some HCV patients have an immune response competent to eradicate the virus, chronic infection develops in 55-85% of patients.<sup>3</sup> Patients with chronic HCV require drug therapy in order to reduce serum viral levels and attain improved health outcomes. Current therapy for Hepatitis C consists of a combination of subcutaneous Interferon alpha and oral Ribavirin.

One of the two components of current therapy, interferon alpha, blocks viral replication by activating the transcription of interferon-stimulated gene (ISG) mRNA. ISG mRNA encodes proteins that interfere with viral replication, protein synthesis, and assembly. ISGs such as 2'5' oligoadenylate synthetase, RNA-specific adenosine deaminase, and protein kinase R are thought to be active in the inhibition of viral replication. Oligoadenylate synthetase activates RNases to cleave viral RNA, adenosine deaminase plays a role in editing viral RNA, and protein kinase R inhibits the translation of mRNA to protein.<sup>1</sup>In addition to activating ISGs, interferon alpha also triggers the antiviral immune response. It contributes to the activation of natural killer cells, the maturation of dendritic cells, the proliferation of memory T-cells, and the prevention of T cell apoptosis.<sup>1</sup> Contrary to belief, the long-term damage to liver tissue is not caused the by virus. Instead, it is caused by the immune system which activates the inflammatory response.<sup>1</sup>

The second component of the current regimen is ribavirin. The general mechanism of the compound remains unclear; however, it is believed that ribavirin causes mutation in virions and exhausts the supply of GTP which is crucial for RNA synthesis of HCV.<sup>1</sup>

A recent milestone in Hepatitis C therapy has been the peglyation of interferon alpha producing a safer, less toxic compound. Pegylation is the process of covalently attaching a polyethylene glycol molecule to a drug compound in order to reduce immunogenicity and antigenicity.<sup>2</sup> In a study that compared the standard interferon- ribavirin with the peginterferon- ribavirin combination, the former presented 44-47% viral eradication whereas the latter presented 54-56% clearance. The pegylated interferon



#### **VOLUME 2, ISSUE 10** Page 17

alpha also has an increased half-life, which allows the drug to be administered in weekly doses.<sup>5</sup> At this time, there are two peginterferon formulations that are FDA cleared: alfa-2a and alfa-2b.

The recommended regimen for hepatitis C using the peg-interferons consists of weekly subcutaneous injections of peg-interferon and twice daily oral doses of ribavirin. The recommended dose of peginterferon alfa-2a is 180  $\mu$ g per week, and that of peg-interferon alfa-2b is 1.5 µg per kilogram of body weight per week.<sup>1</sup>Patients with genotype 1 should receive ribavirin for 48 weeks at a daily dose of 1000 mg, or 1200 mg if weight exceeds 75 kg.<sup>1</sup>Patients with genotype 2 or 3 should receive 24 weeks of the therapy, but with a daily dose of 800 mg of ribavirin.<sup>1</sup>

HCV therapy is gauged by the sustained virologic response (SVR), or the absence of HCV RNA in serum at least 6 months after therapy. Monotherapy of interferon alpha yields a SVR that is less than 20%.<sup>1</sup>However, when peg-interferon is combined with ribavirin, the SVR is greatly improved to 40-45%.<sup>1</sup>The current mainstay therapy—combination of weekly peginterferon and ribavirin-is beset with numerous adverse effects, complex dosing regimens, and limited efficacy in patients with HCV genotype 1. Common side effects of peginterferon include muscle aches, fatigue, depression, anxiety, irritability, sleep disturbance, and difficulties in concentrating.<sup>3</sup> Anemia, a notorious side effect of ribavirin, is the major cause of dose reductions throughout the course of the 48 week therapy. According to the New England Journal of Medicine, 30-40% of patients require dose reductions, and 20% require early discontinuation of ribavirin due to the side effect.<sup>1</sup>Even though recent studies have shown that reducing the dose of ribavirin during week 2 to 600 mg per day is an effective way to manage anemia,<sup>1</sup> the probability that a sudden anemia can induce a myocardial infarction in patients with pre-existing coronary artery disease or a history of stroke cannot be overlooked.<sup>1</sup>For this reason, candidates must meet certain health standards to be considered for therapy. Moreover, patients who do qualify for the treatment must undergo routine blood count to monitor for anemia.

#### **BACK TO COVER**

CLINICAL

As mentioned earlier, the duo yields greater response rates in patients with HCV genotypes 2 and 3 than those with HCV genotype 1. Fortunately, the approval of two NS3/4A protease inhibitors, boceprevir and teleprevir, for patients with genotype 1 has led to a triple combination therapy that markedly improves the SVR in patients with HCV genotype 1.<sup>3,1</sup>This therapy, only approved for genotype 1 patients, consists of one protease inhibitor, one peg-interferon, and ribavirin.<sup>3</sup> The protease inhibitors are always administered as a combination due to the rapid emergence of drug resistant variants in monotherapy.<sup>1</sup>

However, the triple therapy regimen may lead to adverse effects and antiviral resistance. Common side effects with boceprevir include anemia, neutropenia, and dysgeusia. Telaprevir may cause anemia, rash, and anorectal discomfort.<sup>1</sup>Similar to the case of ribavirin, anemia is difficult to manage. Erythrocyte-stimulating agents can be used, but they too have numerous side effects, are costly, and are not approved for routine use in patients with chronic hepatitis C.<sup>1</sup>

Adverse effects are not the only limitation to the proposed therapies. When the drugs are used as monotheraphy, antiviral resistance occurs at the onset of therapy, as early as 4 days after initial administration. <sup>1</sup>And because boceprevir and telaprevir share characteristics, if the resistant variants appear in reaction to one protease inhibitor, similar resistant variants will appear with the use of the other. When resistance is observed, drug administration should be stopped to diminish the resistant variants, which disappear eventually with the therapy halted. Still, certain mutations may persist for 3 or more years after discontinuation.<sup>1</sup>

#### A Glimpse into the Future: Therapies under Current Investigation or Undergoing Approval

There are two classes of NS5B polymerase inhibitors-nucleoside and nonnucleoside analogue inhibitors-that are being developed. The nucleoside inhibitors bind to a specific region in the pocket of NS5B and behave as chain terminators.<sup>3</sup> The nonnucleoside inhibitors bind to other regions of NS5B and act as allosteric inhibitors.<sup>3</sup> Currently, there are



#### Page 18 VOLUME 2, ISSUE 10

about eight NS5A inhibitors and more than twelve NS5B inhibitors undergoing clinical trials phase 2 and 3.<sup>3</sup> Other targets that are being explored follow: NS4B, a nonstructural protein which plays a role in the assembly of the membrane-bound replication complex, and p7, responsible for the formation of ion channels necessary for HCV assembly. However, studies show that drugs targeting NS4B and p7 are less efficacious than those that target NS3/4A, NS5A, or NS5B.<sup>3</sup>

With the development of antiviral therapies which act directly on the viral proteins, host targeting therapies are a debut to the HCV drug therapy scene. One appealing target is Cyclophilin A, an integral component of the viral replication complex. It is known that cyclosporin A is a potent cyclophilin A inhibitor, and the derivatives that lack immunosuppressive properties-alisporivir, NIM811, and SCY-63—are currently undergoing clinical trials.<sup>3</sup> A combination of alisporivir with peginterferon and ribavirin has shown improved efficacy over peginterferon and ribavirin alone, both in treatment experienced and treatment naïve patients.<sup>3</sup> However, due to reports of severe pancreatitis that may be associated with alisporivir, the approval process has come to a halt.<sup>3</sup> In addition to host-targeting, combining drugs with different targets to produce synergistic effects is another possible tactic utilized in development of therapy. In improving the current chronic hepatitis C treatments, researchers are seeking for the combination of drugs with the greatest efficacy, minimal adverse effects, and the least viral resistance.

Recent studies have shown that viral clearance can be attained without the use of interferon and ribavirin. In one study, patients with chronic hepatitis C (both treatment naïve and experienced) were treated with a 13-day regimen of a combination of polymerase inhibitor RG7128 (a nucleoside inhibitor) and protease inhibitor danoprevir.<sup>3</sup> A large portion of patients who received the higher doses had undetectable HCV RNA levels after only 13 days.<sup>3</sup>

MicroRNAs— MiR122 in particular-are integral components that bind RNA to facilitate the replication of HCV. MiR122 can be inhibited by introducing into cells antisense oligonucleotides (short DNA or RNA sequences) that are engineered to be complementary to a certain gene sequence.<sup>4</sup> Much like the binding of mRNA to DNA, antisense oligonucleotides

#### **BACK TO COVER**

bind to miR 122 to hinder the HCV RNA replication. While the concept behind antisense oligonucletides may appear relatively simple if not lucid, research studies suggest the contrary. The antisense mechanism of action is complex and much remains unknown. Delivering the nucleic acid to the cytosol in sufficient amounts without causing cytotoxicity is a major challenge.<sup>5</sup>

Luckily, antisense therapy has witnessed success in the HCV ballpark. In the study conducted by Janssen et al., miravirsen, a chemically modified antisense oligonucleotide that targets miR122, was shown to enter liver cells and binds tightly to miR-122, preventing the latter from binding to HCV RNA.<sup>5</sup> In a phase 2a trial of miravirsen, once a week subcutaneous administration led to the reduction in HCV levels (<3 log<sub>10</sub>) after 5 weeks of monotherapy.<sup>5</sup>

Hepatitis C may present itself as a burden in the upcoming years as earlier undiscovered cases of the viral infection have progressed into the chronic disease phase. Advances in HCV therapy continue to bring about high sustained virological responses and in notable cases, viral clearance. Major success has been witnessed with therapies currently undergoing clinical trial: viral clearance was attained in 13 days with an interferon and ribavirinfree regimen, and the first antisense oligonucleotide effectively reduced viral load. Current developments undergoing clinical trials are promising and comprehensive mapping of the Hepatitis C virus continues to fuel the development of efficacious therapy. The progress of the future awaits to solve HCV enigma.

#### Sources:

1. Hoofnagle JH, Seeff LB. Peginterferon and ribavirin for chronic hepatitis C. *The New England Journal of Medicine*. 2006; 355(23): 2444-2450. http:// www.nejm.org.jerome.stjohns.edu:81/doi/

full/10.1056/NEJMct061675\_\_\_\_Accessed June 26, 2013.

2. Lieberman J, Sarnow P. Micromanaging hepatitis C virus. The New England Journal of Medicine. 2013; 368(18): 1741-1743. http://

www.nejm.org.jerome.stjohns.edu:81/doi/ pdf/10.1056/NEJMe1301348. Accessed June 26, 2013.

3. Ghany MG, Liang TJ. Current and future drug therapies for hepatitis C virus infection. *The New Eng-*



CLINICAL

Page 19 VOLUME 2, ISSUE 10

land Journal of Medicine. 2013; 368(20):1907-1917. http://www.nejm.org.jerome.stjohns.edu:81/ doi/full/10.1056/NEJMra1213651 Accessed June 26, 2013.

4. Dias N, Stein CA. Antisense oligonucleotides: basic concepts and mechanisms. *Molecular Cancer Therapeutics*. 2002; 1: 347-355. http://

mct.aacrjournals.org/content/1/5/347.long Ac-

cessed June 26, 2013.

5. Ahad MA, Alim MA, Saifuddin Ekram ARM. Interferon to peg-interferon: a review. *The Journal of Teachers Association*. 2004; 17(2): 113-116. www.banglajol.info/index.php/TAJ/article/ download/3460/2903 Accessed June 26, 2013.



Figure 1: Schematic representation of antisense oligonucleotide therapy

Figure Source: Antisense Oligonucleotide Therapy

In: Toth, PP. Antisense oligonucleotide therapy in the management of dyslipidemia. Medscape. http://www.medscape.org/ viewarticle/763857\_transcript Accessed July 11, 2013.



#### Angelina Jolie's Double Mastectomy: What it Reveals About Today's Genetic Testing & Road to Curing Breast Cancer

By Sang Hyo Kim, Staff Editor

Angelina Jolie, the actress recognized for her charismatic beauty, revealed to the New York Times that she had undergone double mastectomy, the surgical removal of the breasts. Because her mother died of ovarian cancer at 56, when Jolie learned that she had a mutation in her BRCA1 gene, she proactively choose double mastectomy to diminish her chance of developing breast cancer.

Everyone has the BRCA1 and BRCA2 genes, members of a group known as "tumor suppressing" genes. Any mutation in these genes can increase the risk of ovarian, breast, and pancreatic cancer in women, and testicular, prostate, and a rare form of breast cancer in men.<sup>1</sup> Mutations in the BRCA1 gene occur in only 0.24% of the population and account for no more than 10% of all cases of breast cancer.<sup>1</sup> With a mutation in her BRCA1 gene, Jolie had a 87% chance of developing breast cancer and 50% chance of developing ovarian cancer.<sup>1</sup> By getting the surgery, she reduced the likelihood of getting breast cancer from 87% to just 5%.<sup>1</sup> Jolie will also soon undergo surgery to remove her ovaries to eradicate her chances of developing ovarian cancer.

A simple blood test that costs about \$3000 can be used to detect mutations in the BRCA1 gene. The test is not available to everyone, especially to those not as wealthy as the Oscar winning actress. But women can still choose from other options to reduce the risk of cancer, such as imaging tests, chemoprevention or preventative pharmacotherapy. For those who choose surgery like Jolie has, there are additional factors to consider such as age, psychological impact and cost.<sup>2</sup> The cost from the surgical procedure to the reconstructive process of the breasts afterwards represents the tip of the medical iceberg of mastectomy, which can be daunting. Even though the precautions that she took may sound over cautious to many, the actress hopes to empower, educate, and inform people about genetic mutation and cancer risk by sharing her story.<sup>2</sup>

Angelina Jolie is world famous, which means that her body garners much attention; therefore, one can ask how she deals emotionally with the removal of what many would consider the most sensuous and feminine parts of her body. For Jolie, however, the surgery did not affect her self-esteem as a woman. She says, "I do not feel any less of a woman. I feel empowered that I made a strong choice that in no way diminishes my femininity."<sup>3</sup>

Jolie's decision was courageous because she chose the operation even though she did not have cancer. Sarah Hawley, associate professor of general medicine at the University of Michigan, states that it took a lot of strength for Jolie to get to that point in the first place. Other experts say that the actress made a smart choice; Dr.Eric Winer of the Dana-Farber Cancer Institute said, "[Angelina Jolie's case is] one of the truly unique situations where most medical professionals would say if a woman chose to have both breasts removed, it's a pretty reasonable thing to do."<sup>1</sup> Indeed, the fall in the probability of her getting cancer proves that the decision she made for herself and her family was smart and life changing.

Every year, about 250,000 women go for genetic testing, just like Angelina Jolie has.<sup>1</sup> The advanced technology in genetic testing detects the patient's possibility of developing diseases such as breast cancer, Lou Gehrig's Disease (ALS), Huntington's disease, cystic fibrosis, and hemophilia.<sup>1</sup> With genetic testing, doctors can also determine the most effective chemotherapy for the patient and determine the chance of recurrence by sequencing the tumor's DNA. Despite the continuous research, however, there are still diseases prevalent that cannot be fully detected yet: Alzheimer's disease, autism, diabetes, colon cancer, and obesity.<sup>1</sup>

Genetic testing is useful in the early detection of disease and in the determination of the proper treatment for patients to live longer and healthier lives. Studies have found that actively taking preventative measures, such as genetic testing, depends on the geographical location of the patients and that the rates of employing different preventative testing vary tremendously worldwide. The 2004 'Intergroup Exemestane Study," which is an analysis of surgical





Page 21 VOLUME 2, ISSUE 10

techniques used in an international trial of adjuvant treatment among 4,700 women with early stage of breast cancer in 37 countries, shows that the rate of mastectomy was highest in central and eastern Europe at 77% of women in that region.<sup>4</sup> The United States was second at 56%, Western and Northern Europe at 46%, Southern Europe at 42% and Australia and New Zealand at 34%.<sup>4</sup>

The example of a famous celebrity like Angelina Jolie seeking genetic counseling and choosing mastectomy may inspire women who are fighting breast cancer to become more proactive and have more self-confidence after drastic procedures like mastectomy. It may also help other women overcome their fear of getting medically necessary mastectomies, and even empower women and help them feel that their decisions are progressive, instead of shameful, when they get post-operative breasts implants.

With every pros, however, there are always cons. Debates rise on whether Jolie's case is an oversimplification of the fight against cancer. As mentioned earlier, some women do not have the money or the insurance coverage to go for genetic counseling. Although these realities cannot be denied, what Jolie did has a resounding effect. She has exemplified femininity, and her body was a key dimension to her fame. After revealing her personal story, TIME magazine states that "[her body] may even become a bigger and more inspiring dimension of her influence."<sup>1</sup> Jolie encourages all women who have a family history of breast or ovarian cancer to seek out information. Medical experts can then help the patient in making a personal and informed choice. It was only natural for Jolie to receive the best treatment possible because of her wealth and fame, but we patients should not neglect or doubt what Jolie did. She educated the public to utilize all medical resources that are not just limited to costly surgeries, by finding other forms of cancer treatments or medications. In her own words, "life comes with many challenges. The ones that should not scare us are the ones we can take on and take control of."<sup>3</sup>

#### Sources:

1. K Jeffrey, P Alice. The Angelina Effect. Time. May 27<sup>th</sup>, 2013

2. Dr. Ashton, Jennifer. Angelina Jolie's Mastectomy: What You Should Know. abc News. http://

abcnews.go.com/blogs/health/2013/05/14/whatdr-ashton-wants-you-to-take-away-from-angelinajolies-double-mastectomy/. Accessed May 31<sup>st</sup>, 2013

3. Jolie Angelina. My Medical Choice. The New York Times.

4. What is a Mastectomy? News Medical Website. http://www.news-medical.net/health/What-is-a-Mastectomy.aspx. Accessed May 19th, 2013.

## Has your article been published in an issue of the Rho Chi Post? If so, congratulations!

Here is a suggested format for citing / referencing your work:

[Author(s)]. [Article Title]. Rho Chi Post. [Year and Month Published]. [Volume]([Issue]):[Pages].

To view some examples visit: <u>http://rhochistj.org/RhoChiPost/?page\_id=161</u>

VOLUME 2, ISSUE 10 Page 22

RHOK

#### Journey to a PharmD

By: Jacqueline Chirico, Pharm D Candidate Class of 2016

The reasons behind the choice to study pharmacy here at St. John's University vary from student to student. Some are interested in helping patients, while others are interested in the science behind the effect of drugs on the body. For me, it was the experience that I had growing up with my parents. Pharmacy runs in the family.

#### "Pharmacy is about being proactive and keeping in touch, always learning and looking into the ever-changing world of pharmacy."

As the daughter of two registered pharmacists, my choice to become a pharmacist seems like a fairly predictable one. People aren't surprised when I say, "I'm studying pharmacy." Many people think the profession was forced upon me as a way to "carry on the legacy" that my parents started. However, my decision to become a pharmacist was one l made entirely on my own.

When I first stepped foot behind the counter of my parents' pharmacy, I realized that this was what I was meant to do. After experiencing what pharmacists do in community setting, I realized that I wanted to apply to pharmacy school. It was an option that

made sense to me. The fact that my parents "Even though many patients may not understand were pharmacists motivated me even more. It encouraged me to learn all that they know and to be as interested in the profession as they are.

Following in the footsteps of my parents may sound easy to

those who believe I have my parents' knowledge at my disposal, but the arduous journey to becoming a pharmacist must be taken alone. Having pharmacist

parents doesn't automatically provide you with a "way in." All of what my parents have accomplished since graduation is a testament to the long journey that lies ahead of me.

Sometimes, because of the similarities in our situations, I am often forced to compete with my parents as pharmacy students and licensed practitioners. It would be a long while until I even come close to the professionals my parents are. Still, I want to step out of their shadows and carve my own path while in pharmacy school.

You and my other fellow pharmacy students know that the journey to earning a pharmacy doctor degree is not an easy feat. Finishing the PharmD program requires a high dose of focus, drive, and effort. The degree is not something gained by all who work for it. PharmD is something you must be passionate about.

So here is what I want to say to my colleagues in pharmacy school who decided to enter the profession for a million unique reasons: make the most of your college experience, and be as involved in your profession as you can. This will surely make you more passionate about being a pharmacist. Even though many patients may not understand or appreciate us, you know that being a pharmacist is more than counting pills and following orders. Pharmacy is about being proactive and keeping in touch, always learning and looking into the ever-changing world of pharmacy.

> It is about being a health professional who holds his/her own as an important part of patient health. Of course, this is not the easy way out. However, I think that becoming a pharmacist is most worthwhile in the end. Having parents who are phar-

macists taught me this much. And knowing all of this, I am up for the challenge... Are you?

orders. Pharmacy is about being proactive and keeping in touch, always learning and looking into the ever-changing world of pharmacy."

or appreciate us, you know that being a pharma-

cist is more than counting pills and following

Page 23 VOLUME 2, ISSUE 10

RH

#### **Crossword Puzzle: Drug Therapy for Motor Neuron Disease**

By: Diana Gritsenko, Staff Editor



#### Answers

#### Down

**BACK TO COVER** 

- 1. Medication approved for preexposure prophylazis of HIV
- 2. Monoamine oxidase inhibitor used for Parkinsons Disease
- 3. Pain-relieving medication which was recently rescheduled to CIV
  - 4. Antibiotic which may cause serotonin syndrome
- 6. Class of antibiotics which decreases plasma valproic acid levels
- 7. PDE4 inhibitor used for the treatment of COPD
- 8. Ingredient in OTC medication that is commonly abused by teenagers
  - 10. Vitamin D capsule administered once a week
- 14. First benzodiazepine discovered in 1955

16. Weight loss drug that is a combination of an entiepileptic and a sympathomimetic amine anorectic

17. OTC class of pain relievers

#### Across

- 5. Class of antibiotics that patients are commonly allergic to
- 9. Acne medication that reruires patients to be the IPLEDGE program due to its teratogenicity
  - 11. Newly approved Erectile Dysfunction drug
  - 12. Potassium-sparing diuretic which has antiandrogenic effects
    - 13. Thombolytic agent which requires antigen testing
- 15. Anti-nausea drug introduced in the late 1950s which cause birth defects and was withdrawn
  - 18. Urinary tract analgesic which may discolor the urine
  - 19. Bactericidal antibiotic which causes patients' body fluids to turn red
    - 20. ADHD medication which is available in a patch form

#### **St. John's University** COLLEGE OF PHARMACY AND HEALTH SCIENCES

Look-Alike Sound-Alikes		
	1. A phosophodiesterase 4 enzyme inhibitor which requires monitoring of the patients weight due to a side effect of pronounced weight loss	A. Detrol
	2. Coadministration of this protease inhibitor and food is required and causes an increase in bioavailability	B. Darunavir
SOUND-ALIKE	3. This drug has a black box warning stating that it may cause potentially life - threatening respiratory depres- sion even with therapeutic use, espe- cially with initiation or dose increases	C. Diprivan
By: Frances Trosa, armD. Candidate 2015	4. An angiotensin II receptor blocker and thus has a risk of hyperkalemia	D. Diamode
	5. Causes global CNS depression, which most likely occurs through ago- nism of GABA <sub>A</sub> receptors	E. Daliresp
Many drugs LOOK – ALIKE	6. Commonly used to treat candidi- asis	F. Diabeta
OR SOUND- ALIKE	the treatment of symptoms associ- ated with overactive bladder	G. Diflucan
Causing them to be easily mixed up in practice.	8. Stimulates insulin release from the pancreatic beta cells and reduces glucose output from the liver	H. Diovan
Can <b>YOU</b> match these facts with the correct medication?	9. An anticholinergic agent used for the treatment of symptoms associ- ated with overactive bladder such as urinary frequency, urgency, or urge incontinence	l. Dilaudid
Answers	10. Available as an over the counter preparation used to control the symptoms of diarrhea, including Traveler's diarrhea	J. Ditropan

PUZZLES





#### How Did You Do???

Answers to Crossword & Look Alike and Sound Alike



## Do you enjoy our puzzles?

## Send us a suggestion for a brainteaser at

<u>rhochipost@gmail.com</u>

We will feature your work in our next issue!



## **RHO CHI POST: EDITORIAL TEAM**



#### @ Katharine Cimmino (5<sup>th</sup> 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 (5<sup>th</sup> 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 (4<sup>th</sup> 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

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

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



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

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

#### @ Erica Dimitropoulos (5<sup>th</sup> Year, STJ; Senior Staff Editor)



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

#### St. John's University COLLEGE OF PHARMACY AND HEALTH SCIENCES



Page 27 VOLUME 2, ISSUE 10

#### **BACK TO COVER**

## **RHO CHI POST: EDITORIAL TEAM**



#### @ Tamara Yunusova (3<sup>rd</sup> Year, STJ; Senior Staff Editor)

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



#### @ Beatrice Popovitz (5<sup>th</sup> Year, STJ; Staff Editor)

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



#### @ Diana Gritsenko (5<sup>th</sup> Year, STJ; Staff Editor)

I am proud to serve as an editor for the Rho Chi Post. The Post combines my love for Pharmacy and writing and I am glad to share that passion with all of you! I look forward to working with you and sharing this amazing opportunity!



#### @ Ada Seldin (5<sup>th</sup> 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 (2<sup>nd</sup> Year, STJ; Staff Editor)

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



#### @Davidta Brown (3<sup>rd</sup> Year, STJ; Staff Editor)

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



#### @ You!

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

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

## RHO<sup>R</sup>CHI post

**BACK TO COVER** 

#### **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.

#### **CURRENT EXECUTIVE BOARD**



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

President: Moisey Rafailov Vice President: Majd Ahmad Secretary: Elissa Tam Treasurer: Anh Nguyen Historian: Zinnia L. Yu

Faculty Advisor: S. William Zito, PhD

#### THE RHO CHI POST

#### MISSION

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

#### VISION

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

#### VALUES

Opportunity, Teamwork, Respect, Excellence

#### GOALS

- 1. To provide the highest quality student-operated newsletter with accurate information
- 2. To maintain a healthy, respectful, challenging, and rewarding environment for student editors
- 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

#### **St. John's University** COLLEGE OF PHARMACY AND HEALTH SCIENCES

#### **UPCOMING EVENTS**

Sept 4-7: Pain Week 2013 Los Vegas, Nevada

**Sept 9-13:** Forces of Change: New Strategies for the Evolving Health Care Marketplace Boston, Massachusetts

**Sept 22-24:** 2013 AACP Annual Meeting: Clinical Pharmacology in Optimizing Drug Development and Therapeutics Bethesda, Maryland

**Sept 24-26:** 11th Annual Discovery on Target Boston, Massachusetts

**Oct 16-19:** Drug Discovery Re-invented Scottsdale, Arizona