

STUDENT CLINICAL DIGEST

Spring 2014



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By Lindsey Sellers

Presented by the **Student College of Clinical Pharmacy** – the official UGA chapter of the American College of Clinical Pharmacy

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Clinical Pharmacist Spotlight: Ambulatory Care

By Anh Nguyen & Marisa Fortunato, Pharm.D. Candidates



Catherine Bourg, Pharm.D., BCPS, BCACP

Clinical Assistant Professor, PGY-1 Community Practice Residency Program Director

Why did you choose a career in academic and clinical pharmacy specialized in ambulatory care?

From an ambulatory care standpoint, I really enjoy be-

ing able to have a longitudinal relationship with my patients in an out-patient setting. My first exposure to a clinical setting was actually in a hospital. When I was in my 2nd year of my professional curriculum, I started working for a small community hospital where I shadowed a clinical pharmacist and learned about his roles in patient care. His primary duties at that time were antimicrobial stewardship, clinical decision making on anticoagulation therapy, and patient education on warfarin, heparin, etc. After shadowing him and learning a little bit about his roles as a clinical pharmacist, I became more interested in clinical pharmacy. I started doing research about clinical pharmacy, residency training, and what types of things I needed to do in order to pursue that path. During my APPE year, I had two really good ambulatory care rotations that cap-

tured my interest in becoming a clinical pharmacist in an out-patient setting.

I applied for PGY1 program in a hospital setting with an acute care base because I felt it would give me well-rounded experiences. I wanted to gain both out-patient and in-patient skills. I also wanted to learn how to do research and teach. That was why I decided to pursue my PGY1 training at West Virginia University Hospitals. When I was a PGY1 resident, I wanted to do my ambulatory care rotations earlier in the year so I could figure out if I wanted to do PGY2 in Ambulatory Care. I totally loved my out-patient experiences at WVU.

In addition, I enjoyed mentoring and getting involved with students at the hospital.

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CVS ENDS TOBACCO SALES

By Huldah Abaidoo

On February 5th 2014 CVS Pharmacy announced their plan to remove all tobacco products from their stores by October 1, 2014. This decision is said to be a result of the company focusing on “expanding their role in providing healthcare” (Talsma, 2014). CVS Caremark president and CEO Larry J. Merlo stated, “Tobacco products have no place in a setting where healthcare is being delivered.” It has always been puzzling that pharmacy chains often tout lines about their commit-

ment to providing a healthful way of life, while selling products that are proven detrimental. Tobacco use is the leading cause of preventable death and disease in United States and resulting in half a million deaths per year (Taslma, 2014). CVS believes this is the first step and hopefully a step for others to follow, in removing tobacco products from all establishments that have pharmacies.

The company will also be launching a national smoking cessation program, which

includes information, treatment in its pharmacies and MinuteClinics, and additional programs for CVS Caremark pharmacy benefit plan members (Aldridge Young, 2014). It is said that the revenue from tobacco products alone is over 1 billion dollars to the company, but it seems the company is putting more importance on their place the healthcare arena.

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"I encourage students to learn about residency training as much and as early as they can. It is never too early to start learning about clinical pharmacy."



Dapagliflozin (Farxiga) is a new oral tablet indicated for glycemic control in combination with diet and exercise in adults with Type II Diabetes. Dapagliflozin is a sodium-glucose co-transporter 2 (SGLT2) inhibitor, which lowers blood glucose levels by inhibiting reabsorption in the kidneys. The first line therapy, Canagliflozin, was approved by the FDA in April 2013. Clinical trials showed marked improvement in patients' HbA1c. An elevated incidence of bladder cancer was found among dapagliflozin users; therefore patients with active bladder cancer should not take this medication. Dapagliflozin may be used as a monotherapy or in combination with other drugs to treat Type II diabetes, but should not be used to treat Type I Diabetes or those with moderate to end-stage renal disease.

Reference:

"FDA Approves Farxiga to Treat Type 2 Diabetes." *New Drugs at FDA: CDER's New Molecular Entities and New Therapeutic Biological Products of 2014*. U.S. Food and Drug Administration, n.d. Web.

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After completing my academic rotation for my PGY1 training, I was sure that teaching was something I really wanted to pursue. I loved being able to interact with students both in the clinical setting and in the classroom. From there, I decided that I wanted to be in academia. Thus, I started looking for a PGY-2 program that would develop me both as a clinical ambulatory care pharmacist and a teacher. That was why I chose to start my PGY-2 training and my career at University of Georgia College of Pharmacy.

How would you describe your typical work on weekly basis at your practice site?

My week is set up longitudinally and split up between clinical practice, teaching and other activities. I usually see patients in clinic on Tuesday, Wednesday, and Thursday. On Monday and Friday, I am usually at school either preparing for classes, teaching, working on my research projects or getting involved in school-related activities.

When I am in clinic, I am working with residents and

students to provide comprehensive pharmacotherapy services for our patients. We manage patients with diabetes mellitus, hypertension, hyperlipidemia. We look at drug-related problems and provide appropriate interventions if necessary. My work day at clinic is split up between face-to-face visits with patients, documentation, note writing and clinical teaching.

What educational steps did you take to get where you are today?

I did two years of residency to get where I am today. My PGY-1 training was at an academic hospital center of West Virginia University. Then I completed my PGY-2 training specializing in Ambulatory Care and Academia at University of Georgia College of Pharmacy. While I was a student, I was actively involved in ASHP where I learned more about residency training.

What types of research projects or educational opportunities or classes do you typically offer for students?

I am currently working on

some research projects with our residents and other faculty members. Most of my research projects are survey based research focusing on medical adherence, health literacy, and patients' beliefs about their medication.

I am open to get students involved in my projects, especially in retrospective data collection project that I am working on. I welcome students of any professional year to shadow me at the clinic.

What are your best pieces of advice for students who are interested in residency and clinical pharmacy?

I encourage students to learn about residency training as much and as early as they can. It is never too early to start learning about clinical pharmacy. I also encourage students get involved in extra-curricular activities, participate in community service, and become leaders in organizations in order to be competitive and well-rounded. During APPE rotations, students are encouraged to contact their preceptors in advance to find out about research projects so that students can get

IMMUNIZATION EXPANSION FOR PHARMACISTS

By Rachel Stephens

Vaccinations are commonplace in the United States and can be given by most healthcare providers. Pharmacies throughout the United States and in Georgia are inundated with patients during flu season for their annual flu vaccination. However, it is not well known among the general public that pharmacists can also administer other vac-

inations since a prescription is required before the pharmacist can administer the vaccine. Since a prescription from a physician is required, a typical patient might choose to forgo the inconvenience and therefore not get a highly beneficial vaccine.

According to APhA/NASPA Survey of State IZ Laws/Rules, Georgia pharmacists

are required to have prescriptions to administer the following vaccinations: Pneumococcal (Part B Vaccine), Zoster, Td/Tdap, and HPV. Along with the Influenza vaccine, all vaccinations have age limitations for administration.

What is being done in Georgia to expand immunizations?

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involved in and develop posters for Mid Year. In addition to strong academic performance, I believe that leadership, involvement, community service, and research/poster presentations are the things that make the best candidates for residency.

Thank you for your time, Dr. Bourg.

THE INS AND OUTS OF RESIDENCIES

By Haylee McCoy

A pharmacy residency is a post-graduate training program that allows pharmacists to further their education and continue to grow themselves professionally. As pharmacy continues to develop more employers are requiring residency training. There are both Postgraduate Year One (PGY1) and Postgraduate Year Two (PGY2) programs, each lasting at least one year. PGY1 residencies focus on general pharmacy practice in health

systems, managed care, or community settings. PGY2 programs allow for further specialization in areas including ambulatory care, oncology, pediatrics, cardiology, nuclear pharmacy, informatics, and many more. Each program requires residents to complete a project where they research and conduct a study, then present the results at the regional residency conference.

American Society of Health System Pharmacists (ASHP) is responsible for accrediting residency programs and provides “The Match.”

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State Senator Charlie Bethel (R-Dalton) has been working to alleviate the current constraints placed on pharmacists to give other vaccinations. He is currently sponsoring Senate Bill 85 (Oliver, 2013). The bill would allow pharmacists and nurses to expand the number of vaccinations they can administer without a prescription as long as there is an active vaccine protocol. The amendment defines a vaccine protocol as “a written document mutually agreed upon and signed by a physician and a pharmacist or by a physician and a nurse, by which document the physician prescribes a vaccine and epinephrine, if determined appropriate by the physician, by means of a vaccine order for administration by a pharmacist or a nurse (Bethel, Mullis, Gloden, Carter, Loudermilk, 2013).” This means that a pharmacist or nurse involved in protocol will be able to administer the associated vaccine as long as the patient meets the require-

ments of the protocol.

In general, the vaccine protocols allow pharmacists to administer vaccinations to adults. The limitations of the protocol are based on patient age. Children under the age of 13 are required to have prescriptions to receive an influenza vaccine and for any live attenuated vaccine. Also, anyone under the age of 18 is required to have a prescription for any type of vaccine other than influenza (Bethel et al., 2013).

Does this require pharmacists to deliver vaccinations? State Rep. Bruce Broadrick (R-Dalton) states that pharmacists who choose to not administer vaccinations will not be required to do so by State Bill 85 (Oliver, 2013). However, for many pharmacies, vaccinations are becoming a large area of business. Therefore, with the potential of administering more vaccinations without a prescription, the push from the business aspect of

pharmacy will increase the demand for Vaccination Certified Pharmacists.

References:

- 1 Sheffer, J. (2013). *Types of Vaccines that Pharmacists are Authorized to Administer*. <http://www.pharmacist.com/sites/default/files/PharmacistIAuthority.pdf>
- 2 Oliver, C. (February 12, 2013). *Bill Would Expand Vaccines Pharmacists can Deliver*. *The Daily Citizen*. Retrieved From: <http://www.daltondailycitizen.com/local/x1303547237/Bill-would-expand-vaccines-pharmacists-can-deliver>
- 3 Bethel, Mullis, Golden, Carter, Loudermilk (2013). *Senate Bill 85*. Retrieved From: <http://www.legis.ga.gov/Legislation/20132014/129250.pdf>

Droxidopa (Northera) is an oral capsule approved for the treatment of neurogenic orthostatic hypotension (NOH). This condition is characterized by drops in blood pressure and resultant syncope or dizziness upon standing in individuals with an underlying neurological disease such as Parkinsons. Droxidopa was accepted under the FDA's accelerated approval program which allows patient access the drug while the manufacturer conducts post-approval clinical trials to prove the drug's clinical benefit. Droxidopa may cause elevated blood pressure while lying down which may lead to stroke. In two two-week clinical trials, patients reported improvements in NOH symptoms such as fainting, with superior results compared to placebo.



Reference:

"FDA Approves Northera to Treat Neurogenic Orthostatic Hypotension." New Drugs at FDA: CDER's New Molecular Entities and New Therapeutic Biological Products of 2014. U.S. Food and Drug Administration, n.d. Web. 18 Mar. 2014.

SPECIALIZATION IN CLINICAL PHARMACY

by Andrea Clarke

Beyond receiving a doctorate of pharmacy and beyond PGY-1 & 2 residencies, a pharmacist may expand their knowledge and specialize further by pursuing specialty certification. The Board of Pharmacy Specialties (BPS) currently offers 6 specialty certifications that demonstrate a pharmacist's excellence in a particular field: ambulatory care pharmacy (BCACP), nuclear pharmacy (BCNP), nutrition support pharmacy (BCNSP), oncology pharmacy (BCOP), pharmacotherapy pharmacy (BCPS), and psychiatric pharmacy (BCPP). Two more specializations are on their way into practice as well – critical care pharmacy and pediatric pharmacy are scheduled to begin examinations in Fall of 2015.

The standard requirements for sitting the certification examinations in a specialty field include graduation from an ACPE-accredited school of pharmacy, having an active

license to practice pharmacy, completing a certain number of years in practice with at least 50% of the time spent in that specialty's activities OR completing a PGY-2 residency focused on the specialty.

These are just the basics with specific requirements varying somewhat between specialties. With eligibility requirements met, for a \$600 application fee the candidate may sit the specialty examination containing 200 multiple choice questions. The pharmacist must then be re-certified every 7 years, either through continuing education or through re-examination.

As students move forward in their pharmacy studies, they should consider whether they want to work towards specialty certification. Certification encourages a pharmacist to continue learning, communicates depth of knowledge in a particular field, and opens up opportunities to differentiate oneself from other candidates in the workforce. Each stu-

dent should consider how specialization may affect the clinical role they wish to pursue.

Source:

Board of Pharmacy Specialties: Spring 2014 Candidate's Guide. (2014). Retrieved from <http://www.bpsweb.org/pdfs/CandidatesGuide.pdf>

MTM: BRINGING CLINICAL PHARMACY TO THE RETAIL SETTING

By Allyson Cox

Medication therapy management, commonly referred to as MTM, is a pharmacist-provided clinical service growing more popular throughout all pharmaceutical settings. According to the American Pharmacists Association (APhA), MTM incorporates patient-centered services to optimize patient therapeutic outcomes. Such services include, but are not limited to, medication therapy reviews, disease management, and anticoagulation management. The ultimate goals of providing such services are to help the patient best benefit from his or her drug therapy **(continues on page 7)**

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Although this is a breakthrough in the pharmacy chain arena is hardly the first of its kind with all pharmacies in San Francisco and in some areas of Nevada banning tobacco products as well last year (Gebhart, 2013). Many pharmacy organizations including the American Pharmacists Association and American Society of Health System Pharmacists have lauded this decision and have

long stood by the thought that pharmacies should not be selling a leading cause of death and disease (Aldridge Young, 2014). This decision may hurt the bottom line but hopefully the benefits to patients will ultimately make it worthwhile. The possibility of helping the patients we strive to serve is enough for the pharmacy community to rally behind the decision and push for such changes elsewhere.

References:

Aldridge Young, Cara. "CVS: Tobacco Products Gone by October 1." *American Pharmacists Association*. N.p., 5 Feb. 2014. Web. <<http://www.pharmacist.com/cvs-tobacco-products-gone-october-1>>

Gebhart, Fred. "Some Pharmacy Chains Dropping Tobacco Products | Drug Topics." *Drug Topics*. N.p., 16 Dec. 2013. Web. <<http://drugtop->

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The Match is the process through which pharmacists apply to residency programs. Applicants then rank programs and programs rank applicants and they are matched based of their rankings of each other.

Residency programs may vary greatly from each other allowing each applicant to select a program that best suits their needs and professional goals. Programs offer opportunities such as teaching, staffing, researching, and working with various populations and work environments. There is often some flexibility to tailor a residency program to provide the most beneficial learning experience to each individual.

Pharmacy residencies provide pharmacists with the chance to gain specialized knowledge and practice and hone in on what direction they want their career to go, while providing them with the networking opportunities and skills they will need to advance in their chosen field. By furthering their education, pharmacists are pushing the envelope and stepping out of the traditional pharmacist role and contributing more directly to patient care.

- ◆ In 2013, 3933 applicants participated in the Match: 2495 matched a program.
- ◆ There are over 800 residency programs in the

US.

- ◆ Residents get paid a stipend and often receive benefits like healthcare.

For more info, visit www.ashp.org.

NEW COMPOUNDING LAWS WILL AFFECT PHARMACIES NATIONWIDE

By Mackenzie Johnson and Belinda Li

In 2012, the New England Compounding Center (NECC) shipped over 17,000 vials of methylprednisolone acetate (MPA) steroid injections for back and joint pain. Over 750 patients who received injections from these vials became ill and over 60 patients died as a result of bacterial meningitis^{1,2}. A subsequent investigation by the U.S. Food and Drug Administration (FDA) found unsanitary conditions at the NECC facility that compounded the MPA, including bacteria and mold on surfaces the facility used to prepare drugs². This tragedy prompted the U.S. Congress to enact The Drug Quality and Security Act (PL113-54), which became law in November 2013. The Act has two parts, with Title I regulating the compounding of drugs and Title II establishing a track-and-trace system for the distribution of drugs². Title I of the Act distinguishes

between traditional pharmacy compounding, which is exempt from regulation under the Act, and pharmacies that make large volumes of compounded drugs without a prescription, which are regulated under the Act. Traditional pharmacy compounding refers to the compounding of drugs for identified individual patients by a licensed pharmacist or physician, based on a valid prescription or order. It also includes the compounding of limited quantities of drugs in anticipation of a prescription based on established order history². However, the Title I of the Act prohibits all pharmacy from compounding drugs that are essentially copies of commercially available drugs or those that were removed from the market because they are unsafe or ineffective. Title I also prohibits pharmacies from compounding drugs that appear on a list

of prohibited drugs published by the U.S. Department of Health and Human Services (HHS)². In addition, Title I sets restrictions on out-of-state shipments of compounded drugs. These shipments are limited to either 5% of the total prescription orders dispensed by a pharmacy or an amount specified in a memorandum of understanding between the state and HHS. Additional provisions of Title I regulate sterile compounding by non-pharmacies referred to as “outsourcing facilities².” Such facilities are allowed to compound sterile products provided they voluntarily register with the FDA, operate from a single geographic location, and comply with other provisions of the Act.

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Tasimelteon (Hetlioz) is a new melatonin receptor agonist indicated for the treatment of Non-24-Hour Sleep-Wake Disorder ("Non-24"). Those with the disorder experience chronic disturbances in their circadian rhythm due to their inability to perceive light well enough to synchronize their biological clock to the normal 24-hour light-dark cycle. Although most of the completely blind population do not develop Non-24, an estimated 100,000 individuals in the United States are affected by this condition. Because tasimelteon is designed to treat a rare condition, it received orphan-product designation and priority review. In clinical trials tasimelteon was found to improve nighttime sleep and decrease daytime sleep duration. Available in capsules, Hetlioz is the first FDA approved medication for Non-24.



References:

"FDA Approved Hetlioz: First Treatment for non-24 hour Sleep-Wake Disorder in Blind Individuals." New Drugs at FDA: CDER's New Molecular Entities and New Therapeutic Biological Products of 2014. U.S. Food and Drug Administration, n.d. Web. 18 Mar. 2014.

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Although outsourcing facilities are "exempt from the new drug and adequate directions for use provisions of the FDCA," they are not exempt from "current good manufacturing practice regulations" to ensure safety².

Title II of the Act establishes procedures to be implemented in steps over a 10-year period in order to tighten security in the drug supply chain. Although the Act applies mainly to manufacturers and distributors, several provisions apply to pharmacies and pharmacists. Other stakeholders in the supply chain that will be regulated by the Act include repackagers and third-party logistic providers (3PLs). At the end of the 10-year implementation period, stakeholders in the drug supply chain will have access to "a full system of electronic, interoperable product tracing².

Over these next ten years, manufacturers and repackagers will be required to produce unique product identifiers, such as barcodes, on certain prescription drug packages². Manufacturers, wholesale drug distributors, repackagers, and dispensers will need to provide information about a drug and who handled it each time it is sold in the US. By January 1, 2015, manufacturers must be able to provide the subsequent owners of their products full transaction histories and information, and also have systems in place to quarantine and investigate all possible illegitimate products². If a drug appears to be unapproved, counterfeit, or potentially dangerous, manufacturers, wholesale drug distributors, repackagers, and dispensers must quarantine and quickly investigate the drug and then notify the FDA and other stakeholders. Wholesale drug distributors must also report their licens-

ing status and contact information to the FDA who will then make a public database. 3PLs must also obtain a state or federal license in order to provide storage and logistical operations related to drug distribution².

Also starting January 1, 2015, pharmacies and pharmacists cannot accept products unless distributors provide a full transaction statement with the history and information of drugs. However, drugs dispensed to patients do not need to have this transaction statement linked. Dispensers must also have methods in place when there are suspect products that must be quarantined and investigated. They must also then notify the Secretary of HHS within 24 hours and to their trading partners of the illegitimate drug².

The Drug Quality and Security Act will introduce many changes within the next ten years that will affect pharmacists and pharmacies across the nation, as well as other stakeholders in the drug supply chain. More stakeholders will be held responsible for the safety of the medication that they provide to their patients. Although this means that there will be more responsibility on pharmacists, the intent of the Act is to provide patients with safer sterile and non-sterile drugs as well as legitimate drugs.

References:

Hoey, D. (2014). *The new compounding law and community pharmacy's future - see more at: <http://www.pharmacytimes.com/publications/issue/2014/january2014/the-new-compounding-law-and-community-pharmacy-future>*

2 Vivian, J. (2014). *New rules for compounding drug products. US Pharmacist, 39(2), 40-42. Retrieved from <http://>*

www.uspharmacist.com/content/d/pharmacy_law/c/46717/

RESEARCH DRUG REVERSES AGE-RELATED MEMORY LOSS?

By Brittany Thompson

Researchers at the University of Florida have recently published their findings about the reversal of memory decline in the March 5th issue of the *Journal of Neuroscience*. Although more research and design is required before the drug is made available, the particular drug that they have been investigating shows promise in helping those with less severe memory issues maximize cognitive function as they age. In a nutshell, the research concerns the prefrontal cortex, the area of the brain which uses working (short-term) memory to guide behavior and carry out tasks including arithmetic. However, as we age, the overproduction of a neurotransmitter that slows neural activity causes a chemical imbalance in the brain which results in decreased ability to perform tasks that require working memory. This compound is GABA, and while GABA receptors continuously inhibit neuronal activity to prevent overactive brain states as seen in schizophrenia and epilepsy, the experiment demonstrated that exceptionally high levels of GABA and its receptor may cause working memory decline.

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as well as avoid any medication-related problems.

Not only do patients benefit from MTMs in receiving the best care, but pharmacies can also benefit by providing the best care. Outcomes-MTM, for example, is a company that will contract pharmacies to perform MTM services for the qualified patients. Insurance companies will decide which patients are qualified to receive complete medication reviews (CMRs) and which patients would just benefit from targeted medication interventions (TIPS). After meeting with a patient, the pharmacist can bill OutcomesMTM for any services provided during their meeting. This encourages the pharmacists to spend more face-to-face time with the patients in helping develop a compre-

hensive medication-related action plan (MAP).

MTMs are becoming more popular in all aspects of pharmacy, particularly in the retail setting. Dr. Marlena Rice, pharmacist manager at Kroger #638, is very excited about Outcomes-MTM being part of the retail setting. Dr. Rice believes MTMs will “help give the patients a better idea of what a pharmacist can do, what they are capable of, and their immensity of knowledge. It makes the pharmacists more trustworthy and not just viewed as ‘the pill pushers’ behind the counter.” Because MTMs are newer in retail pharmacy, some patients might be apprehensive about receiving CMRs or TIPS. Dr. Rice thinks it is “important to explain to the patient that the counseling could be very

beneficial. It could result in the patient taking fewer medications as well as spending less money.”

MTMs in the retail setting require more initiation from pharmacists. It is standard procedure to ask patients if they have any questions when picking up their medications, especially if they have never taken it before. But MTMs also include checking in on those patients approximately a week later to see how they are doing on the new medication.

When asked about the future of the OutcomesMTM program in the retail setting, Dr. Rice definitely sees it becoming a more prominent and permanent program. As she simply stated, “Anyone can dispense a pill, but pharmacists should be more involved and MTMs

can help us do that!”

References:

“APhA MTM Central.” *American Pharmacists Association*. <<http://www.pharmacist.com/mtm>>

“Medication Therapy Management in Pharmacy Practice.” *American Pharmacists Association*. March 2008, Version 2.0. http://www.pharmacist.com/sites/default/files/files/core_elements_of_an_mtm_practice.pdf

“OutcomesMTM.” <<http://www.outcomesmtm.com/>>

In order to pinpoint the source of short term memory loss, young and old rats were reduced to 85% of their free-feeding weights over the course of 5 days, and a contraption called a Skinner box was used to monitor their actions. A Skinner box (pictured to the right) is used to study animal behavior by teaching an animal to flip a lever in exchange for a food pellet. In the experiment designed by the UF cognitive research team, rats were placed in the box and were allowed to locate the lever. They were then removed from the box for 30 seconds, placed in the box again, and allowed to find the lever again. For the brief period of 30 seconds, both young (6 month old) and old (22 month old) rats were able to locate the lever, but as the time period increased, many old rats struggled to find the lever

and took much longer than younger rats. Upon brain dissection and analysis, it was shown that the older rats had more GABA receptors and were binding more of the inhibitory chemical and having a reduced memory function.

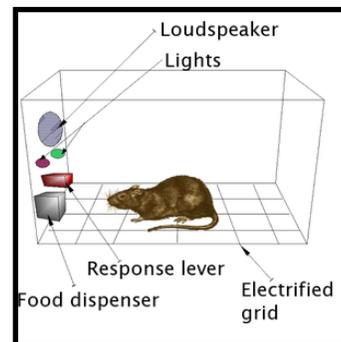
The researchers proceeded to test a GABA antagonist (injected intraperitoneally) on older rats in an attempt to pharmacologically simulate the lower number of receptors that younger rats had naturally. The drug was successful and the older rats who received it improved significantly on the Skinner box memory test. Although rats' cognitive aging process resembles that of humans, the drug is not yet suitable for testing in humans. However, these and other similar findings are very promising in reversing the variable and seemingly inevitable decline

in memory.

References:

C. Banuelos, B. S. Beas, J. A. McQuail, R. J. Gilbert, C. J. Frazier, B. Setlow, J. L. Bizon. *Prefrontal Cortical GABAergic Dysfunction Contributes to Age-Related Working Memory Impairment*. *Journal of Neuroscience*, 2014; 34 (10): 3457 DOI: 10.1523/JNEUROSCI.5192-13.2014

Whiteman, Honor. “New drug could reverse age-related cognitive decline.” *Medical News Today*. MediLexicon, Intl., 7 Mar. 2014. Web. 19 Mar. 2014. <<http://www.medicalnewstoday.com/articles/273636>>



A Skinner box.