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College of Applied and Natural Sciences

ANS Day and ANS Research Symposium
Louisiana Tech University Student Center

March 21, 2013

8:30 – 9:45 AM  Oral Presentations  
(Student Center, rooms 222-224)

9:45 – 11:30 AM  Poster Viewing Session – Poster presenters will be in attendance  
(Main Floor of Student Center)

11:30 – 1:30 PM  Lunch Buffet - Free for ANS students, faculty, staff, and invited guests  
(Main Floor of Student Center)

12:15 - 1:00 PM  ANS Student and Faculty Awards  
(Main Floor of Student Center)
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Oral Presentation Abstracts

Division of Nursing

School of Biological Sciences
Faculty/ Nursing Student Collaboration with The Hearing Voices Curriculum: Improving Outcomes for Patients with Auditory Hallucinations

Tara Haskins¹, Ashlee Hall²

¹Assistant Professor, Division of Nursing Louisiana Tech University
²Undergraduate Student, Louisiana Tech University

This presentation highlights the initial implementation of the Hearing Voices Curriculum executed via faculty/nursing student collaboration. Experiential learning featuring low fidelity simulation was obtained through an Applied and Natural Sciences Technology grant with the objective of decreasing the distance and stigma often experienced by patients with psychotic disorders and healthcare providers. The goal of this project was to foster understanding while illustrating the patient experience in a nursing student university population with minimal life experiences and exposures to persons with psychotic disorders. Hearing Voices is a ground breaking training kit designed to help others understand the challenges of daily functioning while experiencing auditory hallucinations. The curriculum design includes listening to distressing voices through ear buds while completing a series of tasks such as taking a mental status exam in a mock psychiatric emergency room, writing a letter, reading an article or completing simple task like checking out a library book. This method replicates the isolative and solitary experience of auditory hallucinations. Implementation of the curriculum was forged through collaboration between a primary faculty member and an upper class nursing student in an independent study course. In addition to implementation of the curriculum, the student learning objectives were embedded in carrying out the various stages of an information science project through a preliminary examination and evaluation of the literature relevant to the project, function as an assistant to role model nurse leader behaviors, critique the educational value of the curriculum from the student perspective, and provide recommendations for tools or surveys for future research projects. This presentation will present the initial implementation in a collaborative format. Initial student survey results will be shared with the audience as well as faculty and student assistant reflections on type of learning experience in a nursing curriculum.
The Role of IunH and Other Spore Proteins in *Bacillus anthracis*
“Superdormancy”

Prasant Seetala

*Graduate Student, School of Biological Sciences, Louisiana Tech University*

*Bacillus anthracis* is a bacterial species which can create an endospore, the infectious particle of anthrax infections. A spore is a protective, dormant cell type which can survive routine decontamination attempts. One way to perform adequate decontamination is to take the spores out of this protective state through germination. This involves exposing spores to nucleosides and amino acids which trigger pathways that break apart the spore. However, a certain amount of spores do not germinate in response to normal germinant levels. If they do not germinate after two germination attempts, they are termed “superdormant”. We hypothesize that superdormancy could be affected by proteins that make up the coat and exosporium layers of the spore. SDS-PAGE was used to compare proteins present in naïve spores (never exposed to germinants), to proteins in superdormant spores (put through two germination attempts). Data suggests superdormant spore coats contain more protein overall as evidenced by increased intensity of several protein species separated by SDS-PAGE compared to naïve spores. Further research on these protein abundances could lead to better decontamination techniques, and help prevent ungerminated spores from infecting an individual at a later time.
Hepatic Melanomacrophage Aggregates and Mercury in Spotted Gar,
*Lepisosteus oculatus*

J. Daniel French¹, Jamie Young², Matthew M. Chumchall³, Eric Brinkman⁴, Brandon C. Moore⁵

¹Graduate Student, School of Biological Sciences, Louisiana Tech University
²Undergraduate Student, School of Biological Sciences, Louisiana Tech University
³Assistant Professor, Biology Department, Texas Christian University
⁴Fisheries Supervisor, Arkansas Game and Fish Commission
⁵Assistant Professor, School of Biological Sciences, Louisiana Tech University

Mercury is a known toxic metal that can pose serious health threats to fish occupying higher trophic levels in aquatic environments. Through biomagnification, mercury may build up in tissues potentially impacting the immune system and overall fish health. It has been documented that mercury accumulation in the liver may increase the production of melanomacrophages as a consequence of chronic mercury-mediated tissue damage. This experiment investigated the relationship between increasing hepatic mercury concentrations and the frequency of liver melanomacrophages. Spotted gar (*Lepisosteus oculatus*) liver specimens were collected from two southern Arkansas lakes: Calion Lake and Felsenthal National Wildlife Refuge. We quantified the number, size, and frequency of melanomacrophages and the concentration of total mercury in the liver tissues. Lower liver mercury concentrations were found in the fish from the control site, Calion Lake, compared to those from Felsenthal NWR. Both collections of fish from Felsenthal NWR also exhibited increased hepatic melanomacrophage aggregates with higher mercury concentrations. These associations will be discussed in light of possible detriments to spotted gar health and potentially other fish in similar environment conditions.
Effects of Combinatorial Antifungals on *Candida albicans*: Identifying Stress Responses

J. Hunter Collins¹, Edward C. Pierce¹, Patrick L. Hindmarsh²

¹Graduate Student, School of Biological Sciences, Louisiana Tech University
²Assistant Professor, School of Biological Sciences, Louisiana Tech University

*Candida albicans* is a unicellular budding yeast that is a common constituent of the human flora. *C. albicans* is responsible for a number of human diseases including Candidemia, which has a 50% mortality rate, and is also the fourth most commonly hospital acquired infection. For healthy individuals, *C. albicans* has a benign association but for others, in particular those who are hospitalized or have compromised immune systems, *C. albicans* can be highly pathogenic. Modern treatment strategies for *C. albicans* infections must overcome two major obstacles: antifungal toxicity and the development of resistance to current antifungal therapies. *C. albicans* can also respond to stress by switching from yeast to hyphae growth. We have recently observed this hyphal switching in response to combinatorial antifungals. This is an interesting result given that these antifungals normally inhibit hyphae formation and such a response has not been previously reported. The goal of this research is to identify combinations of antifungal drugs that decrease *C. albicans* growth using sub-inhibitory concentrations in the hopes of reducing antifungal toxicity and drug resistance.
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Effects of Dietary Phyto-Estrogens on Southern Toad Development

Alexis Traylor¹, Thea Edwards²

¹Graduate Student, School of Biological Sciences, Louisiana Tech University
²Assistant Professor, School of Biological Sciences, Louisiana Tech University

Flavonoids are a diverse group of secondary compounds produced by plants. Phyto-estrogens are a subgroup of flavonoids that can significantly alter animal development and reproduction by change in endocrine function. Phyto-estrogen levels in plants vary, depending on environmental factors including photoperiod, nitrogen levels, and stresses such as competition. It is possible that changes in phyto-estrogen levels signal environmental change to herbivores. This study will investigate potential links between environmentally induced changes in the estrogenic activity of algae and plants and developmental changes in southern toad tadpoles. Investigating these questions will improve our understanding of how plant flavonoids facilitate plant-animal communication and modulate stress in aquatic ecosystems.
Influence of CotO and SpoVID on Spore Assembly and Function in
Bacillus anthracis

Elizabeth Griggs¹, Trey Hanna², Michael Mallozzi³, Adam Dricks³, Rebecca Giorno⁴

¹Graduate Student, School of Biological Sciences, Louisiana Tech University
²Undergraduate Student, School of Biological Sciences, Louisiana Tech University
³Loyola University, Chicago, IL
⁴Assistant Professor, School of Biological Sciences, Louisiana Tech University

Spore formation in Bacillus anthracis occurs when the bacterium is met with a nutrient poor environment. When this happens, the bacterium undergoes a transformation from the gram positive, rod form, to the more protective spore form. The spore is composed of genetic material housed by the cortex, and surrounded by a protective shell called the coat. The coat protects the cortex from small toxic molecules such as lysozyme. In addition, B. anthracis also has a loosely fitting shell called the exosporium. Some genes which control the formation of the coat in B. anthracis are also thought to control the formation of the exosporium. The goal of this research is to complement spoVID and cotO mutant strains of B. anthracis. The cotO mutant forms no exosporium and the spoVID mutant has very little coat formation, but maintains an exosporium. In order to show if disruption in spore morphology is caused by the mutated gene, a supplementation of the spoVID and cotO mutant strains will be performed. Because spoVID is in a two gene operon with yxxE, either spoVID or spoVID yxxE will be used to complement the spoVID mutant strain. Similarly, cotO will be added to the cotO mutant strain to see if the addition of the gene will revert back to wild type phenotype. In addition, inosine hydrolase activity will be compared in wild type, spoVID, cotO, and lunH mutant spores, to see if morphological changes correlate with loss of inosine hydrolase activity.
To Determine the Roles of the Spore Coat and the Exosporium in Contributing to Spore Ozone Resistance in *Bacillus anthracis* Using Aqueous Ozone

Leema Pradhan¹, Rebecca Giorno²

¹Graduate Student, School of Biological Sciences, Louisiana Tech University
²Assistant Professor, School of Biological Sciences, Louisiana Tech University

In response to unfavorable environmental conditions *Bacillus anthracis* is capable of forming a specialized dormant cell type called a spore which can resume vegetative growth when the conditions become favorable. *B. anthracis* spores are of interest because they are the infectious form of the disease anthrax and are highly resistant to environmental stresses such as extreme temperatures, pH, chemical damage, and drying that readily kill other cellular counterparts. One class of chemicals commonly used to inactivate spores is oxidizing agents. Ozone is a strong oxidizing agent and has well known sterilizing properties. Studies have been performed in *Bacillus subtilis* which demonstrate the protective role the spore coat plays against aqueous ozone. However, at present the role of the exosporium, the outer most layer of a *B. anthracis* spore, has yet to be investigated with respect to ozone resistance. The objective of this study is to determine if the *B. anthracis* spore coat and/or exosporium play any role in providing resistance when challenged to aqueous ozone. Studies using *spoVID* and *cotE* mutant spores, which lack the coat and exosporium respectively, are underway to determine their ability to withstand different concentrations of time dependent aqueous ozone exposure.
Roles of CotJC and BAS2447 in *Bacillus anthracis*

Javier Rivas\(^1\), Rebecca Giorno\(^2\)

\(^1\)Graduate Student, School of Biological Sciences, Louisiana Tech University  
\(^2\)Assistant Professor, School of Biological Sciences, Louisiana Tech University

*Bacillus anthracis* undergoes sporulation to survive harsh environments and as a mode of dispersal. When the spore of *Bacillus anthracis* germinates in a host, it can lead to an infectious disease known as anthrax. In order to better understand the process of germination, we have to look at the proteins involved. There are many proteins in each of the five structural layers of the spore; my research focuses on coat and exosporium proteins. A particular protein of interest is CotH, a suspected coat protein. \(cotH\) mutant spores germinated faster than wild type spores; suggesting, that CotH effects germination. CotJC and BAS2447 are two possible CotH assembly-dependent proteins. The goal of my thesis is to understand the roles of CotJC and BAS2447 on the coat morphology and germination of *Bacillus anthracis* spores. Previous data suggests that CotJC-GFP is CotH assembly dependent. Therefore, I am currently trying to construct a \(cotJC\) deletion strain. I will perform germination assays on the \(cotJC\) deletion strain and record inosine hydrolase activity. To determine if BAS2447 is CotH-dependent for assembly, a green fluorescent protein (GFP) fusion analysis will be employed. This research will offer clarification on coat protein dependency.
**Developing of Autonomously Replicating Plasmids for *Candida albicans***

Xuan Liu\(^1\), Zach Allgood\(^1\), Patrick L. Hindmarsh\(^2\)

\(^1\)Graduate Student, School of Biological Sciences, Louisiana Tech University  
\(^2\)Assistant Professor, School of Biological Sciences, Louisiana Tech University

*Candida albicans*, a dimorphic fungus, is an important human pathogen and part of the normal human flora. In a healthy host, its growth can be inhibited by other microfloras. As an opportunistic pathogen, *C. albicans* can escape its niche in the human biome and colonize other tissues and cause a serious disease, candidiasis. Since 1989, a variety of invasive medical devices have been used medically and with the increased use of anti-fungal drugs there has been an upswing in pathogenicity and an increase in drug-resistant strains and as a result *C. albicans* has become the fourth most common nosocomial infection. The increase in candidiasis as a nosocomial infection and the ineffectiveness of current medications creates a need for new genetic tools to investigate *C. albicans*. At present there are few plasmids available for *C. albicans*, our project is to develop an autonomous replicating plasmid as a functional genetic tool. Previously, use of autonomous replicating plasmids in *C. albicans* has had a number of problems. First, the plasmids may integrate into the *C. albicans*’ genome. Second, plasmids tend to form large tandem multimers where they lose their functionality and become unstable. The goal of this project is to develop an autonomous replicating plasmid for *C. albicans* to solve these problems. For this work we will use the mechanism identified in Epstein Barr Nuclear Antigen 1 (EBNA1) and the Family of Repeats (FR). EBNA1 can recognize and bind FR sequence and AT rich regions of the host chromosomes. We have integrated the FR sequence into pMk22, an autonomous replicating plasmid. EBNA1 and Lac Z were used to knock out *ura3* in *C. albicans*’ chromosome through homologous recombination. Our plasmid will be bound by EBNA1 to *C. albicans*’ chromosomes. This will then allow the plasmid to be stable in the host cells and segregated into the daughter cells.
Effects of Combinational Antifungal Drug Treatment on Drug Resistant *Candida albicans*

Edward Pierce¹, J. Hunter Collins¹, and Patrick Hindmarsh²

¹ Graduate Student, School of Biological Sciences, Louisiana Tech University
² Assistant Professor, School of Biological Sciences, Louisiana Tech University

*Candida albicans* is a ubiquitous commensal species of opportunistic pathogenic yeast that causes acute mucosal infections and, in immunocompromised patients, chronic invasive bloodstream infections. There are two categories of antifungal agents typically used to treat *C. albicans* infections: azoles and polyenes. Azole drugs, such as fluconazole, function by blocking the synthesis of ergosterol, a key component of fungal cell membranes. Polyene drugs, like Amphotericin B, bind to ergosterol, causing membrane damage and leakage of intracellular ions. Treating chronic *C. albicans* infections in immunocompromised patients with azole drugs has resulted in a significant increase in clinically isolated azole and polyene resistant strains of *C. albicans*. One of the goals of our study is to determine the effectiveness of sub-clinical concentrations of antifungal drug in combination at overcoming drug resistance in *C. albicans*. We have already shown that antifungal drug combinations administered at different time intervals are more effective at slowing *C. albicans* growth than single drugs or drug combinations administered simultaneously. We now want to determine the growth limiting effects of antifungal drug combinations on drug resistant strains of *C. albicans*. Another goal of our study is to investigate changes in drug resistant *C. albicans* gene expression caused by treatment with drug combinations. Examining the effects of antifungal drug combinations on drug resistant *C. albicans* will allow for more effective treatment of chronic *C. albicans* infections by reducing both host toxicity and the potential for multi-drug resistance.
Monitoring Flight Calls of Nocturnal Avian Migrants to Identify Rare or Secretive Species

Victor C. Lincecum¹, Terri J. Maness²

¹Undergraduate Student, School of Biological Sciences, Louisiana Tech University
²Assistant Professor, School of Biological Sciences, Louisiana Tech University

Many birds produce species-specific flight calls during sustained flight. These relatively simple vocalizations may help organize individuals within flocks to minimize collisions, particularly under turbulent or low visibility conditions. Most nocturnally migrating bird species are therefore known to vocalize. Acoustic monitoring of nocturnal migrants provides a powerful tool for assessment of migratory behavior and routes. In particular, these calls may be used to identify and estimate the minimum number of individuals of rare or cryptic species moving through an area. In late October 2012, we placed a pressure-zone microphone element (Knowles EK3029c) mounted in a three gallon bucket and pointed toward the sky on the roof Carson-Taylor Hall on the campus of Louisiana Tech University, Ruston, LA, USA. This highly directional microphone is sensitive in the 2-12 kHz band. The microphone was attached via an audio cable to a desktop computer which recorded sounds continuously from 18:00 - 06:00 in a wav format. Wav files were analyzed with Tseep software (Old Bird, Inc.) that detects bursts of acoustic energy in the 6-10 kHz range. This range is effective for detecting night flight calls of most North American warbler and sparrow species. Spectrograms of extracted calls were visually and aurally compared with calls of verified identity. In November and December of 2012, we recorded the flight calls of American Tree Sparrows (*Spizella arborea*), a previously undocumented species in the state of Louisiana. In the same period of time, we also identified several individuals of secretive grassland species: Grasshopper (*Ammodramus savannarum*), Henslow’s (*Ammodramus henslowii*), and LeConte’s (*Ammodramus leconteii*) sparrows. Acoustic monitoring is a relatively inexpensive method of providing presence and movement information of birds that are difficult to visually detect and study. These data are critical for establishment of conservation corridors, placement of wind turbines or communication towers, and detection of altered migration behavior with changing climate.
Hepatic Iron Content in Mercury-Polluted Fish Livers

Jamie E. Young¹, J. Daniel French², Brandon C. Moore³

¹Undergraduate Student, School of Biological Sciences, Louisiana Tech University
²Graduate Student, School of Biological Sciences, Louisiana Tech University
³Assistant Professor, School of Biological Sciences, Louisiana Tech University

An increased iron concentration in fish liver is an indicator of hepatic pathology (hemochromatosis). Environmental pollutants, such as mercury, can result in liver damage and increased hepatic iron loads. We collected spotted gar (Lepisosteus oculatus) livers from two southern Arkansas lakes with varying levels of mercury contamination. We quantified total mercury concentrations in the livers and stained histological sections for the presence of iron using the Prussian Blue technique. Here, we present the relationship between liver mercury levels and the observed degree of hepatic iron staining. We will present our findings in the context of how environmental quality may directly impact fish health and the overall health of the ecosystem.
Hybrid Recombinases Flp-TALE and Cre-TALE as Genome Engineering Tools

Feng Li\textsuperscript{1}, Riddhi Shah\textsuperscript{1}, Yuri Voziyanov\textsuperscript{2}

\textsuperscript{1}Graduate Student, School of Biological Sciences, Louisiana Tech University
\textsuperscript{2}Associate Professor, School of Biological Sciences, Louisiana Tech University

Successful gene therapy applications rely, in part, on the efficient, precise, and safe genome engineering approaches. These approaches can be used either to inactivate a gene or to integrate a gene into a desired genome locale or to replace a defective gene with its wild-type allele. The most efficient genome engineering approaches to inactivate genes are those that rely on DNA repair, for example, the ones that are based on zinc finger and TALE nucleases (ZFNs or TALENs). Several genome engineering approaches can be used to add or replace genes. These include the nuclease-based approaches and the approaches that are based on site-specific DNA recombinases. We recently showed that the latter genome engineering approaches, which are currently utilizing primarily Flp/FRT, Cre/loxP, and phiC31/att recombination systems, can accomplish the task both efficiently and precisely if the dual recombinase-mediated cassette exchange (dual RMCE) is used as a gene delivery/replacement tool. Under optimal conditions, the efficiency of gene replacement by dual RMCE can reach about 50% of the transfected cells.

The dual RMCE reaction depends on the pre-introduction of the recombination target sites into a genome locale of interest before the desired genetic manipulations can be carried out. This dependence can be lifted if variants of site-specific recombinases are evolved to recognize pre-existing target-like sequences that flank a genome region of interest. We present here the analysis of the engineered hybrid recombinases Flp-TALE and Cre-TALE that recognize the genomic sequences of interest. These task-specific variants of Flp and Cre recombinases can be paired to be used to replace the desired genome regions by the dual RMCE approach.
Human tissue kallikrein 5 (KLK5) is a part of the human tissue kallikrein (KLK) gene family which consists of 15 contiguous genes located on chromosome 19. They are serine proteases that have multiple functions at the cellular and tissue level. We assessed KLK5 expression in tumor and normal tissue from the following organs: breast, colon, kidney, liver, lung, ovary, prostate, and thyroid. Expression levels were quantified by real time polymerase chain reaction (qPCR) specific for KLK5. Absolute quantification was performed by using a standard curve of serial dilutions of a plasmid containing a cDNA clone of human kallikrein 5 (KLK5). Preliminary data indicates increased expression of KLK5 in breast and ovarian carcinomas. Immunohistochemistry will be used to try and localize KLK5 protein in related tissue sections.
Q-PCR Survey of Kallikrein 6 (KLK6) Gene Expression in Normal and Tumor Tissues

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The human tissue kallikrein (KLK) gene family consists of fifteen serine proteases whose physiological roles are for the most part unknown. Differential expression patterns between tumor and corresponding normal tissues have been reported for several of the relatively newer members of KLK family, leading to hypothesized potentials as cancer biomarkers. The objective is to use quantitative real-time polymerase chain reaction (Q-PCR) and immunohistochemistry to survey KLK6 expression in commercial cDNA array and tissue section containing cancer and normal tissues from eight different human organ systems. KLK6 over-expression was observed in ovarian, colon, lung and thyroid tumors while in normal kidney and breast. Analysis of positive samples were confirmed by size, melt curve, DNA sequencing and were statistically significant. We conclude assessment of KLK6 expression might useful as a biomarker for several tumor types.
Sharkey shrink-swell clay soils comprise approximately 1.2 million ha nationally and are common throughout the Mississippi River floodplain (Pettry and Switzer, 1996). These soils are often afforested or converted to short-rotation woody cropping systems after years of unprofitable row cropping, however wide scale conversion could have a large impact on regional C dynamics. Accounting for the amount of C lost as total soil CO2 efflux ($F_S$) is essential for estimating a total system C budget. Methods to measure and partition $F_S$ and drivers of $F_S$ are known for less plastic soils, but the literature is deficient on methods for measuring $F_S$ on shrink-swell clays. The objectives of this work are to determine the suitability of the root exclusion method for measuring and partitioning $F_S$ into its primary components, heterotrophic and rhizospheric respiration, throughout the year of establishment. Additionally, we seek to determine if $F_S$ and its components are influenced by species and management intensity. Using a randomized complete block design with a full factorial treatment arrangement, black willow and eastern cottonwood were established from cuttings across three levels of management intensity (0.8 x 0.8m double row pair, 0.8 x 2.1m, and 1.8 x 2.7m) in February of 2012. Gas exchange measurements were taken using a Li-Cor 8100 IRGA at approximately 50-day intervals from April to September of 2012 with one dormant season measurement in February of 2013. Volumetric soil moisture (0-6cm) and soil temperature (5cm) were measured concurrently with gas exchange. Data suggest that no disturbance from root exclusion installation remained fourteen days following complete installation. No influence of species on $F_S$ or its components were found. A significant ($p = 0.0286$) management intensity by time interaction was apparent for $F_S$, although management intensity alone was not significant ($p = 0.4522$). Implications of this work will provide future investigators with some insight into the suitability of root exclusion and the response of $F_S$ and its components in shrink-swell clay soil.
Short-term Changes in Tissue Soluble Carbohydrate Concentration in Longleaf Pine (Pinus palustris Mill.) Subjected to a Prescribed Fire

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Prescribed fire can cause changes in the physiology and ultimately the growth in longleaf pine through the removal of leaf area. The ability of a tree to recover from crown scorch is necessary to prevent long-term growth reductions. Reserve carbohydrates are thought to be necessary for the growth of new foliage; however, which tissues (stem, bud, or root) are responsible for this remobilization is unknown. This study analyzed changes in soluble carbohydrates in multiple tissue types of longleaf pine subjected to a prescribed fire in May of 2011. Tissue samples were collected 10 days following the burn in a 90-acre, 7-year-old plantation located on the Winn Ranger District of the Kisatchie National Forest in central Louisiana. Eighteen trees (nine burned, nine unburned) were destructively harvested and tissue types were separated. Samples were immediately placed on ice, transported to the lab and frozen in a -20°C freezer. Samples were then freeze dried, ground, and analyzed for soluble carbohydrates using an anthrone-thiourea colorimetric assay. Crown scorch had no effect on stem and root soluble carbohydrate concentrations. Soluble carbohydrate concentrations were significantly lower in burned terminal bud tissue than in unburned tissue. A decrease in terminal bud soluble carbohydrates of burned trees may be due to their inability to accumulate as much soluble carbohydrates as the unburned trees due to the partial removal of photosynthetic tissue.
There has been an intensive research going on for Alzheimer’s disease (AD) to understand its cause and progression through the past decade. However, the pathogenic factors that are responsible for these processes are still unclear. In this research we utilize the hippocampal gene expression data of 22 AD patients and present a framework for a comparative study to evaluate the two similarity measures, Mutual Information and Pearson Correlation Coefficient in developing gene co-expression networks. We hypothesize that Mutual Information based co-expression networks can capture more biologically significant dependencies as compared to Pearson Correlation Coefficient due to its ability to capture non-linear relationships. We utilize a parameter free module discovery algorithm to detect functional modules discovered by the two approaches. Further, to validate our approach, we compared the identified functional modules resulted by our experiments to the existing biological modules by computing the Jaccard index between them. Finally, we evaluated the discovered modules for their biological significance by performing biomedical literature search. We also investigated into the drug interdiction pathways, which suggest potential targets for intervention.
Exploratory Study of Cancer Therapies

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As the search for cancer therapies expands, it becomes increasingly more expensive to explore the multitude of treatments discovered. Determining which technologies to pursue can be difficult for sponsors of the research. A comparison of chemotherapy, radiation therapy, and gene therapy is necessary in order to determine which is most beneficial to pursue. The criteria to be considered are: cost to the patient and hospital in developing these technologies; effectiveness of the treatments, including rates of success and symptoms; and the convenience of the duration and frequency of the treatments. This exploratory study found that chemotherapy was less expensive than radiation therapy to the patient and hospital. The side effects were found to be less severe in radiation therapy than in chemotherapy. Dosing was difficult to compare because the schedules are often tailored to each patient as the diagnoses differ and the side effects are observed. Gene therapy, being an emerging science, was difficult to analyze on these criteria. Information on the most current studies available was assessed but not applicable to the overall comparison. The recommended target for research was radiation therapy.
Trends Leading to a Primary Care Physician Shortage

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The “Baby Boomer” generation has now aged enough to now qualify for Medicare, the doctors that are available to treat these patients are dwindling. The decline of medical school applicants may be impacted by such trends as: economic expansion, population growth, physician’s work effort, and the provision of services by non-physician clinicians. An exploratory study is needed to discover if there are fewer applicants to medical school because of the stress of a medical service career, the high cost of malpractice insurance once the physician is practicing, fiscal constraints, less job satisfaction of physicians, or less personal satisfaction of physicians. If the pace of medical education remains the same in the United States, the decline of physicians throughout the spectrum will become more severe with each year. Medical schools have increased class size to aid this looming crisis, but if residency slots do not increase graduates will not have an open residency program for participation. This phenomenon will lead to a specialist physician shortage and primary care physician shortage.
Relationship and Benefits among EHR Implementation and Quality of Care

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Health Information Technology for Economic and Clinical Health (HITECH) Act mandates the adoption of the Electron Health Record (EHR). As of now the majority of patient records are still stored on paper. Many healthcare facilities fail to accurately or timely measure the quality of care given, coordinate care, or see a reduction in medical errors. Not only will implementation improve the care rendered, reduction in medical errors, and coordination of care, but it will give facilities that choose to implement the EHR incentive money. Children’s Medical Center in Dallas is an example of a level 7 facility with a reduction of staff by 47 and a combined savings of $13.7M annually, while receiving $1M annually for 5 years. Children’s Medical Center decreased accounts payable by 10% and improved record access from 10 minutes to 15 seconds and the reduction of ER wait time by 30%. This exploratory study supports that with the implementation of an EHR the quality of care that is rendered and improves the overall return on investment.
The Use of Pre-Operative Techniques in the Reduction of Surgical Errors

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Surgical errors are defined as medical mishaps that cause harm to the patient, and impacts patient safety. The rise of surgical errors has brought forth concern for both patients and providers. Wrong-site surgery, wrong-procedure, and wrong-patient operations are examples of lapse communication between the nurses and surgeons, nurses and patients, and even patients and surgeons. Not only does a surgical error impact the patient but it impacts the surgeons, nurses, and overall adds a financial burden on the hospital. Studies have shown that there is little information about the operation room briefings before the surgery begins. There are a few techniques that have been proven effective to help reduce surgical errors: preoperative and pre-procedure verification, marking the procedure site, and a “time out”. The implementation of a standard set of policies and procedures for pre-operative, inter-operative, and post-operative communication is imperative for the reduction of surgical errors.
Pajama Pants: Does Brand Affect Performance?

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The purpose of this project was to compare the performance of the pajama pants from three retail competitors: Dillard’s, Wal-Mart, and Old Navy.

The construction characteristics of fabrics were evaluated. Construction characteristics included fiber content, yarn structure, weave structure, care information, fabric weight, thread count, home laundering, and perspiration. Dimensional stability was tested by marking a 10” area with sharpie marker on the pajama pants. The pajamas were then laundered according to care instructions. The marks on the pajama pants were measured after being washed one, three, and ten times. Appearance retention after laundering was evaluated and rated using the AATCC reference standards. The ability of the fabric to release oily stains during home laundering was evaluated by applying butter, mustard, jelly, mayonnaise, ranch, chocolate, raspberry vinaigrette, ketchup, and oil to a 6x12 swatch of fabric. The staining substance was allowed to dry for four days and then the fabric specimen was laundered. The stains were rated using AATCC staining scales. Colorfastness of the fabric specimen to chlorine and non-chlorine bleach, home laundering, perspiration, and crocking were tested. The results were then rated using AATCC Gray Scale for staining.

In the dimensional stability test the pajama pants from all three retailers shrunk five percent in the warp direction while Wal-Mart shrunk the most in the filling, Old Navy shrunk the least. When tested for appearance retention, all three of the fabric specimens passed the AATCC. The crocking test showed that Dillard’s passed with flying colors, Wal-Mart passed but didn’t have great results, and Old Navy failed the wet laundered but passed all of the other tests. All three of the pajama pants failed the bleach test while bleach ate through Wal-Mart’s fabric, Wal-Mart made up for the bleach test by passing the stain removal test with the best results. The other two retailers passed everything with stain removal with the exception of mustard. For the perspiration test Dillard’s failed but the other two passed. The home laundering test showed Dillard’s and Wal-Mart failed in colored but passed everything else. Old Navy passed all of the home laundering tests.

The performance test results revealed that no one brand of pajama pants proved a higher quality of fabric and construction. While Wal-Mart shrunk the most in the filling percentage of the dimensional stability and had the poorest results in the bleach process, the results showed it doing the best in the stain removal. Dillard’s and Old Navy ran a tight race with the stain removal process where they performed equally. Dillard’s had the best results for crocking. Wal-Mart and Old Navy showed poor results by the color residue increasing while wet after laundering. This means that the dye in the pants for Wal-Mart and Old Navy is poor. In conclusion of these results, the more expensive the pajama pants did not mean it was a higher quality product and fabric.
The Ultimate Test of the Basic Black T-Shirt

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The purpose of this research project was to test the performance of three different brands of plain black t-shirts from Old Navy, Dillard’s, and Wal-Mart. The general construction of each of the t-shirts was evaluated. The general construction included yarn structure, weave structure, method of coloration, fabric weight, and thread count.

The dimensional stability of each of the garments was evaluated form a 10” square of the fabric. The fabrics were laundered according to the care instructions. The original 10” square was measured after being laundered one time, three times, and ten times. Appearance retention after laundering was evaluated using the same fabric specimens and rating the fabric wrinkles according to the AATCC reference standards. Each of the garment’s ability to release stains during the process of laundering was tested by applying butter, mustard, jelly, mayonnaise, ranch dressing, chocolate, raspberry vinaigrette, ketchup, and oil to a swatch of the garment. The staining substances were allowed to dry and then the fabric was laundered. The stains were rated using AATCC staining scales. Colorfastness of the fabrics was tested for chlorine and non-chlorine bleach, home laundering, and crocking were tested. The results were rated using AATCC Gray Scale for Staining.

Dillard’s had the greatest shrinkage after the first laundering. However, all of the shirts exceeded the industry standard allowed for shrinkage. The appearance retention of the Wal-Mart and Dillard’s shirts were very similar after laundering. Old Navy performed the worse. All of the shirts had acceptable performance results for resistance to staining. This was partially due to the dark fabric of the shirts hiding the staining.

The performance of the shirts did not reveal an exceptional product for any one brand. However, the Wal-Mart shirt was a heavier, thicker knitted fabric leading to a better appearance retention performance after laundering. Since Wal-Mart performed the same or better as the other brands, it is the best buy for the product.
Men’s Dress Shirts: What’s in the Price?

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The purpose of this research project was to compare three dress shirts from different stores with the same fiber contents for performance and construction to determine how their performance differed according to price. The construction characteristics of 100 percent cotton dress shirts were evaluated after several washes. Construction characteristics evaluated included fiber content, yarn structure, weave structure, care information, fabric weight, and thread count. The garments were tested after the first, third and tenth wash.

Dimensional stability was tested first by marking four dots on each shirt with a permanent maker creating a 10” square. The fabrics were laundered according to the care instructions. The dots were subsequently measured to evaluate shrinkage. Appearance retention after laundering was evaluated using the same fabric specimens and rating the fabric wrinkles according to the AATCC reference standards.

The ability of the fabrics to release oily stains during home laundering was evaluated by applying ketchup, chocolate syrup, vegetable oil, mayonnaise, ranch dressing, jelly, butter, Raspberry vinegar, and mustard to fabric specimens. The staining substances were allowed to dry, and then the fabric was laundered. The stains were rated using AATCC staining scales, 5 being the least stain and 1 the worst stain.

Colorfastness of the fabrics to chlorine and non-chlorine bleach, home laundering, crocking were tested. The results were rated using AATCC Gray Scale for Staining, 5 being the least stain and 1 the worst stain.

Test results revealed that the higher priced Dillard’s shirt is an overall better garment according to performance. The shirt is easier to care for because it stains, shrinks and wrinkles less than the shirts from Wal-Mart and Old Navy. This is extremely important for consumers. The test results of the moderately priced Old Navy shirt and inexpensive Wal-Mart shirt revealed that they are very similar in performance despite the price difference. Although all three shirts are composed of the same fiber content and care instructions, the price of a garment can determine how well it performs and in this case the most expensive garment performed the best.
Skinny Jeans: Which Pair Should I Buy?

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The purpose of this research project was to evaluate and compare the performance of three different brands of skinny jeans. The construction characteristics of each brand were evaluated. Construction characteristics evaluated included yarn structure, weave structure, method of coloration, fabric weight, and thread count.

Dimensional stability was tested first by marking 10” measurements with permanent markers in the length and cross directions of the pants. The fabrics were laundered according to the care instructions. The dashes were subsequently measured to evaluate shrinkage. Appearance retention after laundering was evaluated using the same fabric specimens and rating the fabric wrinkles according to the AATTC reference standards. The ability of the fabrics to release oily stains during home laundering was evaluated by applying butter, mustard, jelly, mayonnaise, ranch dressing, chocolate, raspberry vinaigrette, ketchup, and oil to fabric specimens. The staining substances were allowed to dry and then the fabric was laundered. The stains were rated using AATCC staining scales. Colorfastness of the fabrics to chlorine and non-chlorine bleach, home laundering, and crocking were tested. The results were rated using AATCC Gray Scale for Staining.

Old Navy showed the greatest results compared to the wrinkled samples after the first wash. Dillard’s and Wal-Mart had equal results and appeared to be more wrinkled. All jeans were affected by the staining agents leaving residue after laundering. Dillard’s performed the best for crocking both in the original and after laundering. Old Navy and Wal-Mart both performed acceptable for crocking. Wal-Mart had the least amount of shrinkage and remained almost the same form the first to tenth wash. Dillard’s showed results of little shrinking with a consistent amount of shrinking after each wash. Old Navy showed little amount of shrinking from the first to tenth wash.

In overall performance, Dillard’s came in a close second behind Wal-Mart, and then Old Navy was the worst. Although each of the jeans was better in one performance test than the others, Wal-Mart had the overall best performance. For skinny jeans, Wal-Mart is the best brand based on performance and price.
A Meta-analysis of Randomized Controlled Trials of Internet-based Diabetes Self Management Intervention in Patients with Type 2 Diabetes

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With an increase in the prevalence of type 2 diabetes, diabetes self-management education (DSME) is a critical process through which patients with diabetes obtain knowledge and skills in order to improve their lifestyle behavior and self-manage their diabetes successfully. The internet provides information and interactive sources to patients with diabetes efficiently and at a minimal cost. Web-based education has recently been utilized to prevent and manage chronic diseases. The objective of the current study was to systemically review previous reports of published, randomized controlled trials to determine the effect of web-based diabetes education on glycemic control in individuals with type 2 diabetes. A literature search in two scientific databases from January 1990 and October 2012 was conducted based on established criteria for quality and inclusion/exclusion in the study. The seven included studies included 869 patients with type 2 diabetes. The meta-analysis showed 0.40% improvement (95% CI -0.604 - -0.209) in HbA1c among diabetic people who received diabetes self-management education through Internet. In addition, the analysis reported an improvement in fasting blood glucose concentration (0.368, 95% CI -0.491 - -0.245) among individuals who had Internet-based diabetes self-management education. In conclusion, improvements in glycemic control was observed in patients with type 2 diabetes who had Internet-based diabetes self-management education compared with patients with type 2 diabetes who had either diabetes self-management education through lectures and booklets or no education.
Healthy Granola Bars: Low in Fat, Low in Sugar, and High in Fiber

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Granola bars are a popular breakfast and snack item in the United States. However, many of the commercial products available are not healthy. These products are often high in sugar and fat and low in fiber. High sugar and low fiber intakes can lead to type two diabetes, and high fat intake can lead to cardiovascular disease. The purpose of this project was to develop a healthy granola bar recipe that is high in fiber, low in sugar, low in fat, and taste comparable to the commercially produced bars. A three-day development phase was conducted in the study. Final recipe was reproduced three times for consistency. A total of 7 evaluators participated in the sensory evaluation tests during three replication days. Sweetness, tenderness, and overall acceptability were used to evaluate samples. Descriptive statistics for data summary and inferential statistics such as paired-sample T-test were conducted to explore differences among variables. There was no significant difference between recipes in sweetness, tenderness, and overall acceptability. Participants evaluated the final recipe as sweet (n=6, 28.6%), extremely tender (n=4, 19.0%), and chewy (n=3, 14.3%). Results may help people to eat healthier by consuming products with high in fiber, low in sugar, and low in fat.
An Investigation on Food Safety Performance in School Foodservice Operations: Health Inspection Review in State of Louisiana

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There are 163,357 cases of foodborne illnesses being reported in Louisiana (LA) each year. Of approximately 30 foodborne outbreaks investigated, 27% was originated from education institutions (i.e. schools, daycare, and colleges). The purpose of this study was to investigate food safety performance and identify the food safety training needs of school foodservice operations in LA by reviewing the health inspection data within January 1 to December 31, 2011. School foodservice operations’ inspection data from 10 parishes with highest number of population was derived from Department of Health and Hospitals, entered into Excel spreadsheets and converted to SPSS for analyses. The computer function was used to evaluate food safety violations. Descriptive statistics were calculated to summarize the data. A total of 281 health inspection reports from 31 schools in 10 Louisiana parishes were reviewed within a year period. At 31 school foodservice operations, 91 violations were identified through routine (n=279) and re-inspection (n=2). The top categories of food code violations were “receptacles for garbage, rubbish and refuse” (n=9, 9.89%), followed by “floors” (n=7, 7.69%), “walls and ceilings” (n=7, 7.69%), “sanitization” (n=7, 7.69%), “food storage” (n=5, 5.49%), “equipment” (n=5, 5.49%), and “labeling” (n=5, 5.49%). There were 18 (19.78%) critical violations and “sanitation”, “labeling”, and “storage and display” (n=2, 2.20%) were most frequently violated food code categories in schools. This study identified the focus areas for food safety training in school foodservice operations. School foodservice managers may utilize the data to improve food safety performance in their establishments.
No Bake Granola Cake Development

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Research indicates a healthy alternative snack cake can be beneficial for adults and children with medical issues involving weight, diabetes, and heart disease. The no bake granola cake is a great snack for athletes looking for long lasting energy. The purpose of this project was to develop a healthy snack for daily consumption. We have conducted three experiments modifying oils, sweeteners, and dried fruits. The original product consisted of coconut oil, dried cranberries, and brown rice syrup. The winning modified product contained canola oil, dried pineapple, and maple syrup. The slight modified product had canola oil, dried pineapple, maple syrup, and dark chocolate chips. We chose to use dark chocolate due to its antioxidant capacity, which fights against free radicals. A total of 7 panelists sampled and evaluated three granola cakes based on texture, sweetness, and flavor using a 3-point Likert scale. Descriptive statistics for data summary and paired-sample T-test were conducted to compare products. Panelists rated the original product as slightly sweet (n=11, 52%), slightly crunchy (n=9, 43%), and nutty (n=13, 62%). Panelists rated modification 1 as slightly sweet (n=8, 38%), chewy (n=8, 38%), and nutty (n=6, 29%). Panelists perceived modification 2 as slightly sweet (n=9, 43%), slightly chewy (n=8, 38%), and oily (n=8, 38%). The original product was significantly sweeter than modifications (p<.05). Results from this study could lead to healthier oils being used in other recipes without affecting the sensory evaluation.
Reduced-Fat, Reduced-Sugar, Low-Sodium Brownies: Nutritional Quality, Cost Effectiveness, and Consumer Acceptability

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Americans enjoy consuming snacks between, or with meals. Traditional recipes for snacks like this are generally high in sugar, fat, and sodium. A modification in the sugar, fat, and sodium content of the recipe can reduce the total calories in the food. This can also help reduce risk for various chronic diseases including obesity, cardiovascular disease, and diabetes. This research project endeavored to modify a brownie recipe to make it reduced-fat (25% less than the original product), reduced-sugar (25% less than the original product), and low-sodium (≤140mg of sodium per serving). A brownie was modified by replacing half the amount of butter with applesauce, half the sugar with Stevia®, and the salt with lemon juice and a minimal amount of salt. Upon analyzing the multiple modifications in relationship to nutrition, cost effectiveness, and overall acceptance, a modification recipe was chosen. The development modifications were evaluated by 7 untrained panelists. Descriptive statistics were used to summarize the data. Paired-sample T-test was conducted to explore the difference among products. Upon comparing the final modification to the original recipe and a comparable commercial brownie mix product (Betty Crocker Fudge Brownies®), it was found that not only was the commercial product similar in nutritional content, it was more cost effective, and was the overall acceptable product to untrained panelists (p<.05). Results from this study could help consumers in choosing a product that meets quality characteristics, nutritional characteristics, cost effectiveness, and overall acceptability. In the future this study would modify other characteristics and further research fat, sugar, and sodium substitutes to create a healthier and more acceptable product.
Gluten Free Snack Bars Development

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With a sudden increase of people developing gluten allergies and people choosing to live a gluten free lifestyle, finding gluten free snacks that are appetizing and easily accessible have proven to be very difficult. The purpose of this study was to develop a gluten free snack that contains fruit and is rated acceptable in appearance, texture, and flavor by panelists. In this study three different modifications were tested. The three modified components were the amount of fruit preserves, the type of sweetener, and the type of flour. Each of the modifications was tested and the winner from each modification was used to make the final product. A total of 7 panelists participated in the sensory evaluation tests. Descriptive statistics were used to summarize the data. Paired-sample T-test was conducted to explore the difference among products. Panelists evaluated the final recipe on a scale of 1-5. The overall mean appearance was rated 3.12, the mean score for flavor was 3.70, the mean score for texture was 3.61 and the mean score for taste was 3.32. There was no significant difference among products in appearance, texture and flavor. Results from this study could potentially help with the development of more appealing and appetizing gluten free snacks, as well as help product developers better understand what components make gluten free foods more desirable.
To E or Not To E: Exploring Electronic and Traditional Book Preferences Among Preschoolers

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The use of technology in our daily lives is already pervasive and is consistently growing. In fact, today’s children are often referred to as “digital natives” due to the early exposure to technology. Technologies are available for every facet of life, from personal networking to education. This study sought to explore the impact of technology on children during prime growth of their emergent literacy skills, preschool. Through an ANS Faculty Research Grant, materials were purchased to investigate factors related to preschoolers’ literacy preferences. A small pilot sample (n = 25; 14 boys; m age = 4.67, SD = .64) was recruited from a local preschool. Participating parents (21 mothers) were on average 35 years old, of European American descent, college educated/professionals (over 76%), and married (92%). A majority of the parents (60%) reported a total monthly household income before taxes of $4,000 and above. Participating families were provided both electronic and traditional versions of the book Counting Kisses (Katz, 2003). Self-report assessments (both pre and post) were given to parents regarding: their typical reading-time behaviors, their child’s reading preferences during the study, and their child’s level of engagement in the process, in addition to demographic and parenting measures (e.g., Parenting Styles and Dimensions Questionnaire). The “electronic books” were pre-recordable books with the same recording put on each book that read to the child. The “traditional books” consisted of a boxed hardcover book and corresponding toy prop. Children were categorized into Electronic or Traditional Preference Group based on which book they preferred a majority of the nights of the study. We found, among this sample of children with highly authoritative parents (m = 4.00, SD = .42, possible range = 1.00 – 5.00, actual range = 3.27 – 4.80), 76% of the children preferred the electronic version of the book a majority of the time. When analyzing the open-ended question why children preferred one version over the other, the category with the most responses for the electronic book was It Talks to Me and the category with the most responses for the traditional book was I Like Mommy/Daddy Reading to Me. There were differences in how children from the two preference groups interacted with the toy prop. We found children from both preference groups had responses coded in the Affection, Sharing, Active Playing, and Passive Playing categories but only children from the Electronic Preference Group had responses coded in the Rejection category. Analyses have also revealed that although more children report preferring the electronic book, children were more engaged and spent more time than expected on the reading task from the traditional preference group than the electronic preference group.
Small Group Activities in the Classroom: Promoting Student Engagement in a Medical-Surgical Nursing Course

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Nurse educators have been issued a directive from the National League for Nurses (NLN) to promote innovation in student learning. This expectation has evolved to create a change in the manner of instructional methods, from being teacher-centered to learner-centered. Current trends in literature support the relevance of interactive learning strategies as a measure to facilitate student engagement.

An informal survey in a medical-surgical nursing course revealed over half the students were kinesthetic learners, meaning learning is enhanced with active participation. Students also voiced a desire for course content to be presented in a variety of methods. As a result, two small group activities were designed as interactive instructional strategies. The objective was to grant student request while reinforcing student-centered learning and stimulating student engagement.

The small group activities consisted of a Nutritional Case Study on a Vegetarian Diet, and a matching exercise on the Threats to Nutrition course content. For each activity the class participated in groups of three to five students to complete the task. Class discussion followed the group work, which allowed for clarification and debriefing of each activity. Both activities were interactive and encouraged dialogue between students.

A survey administered after the small group activities disclosed students 100% agreed small group tasks promoted active student participation. Eight-five percent of the students agreed the small group activities assisted in reinforcing the course content and course objectives. Seventy percent of the students agreed group activities met their learning style.

The implications of introducing small group activities in the classroom supports research data on the importance of student engagement. This suggests a need to incorporate more interactive learning strategies in the classroom. The concept of small group activities and student engagement can be expanded to examine the outcomes of interactive learning with the development of critical thinking skills.
Down & Dirty in the Heart of Dixie: A Sexual Health Campus Awareness Initiative

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A national study of sexually transmitted infections revealed Louisiana Tech University ranking in the bottom ten universities in the United States in sexual health resources for students. As a result of these statistics, a need for sexual health information and education was identified. Nursing faculty engaging peer instruction collaboration seeks to provide campus-wide awareness on a subject that is largely a taboo subject in the South.

A locally funded grant through the Lincoln Health Foundation allowed Division of Nursing faculty resources to address and broaden sexual health awareness among students at Louisiana Tech University. In addition, a research study was initiated to identify students’ awareness and misconceptions of sexual health. A five item pilot (McFadden, Books, & Sims) Sexual Health: Raising STI (Sexually Transmitted Infection) Awareness Survey is utilized to student participants to research the perceived knowledge of sexually transmitted infections, sexual health, and the efficacy of the STI Awareness presentation.

The Sexual Health campus awareness initiative utilizes peer education through avenues of campus-community Service Learning partnerships fostered in the Maternal-Newborn Health Maintenance course as well as individual nursing student volunteers to educate peers in regard to STI prevention under the supervision of nursing faculty. Visual and odor simulation is incorporated with a concise PowerPoint presentation with graphics of STI’s. Educational materials and referral resources are provided at the presentation. The delivery of STI awareness through Service Learning and peer education is the most visible outreach to the campus community. Presentations to date have included campus organizations, sororities, fraternities, athletics, and campus wellness fairs.

The Louisiana Tech University Division of Nursing strives to promote overall health for the campus and surrounding community. This complements the Lincoln Health Foundation’s vision to facilitate health related initiatives to improve the quality of life for Lincoln Parish residents. The Sexual Health Awareness initiative seeks to identify misconceptions among campus students, educate and provide information regarding referral and treatment, and thereby improve the health of the students at Louisiana Tech University, Lincoln Parish, and the State, in hopes to decrease the statistics of Sexually Transmitted Infections.
Stressed? Causes, Effects, Tools

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Stress is any emotional, physical, social, economic or other factor that requires response or change. Stress depletes the reserve capacity of the individual thus increasing vulnerability to health issues. A stressful situation is specific to the person, with the exact event stressing one person and not another.

Short term the physiological response to stress begins to affect the individual systemically. Continued long term stress decreases the immune and inflammatory response. Continued stress can lead to anxiety, grief, panic attacks and systemic health related issues.

There are many tools to relieve stress. First, the individual must recognize what is stressful. As response to the stress, a tool should be chosen. A primary tool is to develop coping mechanisms and choose assertiveness.

The Louisiana Tech University Division of Nursing recognizes the consequences of unrelieved stress on the educator, the student and thus the program. Stress relieving coping mechanisms are instructed and supported to better empower success in the program and in life.
Simulation has become standard practice in nursing education. Since 1998 when simulation began gaining favor in educational institutions across the US, nursing education has seen a proliferation of centers strictly dedicated to simulation and scholarly publications referencing simulation in research and outcomes studies (Weaver, 2011). The National League for Nursing overwhelmingly supports the use of simulation through the Simulation Innovation Resource Center (http://sirc.nln.org/). The majority of nursing programs incorporate high fidelity simulation (including Northwestern, Grambling, University of Louisiana at Monroe, community colleges such as Delta and technical college LPN programs in our region) as they are recognized as a valuable learning tool increasing a student’s knowledge, skills, and safety in educational settings. Critical thinking skills are improved as students are required to identify, prioritize, synthesize and communicate in unknown scenarios. Student confidence scores and satisfaction increase in relation to the learning experience (Bambini, Washburn, & Perkins, 2009; Schlairet, 2011; Norman, 2012). Using virtual reality simulators in the educational process of health care professionals and nursing students is now considered standard practice. There are benefits for students, patients and healthcare facilities. Ultimately, simulation emphasizes safety in clinical practice thereby reducing errors, complications and unnecessary expenses. Human patient simulators may generate new sources of revenue for universities through electives and continuing education offerings.

In 2005, the Division of Nursing obtained a METI-Man simulator through grant funding to provide high fidelity simulation throughout the program. Comments and responses from students have rated simulation experiences highly and continue to suggest more extensive integration of simulation within the program. This poster presentation highlights the acquisition and implementation of a new METIman® Tetherless Patient Simulator and CAE Healthcare’s Müse® Software Upgrade for METI Emergency Care Simulator to expand simulation experiences for the nursing program at Louisiana Tech. The new METI-Man simulator and Müse® Software Upgrade obtained through a 2012 $62,452.00 Student Technology Fee Board Grant at Louisiana Tech represents a continued commitment by the Division of Nursing and the University to support rich simulation learning experiences to our present and future students. In addition, the newly acquired METIman® has upgraded functions and capabilities (pupil reaction, seizure activity, self-contained body fluids, increased portability and updated guidelines contained in the software) to expand the capability to offer students clinical scenarios that keep LA Tech ahead of the curve and a leader in nursing technology in the state.