DESIGNING RESEARCH POSTERS

Basic Design Tips

Know & Plan

- Guidelines/purpose
- Audience
- Software

Consider

- Legibility
- Labeling
- Organization & design
  - *Order & layout*
  - *Text & visuals*
  - *Color*

What viewers see

1st Images/graphics

2nd Captions

3rd Headlines/subheadings

4th Body text

A Mi Alcance: Action Steps for a Healthy Weight
A Short-Term *Promotor de Salud* Campaign in Hispanic Communities

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Rural Women's Health Project

Background

According to the CDC, the prevalence of obesity and overweight in adolescents and adults has increased over the last 20 years. In 2011, 35.7% of adults in the United States were considered obese.[1] More than 3 out of 4 Hispanics in the U.S are considered overweight and obese,[2] with 39.1% considered obese[1]. Additionally, higher rates of obesity-related conditions, including diabetes[3] and high cholesterol,[4] affect the Hispanic community. These obesity-related conditions represent preventable causes of morbidity and mortality within the Hispanic community.

In response to the prevalence of obesity and related conditions, the Rural Women's Health Project (RWHP), in partnership with the Lake County Community Health Worker Program (LCCHWP), implemented the *A Mi Alcance* [Within My Reach] Program. The program was developed to highlight the importance of achieving and maintaining a healthy weight and reducing risk factors associated with chronic disease.

Program's Goal and Objectives

Goal:
To increase the educational awareness of the importance of achieving and maintaining a healthy weight among Hispanics around Lake County.

Objectives:
1. To increase the Hispanic community's health literacy about healthy weight and its benefits to reducing chronic disease.
2. To link community members to health and well-being services to support their healthy weight goals.
3. To promote "achievable action-steps" to achieving/maintaining a healthy weight.

Program Methodology

The Rural Women's Health Project developed and implemented a *promotor de salud* (lay-health worker) program to educate community members, through one-on-one "orientaciones" sessions, on obesity-related topics. The program was conducted as a short-term campaign, lasting three months.

Fifteen *promotores de salud* (male and female Hispanic community members), identified by LCCHWP, were capacitated in three workshops. Each month, following their training, the *promotores* met one-on-one with members of their community to provide education. The materials developed for the *A Mi Alcance* program included interactive popular education tools and culturally relevant materials beneficial for a broad spectrum of Hispanics. In addition, during each interaction, the *promotores* offered community members a Resource Guide of clinics and healthy-living facilities to link them to wellbeing resources within their community.

The campaign topics:
1. Self-evaluation of weight
2. "Achievable action steps" to improve nutrition & a healthy weight
3. Chronic disease warning signs & health screenings

Acknowledgements

The RWHP acknowledge Alba Stone, *Promotor* Coordinator, and the *A Mi Alcance Promotores de Salud* for their contributions to this program. This program was made possible with by the Office of Minority Health - Florida Dept. of Health and the Florida *Promotor* Initiative.

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3. National Diabetes Information Clearinghouse. (2013, September 09). *National diabetes statistics, 2011*. Retrieved from http://diabetes.niddk.nih.gov/dm/pubs/statistics/
4. Center for Disease Control. (16, October 16). *Cholesterol facts*. Retrieved from http://www.cdc.gov/cholesterol/facts.htm

Program Reach

Over the course of the three month campaign, 15 *promotores* conducted one-on-one education sessions with 684 members of their communities. The demographics below illustrate the diverse group of Hispanics that were reached .

Table 1

Characteristic		N*	#
Sex	Female	60.7%	415
	Male	38.7%	265
Age	< 19	4.5%	31
	19-24	14.2%	97
	25-30	16.8%	115
	31-40	30.2%	207
	41-50	18.4%	126
	51-60	9.8%	67
	>61	5.8%	40
Education	None	1.5%	10
	Primary	24.3%	166
	Middle/ High	54.0%	369
	College	5.7%	39

*"No Response" percentages not listed.

Country of Origin

Figure 1

Insurance Status

Figure 2

Years of Residency

Figure 3

English Ability

Figure 4

Conclusion

Data collected reflects the achievement of program objectives from this short-term, healthy weight awareness campaign. Overall, 96% of participants reported learning new concepts (i.e. reading a nutrition label) and new skills (i.e. self-evaluating their weight). The focus on "achievable action steps" resulted in 84% of participants from Month One of outreach, committed to implementing at least one specific healthy weight action step. In Month Two outreach, 99% identified at least one "achievable action step" to improve their diet and reduce risks associated with unhealthy weight. Additionally, 97% of participants received Resource Guides enhancing action steps to achieving or maintaining a healthy weight.

Noteworthy, is that *A Mi Alcance* was effective in raising health awareness throughout a diverse group of Hispanic community members. Participants represented a broad-range of countries of origin, educational backgrounds, insurance status and years of residency (See Table 1). Sixty-three percent of the population reached by this campaign was uninsured, representing a population with substantial challenges to accessing preventive health services.

Program Benefits

For The Community:
- Promotes behavior change through "achievable action steps"
- Increases health literacy
- Provides guidelines of recommendations, particularly valuable to those without insurance and limited access to prevention services
- Engages participants with culturally-relevant materials and interactive educational strategies

For LHW/CHW Programs:
- Replicable for reaching broad spectrum of Hispanic participants
- Impacts a significant number of participants in a limited timeframe
- Cost-effective dispersion of health messages through *promotor* outreach
- Reduces challenges of *promotor* retention (due to the three-month timeframe)
- Effective in reenergizing existing LHW/ CHW programs

Program Results

Training 1: Self-Evaluation of Risk for Chronic Disease

Print Tools:
1) Self-Evaluation Guide
2) Case Studies
3) Resource Guide

212 participants reached

- **84%** of participants developed goals to reduce their risk for chronic disease, starting...
  - Today (**70%**)
  - Within a week (**17%**)
  - Within a month (**2%**)
  - Other (**6%**)
- **89%** of participants learned new concepts:
  - How to self-evaluate chronic disease risk based on weight
  - The role of nutrition in reducing one's risk for chronic disease

Training 2: Nutrition and Healthy Eating Habits

Print Tools:
1) Nutrition labels on food items
2) *Nutrition with Your Reach*
3) Recommended Daily Limits Sheet
4) Resource Guide

224 participants reached

- **Prior** to the one-on-one session:
  - **42%** of participants believed they ate well
  - **77%** of participants stated they had been taught how to read nutrition labels
- **After** the one-on-one session:
  - **91%** of participants stated they felt more capable of using nutrition label information
  - **99%** of participants named at least one "achievable action step" to improve their nutrition
- **99%** of participants learned new concepts, i.e.:
  - The value of good nutrition
  - The benefits of reducing salt and sugar intake

Training 3: Chronic Illness Danger Signs

Print Tools:
1) *Danger Signs* Card
2) Diabetes *Stop-Light Card*
3) Resource Guide
4) Diabetes/Hypertension Heart Disease Brochures

242 participants reached

- **Prior** to the one-on-one session:
  - **79%** of participants named at least one danger sign of chronic disease
- **After** the one-on-one session:
  - **100%** of participants named one action "achievable action" to manage a chronic disease danger signs
  - The benefits of preventing chronic disease
  - The danger signs associated with chronic disease

Images & Graphics

- Necessity
- Placement
- Background
- Quality
  - *High resolution*
  - *Official logos*

Font/type/text

- KEEP it simple
- Small changes for emphasis
  - *Bold, italics, underline*
  - *Size*

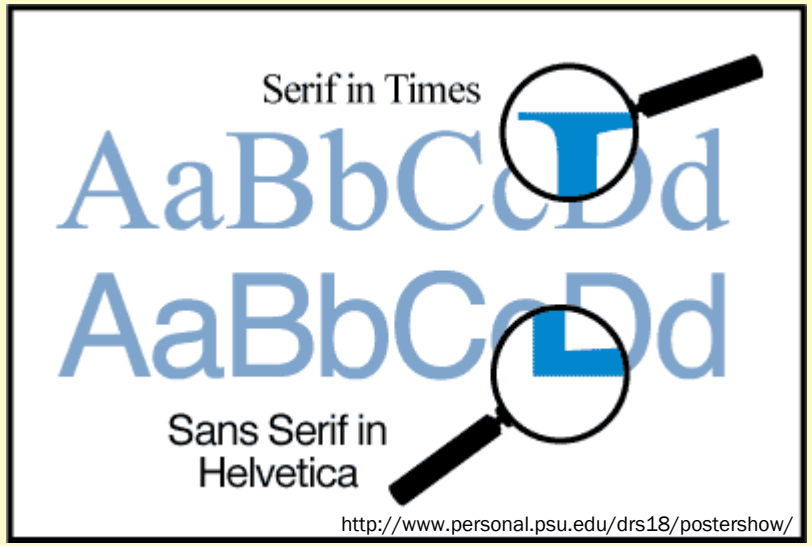
Font/type/text

“What is design?... It's where you stand with a foot in two worlds—the world of ***technology*** and the world of ***people and human purposes***—and you try to bring the two ***together***.” - Mitchell Kapor

- Attention-getting?
- How many different fonts?

Font/type/text

- Appropriate
- Size
- Serif vs. sans-serif
- Alignment
- Bullets vs. sentences
- Consistent
- How much?



Aligned left

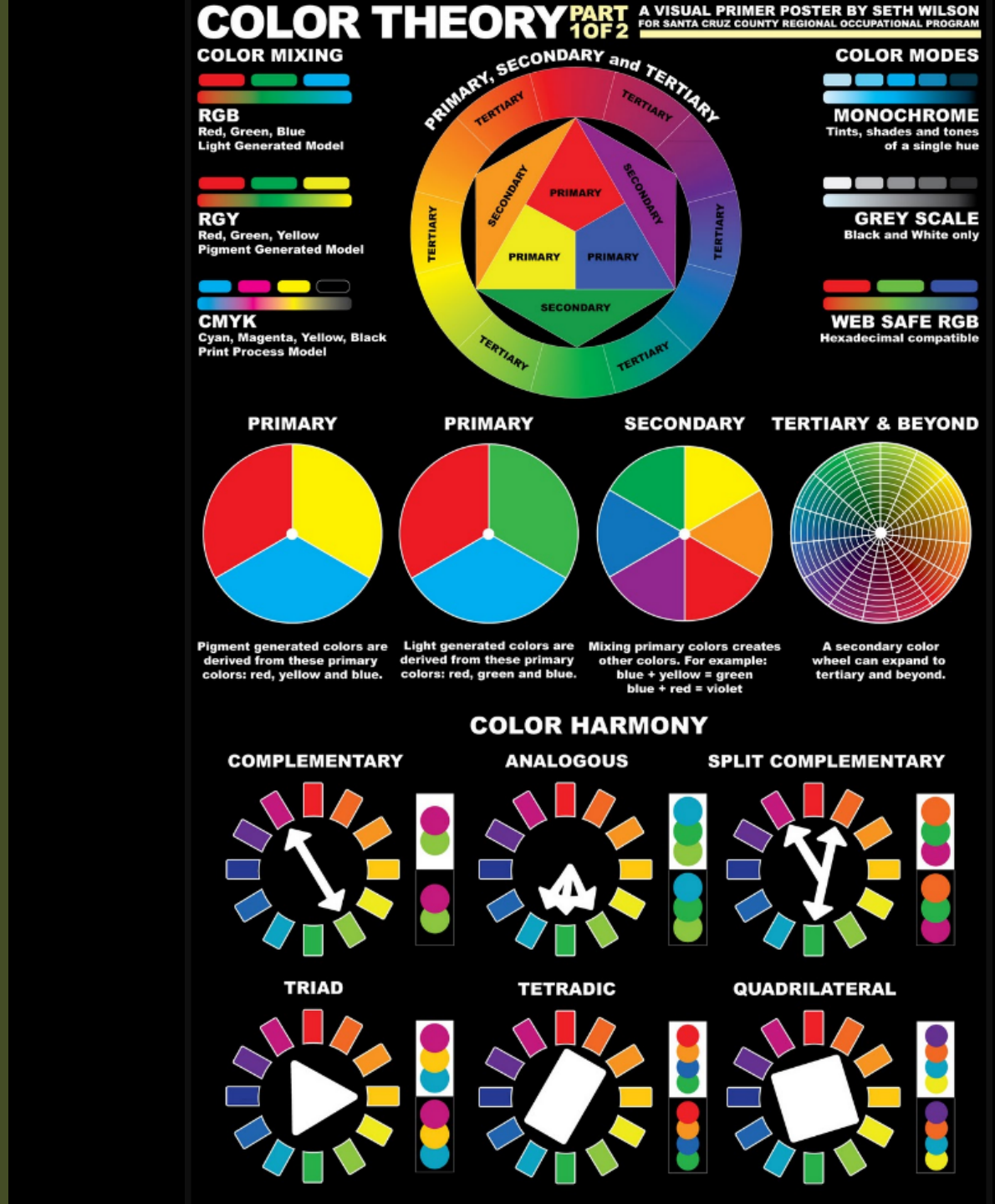
This is the best option for justifying the text in your poster sections. This is the easiest to read and most acceptable.

Justified

This is an option to avoid, though some people enjoy the straight edges. Fully-justified text creates strange spacing that's harder to read and distracting.

Color

- Purpose & placement
- How many?
- Consistent
- Yellow



Source: http://niki.zone/design/color-theory-for-designers-part-1/

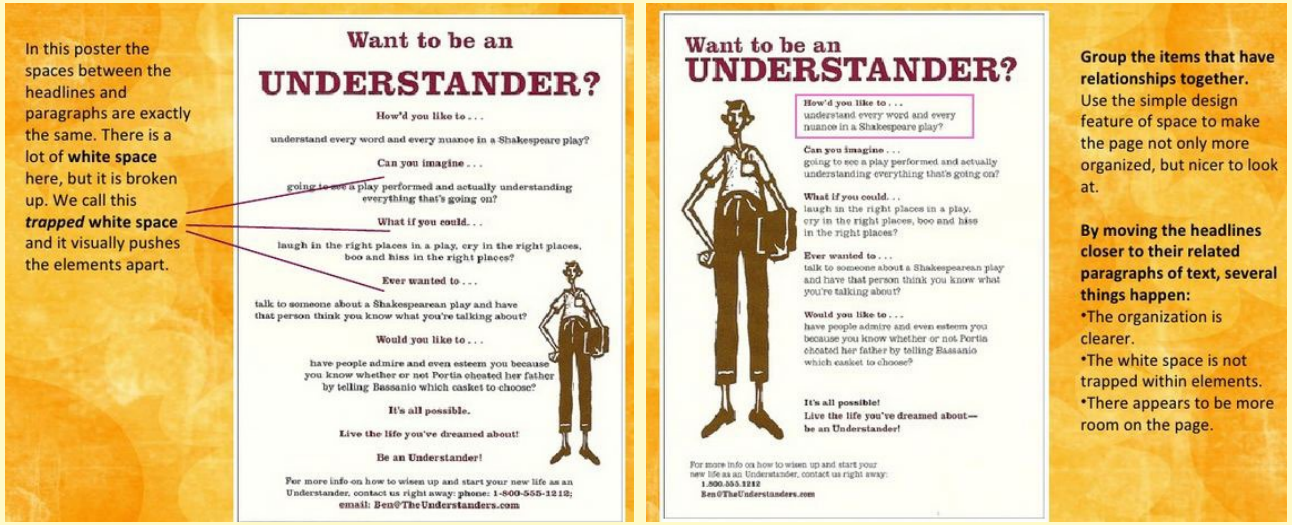
Color

*“In nature, light creates the colour. In the picture, **colour** creates the light.” - Hans Hofmann*

“In nature, light creates the colour. In the picture, colour creates the light.” - Hans Hofmann

Alignment & Proximity

- Visual appeal
- Clarity (spacing)



Source: http://www.slideshare.net/dianetch/principles-of-visual-design-6647916

Bottom line?

- Clear message
- Visually appealing
- Not too wordy
- Balance of elements
- Easy to read

WHAT DO YOU THINK?

Examples for Discussion

The status of Tennessee foster parent training and support including fostering children with Neonatal Abstinence Syndrome (NAS), and the relationships of foster parents' perceived abilities and motivations with likelihood to continue fostering

, PhD, CFLE

PURPOSE

1. To understand the current status of foster parent training and support in the state of Tennessee, and how the current training and support related to the perceived abilities, motivations, and preparedness to foster
2. To focus on the training and support for those who foster children with NAS and how that training and support relate to the perceived abilities, motivations, and preparedness to foster

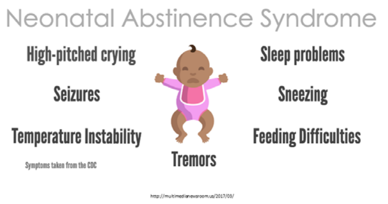
METHODS

- Survey
- Validity: Expert quantitative review, Expert YCF panel, PhD survey think tank
- Reliability (Foster parent pretest)
- Descriptive statistics & Crosstabulations
- Correlational analysis, regression analysis, and Pearson's chi square statistic test

DEMOGRAPHICS OF PARTICIPANTS

	Frequency	Percent
Gender		
Male	27	82.7%
Female	129	17.3%
Race		
White	144	88.9%
Black or African American	14	8.6%
American Indian or Alaska Native	2	1.2%
Other	2	1.2%
Region		
West	22	13.9%
Middle	57	36.1%
East	79	50%

What is NAS?



Results

What is the state of foster parent training in the three major regions of Tennessee?

Above 80% Trained:

- First Aid and CPR
- Medication administration
- Cultural awareness
- Working with the birth parents and visitation
- Working with the education system
- Parenting sexually abused children

Below 25.6% of Foster Parents Trained In:

- Sudden Infant Death Syndrome (SIDS)
- Shaken Baby Syndrome
- Medically fragile children
- NAS
- Soothing strategies for infants with NAS
- Symptoms of NAS
- Children with disabilities
- Parenting a youth offender
- Kinship placement
- Therapeutic foster training

What is the current state of support offered by agencies or other sources to foster parents in the three major regions of Tennessee?

Agency Support:

- Highest: returned phone calls/ texts/emails (77.4%, n = 127) and additional/refresher trainings (76.8%, n = 126)
- Least: equipment, crisis management support, and agency-formed support groups.
- Less than a third reported having support in the form of respite care

What are the foster parents' motivations to foster children in Tennessee?

- Highest motivation: wanting to make a difference and wanting to give back
- One respondent in East Tennessee: extra income
- One-fifth (n = 34): infertility issues

What is the current state of training in Tennessee (types, sources, and amounts) related to NAS?

Table 8. Frequencies and Percentages of Foster Parent NAS (*N* = 75)

Type of NAS Training	Percent	Frequency
NAS soothing strategies	45.3%	*n* = 34
NAS Withdrawal symptoms	44%	*n* = 33
NAS medical score sheet	12%	*n* = 9
NAS Daily infant care	37.3%	*n* = 28
Effects of drug and alcohol abuse on infants	41.3%	*n* = 31
Maternal drug abuse	24%	*n* = 18
Community resources	16%	*n* = 12
Parental self-care	9.3%	*n* = 7
Parental stress management	13.3%	*n* = 10
Impact on other children in the home	13.3%	*n* = 10
Other	2.7%	*n* = 2
I was not trained	45.3%	*n* = 34

Source of NAS Training

- Lowest source: doctor or nursing staff 18.7% (n = 14)
- Hospital additionally low source, 21.3% (n = 16)
- Foster parent agency: 20% (n = 15)

Among parents who care for children with NAS, to what extent do they feel the training they received was adequate to meet their needs?

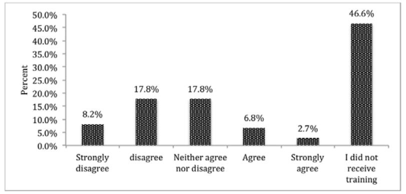


Figure 4. Distribution of Responses on: "The NAS training I received from my agency was adequate to meet my needs."

Is there a relationship between training (or lack of it) and foster parents' likelihood to continue fostering?

- Crosstabulations generated with Pearson's chi square statistic test to determine relationship, no relationship at the 0.05 alpha level

Are there relationships between parents' training, gender, age, region, and likelihood to continue fostering?

- Regression results indicate that the model of four predictors, age, gender, East, and West did not significantly predict likelihood to continue fostering $R2 = .002$, $R2$ adj = -.025, $F(4, 144) = .087$, $p > .05$.

Discussion

Marcellus (2008) has been the leading researcher on foster parent training in NAS. The programs and training developed by Marcellus (2000) differed from Tennessee foster parent training, as her programs and research were Canadian where different laws and regulations exist. It is noteworthy that Canada's initiation of required training for foster parents who care for infants with NAS resulted from a case of Shaken Baby Syndrome (Marcellus, 2000). Is Tennessee waiting for a case of shaken baby syndrome before beginning mandatory training in NAS and a focus on infant well-being?

Additionally, it was surprising that West Tennessee had the highest rates of NAS training, yet, East Tennessee and Middle Tennessee has a higher birth rate of NAS infants (Bauer & Li, 2013) and their training in NAS is lower. Why is it that West Tennessee training rates were higher? Perhaps, an answer to the question could lie within the data that was gathered regarding who (what agencies or organizations) were training foster parents to care for infants with NAS. Could it be that agencies were assuming that hospitals, nurses, and doctors were training parents on an individual level and vice versa– the doctors, nurses, and hospitals assumed agencies were training parents?

Further Research

For future research, it is suggested that this study be completed in other states to compare the status of foster care training (especially in the area of NAS) across states. Additionally, because of the different interpretations that states make regarding the Foster Care Independence Act of 1999, it would be wise to investigate other states' practices to comprehensively define foster parent training and support.
An in-depth program evaluation of Canada's Safe Baby program is recommended to fully understand the content, delivery methods, and success rates of the program.

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Elizabeth is a recent PhD Candidate of ELPH, YCF, TTU and would like to thank her Co-Chairs Dr. Jane Baker and Dr. George Chitiyo.

Obesity Propensity Differentially Alters Locus Coeruleus Norepinephrine Neural Activity

RUTGERS
Aresty Research Center for Undergraduates

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Backgrounds

Obesity is associated with a variety of metabolic and lifestyle disruptions, including reduced mood, lower quality of life scores, and an elevated risk for cardiovascular diseases. It is a widespread health issue in the United States. According to the Center for Disease Control and Prevention, more than one-third (35.7%) of American adults are categorized as obese.

Food intake is regulated by several projections to forebrain areas. One of which is the locus coeruleus norepinephrine (LC-NE) system. The LC-NE is an important modulator of affect, stress responsivity, and sympathetic activation. Despite this, little is known of obesity's influences on the LC-NE system.

Single-unit electrophysiology is a reliable technique to directly characterize neuron firing patterns. When utilized *in vivo*, electrophysiology could be used to investigate sensory, motor, and regulatory neurons in their intact circuitry. Likewise, locus coeruleus neurons demonstrate spontaneous and biphasic responses to painful sensations that can be observed through electrophysiology.

Motivations & Approach

- Given the high number of afflicted Americans, obesity and its propensity are important research topics.
- Novel understandings of obesity's influences on the LC-NE system could provide insights to future treatments.
- Locus coeruleus neurons exhibit reliable biphasic responses that are also sensitive to specific physiological manipulations.
- Previously electrophysiology experiments by the Bello Lab have demonstrated that dietary-induced binge-eating dampens locus coeruleus activation.
- **The aim of this experiment is to characterize the effects of obesity propensity on the LC-NE circuitry.**

Materials & Methods

- The present study utilizes obesity animal models in Sprague-Dawley rats selectively bred to be obese-prone (**OP**) or -resistant (**OR**).
- These two strains are further split into groups fed with either high-fat (45%, **HF**) or low-fat (10%, **CD**) diets *ad lib* for 10 weeks.
- **See table below** for grouping summary.
- Non-invasive cardiovascular data was taken the 10th week.
- The locus coeruleus neurons of these animals were subsequently recorded through single-unit *in vivo* electrophysiology under isoflurane anesthesia.
- During each electrophysiology recording, 3 minutes of spontaneous activity was recorded followed by 50 trials of contralateral sciatic nerve stimulations applied at 0.2 Hz.
- 2-10 cells were recorded per rat and the data was compiled into averaged peri-stimulus histograms for analysis.

DIET \ STRAIN	Obese-Prone	Obese-Resistant
High-Fat	OP-HF n=6	OR-HF n=7
Low-Fat	OP-CD n=7	OR-CD n=6

Results

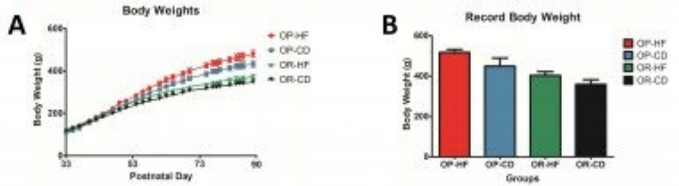

Figure A Body weight progression of each group across the ten-week time span on their designated diets. By week 10, the OP animals demonstrated a roughly 25% higher body weight than the OR animals. HF diet also increased body weight as expected, to a lesser extent.

Figure B The final recording body weight of each group. Bar indicates average body weight ± SEM. Each group exhibited significantly different body weight ranges.

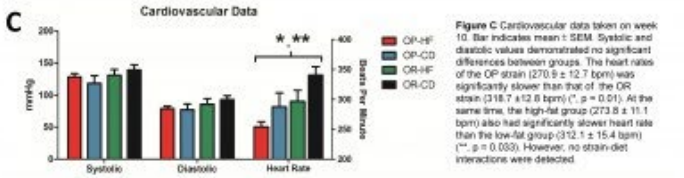

Figure C Cardiovascular data taken on week 10. Bar indicates mean ± SEM. Systolic and diastolic values demonstrated no significant differences between groups. The heart rates of the OP strain (270.9 ± 12.7 bpm) was significantly slower than that of the OR strain (318.7 ±12.8 bpm) (*, p = 0.01). At the same time, the high-fat group (273.8 ± 11.1 bpm) also had significantly slower heart rate than the low-fat group (312.1 ± 15.4 bpm) (**, p = 0.033). However, no strain-diet interactions were detected.

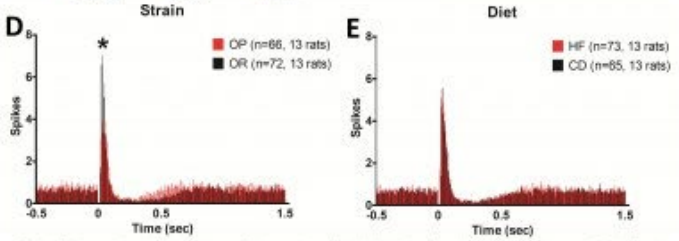

Figure D The averaged peri-stimulus histogram of strain comparison. X-axis indicates time from stimulation. This histogram unveiled significant strain effects in the evoked and spontaneous activity of the firing pattern. For rate analysis, see figures F and G below. OP animals also visibly demonstrated a shorter inhibition period indicated by the earlier recovery phase.

Figure E The averaged peri-stimulus histogram of dietary comparison. X-axis indicates time from stimulation. This histogram showed no significant dietary effects.

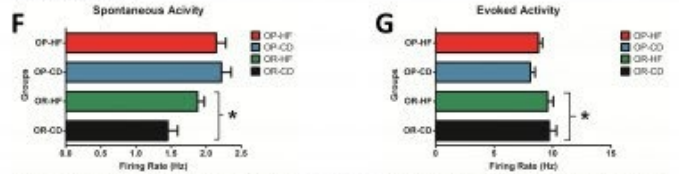

Figure F Rate data of spontaneous discharge. Bar indicates mean rate ± SEM. There was a higher spontaneous discharge rate for OP (66 cells; 2.18 ± 0.09 Hz) compared to OR (72 cells; 1.67 ± 0.09 Hz) (*, p < 0.001). Post-hoc analysis further revealed that the OR-CD spontaneous activity is significantly different lower than the three other groups. Similarly, OP demonstrated heightened tonic activity (500 ms before stimulus onset; 1.97 ± 0.09 Hz, bar graph not shown) than OR (1.53 ± 0.08 Hz) (p < 0.001).

Figure G Rate data of evoked activation firing. The OP group (8.46 ± 0.35 Hz) exhibited lower evoked firing rate than the OR group (9.64 ± 0.34 Hz) (*, p = 0.015).

Results (Cont.)

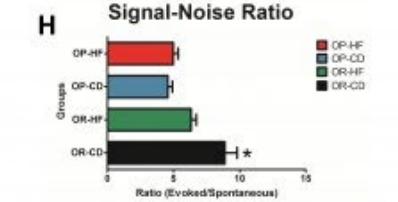

Figure H Ratio analysis of signal-to-noise (evoked-to-tonic) firing rate. There was a significant strain-diet interaction in this ratio analysis (*, p < 0.01). Post-hoc analysis also showed that OR-CD has the highest signal-to-noise ratio of all four groups.

Conclusions

- The obesity rat models sufficiently represented the phenotypes of human obesity by having reached the top 5% of the body weights with food *ad lib*.
- The OP group expressed significantly dampened evoked activation of the LC-NE system versus the OR group.
- The OP animals also expressed an elevated level in the spontaneous discharge rate of locus coeruleus neurons compared with the OR animals.
- The signal-to-noise ratio analysis revealed that the groups of different obesity propensities responds differently to high- and low-fat diets.

Discussion

The present data are the first evidences for the involvement of the LC-NE in obesity susceptibility. Similarly, these results provide further insights into the chronic influences of obesity on the LC-NE system and, therefore, on mood and sympathetic activity. These findings provide grounds for LC-NE targeting treatments of obesity and related emotional disruptions.

To complement this experiment, an additional group of non-selected strain of Sprague-Dawley rats will be recorded after appropriate dietary conditioning to represent the theoretical baseline of obesity propensity. Furthermore, the relationship between obesity propensity and the fat-content level in diets is also a topic of interest.

Future research directions look to investigate mechanisms of modern weight-loss drugs, such as GLP-1 agonists, in relation with the LC-NE system. Having characterized the obesity propensity models at hand allows us to investigate how these drugs effectively mediate the LC-NE disruption caused by obesity.

Acknowledgements

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NUCLEAR ENERGY
DISASTER DESTRUCTION DEATH

By Oussama Zenaro
Professor Jennifer L. Rideout

Tennessee TECH

Nuclear energy

Nuclear power is the use of nuclear reactions that release nuclear energy to generate heat, which most frequently is then used in steam turbines to produce electricity in a nuclear power plant. The term includes nuclear fission and nuclear fusion and are both nuclear processes by which atoms are altered to create energy.

Figure 1 Cambodia first nuclear plant.

A lot of scientist have been proposed the nuclear energy as an answer to the need for a clean energy source as opposed to CO2 producing plants. However, this non-renewable energy is not a clean source as many claim and its effects on the environment pose serious concerns that need to be considered, especially before the decision to build additional nuclear power plants is made.

Figure 2 DNA modified by nuclear radiation.

Environmental issues

CARBON DIOXIDE
Despite the fact that nuclear power plants do not emit carbon dioxide during operation, they release a high amount of CO_2 in activities related to building and running the plants. Also the process of mining uranium releases high amounts of carbon dioxide into the environment polluting the air. Finally, the transport of radioactive waste also causes carbon dioxide emissions.

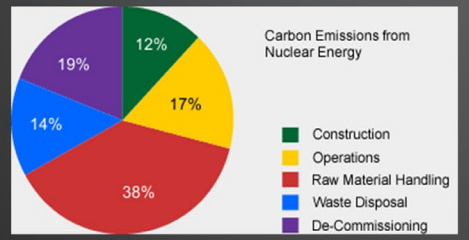

Figure 3 Carbon dioxide emissions

COOLING WATER SYSTEM
Cooling systems are used to keep nuclear power plants from overheating. Consequently, there are two main environmental problems associated with nuclear power plant cooling systems. The first one is that: Fish are inadvertently captured in the cooling system intake and killed because the water is pulled from an ocean or a river source. The second is the water that is returned is approximately 25 degrees warmer than the water was originally causing the death of some species of fish and plant life.

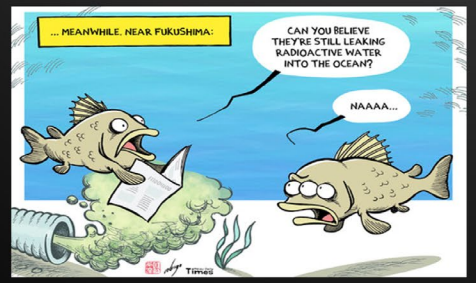

Figure 4 Radioactive sea

LOW LEVEL RADIATION
Several scientific studies have shown that the people who live close to nuclear power plants are subjected to cancer due to the constant emission of low level radiations into the environment. The exposition to low level radiations as demonstrated, contribute not only into damaging the DNA but also cause to plants, wildlife, and ozone layer several problems leading to their degradation. Many researches are conducted by different universities to determine the magnitude of effects caused by low levels of radiation to the environment.

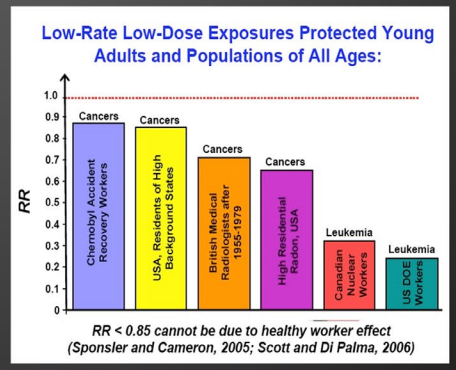

Figure 5 Low-level radiation effects

NUCLEAR PLANT DISASTERS
The **Chernobyl** disaster was the worst nuclear power plant accident in history in terms of cost and casualties. It is one of only two classified as a level 7 events (the maximum classification) on the International Nuclear Event Scale, the other being the **Fukushima Daiichi** nuclear disaster in Japan in 2011. After the accident, the deposition of radioactive iodine contaminated agricultural plants, grazing animals, and thus the milk produced in parts of Belarus, Russia, Ukraine and some other parts of Europe. Also lakes and rivers have been contaminated causing the death of many kind of fish and the extinction of some species.

Figure 6 Chernobyl disaster

Potential solution

There are several ways that the issues involving Nuclear Power can be solved:

- Investing more on renewable energy such as wind power, solar power, tidal power etc.
- In order to limit the effects outside of the nuclear power plant, citizens in the area would be given safety classes to prepare for any disaster.
- The use of a new method for recycling the radioactive waste since the average cost of disposing of it has been estimated at $92 billion.
- Educate the new generation of dangers arising from nuclear power both on human beings and the environment to limit its spread in the future.

Conclusion

The Nuclear Discourse It has been a topic of discussion for years. Many claim it to be an efficient form of energy that does not pollute the rest of the way. I think nuclear power has nothing good and as history has taught me how it happened in Chernobyl and Fukushima, nuclear can only lead to destruction if not our extinction if it is not eradicated right away. Of course, solar, wind and geothermal energy still have environmental issues, but ones that are not as great as nuclear plants or coal-burning power plants.

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Plumer, Rudi. "Carbon Dioxide Emissions." Vox, Topic6, 13 June 2016, www.vox.com Accessed 9 November 2017 Figure 3
Torres, Rodrigo. "Radioactive Sea." Tiempos' Macau Daily Times, 7 Sept. 2012, www.tiempos.com Accessed 9 November 2017 Figure 4
Vince, Giuliano. "Low Level Radiation." Agriexperience Firewalls, 7 Sept. 2015, www.ami-agriculturalfirewalls.com Accessed 9 November 2017 Figure 5

Examination of Environmental Education Initiatives in Prek Toal and Anlong Taor Villages in Cambodia

By Angela Hessenius, University of San Diego
School for Field Studies, Center for Mekong Studies, Siem Reap, Cambodia

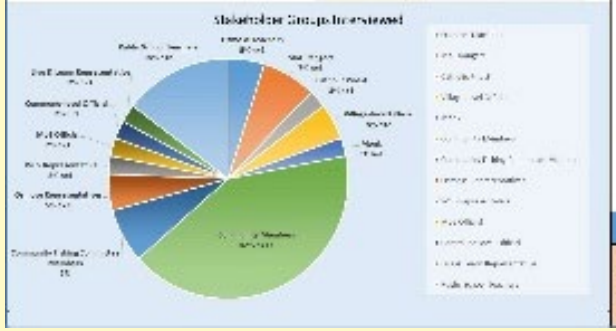
Research Aims and Objectives

1. Identify stakeholders involved in development and implementation of environmental education projects and initiatives in Prek Toal and Anlong Taor
2. Determine what mechanisms and activities different stakeholders employ in their EE initiatives and what concepts and topics they choose to cover
3. Examine community reception of past and current EE initiatives by exploring environmental awareness and knowledge among the local community
4. Analyze and compare EE initiatives shared by respondents

Methods

Data collection took place in Prek Toal and Anlong Taor villages in the Tonle Sap Biosphere Reserve of Cambodia (see map to right) between April 18th-April 27th 2016.

In total, 41 semi-structured interviews were conducted with a broad range of stakeholders, see Figure below:



Results

Osmose Floating Classroom in Prek Toal, Hessenius 2016

Common Themes of Awareness and Perceptions Among Community Members

Discussion & Conclusions

Opportunities and Challenges for EE in Prek Toal and Anlong Taor

Opportunities

- Many children have received EE from Osmose and in the public school
- Community-based and bottom-up EE approaches can have positive outcomes in engaging and educating the community
- Models that link EE with economic development have yielded positive conservation outcomes

Challenges

- There is currently a lack of EE for adults
- Limitations on access to EE
- Lack of dissemination of information on positive results of conservation initiatives
- Tendency for stakeholders not to engage in EE because other stakeholders are currently
- Poverty and dependence on natural resources restrict people's choices and force them to commit illegal actions for survival

Acknowledgements

Thank you to the following people and institutions who helped make this research possible: Principal Investigator: Dr. Georgina Lloyd Rivera, Translator: Samrith Vichet, Ministry of Environment, and all the people who were interviewed.

Examining Kinetics of Kallikrein-8 Inhibition via Alpha-1 Antitrypsin: Implications for Ovarian Cancer

Nastasia Allred, Dr. Robby Sanders
Department of Chemical Engineering, Tennessee Technological University

Introduction

Ovarian cancer is the *deadliest* form of gynecological cancer, being termed the "Silent Killer" for its reputation of a lack of symptoms leading to a diagnosis that is usually *far too late*.[1]

- *Only* 15% of ovarian cancer is diagnosed before it progresses to a more advanced stage. [1]
  - Current methods for diagnosis include CA-125 test and ultrasounds.[2]
  - A better diagnosis method is needed.
- Observing the kinetics of kallikrein-8 may bring about a more efficient way of diagnosis.
  - Kallikreins are trypsin-like serine proteases shown to be overexpressed in ovarian cancer. [3]
  - Alpha-1 antitrypsin (A1AT) is a proposed inhibitor of kallikrein-8 (KLK8). [5,6]
- A combinatorial enzyme analysis with KLK8, A1AT, and substrate S2266 will be performed in order to explore the kinetics.
  - Michaelis-Menten kinetics will be applied to analyze the results.

Survival Rate and Diagnosis for Varied Stages of Ovarian Cancer[1] (2002-2008)

Stage at Diagnosis	5-year Relative Survival Rate	% of Total Women Diagnosed
Localized (cancer is limited to organ from which it originated)	91.5%	15%
Regional (cancer has spread to nearby lymph nodes or organs and tissue)	71.9%	17%
Distant (cancer has spread to distant organs or lymph nodes)	26.9%	61%
Unstaged (not enough information to identify a stage)	22%	7%

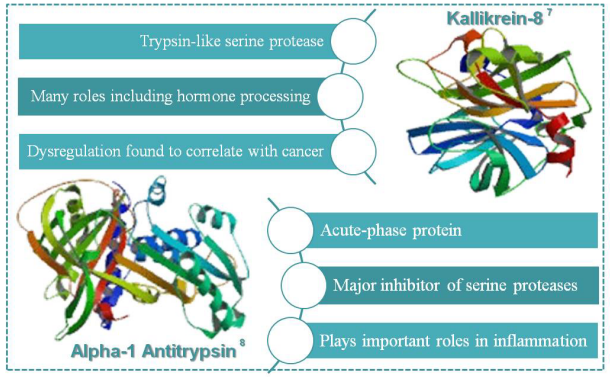
Experimental Method (Anticipated)

Physical System
- A 96-well plate will be use to perform the serial dilution.
- The wells will contain a varying amount of KLK8, A1AT, and S2266 (substrate) with the substrate concentration being at least 1000-fold higher than that for the enzyme.

Obtainment of Data
- Plate will be placed in a Titertek Multiskan Plus MK II (type 314) microtiter plate spectrophotometer.
- Absorbance will be read at 405 nm.
- Readings will be taken every 30 seconds for 10 minutes.

Transfer of Data
- Data obtained will be transferred into Microsoft Excel.

Analysis
- Data will be analyzed using Michaelis-Menten kinetics.
- Lineweaver-Burk Plots will be used to determine Km, the Michaelis-Menten constant, and Vmax, the max rate of production.



Michaelis-Menten Kinetics

No Inhibition [9]

$$E + S \underset{k_1}{\overset{k_{-1}}{\leftrightharpoons}} ES \xrightarrow{k_2} E + P$$

Competitive Inhibition [9]

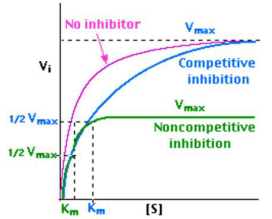
$$E + S \underset{k_1}{\overset{k_{-1}}{\leftrightharpoons}} ES \xrightarrow{k_2} E + P$$
$$+$$
$$I$$
$$\Updownarrow k_i$$
$$EI$$

Non-Competitive Inhibition [9]

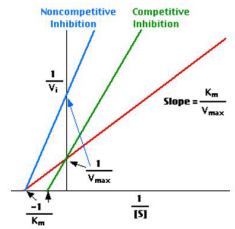
$$E + S \underset{k_1}{\overset{k_{-1}}{\leftrightharpoons}} ES \xrightarrow{k_2} E + P$$
$$+$$
$$I$$
$$\Updownarrow k_i$$
$$ESI$$

Mixed Inhibition [9]

$$E + S \underset{k_1}{\overset{k_1}{\leftrightharpoons}} ES \xrightarrow{k_2} E + P$$
$$+ \qquad\qquad +$$
$$I \qquad\qquad I$$
$$\Updownarrow k_i \qquad \Updownarrow k_i'$$
$$EI \leftrightharpoons ESI$$



General Plot of Substrate Concentration versus Vi for each case[4]



Lineweaver-Burk Plot for each case[4]

Conclusion

The kinetics of kallikrein-8 inhibition via alpha-1 antitrypsin are being explored in hopes of producing a better method of diagnosing ovarian cancer.

- A better method is needed due to the low diagnosis rate and the low accuracy in current diagnosis methods.
- Through this experiment the type of inhibition (if any) observed with KLK8 and A1AT will be determined.
- Lineweaver-Burk plots will be constructed and analyzed in order to determine Km and Vmax which will tell us the strength of A1AT as an inhibitor of KLK8.
- If A1AT is a strong inhibitor of KLK8, it may put us a step closer in finding a better diagnosis for ovarian cancer.

Acknowledgements

I would like to give thanks to my advisor, Dr. Robby Sanders, and to Dr. Cynthia Rice.

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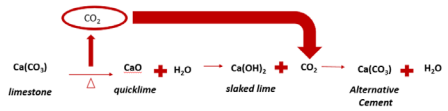
Direct Carbonation of $Ca(OH)_2$ Using Supercritical CO_2

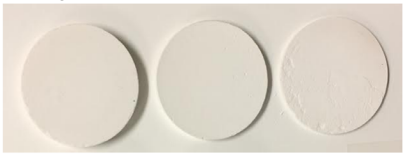
and , Department of Chemical Engineering

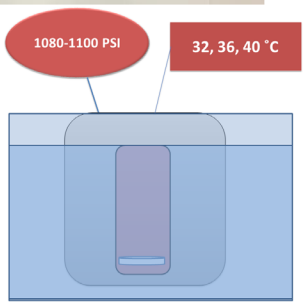
Introduction: Since the start of the Industrial Revolution carbon dioxide (CO_2) has been emitted to the atmosphere at an exponentially increasing rate. CO_2 emissions now account for about 82% of all the green house gases emitted by humans. These annual emissions equate to about 30 billion tons of CO_2. This research focuses on the portion that cement contributes to the annual CO_2 emissions, which equates to about 7% or 2.1 billion tons of CO_2. The goal is to provide an alternative cement that utilizes the CO_2 generated rather than releasing it to the atmosphere. Making such a technology possible could help reduce carbon emissions and potentially produce a carbon neutral cement.

The following process is proposed:



This study seeks to accelerate the carbonation reaction of $Ca(OH)_2$ by utilizing the supercritical state of CO_2. The experimental parameters included different brands of $Ca(OH)_2$ (Acros and Fischer), various temperatures in the supercritical state, 32, 36, and 40˚C; various pressures at which $Ca(OH)_2$ pellets were hydraulically pressed, 5K, 15K, and 25K PSI; and various masses of the pellets, 2g, 4g, and 6g. The effect of these parameters on the $CaCO_3$, was observed.

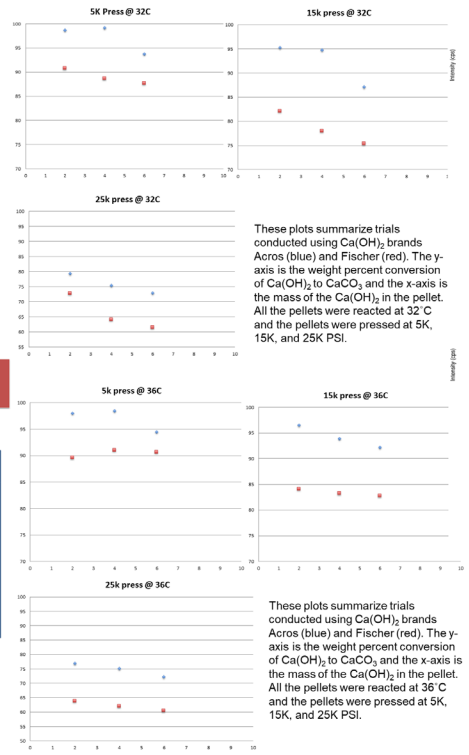




Methods:

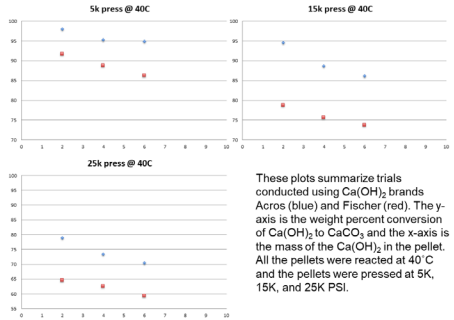
1. The $Ca(OH)_2$ powder was hydraulically pressed using the desired pressures and masses to form pellets.
2. The reactor vessel (pictured below left) was placed in a heated water bath. The pellets were then placed in the reactor vessel, and the vessel was filled with liquid CO_2 and simultaneously purged of air.
3. The temperature of the water was heated to the desired temperature which would in turn raise the temperature of the liquid CO_2 within the reactor to over the supercritical temperature (31.1 ° C). This in turn raised the pressure to over the supercritical pressure (1071 PSI).
4. These conditions were maintained for the duration of the reaction, 2 hours.
5. After 2 hours, the vessel was purged and the carbonate samples collected.
6. The samples were dried and analysis was conducted on the dried $CaCO_3$ samples.

Results:



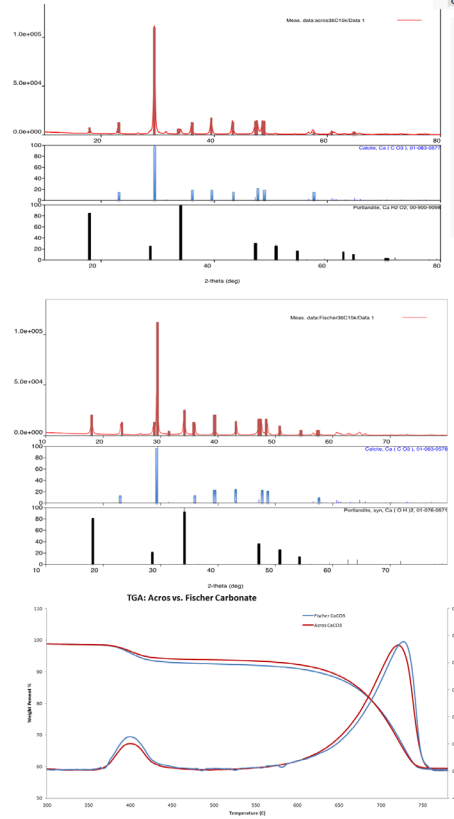
These plots summarize trials conducted using $Ca(OH)_2$ brands Acros (blue) and Fischer (red). The y-axis is the weight percent conversion of $Ca(OH)_2$ to $CaCO_3$ and the x-axis is the mass of the $Ca(OH)_2$ in the pellet. All the pellets were reacted at 32˚C and the pellets were pressed at 5K, 15K, and 25K PSI.

These plots summarize trials conducted using $Ca(OH)_2$ brands Acros (blue) and Fischer (red). The y-axis is the weight percent conversion of $Ca(OH)_2$ to $CaCO_3$ and the x-axis is the mass of the $Ca(OH)_2$ in the pellet. All the pellets were reacted at 36˚C and the pellets were pressed at 5K, 15K, and 25K PSI.

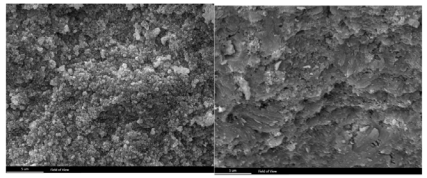


These plots summarize trials conducted using $Ca(OH)_2$ brands Acros (blue) and Fischer (red). The y-axis is the weight percent conversion of $Ca(OH)_2$ to $CaCO_3$ and the x-axis is the mass of the $Ca(OH)_2$ in the pellet. All the pellets were reacted at 40˚C and the pellets were pressed at 5K, 15K, and 25K PSI.

Results continued: X-ray Diffraction (XRD) and Thermogravimetric Analysis (TGA)

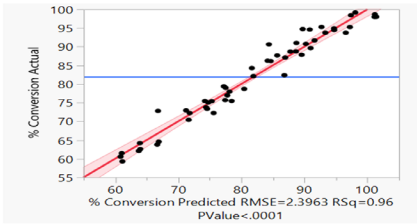


Results continued: Scanning Electron Microscopy (SEM) and Multivariate Regression of Data



SEM images of the Acros (left) and Fischer (right) carbonate products show that the Acros carbonate formed much smaller and distinctly defined $CaCO_3$ particles than the Fischer carbonate, which formed a more non distinct “cohesive” looking mass.

Source	LogWorth	PValue
Brand	19.357	0.00000
P	12.544	0.00000
m	9.092	0.00000
P*d	3.438	0.00037
d	0.951	0.11191



The multivariate regression correlated the reaction extent the experimental variables. Brand, pressing pressure, mass and the cross-product of pressure and density were found to be the most significant factors. The black dots are the corresponding points of the actual and predicted conversions. The red line is the linear regression of the actual and predicted conversions with its 95% confidence interval.

Discussion and Conclusion: The temperatures observed in this study did not provide a significant affect on the carbonation result. This work confirms that the brand of the $Ca(OH)_2$, the pressure at which the pellet is pressed, and the mass of the pellet have the most significant affect on the microstructure of the carbonation product and extent of reaction. This research concludes that rapid carbonation is achievable and viable on the experimental scale. More comprehensive studies as well as a completed heat and material balance and economic feasibility study are ongoing.

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Acknowledgments: *National Science Foundation (NSF) Grant Award No. CMMI-1563173, Tennessee Tech University, Center for Energy Systems Research, Dr. Holly Stretz, Dr. Michael Adenson and Mr. Ali Zolghadr.*

Characterizing the Flammability of Cardboard Using a Cone Calorimeter

K. J. Overholt[1], M.J. Gollner[2], A.S. Rangwala[1]

Worcester Polytechnic Institute[1]
University of California, San Diego[2]

1 The importance of cardboard in large warehouse fires

The potential for a large fire in a warehouse is high because of **dense packing**, **large amounts of hazardous materials** such as papers and plastics, and the presence of **flammable packaging materials**.

In storage applications, it is important to classify the burning of cardboard because it provides a **source of flaming combustion** and is usually the **first item to ignite and sustain flame spread**.

2 A dimensionless parameter: The B-number approach

The B-number is useful in **ranking** the hazard level of a fuel since it depends on the **ratio of energy available** from the fuel **to the energy required to gasify** the fuel. A higher B-number signifies a fuel with more net energy (more hazardous). This equations shows the B-number in an expression for the mass loss rate [4].

$$\dot{m}''_F = \frac{\bar{h}}{c_g}\ln(1+B)$$

The heat transfer coefficient ($\bar{h}$) is defined here as a convective heat transfer coefficient by using the Nusselt number for a convective turbulent boundary layer on a vertical plate [2]. The Prandtl number is defined as $Pr = \alpha_g/\nu_g$.

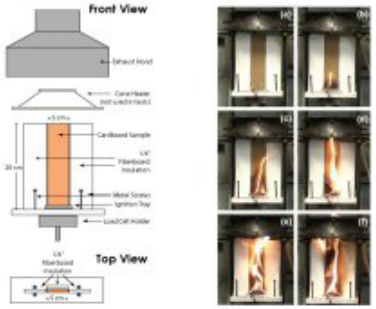
$$\bar{h}/c_g = (\rho_g \alpha_g / x_p)Nu \qquad Nu = 0.13(Gr \cdot Pr)^{1/3}$$

Rearranging for B, we can use the **mass loss rates** obtained from the cone calorimeter to **determine the B-number experimentally**.

$$\bar{B} = \exp\left(\frac{\dot{m}''_F}{(\rho_g \alpha_g / x_p)\cdot 0.13(Gr\cdot Pr)^{1/3}}\right) - 1$$

B - *Mass transfer number (-)*
c_g - *Specific heat air (kJ/kg-K)*
$\bar{h}$ - *Heat transfer coeff. (W/m²-K)*
Gr - *Grashof number (-)*
$\dot{m}''_F$ - *Mass burning rate (kg/m²-s)*
x_p - *Pyrolysis length (m)*
α_g - *Thermal diffusivity air (m²/s)*
ρ_g - *Density air (kg/m³)*

3 Experimental setup for studying cardboard flame spread



4 tests were performed in which 5 cm x 20 cm samples of cardboard were ignited across the base in the cone calorimeter. The sample size was chosen as a tall strip since **vertical flame spread is the primary focus** of this study. The corrugated cardboard used in these tests is identical to the type that is used to store commodities.

4 Predicting flame heights using the B-number from experiments

To predict flame height as a function of time, the following equations [1] were used iteratively to first find the length of the pyrolysis front (x_f) and then the turbulent flame height (x_p) by using the averaged B-numbers found experimentally from the small-scale flame spread tests.

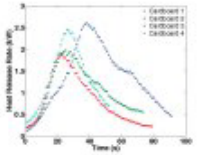
$$(x_p^{1/2} - x_{p,0}^{1/2}) = \left(\frac{4(1-1.25(r/B)^{1/3}}{\pi}\right)\left(\frac{\alpha_0^2}{\rho_s c_{p,s} k_s (T_g - T_\infty)^2}\right)(t - t_0)$$

$$\Phi = \frac{x_f}{x_p} = 0.64(r/B)^{-2/3}$$

α_0 - *Various fuel and gas prop. (-)*
$c_{p,s}$ - *Specific heat of fuel(kJ/kg-K)*
k_s - *Thermal cond. of fuel(W/m-K)*
ρ_s - *Density of fuel (kg/m³)*
r - *Stoichiometric parameter (-)*
t - *Time (s)*
T_g - *Gasification temperature (K)*
x_f - *Flame height (m)*

5 Results from a simple model to predict flame heights

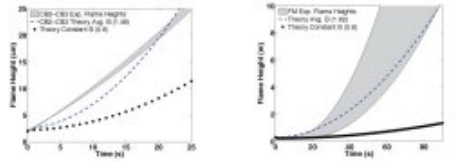
The **average B-number** for the 4 cardboard tests (CB1-CB4) was found to be **1.82** and was used to calculate predicted flame heights.



Results from vertical flame spread experiments performed in the cone calorimeter

Test name	Total Energy Released (kJ)	Average HRR (kW)	Mass lost (g)	B-number
CB1	120	1.3	6.2	**1.81**
CB2	78	1.1	4.7	**1.69**
CB3	65	0.8	3.9	**1.22**
CB4	70	1.3	3.8	**2.56**

The simple model shows **good agreement** with **both the small-scale (centimeters) and large-scale (meters) experimental flame heights** [3] by using the average B-numbers that were determined experimentally from the small-scale tests in the cone calorimeter.



6 Conclusion and future work on the flame spread model

A **method** for experimentally determining the B-number using a cone calorimeter in order to rank the fire hazard of a material has been shown, and a **model** for predicting vertical flame spread along cardboard has been presented.

To use the model in storage applications, scaling analyses will be perfomed to relate this research to intermediate commodity test burns performed by Michael Gollner. Additional fuels will be tested to assess the flammability and hazard ranking across a range of fuels.

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Acknowledgements:
Thanks to Randall Harris at the WPI Fire Science Laboratory for experimental guidance with the cone calorimeter tests. Commodity samples were donated by David LeBlanc at Tyco International.

Gone with the mind: Thought based meditation and its implications to attention strategies

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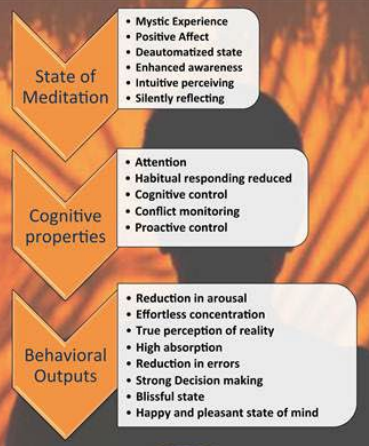
Abstract:- Meditation has been proven to be a boon to medical sciences as well as for gaining powerful self-regulatory mechanisms. In the present review, a model has been hypothesized for a method of meditation (*Rajayoga* Meditation) based on generation of a thought and its propagation to utmost level of consciousness. *Rajayoga* meditation (RM) is being taught worldwide by *Brahma kumaris* World Spiritual University. It has many classified strategies, which allow its effects to leave impressions on conscious mind, unlike defined instructions for mindfulness and concentrative meditation; RM is composed of many modes of thoughts. In the given model, attention correlates of long term meditators are presented and with their experience, it has been approached to provide insights of: how they react to any sensory cue provided, how they orient their attention to other cue and how they became able to monitor conflict; generated due to provided cue having similar properties. Most striking are the changes lied down in their approach of reactions due to regular practice of meditation. One interesting finding has been documented relating one's intrinsic awareness with extrinsic attention. As the *Rajayoga* is based on positive thought incorporation and its iteration, it provides flexibility & modulates the ability to evaluate performance by Meta-cognitive awareness of one's cognitive processes. With previous findings on cognitive control and attention, meditation has been found out to create holistic awareness about environmental cues with reduced arousal (Langer, 1981). But due to reduced arousal focal attention is also reduced on specific cue and habitual responding with many hours of meditation practice also gets reduced. Expert meditators can reverse the phenomenon of automatization as their involvement in meditation leads to reduction in habitual cognition. It has been described in poster with the help of interactive model.

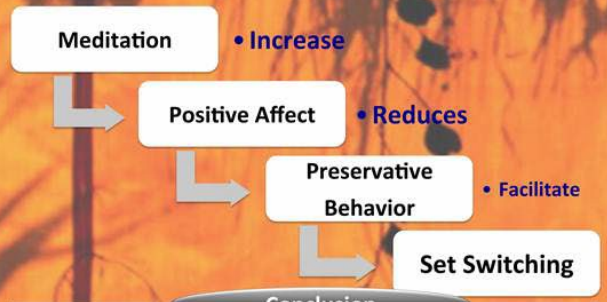
Introduction

Rajayoga is a regulated exercise in which recollection, contemplation, concentration and attention are used in a methodical way to achieve blissful state. While doing practice of Rajayoga one has to detach from mundane the gross and material. Mind, intellect and emotions are being used for a special theme in a special way. It may be practiced at progressive levels of knowledge, faith, energy and consciousness. Technique of self exploration, leading to the experience of heightened and expanded awareness reaching to supreme and bridging itself to soul's awareness. It is based on thought generation and propagation of mind to blissful state using the same thought. During this practice meditators gets mind transformed into a reservoir accepting positive thoughts and neglecting negative thoughts.



Approach

Approach of this poster is a depth review of researches done on meditation and its effect on cognitive dimensions of human. Meditation provide a vision over metacognitive process which flexibly control over perception and attention.



Conclusion

Meditation has been seen as the most wonderful phenomenon to achieve performance enhancement. In most meditation types, there is a zeal to achieve an elevated state. This state of elevation extends to relaxed and calm mind or enervated state or thoughtlessness. With the diagrammatic representation of Rajayoga meditation, it has been tried to understand the manner in which it is influencing the state of self awareness and monitors the performance measures itself while engaging in task based stress. Person engaged in Rajayoga practice for long time i.e. years might develop steady changes in strategies to look into situations and deal with them efficiently. Major part of this enhancement is played by the positive affect and thoughts generated and propagated in this type of meditation. There is still a gap with reduction in arousal hypothesis which opposes enhancement of selective attention during reduced arousal states. But with widely accepted researches stating performance enhancement with meditation makes it a prominent non invasive method for attention enhancement.

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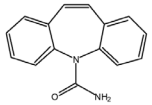
TiO_2/CdS Photocatalytic Degradation of Carbamazepine

[illegible] Preshong, [illegible] Jevtić, Nastasia [illegible], Dr. [illegible] Arce

Introduction

Pharmaceuticals and personal care products (PPCPs) cannot be degraded by traditional methods of wastewater treatment, leading to contamination in groundwater and even drinking water and posing potential harm to people and to aquatic life. Photocatalytic degradation is an advanced oxidation process (AOP) that provides an effective method for degrading these substances. This research examines the degradation of carbamazepine (CBZ), a model PPCP, by titanium dioxide and cadmium sulfide.

Carbamazepine and PPCPs



$C_{15}H_{12}N_2O$ • 236.269 g/mol
MP: 191-192°C
Biological half-life: 25-65 hours (initial), 12-17 hours (repeated doses)

- Used to treat epilepsy, seizures, neuralgia, etc.
- Like other PPCPs, has high affinity for aqueous phase
- Detected in municipal wastewater, groundwater, seawater, and even drinking water
- Was found at concentrations up to 1075 ng/L in surface water in Berlin

Coverage/Methodology

Generic Photocatalytic Process

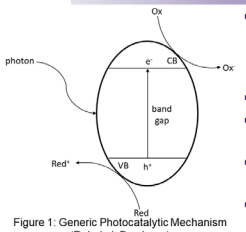


Figure 1: Generic Photocatalytic Mechanism (Rebekah Preshong)

- Photon of sufficient energy excites electron from valence band (VB) to conduction band (CB) of semiconductor
- Positive hole left behind in VB
- Charge recombination can occur rapidly
- Oxidizing agents reduced by CB electron
- Reducing agents oxidized by VB hole

Important elements in papers reviewed

- Titanium dioxide photocatalysis
- Degradation mechanisms (esp. of CBZ with TiO_2)
- Modified TiO_2 photocatalysts (esp. TiO_2/CdS)
- Effect of UV vs. UV-Vis light
- Importance of hydroxyl radicals
- Kinetic analysis

Results

Dual Semiconductor

- Electrons migrate to CB of TiO_2 (lower than CdS CB)
- Holes migrate to VB of CdS (higher than TiO_2 VB)
- Creates charge separation that slows recombination of electron/hole pairs
- Water is oxidized, producing hydroxyl radicals that will oxidize CBZ
- Oxygen (most likely) is reduced; $O_2^{\bullet-}$ and $HO_2^{\bullet}$ will also oxidize CBZ
- Ideally, CBZ will reach complete mineralization

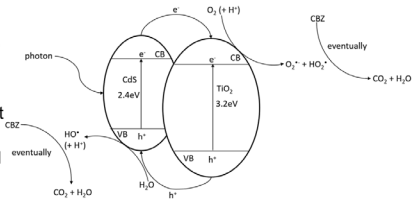


Figure 2: Dual Photocatalytic Mechanism (Rebekah Preshong)

Mechanism Proposed by Martínez *et al.*

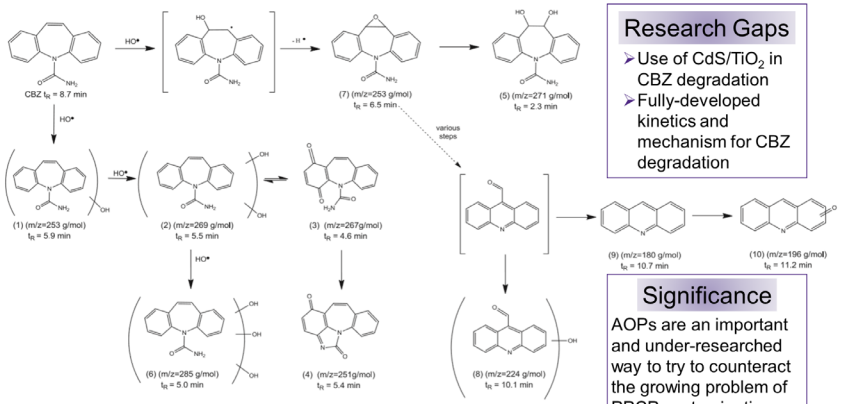


Figure 3: Martínez et al. Degradation Mechanism

Research Gaps

- Use of CdS/TiO_2 in CBZ degradation
- Fully-developed kinetics and mechanism for CBZ degradation

Significance

AOPs are an important and under-researched way to try to counteract the growing problem of PPCP contamination.

Variations Based on Reaction Conditions (from Martínez *et al.*)

Table 6
Photoproducts (numbered according to Scheme 2) obtained upon degradation of CBZ after photocatalysis upon UV or NUV–Vis irradiation.

Reaction conditions			Photoproducts
Lamp	Catalyst	%O_2/co-oxidant	
NUV–Vis	P25	0	1, 2, 3, 7, 9, 10
		50	1, 3, 4, 5, 7, 8, 9, 10
		50/H_2O_2	1, 3, 4, 5, 7
	Anatase	50	1, 3, 4, 5, 7, 8, 9
	Rutile	50	1, 3, 4, 5, 7, 8, 9, 10
	ZnO	50	1, 4, 7
	P25 + MWCNT	50	1, 2, 3, 5, 7, 9, 10
	10-MWCNT-TiO_2	50	1, 2, 3, 5, 7, 9
		50	1, 2, 5, 7
UV	P25	50	1,3, 4, 5, 6, 7, 8, 9, 10
	Anatase	50	1, 3, 4, 5, 6, 7, 8, 9
	Rutile	50	1, 3, 4, 5, 6, 7, 10
	10-MWCNT-TiO_2	50	1, 3, 7, 9, 10
		50	1, 3, 5, 6, 7, 8, 9

Table 1: Intermediates Detected Based on Varied Reaction Conditions (Martínez et al.)

Kinetics

- Langmuir-Hinshelwood kinetics model is typically used

$$r = -\frac{dC}{dt} = \frac{k_r K_{ad}}{1 + K_{ad} C}$$

  - r: degradation rate
  - C: reactant concentration in water at irradiation time t
  - k_r: reaction rate constant
  - K_{ad}: adsorption coefficient

- Under many conditions can be simplified to a first-order rate equation:

$$\ln\left(\frac{C_0}{C}\right) = k_r K t = k_{app} t, \text{ or}$$
$$C_t = C_0 e^{-k_{app} t}$$

  - k_{app}: apparent first-order rate constant

Conclusions

Brief Summary

- Titanium dioxide (TiO_2): Inexpensive; non-toxic; effective; activated only by UV light
- Cadmium sulfide (CdS): Smaller bandgap; can be activated by visible light
- TiO_2/CdS: Use of effective TiO_2 ***and*** activation with visible light
- Hydroxyl radicals: essential in CBZ degradation
- Intermediates: vary with reaction conditions

Proposed Experiment

- Preparation of dual photocatalyst from Na_2S, $Cd(NO_3)_2$, and TiO_2
- Experiments run with various catalyst loadings, CBZ concentrations, and types of irradiation
- Samples collected every 5 minutes and analyzed with UV-Vis spectrophotometer at 284nm to determine CBZ degradation

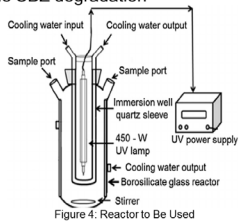


Figure 4: Reactor to Be Used

Sample Concentration	Amount of CBZ, ppm	PC Loading, mg/L	Irradiation Source	Irradiation Time, min
Low	5	50	UV, Vis	45
Low	5	250	UV	45
Low	5	500	UV, Vis	45
High	250	50	UV, Vis	45
High	250	250	UV	45
High	250	500	UV, Vis	45

Table 2: Proposed Experimental Conditions (K. Jevtić)

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Acknowledgements

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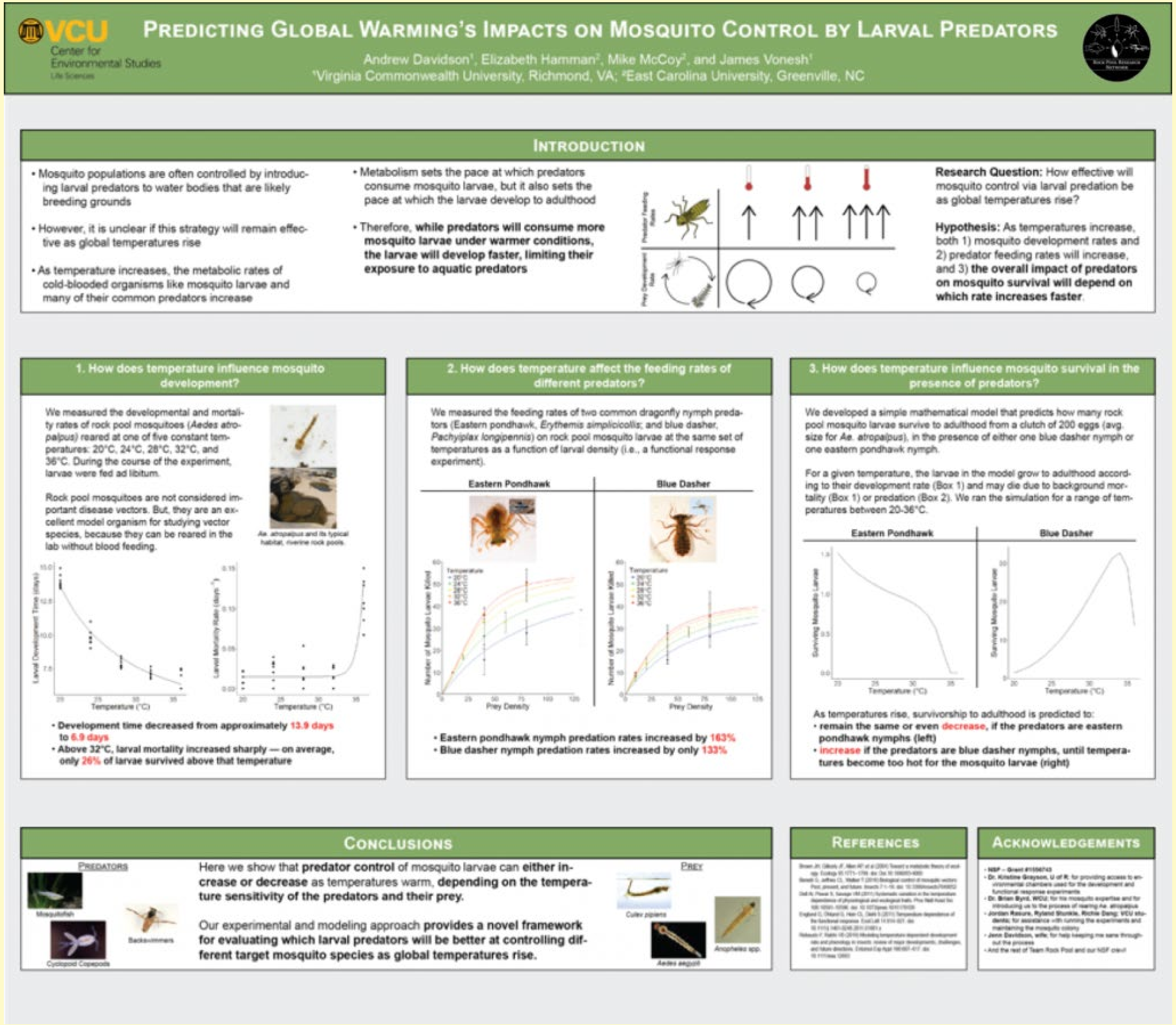

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Questions?