"Success story of NASA Space Grant CoP program at the Great Basin College."

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Introduction - Community of Practice - CoP

- Model to Engage and Retain Minority Students

- Engage community college students with hands on science

- Attract / retain more community college students in STEM fields

- Increase AS degree completion

- College transfer / employment in STEM areas
<table>
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<th>Statewide Program</th>
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<td>Nevada NASA Space Grant Consortium</td>
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<th>CSN College of Southern Nevada</th>
<th>TMCC Truckee Meadows Community College</th>
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<td>WESTERN NEVADA COLLEGE</td>
<td>GREAT BASIN COLLEGE</td>
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Great Basin College

- Rural
- Great Basin College covers 86,500 square miles
- Two time zones
- Ten of Nevada’s largest counties
GBC CoP - How to be a scientist?

- Broad scope of topics

- Number of students – 2 – 7 students/ semester

- Not research based

- End of semester (3 P’s)
  1. Proposal – Literature based Research proposal
  2. Presentation
  3. Poster
3 P’S - Proposal

- Focused on students area of interest – e.g. - Claytronics, cybernetics

- Literature based

- Discussion

- Review panel
Osteosarcoma: Is PTHrP to Blame?

Abstract - With the discovery of PTHrP in the late 1980’s it is a newer hormone being researched. There is some research being done on other types of cancer related to the PTHrP hormone, but it has no yet been looked at as far as its links to osteosarcomas. With specifically designed research it may very well be possible to finally link PTHrP to osteosarcomas. This research very well could lead to further testing with genetics and the manipulation of the genetics to cure this cancer.

Introduction - There are many types of bone cancer that people can develop but one of the most common types of bone cancer is the osteosarcoma. One must first understand what an osteosarcoma is. An osteosarcoma is when the normal bone cells start to grow out of control. In this cancer, the osteoblasts make a bone matrix that is not as strong as that of the normal bone. Osteosarcomas can further be subdivided into high-grade (spreading the quickest), intermediate-grade, and low-grade (spreading very slowly). Most commonly children and young adults will develop osteosarcomas and they will usually get high-grade osteosarcomas (Dentice, M., 2005). However, one can develop an osteosarcoma at any age it is usually intermediate or low grade. There have also markedly been cases of osteosarcomas after the birth of a child. Osteosarcomas are found in the end of the long bones that are growing quickly such as: distal femur, the proximal tibia, and the proximal humerus (Dentice, M., 2005). The next thing that one must look at is a hormone called PTHrP. PTHrP is an amino-acid protein and has a widespread physiological importance including augmentation of the transportation of calcium and inhibits bone resorption. PTHrP just as importantly regulates endochondral bone development by maintaining the endochondral growth plate (Camirand, A., (2016).
Hypothesis

H1: PTHrP in excess is what is causing osteosarcomas in teens, young adults, and postpartum women.

H0: Excess PTHrP is not related to causing osteosarcomas in teens, young adults, and postpartum women.

H2: Lack of/diminished PTHrP is what is causing osteosarcomas in teens, young adults, and postpartum.

H0: PTHrP plays absolutely no role in the development of osteosarcomas in these groups.

Plan of Research - The use of isogenic mice for this research will be imperative as it prevents natural variation (Mouse, 2/17). The mice will first have blood work to get a baseline of the PTHrP levels. Once this is done 50 mice will be given interleukin-2 (amount of 10(-10) M) to naturally increase the PTHrP levels in the mice. Another 50 mice will be given 1.25(OH)2D3 (calcitriol) 2cc to naturally decrease the PTHrP levels. The last group of 50 will not be given anything and they will be the control group. The testing on the mice will begin when they are in their teenage years for the first round. In the second round, we will start testing when they are in young adult hood. The third round will be in female mice postpartum. This timetable will continue for six months in the teenage years of the mice. At the end of the 6 months the final blood work will be done and mice will be checked for the formation of an osteosarcoma. Running simultaneously with this experiment the young adult mice will also go through the same schedule and testing. The postpartum adult mice will begin testing after the first batch of babies is born and will not be allowed to breed again until testing is done.
**Timetable**

Day 1: Run blood work on all 150 mice to get a baseline PTHrP for all of them.

Day 2: Inject 50 mice with 1.25(OH)2D3 concentration 10(-10) M. Inject 50 mice with 2cc interleukin-2. Leave the last 50 mice for a control group.

Day 3: Mice will be monitored

Day 4: Blood work will again be done to test the PTHrP levels in all mice.

Day 5: The same 50 mice will again be injected with the 1.25(OH)2D3 10(-10) M solution. The same mice will be injected again with 2cc interleukin-2. The control group will not be injected.

Day 6: Mice will be monitored.

Day 7: Blood work will again be obtained to measure the PTHrP levels in all the mice.

**Methods** - The methods that will be used for this experiment will be getting baseline bloodwork of the PTHrP hormone in all isogenic mice. One group of mice will be injected with interleukin-2 (2cc), one group will be injected with 1.25(OH)2D3 (10(-10)) M. The third group will just be monitored as the control group. The testing for this will last 6 months with each group. There will be testing done at different ages of mice including young mice, mice when they are in the young adult years, and mice that are post-partum.
**Results** - Hypothetical results would show that an excess of the PTHrP hormone was causing osteosarcomas in the three groups consisting of teenagers, young adults, and in postpartum women.

**Plan of sharing** — I would present the results at medical conferences. I would also have the results published in journals including Journal of the American Medical Association and the Journal of Cancer. Undergraduates will be trained in testing procedures and in data collection. The research will be done in conjunction with the University of Reno in their laboratory. This would be aided by an endocrinologist and an oncologist.

**Future direction** - Once it is found that osteosarcoma is caused by excess PTHrP then the next step would be to begin genetic testing to identify why genetically the body is producing too much PTHrP. Once the genetic testing was done then a test should be developed to test preteens for excess PTHrP. Once these steps have been taken then the next step should be to figure out if there was a way to manipulate the genes that are triggering the excess PTHrP hormone.

**Conclusion** - The link between osteosarcoma and PTHrP hormone may be a reality. The use of isogenic mice will alleviate natural variation and allow them to be tested to see if the PTHrP hormone in excess levels is causing osteosarcomas. This testing will also allow us to see if diminished or nonexistent PTHrP levels are causing osteosarcomas. Once the testing is done we should be able to show that there is either a definite connection between the osteosarcoma or that there is absolutely no connection between the two. Once the testing is done it will allow us to move on to further testing. The testing will also allow us to be able to share our research and its results with other medical personnel who will find the information important. This research could move finding a cure for this cancer closer than we have ever been.
3 P’S - Presentation

- GBC

- Peer reviewed research paper – Area of interest

- Current topic – Noble prize, Measles, Ebola

- TED talk

- Final presentations- Public -GBC

- State meetings
3 P’s – Poster

Ebola: Containing an Epidemic

Introduction

The 2014 Ebola outbreak is the largest that the world has ever seen. How can we contain an epidemic of this size and severity? The third phase, the containment phase, needs to be applied differently for an effective response to a crisis of this magnitude.

Abstract

The rapid spread of Ebola through West Africa threatens all aspects of global health services that are often hit in recent years. The continued presence of Ebola is a threat to global health security and the longer the disease persists, the greater the likelihood that it will become endemic. Reducing the spread of disease will require the implementation of control measures and control of the disease. Controlling the disease requires the implementation of control measures and control of the disease. Controlling the disease requires the implementation of control measures and control of the disease. Controlling the disease requires the implementation of control measures and control of the disease.

Research and Goals

- Determine why the current response is not effective.
- Come up with practical ideas to the areas of improvements in the current containment strategies.
- Ultimately, stop Ebola Virus Disease out of Western Africa.

Current Containment System

- Hospital Staff
- Field Work
- Information

What Needs to Change

- The international community must have a response plan for Global Health Emergencies.
- Better resource allocation to meet the international community needs.
- Improved capabilities in outbreak management.
- Increased funding for epidemiology and virology laboratories.
- Improved laboratory infrastructure.
- Improved surveillance and laboratory capacity.
- Improved transparency and accountability.
- Improved coordination and communication.

Division of Labor

- Division of labor among containment staff.
- Training, Case Management, Lab Work, Information, Workforce, Community Engagement, Social Mobilization, Information Management.

Duties of Each Group

- Hospital Staff: Triage, surveillance, Laboratory, contact tracing.
- Field Work: Vaccination, surveillance, Laboratory, contact tracing.
- Information: Laboratory, Epidemiology, Contact tracing.

Misconductual Needs

- Due to the communication problems in developing countries teams can be decentralized and less efficient.
- WHO needs to create an emergency fund to deal with global health crises.
- Containment of Ebola needs to be better organized so everyone remains efficient.
- Information and communication to local populations must be the top priority.

Conclusion

- In order to successfully eradicate Ebola in Western Africa we need to demonstrate our genuine commitment.
- With a clear mechanism for controlling Ebola, the WHO could become leaders in Western Africa and a potential global health threat.
- The WHO needs to be better equipped to respond to global health emergencies.

Works Cited

Kelly Kleeb
Projects completed till now

Spring 2015
A. Marisela Ramirez – “Measles Prevention”
B. Kelly Kleeb – “Ebola containing an epidemic”

Fall 2015
A. Hannah Mason – “Theoretical applications for travelling faster than light”
B. Patrick Wick – “Artificial intelligence virtual Avatar”
C. Fabian Gonzalez – ‘Unmanned aerial vehicle efficiency in America”
D. Bryce Powell – “Wave pattern on mars “
E. Thomas Stafford- “Desalination: A tool for Survival”
F. Emilee O’Neal – ‘Cleaning space debris”
G. Colin Mclean – “Material to be used in space”
Spring 2016
A. Thomas Strafford – “Surveying the unknown: Colonies within Lava tubes can work”
B. Amanda Murray – “Cybernetics: neural implants”
C. Patrick Wick – “Home Automated Security Avatar (HASA)"
D. Shaun Richard – “Quantum Entanglement”

Fall 2016
A. Amanda Murray - “Claytronics- Programmable Matter”
B. Smokey Chrisman – “Nanotubes for orthopedic internal implants”
C. Michelle Milam – “Cheat grass – Alien from Asia”

Spring 2016 (In progress)
A. Smokey Chrisman – “Osteosarcoma: Is PTHrP (Parathyroid hormone related protein) to Blame?”
B. Michelle Milam – “Invasive species – Trout ?”
C. Everett Staley – “Flywheel application”
Challenges for GBC

- Different location

**Recruiting students**
- Non-traditional student schedules
- Associate of science
- Rural – Nursing, Trade school

**Lack of Infrastructure**
- No dedicated lab space
- Long term support for equipment and supplies
Challenges for GBC

Tracking Program Alumni

Involving more faculty

- Research program of their interest
- Release time unavailable
Benefits

- 19 Scholarships - $2000 each
- NASA conferences
- State meetings – Reno, Las Vegas
- Nevada Society of professional Engineers
- Blue bucket challenge
Blue Bucket Challenge

- Science Saturday
- GEAR UP - “Gaining Early Awareness and Readiness for Undergraduate Programs” - Elko, Pahrump
- Girl Scout – Science Badge

David E. James, PhD. PE F.NSPE
Director, Solar and Renewable Energy Programs
Associate Professor - UNLV
Department of Civil and Environmental Engineering and Construction
State Meetings

- IAV – TMCC, WNC, CSN, GBC
- Faculty and students from all the community colleges in Nevada
- Monthly interactive video conference meetings
- Speakers – Research faculty, workshops, NSHE
Success story – 1 – Smokey Chrisman

- Carbon Nanotubes for Orthopedic - Internal Implants – Fall 2016
- PTHrP hormone and its links to an osteosarcoma – Spring 2017
- Huntsman and work on cancer research there for the summer - Salt Lake City, Utah
- Research - Medicine
Success Story – 2 – Hannah Mason

- Transferred to the University of Nevada, Reno
- Pursuing a degree in both Physics and Engineering Physics
- Working in the Electrical and Biomedical Engineering department
- Volunteering as a research assistant in a physics lab in search of dark matter
- NASA – Scientist
Success Story – 3 - Thomas Stafford

- Fall 2015 & Spring 2016
- Academic Year 2016-2017 NSF UROP (Upper Division)
- Bachelor's in Applied Science in Management in Technology in December
Overall Conclusion

- Successfully completed the Co P program
- Worked together
- GBC – 19 scholarships – 14 students – 7 female - $2000
- Educational supplies
Co P – Partners

Stephanie Fiorenza
CSN

Laura Briggs
TMCC

Elizabeth Tattersall & Tom Herring
WNC
Nevada NASA Space Grant Consortium & NASA EPSCoR

Dr. Lynn Fenstermaker
Nevada NASA EPSCoR and Space Grant Director

Gibran Chavez-Gudino
Research Administrator
QUESTIONS ?