JUNE 26, 2020

BRIDGE

Beginning **R**esearchers **I**nvolved in **D**ISCOVERY through **G**uidance and **E**XPLORATION

Hosted Virtually by
Pharmaceutical Research Institute
Albany College of Pharmacy and Health Sciences
1 Discovery Drive
Rensselaer, New York 12144

QUEST R III
PUTTING STUDENTS FIRST

Pharmaceutical Research Institute
ALBANY COLLEGE OF PHARMACY AND HEALTH SCIENCES

GLOBAL THROMBOSIS FORUM

Brief Biographies

Dr. Shaker A. Mousa

Shaker A. Mousa finished his PhD from Ohio State University, College of Medicine, Columbus, Ohio and Post-doctoral Fellowship, University of Kentucky, Lexington, Kentucky. He also received his MBA from Widener University, Chester, Pennsylvania. He is currently an endowed tenure Professor and Executive Vice President and Chairman of the Pharmaceutical Research Institute and Vice Provost for Research at ACPHS. Prior to his academic career, he was a senior Scientist and fellow at DuPont Pharmaceutical Company for 17 years, where he contributed to the discovery and development of several FDA approved and globally marketed diagnostics and therapeutics.

He holds over 350 US and International Patents discovering novel anti-angiogenesis strategies, antithrombotics, anti-integrin, anti-cancer, and non-invasive diagnostic imaging approaches employing various nanotechnology platforms. He has published move than 1,000 journal articles, book chapters, published patents, and books as editor and author. He is a member of several NIH study sessions, and the Editorial Board Member of several high impact Journals. His research is focused on diagnostics and therapeutics of angiogenesis-related disorders, thrombosis, vascular and cardiovascular diseases.

Dr. Atul Laddu

GTF is privileged to attend the BRIDGE event at ACPHS for the 3rd year in a row. It all started with a brief visit to Dr. Shaker Mousa in May 2016 when GTF was trying to explore a research training facility for its students. The idea of a joint conference for the Questar III Students and GTF students was born during this meeting. Dr. Mousa quickly talked with Dr. Ruth Russell about this concept, and Dr. Russell agreed immediately. This was the birth of the BRIDGE Concept.

Global Thrombosis Forum (GTF, www.gtfonline.net), which is an affiliate of the North American Thrombosis Forum (NATF, www.natfonline.org), was formed in 2012 with a primary purpose to increase the awareness of thrombosis in the community. Later on, we expanded to expose the GTF young members to research activities, such as the ones at ACPHS.

In 2019, 2 of our students, Ms. Anjali Bhave and Mr. Sharan Krishnappan joined the newly initiated internship program for a period of 4 weeks at ACPHS. The outcome of the research was phenomenal and our students presented their research work at the ASH and the FASEB meetings, a distinguished Honor to any High School student and to GTF.

The year 2020 would have been even better with five students performing a research internship at ACPHS, but Mother Nature had something else in mind. With the emergence of the scare of COVID-19, all our hopes for the internship were shattered due to the Federal and NY State Government regulations.

However, little did anyone know that Drs. Mousa, Russell and the BOD of GTF were not going to back out of this just because of a COVID-19 scare. The brains started turning to find some alternatives to the in-person BRIDGE event, and this was the origin of the BRIDGE event 2020 virtually.

GTF has several middle school and high school students enrolled, but the BRIDGE event is attended by the students who have been trained enough in GTF for an average period of 2-3 years.

GTF, a non-profit 501-c-3 organization, and is run on a purely voluntary basis, and does not charge the students for the efforts of the GTF staff. GTF has a strong non-discriminatory clause and is open to any student, irrespective of the age, gender, race and national origin.

In 2019, GTF added a new research facility (Evanston Hospital) to our already existing facilities (ACPHS and Loyola).

In 2020, GTF is very proud to announce The Dr. Brij Bihari Lal Mathur Memorial Research Scholarship in the memory of the Late Dr. Brij Bihari Lal Mathur, a teacher, a mentor, a well-wisher, a father and a guardian to Atul Laddu. Mrs. Usha Mathur, MD, a psychiatrist from Worcester and wife of the late Dr. Brij Bihari Lal Mathur, has kindly agreed to award the scholarship to two GTF students.

A word of thanks to Drs. Fareed, Mousa and Tofur at these institutions for their continued support and encouragement to our young members would be perfectly in order. We could not have done all this without the full unconditional support and cooperation of Ms. Danielle Cowin and Ms. Laura Stellato, whom we consider partners in our success. Let me welcome the GTF young presenters and the members of the Questar III team to this fabulous BRIDGE 2020 event at the ACPHS.

Ruth S. Russell

Ms. Russell obtained her MPhil/ABD Pathobiology and Molecular Medicine, Columbia University and her NYS Teacher Licenses in Chemistry, Biology, and Mathematics. She has more than 20 years' experience teaching in public schools and colleges. She began working for Questar III New Visions Scientific Research and World Health program in 2005. Ms. Russell is an Adjunct Professor of Biology and Public Health at SUNY Albany and an Adjunct Professor of Biotechnology and Literature at Russell Sage College. Ms. Russell's interests include a research based college level program in biological sciences and epidemiology for accelerated high school seniors, located at SUNY Albany's Health Science Campus and involving hands-on experimental projects and rotations in cutting edge technologies, pharmaceutical sciences and toxicology in collaboration with multiple area professionals and entities including the Pharmaceutical Research Institute, the Center for Functional Genomics and the Institute for Health and Environment at University at Albany's School of Public Health.

Agenda

Agenda Friday-June 26, 2020

8:30AM Welcome — Dr. Shaker Mousa
Global Thrombosis Forum Scholars, Members, Questar Students, Guests & Pharmaceutical Research Institute Members

Introductions — Atul Laddu, Ruth Russell

Power Point Presentations

9:00 **COVID-19 and VTE:** ***Sonal Churiwal, Ananya Mahesh***, Akshay Kulkarni, and Krishal Patel

9:15 **Thrombosis in Space:** ***Anushka Bhate***, Ankita Mahajan, Milind Mukkamala, and Raina Singhal

9:30 **Global Heparin Shortage:** ***Sanket Gavankar***, Sonika Tatipalli, Meghana Malempatti
How Does It Affect Us?

9:45 **Ovarian Cancer and VTE:** ***Anusha Tembe***, Prasad Shetye, Arya Bhanushali,and Krish Sharma

10:00 **The Adaptive Role of the Parahippocampal Place Area in Human Echolocation:** *Joshua Elfman*

10:15 **Oxidative Stress From Traffic Related Air Pollution Exposure Enhances Development of Alzheimer's Disease:** *Kira Fischer*

10:30 **Controlled Use of Rhizofiltration to Improve Water Quality After E. Coli Contamination:** *Ryan Nowak*

10:45 **A Neuroimmunological Study of Acute Disseminated Encephalomyelitis in Children:** *Madison Rifenberick*

11:00 BREAK

11:15 Presentation of Posters and judging by the review committee

Poster Presentations

The Caprini Score: ***Mrunalini Ghangrekar***, Tej Murudkar, Roumika Patil and Shivangi Ranjan
Falls in the Elderly: ***Rohan Pai***, Malvika Sawant, Rishi Bappanad and Krishan Patel
Rehab Labs: ***Rashee Modey***, Radhika Kulkarni, Tanisha Singhal,Tejas Deodhar
Unintended Biological Effects of Organophosphate Use: *Lena Kiehl*
Comparing the Safety and Efficacy of Tocilizumab and Methotrexate in Juveniles with Rheumatoid Arthritis: *Ryan LaBarre*
Optogenetics and Deep Brain Stimulation as Novel Treatments for Essential Tremor: A Comparison: *Madison Shumpert*

12:15PM Award Presentations — Shaker Mousa, Atul Laddu, Ruth Russell
Dr. Brij Bihari Lal Mathur Memorial Research Scholarship award:
In memory of the Late Dr. Brij Bihari Lal Mathur presented by Mrs. Usha Mathur
To Sharan Krishnappan & Sonal Churiwal

Honoring Summer Interns: Ananya Mahesh, Sanket Gavankar, Sharan Krishnappan, Sonal Churiwal, and Sonika Tattipalli.

1:00 PRI Virtual Lab Tour & ACPHS video

1:30 Closing Remarks — Shaker Mousa, Atul Laddu, Ruth Russell

Program Information

Questar III New Visions Research and World Health:

Questar III New Visions is a highly selective, college level academic experience offered to accelerated high school seniors living throughout the Capital District. This program involves hands-on laboratory research in the emerging biotechnologies, scientific literacy and global health. Students interested in future careers in the any of the biological sciences, including medicine, healthcare, biotechnology, pharmacy, biomedical research, genetics, forensics, health fields, biomedical engineering, environmental science, toxicology, biophysics, infectious and chronic disease, Nano biotechnology, etc. Students examine emerging biological research efforts and global health issues. They support their studies by reading some of the literary works that changed the world and by studying current scientific and medical journals. Students work independently and collaboratively to explore solutions to real life issues.

Students learn fundamental research methods in our laboratory. They become skilled at appropriate experimental design and capable of thinking on their own, finding solutions to problems using their intelligence, not just by following established protocols. The technologies learned in the student lab include DNA and protein gel electrophoresis, Western blot, PCR technologies, tissue culture, microbiological techniques, immunology and plasmid gene mapping. Students master the basic protocols necessary to succeed in today's biotechnology lab. The *Albany College of Pharmacy's Pharmaceutical Research Institute* and the *New York Neuronal Stem Cell Institute* conduct human embryonic stem cell and cancer research studies and are resident at East Campus, providing students with the opportunity to observe and sometimes even participate in cutting-edge scientific discoveries as they occur!

Many world-renowned researchers and business entities reside at SUNY Albany's Health Sciences Campus, and regularly work with our young scientists. These include Albany School of Public Health, New York State Department of Environmental Conservation, Taconic, Inc., Regeneron, Inc., and Pharmaceutical Research Institute, New York Neural Stem Cell Institute, Institute for Health and the Environment, Cancer Research Institute, Vascular Endothelial Cell Technologies, Inc., SyntheZyme, Inc., Intidyne, Inc., Ultradian, Inc., Albany Molecular Research, Inc., and many others. Additional individuals and entities working with our students include the RNA Institute at SUNY-Albany, Albany Medical Center physicians, RPI scientists, the Albany College of Pharmacy, the Albany County Department of Health, the New York State Cancer Registry, New York State Museum scientists, and many more. ***We are deeply grateful for their continued support of our program and its future scientists.***

Global Thrombosis Forum (GTF)

Dr. Atul Laddu's grandson, Rajan, had back surgery in 2011, after which he was diagnosed with two large blood clots in both his lungs (a condition called Pulmonary Embolism, or PE), which can be a fatal, if not treated immediately. Luckily, Rajan received prompt medical attention and recovered. During this experience, while talking with his many friends at North American Thrombosis Forum (NATF), Dr. Laddu realized how little did the general public know about 2 deadly thrombotic conditions called deep vein thrombosis (DVT) and pulmonary embolism (PE). This is when he decided to work with NATF, an organization that conducts research on and spreads awareness about thrombotic conditions nationwide.

Global Thrombosis Forum (GTF, www.gtfonline.net) is an affiliate of North American Thrombosis Forum (NATF, www.natfonline.org), a community-based organization. GTF had its first meeting held on December 12, 2012. The mission of GTF is to spread awareness about a deadly condition, Thrombosis, in the community. Dr. Atul Laddu, a retired Cardiologist, envisaged the mission, structure and function of GTF with the help and

guidance from Dr. Jawed Fareed, Director of the Hemostasis & Thrombosis Research Laboratories at Loyola University Medical Center and Vice-President of NATF and Dr. Samuel Goldhaber, Professor of Medicine at Harvard Medical School and President of NATF.

The primary goal and the mission is to work and increase the awareness of thrombosis in Georgia. In addition, GTF works to network with various groups involved in thrombosis, coaches' young volunteers in skills such as communication, presentation, research, and encourages the youth volunteers to organize, plan, and conduct the activities of GTF.

The forum involves middle school and high school young volunteers and are coached by a team of adult volunteers. Together, they reach to the masses, primarily in the state of Georgia, and educate them about various aspects of the condition of thrombosis.

GTF has now reached out to several thousands of citizens in the state of GA through its various projects on thrombosis. To date, in just a period of six years, GTF has received several proclamations, including by the Georgia State Senate, 9 cities and 5 counties, for its genuine work. In 2013, the Governor of Georgia, Nathan Deal, signed a proclamation for GTF and September as Thrombosis Awareness month in the State of Georgia. There are basically seven different major categories of GTF activities, namely booths, posters, presentations, interviews, research and publications, internships, and Thrombosis Club, all planned, organized and managed by the young volunteers with guidance from the members of the GTF Working Group, Board of Directors and some physicians.

Dr. Jawed Fareed, Director of the Hemostasis & Thrombosis Research Laboratories at Loyola University Medical Center, honored the excellent research work by the GTF interns by proclaiming an annual High School Scholar's Day at Loyola.

Biography & Abstracts for ***PowerPoint*** Presentations

Covid-19 and VTE

Sonal Churiwal, Northview High School

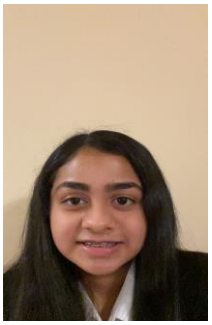
BIOGRAPHY

I am currently a rising junior at Northview High School, graduating in the 2022. For three years, I have been an active member of GTF. During my membership in GTF, I have not only been able to give back to the community by volunteering at multiple booths, but I have also had the invaluable opportunity to work on several research projects, including "African Americans and VTE", "COMPASS Trial", and "Coagulation Cascade". These experiences with GTF alongside my other involvements in organizations such as Health Occupation Students of America (HOSA) have fostered my aspiration to work in the medical field and grown my ability to write and present research projects. My biggest role model is my sister Mehal Churiwal, a current pre-med student at the University of North Carolina at Chapel Hill. Not only does she always support me in my endeavors to pursue the medical field, but is also endlessly dedicated to her academics. Today, I am going to present our research on COVID-19 and VTE.

ABSTRACT

Since its inception a few months ago in Wuhan, China, COVID-19 has affected the entire World, making it a pandemic. Unfortunately, the lack of adequate resources compounded with the long 14-day incubation period of COVID-19 is enabling the rapid spread of the virus. Diagnosis of COVID-19 includes nasopharyngeal swabs and serological testing. Patients at high-risk of contracting COVID-19 include the elderly and patients with asthma, chronic lung disease, immunocompromised patients, etc. One prevalent complication of COVID 19 includes thrombosis, which although has been highest among patients that are not receiving adequate prophylaxis, is still prevailing among those who are receiving prophylaxis. Thrombosis is managed through anticoagulants; however, care should be exercised in order to prevent excess bleeding.

Thrombosis in Space



Anushka Bhate, Green Hope High School

BIOGRAPHY

I am a 10th grader going to Green Hope High School, Cary, NC, and expect to graduate in 2022. I am inspired by my neighbor who is a firefighter and risks his life every day to save other people's lives. This further motivates me to have a career in medicine because I also want to be able to help others. In the future, I hope to go to medical school and become a surgeon. Today, I am going to present our research on Thrombosis in Space.

ABSTRACT

This describes the first case of thrombosis in space in an astronaut, and the challenges for female astronauts, as narrated by Varsha Jain, MBBS, MRCOG, Stephan Moll, MD, an expert from the UNC, was an expert consultant. The space shuttle crew and the physicians had a challenge: how to treat the astronaut with a blood clot, no knowledge of which anticoagulant to be used, and how to manage the side effects. Enoxaparin (1.5 mg once daily, followed by 1 mg once daily) was followed by apixaban (5 mg twice a day followed by 2.5 mg twice a day). The blood clot, monitored carefully, disappeared gradually. This was the first incidence that took place in zero gravity, indicating that a lot more work needs to be done. Some of the authors want to take a challenge in their future by being an astronaut and researching more about the space and medical conditions that may exist there.

Global Heparin Shortage: How Does it Affect Us?

Sanket Gavankar, Alpharetta High School

BIOGRAPHY

I have just finished my sophomore year of high school at Alpharetta High School in Alpharetta, GA and am expected to graduate in 2022. I have been a member of GTF since January 2017, have been a part of many booths, and published a multitude of articles. I have worked on a poster "Compression Stockings and VTE" which I presented on High School Scholar's Day at Loyola University in 2019. My role model in my grandfather, who not only has profound ingenuity but also is also a kind and working person. What he has accomplished and provided for his family is something I hope to replicate with my future family. He always inspires me to take initiative and be best the version of myself. My future aspiration is to become a cardiovascular surgeon because of my deep interest in the medical field and the human body. I have started becoming more interested in medicine since the start of high school where I joined HOSA and had been a member of GTF for two years. By being a physician, I would be able to help others in need and give back to the community, which has given me so much. My project title is Global Heparin Shortage, how does it affect us?, which I will present at the 2020 BRIDGE Event.

ABSTRACT

Heparin is a hundred year plus old anticoagulant being still used in therapy. It is an effective and relatively safe drug. Despite several anticoagulants been developed in the recent years, heparin is holding its firm place in the pharmacy. In the past few years, some disturbing news about a global heparin shortage is causing scare in the medical community. The authors researched the various aspects of global heparin shortage in this presentation. Each one of the various involved parties such as the FDA, the manufacturers, the physicians and pharmacists must play a synergistic role in preventing and combating this global shortage of a lifesaving anticoagulant.

Ovarian Cancer and VTE

Anusha Tembe, Campbell High School

BIOGRAPHY

My name is Anusha Tembe. I have just finished my sophomore year at Campbell High School, in Marietta, GA, and am expected to graduate in 2022. I have been a member of GTF since 2015, and have completed several projects. One project I have completed recently is "Physical Therapy and VTE." My role models are my parents. They inspire me because they are hardworking, intelligent, and ambitious. They always push me to do my best. In the future, I would like to have a career in the biomedical sciences.

There is a high rate for venous thromboembolism (VTE) amongst patients with ovarian cancer; VTE is a very serious and common complication for women with ovarian cancer. I am going to present the relationship between ovarian cancer and VTE.

ABSTRACT

Ovarian cancer is the second most common gynecologic malignancy (second only to uterine cancer) but leads to the most deaths and is overall the 5th leading cause of cancer death in women in the US. There are three different types of ovarian cancer: epithelial tumors, stromal tumors, and germ-cell tumors. There is a high rate for venous thromboembolism (VTE) amongst patients with ovarian cancer and it remains a serious and common complication for women with ovarian cancer. The purpose of our study was to examine this link more closely. Currently, the primary treatment approaches for ovarian cancer include medical, surgical and radiation. The risk for VTE varies with the type of treatment that is used and is directly proportional to the stage of cancer that is diagnosed.

The Adaptive Role of the Parahippocampal Place Area in Human Echolocation

Joshua Elfman, Troy High School

BIOGRAPHY

Josh will attend Stony Brook University to study biology.

ABSTRACT

By interpreting the reverberations of click like echoes, some humans are able to discern size, shape, material, and velocity of objects in the world around them. Many different areas of the brain have roles in this process of proprioception through echolocation; however, research into the parahippocampal cortex's role has been of particular interest due to some of its structures involvement in object and spatial memory. One of these structures, the parahippocampal place area, has been shown to be involved in material processing, spatial memory, and proprioception in the brains of sighted individuals. After visual impairment occurs, however, some areas of the brain have shown remarkable compensatory plasticity and are activated by stimuli that in an ordinary brain would cause little or no activation. This study hypothesized that the PPA plays a significantly more prominent role in proprioception in blind people than in sighted people. Peer-reviewed literature retrieved from PubMed and Google Scholar, as well as online neuroscience seminars, were used to gain a clearer picture of the adaptive role of the PPA. The results of this study were limited by a lack of experimentation. However, the information gathered about the plasticity of individuals with early-onset blindness, in tandem with information about the functionality of the parahippocampal cortex, suggests that PPA activity is more pronounced in blind echo locators.

Oxidative Stress From Traffic Related Air Pollution Exposure Enhances Development of Alzheimer's Disease

Kira Fischer, Berne-Knox-Westerlo High School

BIOGRAPHY

Kira will attend Northeastern University to study biology.

ABSTRACT

Automobile air pollution has been associated with numerous cardiovascular and respiratory ailments. Traffic related air pollution (TRAP) is highly heterogeneous, often containing a mixture of solids and vapors. Common components that have sparked health concerns include particulate matter (PM), Ozone (O_3), nitrogen oxides, carbon monoxide, sulfur dioxide, and lead. Recent research has highlighted the possible role TRAP plays in the pathology of various diseases of the central nervous system (CNS). This study focuses solely on Alzheimer's disease (AD) and its possible relationship to TRAP. AD is already the most common form of dementia among the elderly, and is on the rise. Despite extensive research by many institutions, the pathology of AD remains largely unclear and there is no known cure. It is widely accepted that the disease is multifactorial, caused by an interplay of genetics and the environment. This study explores the possibility of TRAP as an environmental risk factor, specifically through its ability to induce oxidative stress in the brain. The methods employed include a review of literature and current toxicological data on the topic. Included studies consistently demonstrate the ability of certain components of TRAP to cause oxidative stress in the brain. Additionally, animal trials in several of the studies produced symptoms characteristic of AD. While this data is insufficient in proving causality, it opens up doors for future research. Future focus could be directed toward the specific pathways by which components of TRAP are able to reach the brain. Oxidative stress demonstrates clear potential as a contributing factor to AD and must be studied further.

Controlled Use of Rhizofiltration to Improve Water Quality After E. Coli Contamination

Ryan Nowak, Taconic Hills High School

BIOGRAPHY

Ryan will attend Union College to study environmental engineering and biology

ABSTRACT

In the United States, freshwater resources are continuously becoming contaminated through Concentrated Agricultural Feeding Operations (CAFOs). CAFOs produce high amounts of fecal matter due to the high density of livestock that is present on the farm. Fecal matter from CAFOs enter freshwater sources through natural water runoff, snowmelt, and faulty containment areas. This study looks to examine the process of phytoremediation and the application of a small scale constructed wetland to improve the water quality of a contaminated water source. The small-scale constructed wetland created for this study consists of three tanks containing a variety of plants to create a closed system. The goal of this project is to show the potential for a small-scale constructed wetland utilizing rhizofiltration to decrease contaminates in a polluted water source and improve the overall water quality. Over the course of 20 days, the system exhibited the potential to improve contaminated water to safe levels, however, due to time constraints and time of year the full potential was not met. The data that was collected during the given duration did give promising results to what could be done even with a small scale set up during a time of hardship (COVID-19 Pandemic). For further research, this study should be repeated with a longer period of time to run, more time for the plants to develop a strong root base, and more series of contaminations should be conducted.

A Neuroimmunological Study of Acute Disseminated Encephalomyelitis in Children

Madison Rifenberick, Troy High School

BIOGRAPHY

Maddy will attend Columbia University to study neuroimmunology

ABSTRACT

Acute Disseminated Encephalomyelitis (ADEM) is a monophasic, demyelinating, neurological autoimmune disorder which results in widespread inflammation of the central nervous system. The disorder typically manifests after a viral infection when leukocytes, granulocytes, and macrophages infiltrate and demyelinate neurons in the CNS. ADEM is extremely rare, affecting one in every 250,000 people with - 85% of cases being children under the age of 10. ADEM presents with symptoms similar to those of multiple sclerosis (MS) such as encephalopathy, cranial nerve palsy, ataxia, and seizures. The corticosteroid, methylprednisolone, is usually administered by IV for up to 6 weeks to reduce inflammation. Intravenous immunoglobulin therapy (IVIG) is the second course of treatment available if the patient does not respond to methylprednisolone. A multitude of current peer-reviewed articles were studied which evaluated the biological mechanisms of ADEM as well as the efficiency of treatment options available. Studies found an overall recovery rate of 70% with 90% who saw a reduction of inflammation in the CNS after they were given methylprednisolone. Although more research needs to be conducted to better understand the cellular mechanisms behind ADEM, studies have shown that treatment options currently available are successful and allow for a potential full recovery.

Biography & Abstracts for ***Poster*** Presentations

The Caprini Score

Mrunalini Ghangrekar, West Forsyth High School

BIOGRAPHY

My name is Mrunalini Ghangrekar, and I am a member of the Global Thrombosis Forum since April 2018. I have just finished my freshman year of high school at West Forsyth High School, and I am expected to graduate in the year of 2023. I have led a few GTF community booths. I presented a talk on "An Overview of General GI Endoscopic Procedures" at the GI Symposium sponsored by the NATF, Loyola University, GTF and the International Union of Angiology on January 12, 2020. I then worked on the "Caprini Score" project, which I will be presenting virtually at the 2020 BRIDGE event. My role model is my mother because she is exceedingly kind to everybody and is extremely positive and hard working. Her optimistic attitude towards all situations teaches me to stay open-minded in life. I want to be a pediatrician in the future because of my interest in medicine, my eagerness to assist others and my love for children. I have always been fascinated by how the human body works, and the journey, which I would go through to become a pediatrician, would enable me to develop my knowledge in the pediatric field of healthcare.

ABSTRACT

Thrombosis is the # 1 preventative post-operative fatal condition, and thromboprophylaxis is the prevention of thrombosis. Some physicians approach a course of thromboprophylaxis on intuition, which is not very safe. The Caprini Score is used as one of the risk assessment tools to determine whether to prescribe thromboprophylaxis, based on an assessment of factors such as age, surgery severity, bedrest, conditions, etc., assigned to a point system. Although the Caprini score is the most effective of the few thromboprophylaxis assessments that there are, it is not as accurate after 10 points. Caprini Score does suggest an accurate course of action in determining whether thromboprophylaxis should be prescribed, as it is more lenient to provide preventative healthcare to patients.

Falls in the Elderly

Rohan Pai, Paul Duke STEM High School

BIOGRAPHY

Hello, my name is Rohan Pai, a rising sophomore at Paul Duke STEM High School in Peachtree Corners, Georgia. I enjoy speed cubing and drawing in my free time. I have been with GTF for 4 years. Some of my work in GTF includes obtaining a proclamation for the city of Peachtree Corners, presenting at the Evanston Hospital in Chicago on the topic of, "What should be hospitalized patients be most worried about?" in September 2019 and the Coagulation Cascade at the G. I. Symposium held in January 2020. My father has influenced my life the most because he teaches me a lot of life skills. Today, I will be presenting on our research, "Falls in the Elderly".

ABSTRACT

This was research on the common problem of falls in the elderly. Every 11 seconds, an older adult is treated in the emergency room for a fall; every 19 minutes, an older adult dies from a fall. Factors involved in the falls in the elderly include hypertension, diabetes, polypharmacy, dementia, weak muscle tone, and deteriorating eyesight and hearing. Falls threaten seniors' safety, independence, and generate enormous economic and personal costs due to increased diagnostic tests and hospitalization. The estimated annual cost for the US healthcare system on the falls among the elderly is $67 billion. In many cases, falls in the elderly can be prevented by conducting simple exercises on a daily basis. We conclude that as the population is aging, falls in the elderly should be taken very seriously.

Rehab Labs

Rashi Modey, South Forsyth High School

BIOGRAPHY

My name is Rashi Modey. I am a rising freshman at South Forsyth High School, expected to graduate in 2024. I have been a member of the Global Thrombosis Forum since April 2019. My family inspires me because they work hard and support me. In my future, I hope to major in field of hospitality and tourism because of my passion for communication, serving others, and finding solutions to challenges.

ABSTRACT

This project is an overview of the various procedures used in patients following a Myocardial Infarction (MI). Patients with MI will get medical treatment by their physicians first, followed by the rehab. Rehab includes a variety of exercises given by the rehab team to strengthen the muscles of the body. Rehab can be conducted in a hospital setting or in a house. Rehab is individualized for each patient. Typically, the duration of rehab lasts from 4-6 months. Rehab is not typically very expensive. In very rare cases, rehab may induce an injury to the patient, but this is easily managed by their physician. In summary, rehab labs improve the strength, health, and quality of life of the patient.

Unintended Biological Effects of Organophosphate Use

Lena Kiehl, Averill Park High School

BIOGRAPHY

Lena will attend SUNY Geneseo to study neuroscience

ABSTRACT

Organophosphates are a family of chemicals that are produced when esterification between phosphoric acid and alcohol occurs. Organophosphates are common components in many commercial pesticides, herbicides, and insecticides. They are also a main component in nerve gases. Organophosphates have been banned for residential use in the United States, but they are still used for commercial agricultural purposes. This study looks at how organophosphates interact with unintended organisms. These organisms include fish, birds, children, agriculture, and fungus. The hypothesis is that organophosphates harm the environment and consumers more than they harm their intended target. This study was conducted through an analysis of published literature and a plant culture experiment. The plant culture experiment consisted of making agar cultures with differing amounts of pesticide and cutouts of mint leaves. Pesticides used in the plant cultures restricted the growth of fungus in multiple concentrations. The results of this study show harmful effects on multiple different unintended organisms.

Comparing the Safety and Efficacy of Tocilizumab and Methotrexate in Juveniles with Rheumatoid Arthritis

Ryan LaBarre, Catskill High School

BIOGRAPHY

Ryan will attend Albany College of Pharmacy to study microbiology

ABSTRACT

Arthritis is often a problem seen in adults, but it also affects approximately 300,000 children in the United States. Of those cases, only a third of them are attributed to rheumatoid arthritis, which is a type of arthritis that specifically affects the joints. In severe cases, patients can be treated with methotrexate to stop the inflammation and growth of inflamed cells, in order to prevent further damage. In cases of which this treatment does not work, however, another drug called tocilizumab can be used. An analysis of both drugs through a literature study was conducted, using both Google Scholar and PubMed with the search terms 'juvenile arthritis', 'tocilizumab', 'juvenile rheumatoid arthritis', and 'methotrexate'. Adverse effects are associated with both drugs, in the form of momentary liver damage, intestinal problems, vomiting, and several lesser concerns. The two drugs have very similar ingestion methods, either subcutaneously or intravenously, which allows the blood to bypass the digestive tract. With the drugs in the blood, the liver often takes the brunt of the chemical impact, which accounts for the liver damage. Via the literature analysis, it appears clear that tocilizumab is more targeted for juvenile rheumatoid arthritis than methotrexate, because of their disparities in cellular function. Tocilizumab focuses on specific cell receptors, which reduces the possibility of detrimental adverse effects, like stunted bone growth, by not shutting down the entire cell. All in all, it seems as though tocilizumab, as a targeted drug, is safer, and less problematic for the patients on it.

Optogenetics and Deep Brain Stimulation as Novel Treatments for Essential Tremor: A Comparison

Madison Shumpert, Shenendehowa Hill High School

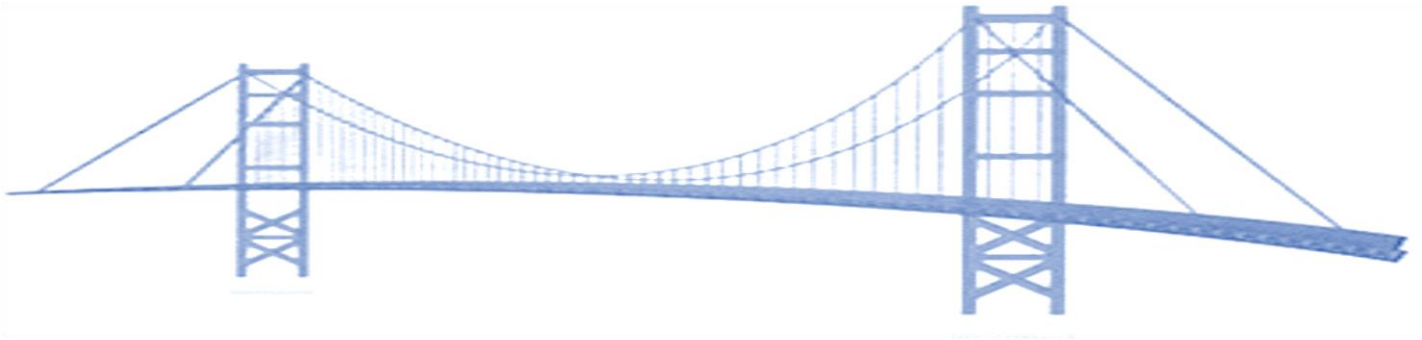
BIOGRAPHY

Maddie will attend Emory University to focus on premedical studies

ABSTRACT

Essential tremor is a nervous system disorder that causes rhythmic shaking, it is not curable, only treatable. Medication is the first line of treatment. If drugs do not work, deep brain stimulation is a viable option commonly used today. However, optogenetics, an up and coming technology that uses light to alter neurons, may overthrow deep brain stimulation as the best form of treatment for essential tremor in the near future. Optogenetics offers high temporal precision, high cell type specificity, as well as being able to induce both excitation and inhibition (Liu, et al. 2016), which deep brain stimulation lacks. When used in addition to deep brain stimulation, optogenetics appears to even make the effects of treatment last longer (Creed, et al. 2019). Optogenetics is not currently used in the clinical setting; however, in the lab setting it is showing incredible potential to change people's lives once it is integrated into practical use on humans. Like deep brain stimulation, optogenetics would not be used as a stand-alone treatment; it would be used in adjunct with other treatments and therapies. The goal would be the same as deep brain stimulation, which is to reduce severity of tremors, improve daily functioning, and improve quality of life. Currently, both optogenetics and deep brain stimulation are very invasive surgeries, though strides are currently being taken towards making optogenetics much less invasive. In the upcoming years, it is plausible that optogenetics could replace or be used with deep brain stimulation as a treatment for essential tremor.

Thank you for your attention.



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