

JUNE 22, 2022 – 8:30AM-11:30AM EST

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5th Annual **BRIDGE**

BEGINNING **R**ESARCHERS **I**NVOLVED IN
DISCOVERY 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

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 400 US and International Patents discovering novel anti-angiogenesis strategies, antithrombotic, anti-integrin, anti-cancer, and non-invasive diagnostic imaging approaches employing various nanotechnology platforms. He has published more 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

Atul Laddu, MD, PhD, FACC finished his MD and PhD degrees from India, and came to the U.S. to pursue his fellowship. After completing 5 years in research, he decided to join Pharmaceutical Industry, worked with several companies and was responsible to get approval of acebutolol, amiodarone, AXID, esmolol, Lexiscan, ReoPro, and Terazosin by the FDA.

After his retirement, he wanted to spend his time doing community work using his extensive passion and experience in research to develop interest in research in young high school students. In 2011, he met with Drs. Jawed Fareed and Samuel Goldhaber at the annual conference of North American Thrombosis Forum (NATF). Both Drs. Fareed and Goldhaber persuaded Dr. Laddu to work in the State of Georgia and expand the mission of NATF in the state of Georgia, a recommendation that Dr. Laddu decided to undertake very seriously, and his efforts resulted in the birth of Global Thrombosis Forum (at that time it was called Georgia Thrombosis Forum, or GTF).

Several volunteer members of GTF worked very hard resulting in multiple proud achievements by GTF students, these were noticed by several associations and GTF was invited to become an affiliate of the North American Thrombosis Forum (NATF, www.natfonline.org), and since 2021 an Associate Society of the International Union of Angiology (**Error! Hyperlink reference not valid.** and a member of the PACO (Promoting Awareness of Clotting Outcomes) Foundation.

GTF is privileged to attend the BRIDGE event at ACPHS for the 5th year in a row. GTF continues to invite students from all areas and all backgrounds. GTF has a strong non-discriminatory clause and is open to any student, irrespective of the age, gender, race, and national origin.

A word of thanks to Drs. Antignani, Caprini, Fareed, Goldhaber, Komlos, Mousa, and Tafur at ACPHS, IUA, Loyola, NATF, and PACO Foundation for their continued support and encouragement to our young members would be perfectly in order. Let me welcome the GTF young presenters and the members of the Questar III team to this fabulous BRIDGE 2022 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

5th Annual BRIDGE Event

Wednesday, June 22, 2022
8.30 am EST

8.30am **Welcome**

EST

Dr. Shaker Mousa- VP of Pharmaceutical Research Institute - ACPHS

Introductions | Ruth Russell-Professor with Questar III New Visions

Introductions | Atul Laddu-President & CEO of Global Thrombosis Forum

8.40am **Power Point Presentations- 10 minutes each +2 Q&A**

EST

Reversal agents for DOAC's | Shriya Sawant, Shivam Gupta, **Mentor:** Dr. Sagar Garud

Vaccine-induced immune thrombotic thrombocytopenia (VITT) | Priyanka Kavadihar

Mentor: Mr. Aditya Sathe

Biomarkers of Thrombosis | Saanvi Tatipalli, **Mentor:** Dr. Atul Laddu

MicroRNA's as Biomarkers for Pulmonary Embolism | Josh Bourassa

The Role of Biofilm Formation in Chronic Lyme Disease | Lily Gould

Translocation of Ultrafine Particles within the Cardiovascular System | Max Loccisano

10.00am **Break – 5 minutes**

10.05am **Poster Presentations- 5 minutes each +2 Q&A**

EST

COVID-19 and D-dimer | Divyanka Kavadihar, Rohit Dandavate, **Mentor:** Dr. Gargi Garud

Role of nurses in the management of VTE | Ishaan Dhaneshwar, **Mentor:** Ms. Priya Lokasundaram

Hypertension and VTE | Vivaan Karnik, **Mentor:** Dr. Rashmi Kulkarni

The Role of TAR-DNA Binding Protein in Neurodegenerative Diseases | Lauren Bradley

The Effects of Caffeine on Vascular Endothelium | Ava Faragon

Post-Traumatic Stress Disorder and Chemical Changes in the Brain | Harley Horlacher

The Effectiveness of Cell Therapies for Non-Small Cell Lung Cancer | Hannah Konsul

Health Effects of Long-Term Diabetes: An Analysis of Treatments | Michelina Lombardi

11.10am **Closing Remarks**

EST

Shaker Mousa, Ruth Russell, Atul Laddu

Program Information

Questar III New Visions Scientific Research and World Health:

Questar III New Visions is a highly selective, college level academic experience offered to accelerate 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, the late Rajan Laddu, 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 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. Unfortunately, Rajan lost his battle to a 5th attack of PE on October 8, 2020, but his legacy continues through the efforts of GTF, NATF, and the BRIDGE Event.

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 are to increase the awareness of thrombosis. 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. Currently, GTF has students from the states of California, Georgia, Missouri, North Carolina, and Pennsylvania.

The forum involves middle school and high school young volunteers and are coached by a team of adult volunteers. In 2020, we recruited students in nursing school, and medical students as Mentor to work with our young students. Together, they reach to the masses, and educate them about various aspects of the condition of thrombosis.

GTF has now reached out to several thousands of citizens through its various projects on thrombosis. In 2013, the Governor of Georgia, Nathan Deal, signed a proclamation for GTF and September as Thrombosis Awareness month in the State of Georgia. To date, in just a period of nine years, GTF has received proclamations for thrombosis awareness, including by the Georgia State Senate, several cities and counties, not only in the State of Georgia, but also in the state of California, Missouri and North Carolina.

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.

Pharmaceutical Research Institute (PRI)

Founded in 2002, the Pharmaceutical Research Institute at ACPHS is a center for drug discovery and development. PRI investigators possess expertise in fields that include nanotechnology, medical chemistry. Molecular biology and cell biology. Areas of focus include hematology/oncology, cardiovascular (dyslipidemia), ophthalmology, vascular diseases, neurology, and inflammation.

As part of its mission, PRI is also engaged in teaching and learning, Pharmacy students, graduate students and visiting scholars from around the world visit the Institute to conduct research and learn the latest advances across a wide range of therapeutic areas. Visit our website at <https://pri-albany.org/>.

Albany College of Pharmacy and Health Sciences (ACPHS)

Founded in 1881, Albany College of Pharmacy and Health Sciences is a private, independent institution with a long tradition of academic and research excellence. The College is committed to educating the next generation

of leaders in the health care professions and advancing innovative research that translates scientific discoveries into therapies that benefit humankind.

ACPHS experience is one that combines quality academics, experiential learning, personalized attention, and a strong emphasis on service – all of which help our students grow personally and develop into talented and trusted professionals. ACPHS has long been regarded for its Doctor of Pharmacy program which remains the school’s core program. In recent years, the College has expanded its academic offerings to include five bachelor’s programs and five master’s programs in the health sciences. Opportunities exist for students within each of these programs to work side-by-side with faculty on groundbreaking research in areas such as cancer, infectious disease, and obesity. These opportunities, along with access to resources such as the cutting-edge Pharmaceutical Research Institute, two student-operated pharmacies and the Collaboratory are part of what distinguishes ACPHS from other colleges and universities. Graduates of the College are prepared for a range of careers such as: biochemist, clinical laboratory scientist, consumer safety officer, drug information specialist, environmental toxicologist, health policy analyst, hospital administrator, pharmacist, physician, physician assistant and research scientist. Graduates are also well positioned to continue their education in graduate or Professional Schools.

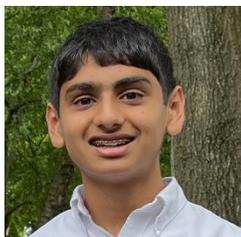
Biographies & Abstracts

SHRIYA SAWANT



My name is **Shriya Sawant**. I am a rising 10th grader at Denmark High School, Cumming, GA. I have been a member of GTF for the past 2 years. I am interested in pursuing Robotics, as I am passionate about improving lives here on Earth and exploring outer space. This interest allows me to learn about medical science. My hobbies include reading and writing.

SHIVAM GUPTA



My name is **Shivam Gupta**, I am a 9th grader at Lambert High School, Johns Creek, GA. I have been a member of GTF for the past year. I am interested in pursuing computer science as I am passionate about emerging technologies. My hobbies include coding, playing chess, and challenging myself.

Reversal agents for DOAC's - Abstract

1. Direct Oral Anticoagulants (DOACs) are widely used to treat conditions such as venous thromboembolism (VTE), atrial fibrillation (AF) and acute coronary syndrome (ACS).
2. Bleeding is a major adverse effect of the DOACs.
3. We will review the reversal agents used to treat the adverse effects of DOACs.

**PRIYANKA
KAVADIKAR**



My name is **Priyanka Kavdikar** and I am a 10th grader at Johns Creek High School, Johns Creek, GA. I have been a member of GTF for a little over 1 year. I am interested in pursuing a career in the medical field. My hobbies include playing the piano, drawing, and dancing.

VITT – Abstract

1. Vaccine induced thrombotic thrombocytopenia is a serious, life-threatening adverse effect reported from 2 COVID-19 vaccines, the AstraZeneca and the Johnson & Johnson vaccines.
2. Thrombosis often occurs at unusual or multiple sites, in conjunction with thrombocytopenia, grossly elevated d-dimer levels, reduced fibrinogen levels, and the presence of anti-platelet factor 4 (PF4) antibodies.
3. Diagnosis of VITT is based on the presence of thrombotic symptoms along with confirmatory laboratory studies (platelet count, D-dimer and diagnostic imaging/testing) to investigate for arterial and/or venous blood clots or bleeding.
4. Treatment of VITT involves immediate hospitalization, plasma exchange therapy to clear the antibodies from blood, avoiding administration of heparin and platelet transfusion, and administering Factor X1 inhibitors (Apixaban, Edoxaban or Riveroxaban).

SAANVI TATIPALLI



My name is **Saanvi Tatipalli**, and I am a rising sophomore from South Forsyth High School in Cumming, GA. I have been a member of GTF for the past 2 years and look forward to continuing my journey with the organization. Some of my hobbies include art and writing – anything that really allows me to create. I am extremely passionate for service and volunteering and love meeting new people, making strong connections, and learning more about the world around me.

Biomarkers of Thrombosis – Abstract

1. A biomarker is a biological molecule found in blood, body fluids, or tissues that is

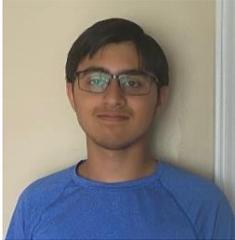
- a sign of a normal or abnormal process, or of a condition.
2. Biomarkers such as D-dimer, P-selectin, cardiac enzymes (CPK, MB, troponin, and CRP) have been used to see how well the body responds to a treatment for a disease or condition.
 3. We also conducted research on the relationship of COVID-19 to these biomarkers.

**DIVYANKA
KAVDIKAR**



Hi, my name is **Divyanka Kavdikar** and I am a 9th grader at Johns Creek High School, Johns Creek GA. I have been a member of GTF for a little over a year. I am interested in pursuing a career in genetics as I am passionate about biology. My hobbies include dancing, reading, and writing and playing music.

ROHIT DANDAVATE

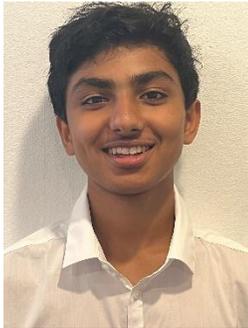


My name is **Rohit Dandavate**. I am a rising 10th grader at Northview High School, Johns Creek, GA. I have been a member of GTF for the past year. I am interested in pursuing a career in the field of biotechnology as I am passionate about computers and helping people. This interest allows me to work with new and emerging technologies in the field of medicine. My hobbies include chess, reading, Karate (I am a second-degree black belt), and I am a Boy Scout.

COVID-19 & D-dimer – Abstract

1. Covid-19 is caused by SARS-CoV-2 and has now been identified as a global pandemic. The COVID-19 infection can lead to thrombotic complications.
2. D-dimer has been used as a biomarker in COVID-19 during its early stages to prevent and manage thrombosis. Elevated D-dimer levels have been found in patients with COVID-19.
3. In this research effort, we have tried to understand what D-dimer is, establish it as a biomarker, the role of D-dimer in COVID-19 patients, changes in D-dimer with age and anticoagulation.

**ISHAAN
DHANESHWAR**



My name is **Ishaan Dhaneshwar** and I am a rising 10th grader at Alpharetta High School in Alpharetta, Georgia. I have been a member of GTF for the past 2 years in which I have thoroughly enjoyed my experience. I am interested in pursuing a career in the medical field and GTF has given me a great opportunity to explore and learn more about my interests.

Role of Nurses in the Management of VTE – Abstract

1. This is our effort to look closely at the significant role of a nurse in guiding patients who suffer from VTE.
2. From patient education to various forms of risk assessment, we have studied many factors of the VTE recovery process to conclude how nurses play a crucial role and are much needed in this process. The nurses use their wide variety of skills and knowledge to ensure patients have a safe recovery.
3. The project idea originated from Ms. Priya Lokasundaram, who is a nurse and GTF mentor and our association with Dr. Margaret Callahan, the Provost of Loyola University, and a nurse by profession, is a tribute to Ms. Florence Nightingale who spearheaded the movement to make the career of nursing the most trusted out of all professions.

VIVAAN KARNIK



My name is **Vivaan Karnik**, I am a 10th grader at Johns Creek High School, Johns Creek, GA. I have been a member of GTF for the past 3 years. I am interested in pursuing medicine as I am passionate about helping others and learning about Thrombosis. This interest allows me to explore my interest in the medicinal field and for me to learn new content. My hobbies include playing basketball for my high school, hanging out with my friends, playing golf, and helping in the community.

Hypertension and VTE – Abstract

1. The relationship between high blood pressure and VTE has been researched in this project.
2. Hypertension (HTN) is a major medical burden throughout the world. In 2000, it was estimated that approximately 1 billion people Worldwide.
3. HTN is often accompanied by thickening of the interior wall of the blood vessels, and results in thrombotic events. It is concluded that there is a direct relationship between hypertension and VTE.

JOSHUA BOURASSA



My name is **Joshua Bourassa**, and I am a member of the New Visions Scientific Research and World Health program. I go to Shenendehowa High School in Clifton Park, New York and am graduating this year in 2022. I will attend the University of Wisconsin at Madison in the fall and will study biomedical engineering. I am motivated by helping others. Specifically, I volunteer at lifeworks food pantry in Ballston Spa in my free time. I have always loved to help other people in need and that has translated to my academia and my passion for research.

MicroRNAs as Biomarkers for Pulmonary Embolism - Abstract

A pulmonary embolism is a relatively common condition that affects many people who are old, obese, smokers, or have a history of clots. A pulmonary embolism often occurs when a clot in the leg travels to the lung through the blood. Pulmonary embolisms affect 39 to 115 out of every 100,000 people, making it the third most common type of cardiovascular disease. MicroRNAs (miRNAs) are small noncoding RNAs that regulate mRNA through degradation and manipulating protein levels. Only until recently, miRNAs have been used as biomarkers for diseases. This study aims to look at miRNAs as biomarkers for pulmonary embolisms. The hypothesis for this study was that miRNAs serve as biomarkers for pulmonary embolisms. Using scientific literature and webinars from Ion Torrent and the [APJ Virtual Genetic Solutions Tour](#), data was collected to determine that miRNAs are heavily involved as biomarkers for pulmonary embolisms. The keywords that were used when searching for articles include MiRNAs, Pulmonary embolism, Cardiovascular disease, biomarkers, and thrombosis. It was found that miRNAs are highly specific and specific miRNAs are downregulated in the occurrence of pulmonary embolisms. This study looked at various miRNAs across different studies and compared them. Future research of miRNAs as biomarkers could lead to the potential use of miRNAs to diagnose pulmonary embolism and other cardiovascular diseases, saving thousands of lives.

LAUREN BRADLEY

My name is **Lauren Bradley**, and I am a senior from Averill Park High school. This year I was a part of the Questar III New Visions Scientific Research and World Health program. I have a passion for volunteering. I have been involved in other clubs such as Best Buddies and student government. These clubs allowed me to connect with my peers and improve my school and community. My family has motivated me through this journey to pursue high academics and goals. In the fall I will be attending John Patrick University to receive my



associates degree in medical imaging. I hope to pursue this further and to get my master's degree in radiologic field.

The Role of TAR-DNA Binding Protein in Neurodegenerative Diseases - Abstract

TAR-DNA binding protein (TDP-43) contains 414 amino acids and the encoding gene *TARDBP* is located on chromosome number 1. TDP-43 plays key roles in preserving cellular function and survival and is involved in a myriad of functions. This protein has been linked to many neurodegenerative diseases. In specific, chronic traumatic encephalopathy (CTE), amyotrophic lateral sclerosis (ALS), and frontotemporal dementia (FTD) will be examined in this research. The purpose of this study is to understand where it is located, how it is malfunctioning, and what role it plays. It is hypothesized that the cause of the malfunctioning of this protein is attributed to aggregation, and misfolding. Data was collected by evaluating scientific literature. Twelve articles were obtained from PubMed and Google Scholar with search terms such as TDP-43, CTE, ALS, and FTD. Along with 20 hours of mentorship with Northeast Radiology observing various modalities of diagnostics. This research brings a unique perspective on this topic with the collection of 12 papers and mentor experience. It was concluded that there are many mechanisms of malfunctioning of the TDP-43 protein. With aggregation being the most common malfunction in ALS and FTD. There are also many unrelated reasons that an individual develops a neurodegenerative disorder. There is more research to be done regarding why the TDP-43 protein is in the cytoplasm instead of the nucleus in individuals who have neurodegenerative disorders.

AVA FARAGON



My parents inspire me to be successful because they have shown me that working hard pays off. They are always supportive in everything I decide to do. I plan to go to the SUNY Polytechnic Institute; my future goal is to become a Nurse Practitioner.

The Effects of Caffeine on the Vascular Endothelium – Abstract

Caffeine is a psychoactive substance that occurs naturally in coffee. Manufacturers include it in many teas, sodas, and energy drinks. While it is a socially acceptable substance as 90% of the United States population consumes some sort of caffeine daily, research is conflicting about its safety and long-term impact on cardiovascular health. The vascular endothelium lines all blood vessels and regulates exchanges between the bloodstream and the surrounding tissues. Vasodilation is defined as widening of the blood vessels leading to increased blood flow. Although caffeine and the vascular endothelium has been researched before, this topic remains controversial about whether caffeine is beneficial to one's health. Some studies show that caffeine can improve an individual's risk of developing a neurodegenerative disease. The data was collected through multiple peer reviewed journal articles obtained from PubMed and Google Scholar. Five professional level webinars were also used to further understand topics varying from diet, COVID-19 and endotheliitis, inflammation and vascular damage, and cardiovascular function including related diseases. To determine some of the effects, a study was conducted to determine how high levels of caffeine impacts the vascular endothelium. Using research from the peer reviewed papers, there is a strong correlation that vasodilation and nitric oxide is stimulated while taking high doses of caffeine. Additionally, caffeine completely blocks the adenosine receptors. This can be proven throughout this research paper.

LILLIAN GOULD



My name is **Lillian Gould**, and I am a graduating Senior at Ichabod Crane High School. I am part of the Questar III New Visions Scientific Research and World Health program and have dedicated my year to researching Lyme disease. I have been involved with RISSE in Albany, a refugee and immigrant support center, for the past two years. I have tutored civics and English, as well as created children's art classes for the center. In school, I am involved with Model UN and the newspaper.

I am inspired by the woman I worked with tutoring, Heba, who is a refugee from Syria who worked incredibly hard to earn her citizenship. I provided civics tutoring and support for the citizenship application process, and she spent countless hours studying. She would meet whenever possible, taking care of eight children, and always come prepared. I am motivated to appreciate all the opportunities that I have available to me and to work as hard as she has shown me is possible. I will be attending Smith College in the fall to dual major in Biological Sciences and Government. I hope to ultimately pursue a career in public health research and policy, in addition to working internationally.

The Role of Biofilm Formation in Chronic Lyme Disease - Abstract

The purpose of this study is to evaluate the role of biofilm formation in the development of chronic Lyme disease (CLD). The hypothesis of this study is that the formation of biofilms from *Borrelia burgdorferi* is a cause of CLD. Biofilms are organized communities of microbes joined together by an extracellular matrix produced by bacteria. CLD is defined by persistent symptoms of Lyme disease for greater than six months following antibiotic treatment. Data was collected from the evaluation of scientific research papers retrieved over the PubMed database, as well as from the use of four professional scientific webinars and from mentor time. Two mentors, Amanda Roome and Margaret Duris, were met with and their research in the field of Lyme disease was discussed. Results of this evaluation show that biofilms have inherent properties that increase their antibiotic resistance and allow the *B. burgdorferi* bacteria to evade the immune system and remain dormant. In conclusion, this creates a prolonged inflammatory response in the body due to the persisting bacteria that manifests in CLD. This study is important because recognizing the existence of biofilms as a barrier to antibiotic treatment could result in the introduction of drugs that target both the biofilm and the bacteria. Future studies may examine potential biomarkers for CLD.

HARLEY HORLACHER



I am **Harley**, a student at Questar III New Visions Scientific Research and World Health.

PTSD and Chemical Changes in the Brain – Abstract

The purpose of this study is to bring awareness to the diagnosis of PTSD, the vast number of people who suffer from PTSD, and the importance of further research on the brain regarding PTSD, but to also help understand the chemical changes that occur after a traumatic event. PTSD is a mental illness that occurs following an event that is life-threatening or traumatic. Yes, changes occur in the amygdala as it processes fear and threatening stimuli as well as in the hippocampus as it regulates emotional memory. This study was conducted as a literature review in which 12 articles were analyzed. Articles were found on PubMed, NIH, SUNY Albany Database, Google Scholar, and NCBI. This study included a 10-hour mentorship with Carol Levett, PhD, Psychologist, and professional level webinars including the National Center for PTSD affiliated with the VA (Veteran Affairs). Studies have demonstrated that when trauma occurs, the amygdala and hippocampus are chemically modified. The amygdala releases cortisol and adrenaline because of a trigger, leading to symptoms that mock anxiety. The hippocampus shrinks in size due to the slowing of neurotransmitters when in high

stress situations leading to flashbacks and memory blocking. In conclusion, both the amygdala and the hippocampus are chemically altered in response to trauma. For further research, there needs to be more information on the brain but more specifically with mental illnesses.

**HANNAH
KONSUL**



I am **Hannah**, a student at the Scientific Research and World Health Catskill High School, Catskill NY. Both of my parents inspire and motivate me because they have taught me to never give up and to follow my dreams. I plan to go to the University of Rhode Island to study biological science, pre-med with hopes to become a pediatric surgeon.

The Effectiveness of Cell Therapies for NSCLC - Abstract

Non-small cell lung cancer is a group of lung cancers that behave similarly. Two examples of NSCLC are squamous cell carcinoma and adenocarcinomas. Squamous cell lung carcinoma is a slow-growing type of non-small cell lung cancer. Adenocarcinomas start in the cells that would normally secrete substances such as mucus. Lung cancer is the most common cancer worldwide, accounting for 2.1 million new cases and 1.8 million deaths in 2018. The goal of this project was to determine the most effective type of cell therapy used to treat lung cancer patients whose chemotherapy was not successful. The information was collected through a literature review of twenty previously published papers and four published scientific webinars. The cell therapies that were studied consisted of chimeric antigen receptor (CAR) T cell, tumor infiltrating lymphocytes (TIL), vaccines, NK cells, the programmed death 1 (PD-1) inhibitors and Engineered T Cell Receptor (TCR) Therapy. There was also data collected on the pathology and screening for lung cancer. The type of cell therapy that was found to be the most effective was CAR T cell therapy. The data collected from previous studies showed a positive correlation between lung cancer treatment and cell therapies. The webinars were used to collect more information from cancer professionals, who were not able to be met in person. This project helps to give a better understanding of cell therapy and how it works in the body, which still needs to be studied more in depth. There is not a ton of information on different cell therapies, as it is still relatively new and new methods are still being developed.

MAX LOCCISANO



I am **Max**, a student at the New Visions Scientific Research and World Health Program Troy High School, Troy NY. My friends and family motivate me by always pushing me to be the best version of myself, in and outside of academics. I plan to go to SUNY ESF and become a Microbiologist

Translocation of Ultrafine Particles within the Cardiovascular System – Abstract

Ultrafine Particles are heterogeneous mixtures of emission sources and toxic chemicals that are less than 100 nm (approximately $1\mu\text{m}$). These particles' size and insoluble characteristics increase their ability to enter the respiratory tract. With the lack of understanding about ultrafine particles, the hypothesis for this study is that due to ultrafine particles' small size and toxic characteristics, they can translocate into the respiratory tissue, inducing damage to the cardiovascular system. Through multiple webinars (RNA and ENYCASM symposium) and mentorships (DEC members), as well as a literary review of articles on PubMed, google scholar, and the UAlbany database, the keywords: Ultrafine particles, particulate matter, air pollution, cardiovascular disease, translocation, diffusion, particle deposition and inflammation were researched and analyzed. It was concluded that the biggest determinant on a particle's ability to translocate is the particle's size. Once entering the lumen side of the respiratory tissue, Ultrafine particles mostly deposit within the alveolar regions of the lungs, but also settle in the nasopharyngeal and tracheobronchial regions. The body's clearance

mechanisms use physical translocation and chemical dissolution to move the particles out of the respiratory tract, clearing the particles to the gastrointestinal tract. Exposure to these UFPs can eventually lead to cumulative toxicity, by contaminating the blood and lymphatic circulation. This toxicity induces widespread oxidative stress and inflammation, damaging all other organs leading to plaque formation.

**MICHELINA
LOMBARDI**



I am **Michelina**, a student at the Averill Park High School, Averill Park, NY. My parents inspire me and push me to work hard every day. If it wasn't for my mother and father, I wouldn't be where I am today. I plan to go to the Le Moyne College. My future goal is to become an endocrinologist.

Health Effects of Long-Term Diabetes: An Analysis of Treatments - Abstract

In the United States, diabetes is the seventh leading cause of death. 34.2 million Americans have diabetes, which translates to 1 in 10 people. As the population continues to increase, so does the incidence and prevalence of diabetes. The world faces an emerging deadly threat to people's health and nations' public- health systems with a large economic burden. Diabetes can affect all people of all ages, races, and ethnicities. As individuals age, their likelihood of developing diabetes increases. Older adults are at high risk for developing diabetes due to the combined effects of increasing insulin resistance and impaired pancreatic islet function with aging. People with diabetes have a compromised immune system which puts them at a greater risk of developing other serious conditions. Evidence has shown that diabetics/pre diabetics have higher risks of a wide range of complications, including cardiovascular diseases, neurological damage (Alzheimer's disease and dementia), cancer, stroke, amputations, acute myocardial infarction, and renal failure. Modern medicine is ever-changing and new treatment methods are invented and released to try and keep up with the evolving diseases and infections. These treatments will be assessed and analyzed throughout this paper. Using professional webinars and peer-reviewed articles from sources like Google Scholar and PubMed, data was collected to determine the long-term effects of diabetes and the different treatment types, along with their mechanisms.

GTF Rising Freshmen

Divyanka Kavdikar, Johns Creek High School, Johns Creek GA
Shivam Gupta, Lambert High School, Johns Creek, GA

GTF Rising Sophomores

Shriya Sawant, Denmark High School, Cumming, GA
Saanvi Tatipalli, South Forsyth High School in Cumming, GA
Priyanka Kavdikar, Johns Creek High School, Johns Creek GA
Rohit Dandavate, Northview High School, Johns Creek, GA
Ishaan Dhaneshwar, Alpharetta High School, Alpharetta, GA
Vivaan Karnik, Johns Creek High School, Johns Creek, GA

Questar III Rising College Freshmen

Joshua Bourassa, Shenendehowa High School, Clifton Park, NY
Lauren Bradley, Averill Park High school, NY
Ava Faragon, Averill Park High school, NY
Lillian Gould, Ichabod Crane High School, NY
Harley Horlacher, Greenville High School, Greenville, NY
Hannah Konsul, Catskill High School, Catskill, NY
Max Loccisano, Troy High School, Troy NY
Michelina Lombardi, Averill Park High School, Averill Park, NY

Thank you for your attention!

Planning Committee

- Dr. Shaker Mousa, Chairman & Executive Vice President, PRI
- Professor Ruth S. Russell, Questar III New Visions Scientific Research & World Health
- Atul Laddu, President and CEO, Member of the Board of GTF
- Mrs. Archana Athalye, Vice President, Member of the Board of GTF
- Mrs. Supriya Sawant, Member of the Board of GTF
- Mrs. Shubhangi Bongirwar, Member of the Board of GTF