Scientific Caribbean Foundation

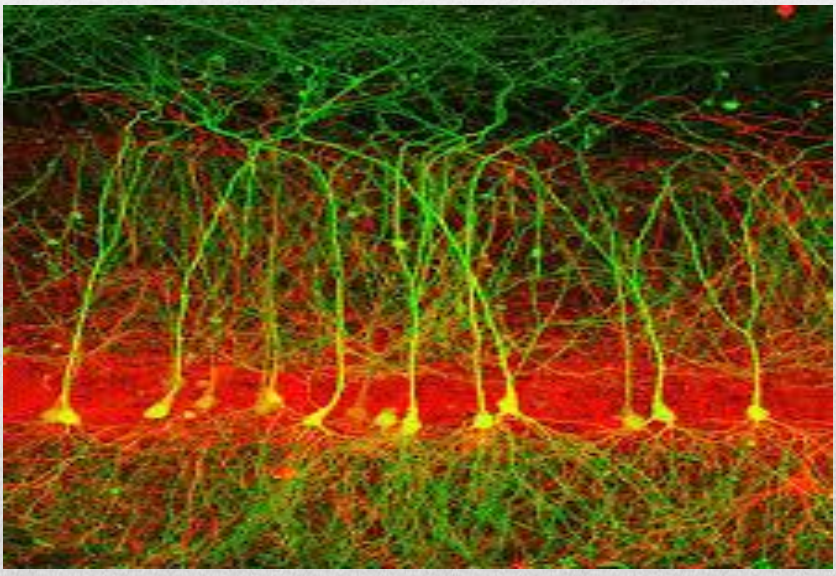
Scientific Caribbean Foundation

Student Research Development Center

Sprint 2020

Pre-College Research Symposium

Genomics – Biological Sciences - Neurosciences



Astrophysics

Saturday, May 23, 2020

Virtual Due to Coronavirus and Pandemic

San Juan , Puerto Rico

SCIENTIFIC CARIBBEAN FOUNDATION
AND THE
STUDENT RESEARCH DEVELOPMENT CENTER

ARE PROUD TO HOST THE

SPRING 2020 PRE-COLLEGE RESEARCH SYMPOSIUM

SHOWCASING MINORITY HIGH SCHOOL STUDENTS' MENTORED RESEARCH

Leadership at

SCIENTIFIC CARIBBEAN FOUNDATION

Juan F. Arratia, Ph. D.
President and Founder
Research Professor and Mentor

SAN JUAN, PUERTO RICO

May 23, 2020

TABLE OF CONTENTS

Scientific Caribbean Foundation
Student Research Development Center

MISSION

Scientific Caribbean Foundation (SCF) was founded by Dr. Juan F. Arratias, a Chilean American with more than 45 year of academic experience in universities and companies in Chile and Puerto Rico. Recipient of the 2006 US Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring giving at the White House by President George W. Bush. The idea of SCF is to continue the success of the Model Institutions for Excellence (MIE), a grant awarded by the National Science Foundation (NSF) to transform Universidad Metropolitana (UMET) into a nationally recognized undergraduate research institution, and a model in science, technology, engineering and mathematics (STEM). Mentoring of undergraduates and pre-college students by research mentors was the cornerstone of the MIE Project. Dr. Arratia was the Principal Investigator of the MIE grant at UMET. We believe that creative research is one of the best ways to prepare students to become persistent and successful in college, graduate school and professional careers. Today, the Student Research Development Center (SRDC), which is part of the SCF, is the entity that will continues the MIE strategy by impacting pre-college and university students from institutions in Puerto Rico and across the nation, as well as pre-college students from the Puerto Rico Educational System.

EXECUTIVE SUMMARY

The MIE ended in 2009 at UMET. The outcome of the program was over 280 UMET STEM-C majors completed their BS degrees and 175 were transfered to graduate school, with 65 achieving doctoral status (PhD, MD, VVM, Pharm D). In order to increase the number of BS degrees transferred to graduate school, we will continue with the strategy of an early research program and partnership with key research institutions in Puerto Rico, the US mainland and abroad. Research mentoring will be the central component of the knowledge transfer and creative thinking activities at SCF. Project based learning, collaborative learning strategies, presentations at scientific conferences, scientific writing and co-authorship, technology literacy, and preparation for graduate school are activities that are transforming the philosophy of competive institutions.

GOALS

The main goal of the Spring 2020 Pre-College Research Symposium is to encourage pre-college research with research mentors, develop students' written and oral communication skills, provide a forum in the Caribbean for students to foster interest in undergraduate education, particularly in STEM-C fields, and set national research standards for pre-college research presentations.

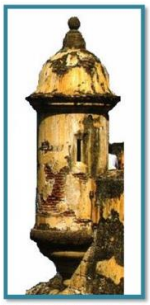
SCIENTIFIC CARIBBEAN FOUNDATION
STUDENT RESEARCH DEVELOPMENT CENTER

SPRING 2020 PRE-COLLEGE RESEARCH SYMPOSIUM

CONFERENCE AT A GLANCE

SATURDAY, MAY 23, 2020	VIRTUAL

8:50–9:00 a.m.	**Opening Ceremony**
	Dr. Juan F. Arratia, Research Professor and Mentor **Dr. Angel Arcelay, Professor of Chemistry**
9:00–10:20 a.m.	**Poster-Oral Sessions**
	Neurosciences-Genomics-Biological Sciences
	Astrophysics
10:20-10:30 a.m.	**Pre-College Alumni Research Experiences**
10:30–10:40 a.m.	**Awards Ceremony and Closing Remarks**
10:40 a.m.	**Symposium Adjourns**



Scientific Caribbean Foundation

May 23, 2020

Dear Pre-College Students:

The Spring 2020 Pre-College Research Symposium is the culmination of the activities and dissemination process of the Spring 2020 Saturday Research Academy Program of the Scientific Caribbean Foundation. For a period of four months, interrupted by the coronavirus, since January 2020, pre-college students from private and public high schools of Puerto Rico worked long hours in the research laboratories of Polytechnic University of Puerto Rico campus and during the pandemic online, with the guidance and mentorship of faculty and student research mentors in research projects in STEM–C fields.

One of the objectives of the Spring 2020 Pre-College Research Symposium is to offer young motivated high school researchers the opportunity to learn and to practice their English communication skills in a formal professional scientific meeting. A second objective is to give high school students of Puerto Rico a forum for the presentation of the outcomes and findings of their research projects to research mentors, family members, and the educational community at large.

We at Scientific Caribbean Foundation are proud of the results obtained by the pre-college students and their mentors in the Spring 2020 Saturday Research Academy Program. I hope your experience inspires you and your peers to select science, technology, engineering, mathematics and computer science as your field of study in the near future.

My sincere appreciation goes to the staff of the Student Research Development Center and the student research mentors for their effort and commitment to implement the Spring 2020 Pre-College Research Symposium.

Sincerely yours,

Juan F. Arratia, Ph. D.
Founder and President
Research Professor and Mentor
Scientific Caribbean Foundation

Research Mentors's Biosketch

Ángel R. Arcelay Gutiérrez, Ph.D.

Ángel Arcelay finished his baccalaurean degree at the Mayaguez campus of The University of Puerto Rico in chemistry. He completed a Master degree with specialization in food chemistry at the same campus. A PhD in biochemistry and biophysics was obtained at The Ohio state University. Post- grade research for chemical environmental remediation was held at the Kennedy Space Center, NASA. Long-term goal throughout my profession has been the service provided to under-represented pre-college, undergraduates and graduate students, which are the individuals that produce the pipeline of higher education at Puerto Rico. The contribution at the pre-college level arouse from working at the science fair projects, being judge with students and as the coordinator of the branch of the Caribbean Computer Center for Excellence at Universidad del Este. Most students from this research academy during Saturdays have been accepted to principal universities at Puerto Rico and other states for undergraduate degree and internships. With undergraduates, I have been involved since completing my bachelor as a laboratory instructor mentor, tutor, organic chemistry class assistance, research and personal assistance to professional schools. Several students have performed undergraduate research under my guidance with symposiums presentations and admittance to graduate programs. Many students have been accepted to internships with my guidance. At the graduate level, my involvements have been at the research level and mentorship to complete thesis. I have been advisor to thesis completion and served in several research projects as a member of graduate committees. As a professor I have taught courses, served in committees, worked curriculums and training projects, worked with school science teachers and students. Wrote internally and externally funded proposals and mentored undergraduate research students. I have collaborated with several research colleagues to complete projects of students at different levels

Juan F. Arratia, PhD
Research Professor and Mentor
Scientific Caribbean Foundation

Dr. Juan F. Arratia was born in Pomaire, Chile. He graduated from Universidad Técnica del Estado with a BS in Electrical Engineering in 1973. He was awarded a MSc in Engineering from Louisiana Tech University, Ruston, Louisiana, in 1979 and a Ph.D. in Electrical Engineering from Washington University, St. Louis, Missouri in 1985. He has taught and conducted research at universities in Chile (Universidad Técnica del Estado and Universidad Austral de Chile), Puerto Rico (Universidad Interamericana de Puerto Rico and the University of Puerto Rico-Mayaguez), and in the US mainland at Washington University, St. Louis, and Louisiana Tech University, Ruston, Louisiana. He has lectured and given conferences on advanced automation, robotics, vision systems, artificial intelligence, total quality management and science and engineering education in Chile, Bolivia, Ecuador, Guatemala, Panama, Mexico, Brazil, Nicaragua, Perú, Canada, Spain, the Netherlands, Turkey, Japan, Philippines, Singapore, Australia, China, Puerto Rico and in the US mainland. He was the Advanced Manufacturing Manager for Medtronic, Inc., a leading pacemaker company, and is a consultant in advanced automation for pharmaceutical and medical devices companies in Puerto Rico. From 1998 to 2008, he was the Director and Principal Investigator of the Model Institutions for Excellence (MIE) Project, a National Science Foundation sponsored program based at Universidad Metropolitana in San Juan, Puerto Rico. From 2008 to 2018, he was the Executive Director of the Ana G. Méndez University System (AGMUS) Student Research Development Center, designed to disseminate MIE best practices at Universidad del Turabo and Universidad del Este. For twenty year he was part of AGMUS and during his tenure he wrote proposal to NSF and was awarded more than 85 million USD for MIE, CCCE, AGMUS Institute of Mathematics, MRI-AMISR, MRI-Puerto Rico Laser, Administration of Arecibo Observatory among others. Since 2018 to present he is the President of Scientific Caribbean Foundation in San Juan Puerto Rico. In November 2007, he was awarded the Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring at a ceremony in the White House in Washington DC.

Rubén A. García is currently an undergraduate student in his senior year pursuing studies in Psychology with a minor in Biology at Metropolitan University (UMET), Cupey. Before deciding whether to pursue a degree in a STEM+ field, he participated in the Saturday Research Program sponsored by the SRDC and the National Science Foundation for two and half years in high school. Furthermore, he has received training and has conducted projects in Chemical Engineering, Bio-Mathematics, Biology, Neuroscience, Bioinformatics, Developmental Neurobiology, Organometallic Chemistry, Ecology, and Environmental Science. All of these experiences have been gained through his involvement as a pre-college and undergraduate student at Polytechnic University, UMET and through five internships now in U.S. mainland research-intensive institutions like The University of Vermont, Washington University School of Medicine in St. Louis and Argonne National Laboratory. Furthermore, for the last year and a half, he has been an NIH BP-ENDURE Fellow conducting research in nervous system development and regeneration at the University of Puerto Rico, Río Piedras Campus under the mentorship of Dr. José E. García-Arrarás, Ph.D. Thanks to his NIH fellowship, Rubén has presented his research work at national conferences such as SACNAS and the Society for Neuroscience (SfN) gaining national exposure for two years now. Consequently, since he started his undergraduate degree in 2015, Rubén has directed the Saturday's Academy Neuroscience Research Program achieving great success with his students earning multiple awards and competing in symposiums as Intel's ISEF and the Metropolitan Science Fair. He has mentored over 70 students and the overwhelming majority (99%) of them have continued towards STEM fields at universities all around the United States (Columbia, Dartmouth, Johns Hopkins, Arizona State, Yale, Brown, Clark, Stanford and MIT) including Puerto Rico (UPR Mayagüez, UPR Río Piedras, Turabo, Inter Bayamón, Inter Metro and UMET Cupey). After he graduates, he will pursue a Ph.D. in Neuroscience specializing in translational neuroscience and bioinformatics to produce work that can help advance treatments and therapies in people with psychiatric and psychological illnesses. In January 2019, Rubén seeks to empower even more pre-college students to pursue research careers returning as a Research Mentor in the new area of Translational Neuroscience and Bioinformatics.

Diego E. García Ortiz is an undergraduated student majoring in Natural Sciences with concentration in Biology at the Universidad Ana G. Mendez, Recinto de Gurabo. He participated 4 semester as a neurocircuitry student in the Saturday Research Academy, experience that give him the opportunity to participate in the Puerto Rico Institute for Microbial Ecology Research (P.R.I.M.E.R.) where with Dr. Lisandro Cunci he acquire knowledge on electrochemistry, developing a research about using Electrochemical Impedance Spectroscopy for the detection of neuropeptide Y. On the second semester of his second year he become an assistant mentor with Alexa Pérez in the area of Biological Sciences at Universidad Ana G. Mendez, Recinto de Gurabo research site. Diego is now working on a research proposal on how to use Electrochemistry to improve Alzheimer's Diagnosis and plans to continue his studies on Master's Degree on Pathological Sciences and a Doctorate on Neurobiology aiming to become a researcher to develop and improve treatments for Alzheimer's and other neurodegenerative diseases.

SCHEDULE OF EVENTS

SATURDAY, MAY 23, 2020 **VIRTUAL**

9:00 – 10:00 a.m. **POSTER-ORAL SESSION** **VIRTUAL**

Chairperson: Dr. Angel Arcelay

BIOLOGICAL SCIENCES

9:00 – 9:10 a.m. **Carolina I. Ferrer-Angulo**, Academia María Reina, San Juan, Puerto Rico

A Biochemical Synthetic Mechanism to Provide Signaling to STAT

9:10 – 9:20 a.m. **Leonardo C. Zambrano Tapia**, Specialized School of Science, Mathematics and Technology (CIMATEC), Caguas, Puerto Rico.

Antibiotic Overuse in Pediatric Patients with Asthma Exacerbation

BIOINFORMATICS-GENOMICS-ASTROPHYSICS

9:20 – 9:30 a.m. **Carola F. González-Lebrón**, University Gardens High School, San Juan, Puerto Rico

Common Mirna Between Parkinson's, Alzheimer's and Huntington's Disease and their Functions

9:30 – 9:40 a.m. **Alexander R. Zambrano Tapia,** Specialized School of Science, Mathematics and Technology (CIMATEC), Caguas, Puerto Rico

PH Resistance of V-Type Proton Atpase Subunit to Acidic Mutation Point Mutations in Positioning

9:40 – 9:50 a.m. **Martín E. Fuentes-Quiñonez**, Colegio San Ignacio de Loyola, San Juan, Puerto Rico

The Effect of Simulated Microgravity and Hypergravity on Gene Expressions and the Human Body

NEUROSCIENCES

9:50 – 10:00 a.m. **Daina I. Ramírez-Ortiz**, Academia Maria Reina, San Juan, Puerto Rico

Psychology Trauma During Youth: Memory Loss During Elderly Years

10:10 – 10:20 a.m. **María F. Vázquez**, Academia María Reina, San Juan, Puerto Rico

Dynamics of Schizophrenia: Effects of Clozapine and Propable Improvement

A BIOCHEMICAL SYNTHETIC MECHANISM TO PROVIDE SIGNALING TO STAT

Carolina I. Ferrer-Angulo, Academia María Reina, San Juan, Puerto Rico
Research Mentor: Rubén A. García-Reyes, Scientific Caribbean Foundation, San Juan, Puerto Rico

Ebola virus is not a common disease; however, it is responsible for the deaths of 11,000 people during the West Africa epidemic in 2014. Ever since the first case in 1976, five strains have been discovered of which Sudan ebolavirus and Zaire ebolavirus are the deadliest since they have been responsible for the highest death rates. Zaire ebolavirus (EBOV) contains seven genes that each produce a type of protein important for the virus to replicate and survive. Two of these proteins are in charge of suppressing the immune system, VP35 and VP24. VP35 suppresses this system when it caps dsRNA which will prevent the receptors from getting the signal to produce certain proteins in the immune system. VP24 binds messengers, such as karyopherin, that send signals to the gene activation of the cell, which also prevents the immune system from counter-attacking the virus. EBOV has the perfect strategy to block the immune system from fighting the virus in order to survive. This is because the virus "knows" exactly what it will encounter. The idea is to expose the virus to a biochemical synthetic mechanism that it is not used to and specifically tackle VP24. This way, the virus does not "know" how to fight the artificial mechanism. This system consists of synthetically made cell receptor that signal STAT, a transducer that mediate aspects of the cellular immunity. This is needed because VP24 binds protein STAT1, which is another signal carrier of transcription 1. In other words, a synthetic messenger that VP24 will not recognize will be interpolated into the cell, so that it can carry out the job of these messengers and activate the immune system.

ANTIBIOTIC OVERUSE IN PEDIATRIC PATIENTS WITH ASTHMA EXACERBATION

Leonardo C. Zambrano Tapia, Specialized School of Science, Mathematics and Technology (CIMATEC), Caguas, Puerto Rico.
Research Mentor**:** Diego García, Universidad Ana G. Méndez, Gurabo, Puerto Rico

Historically asthma has been known to be a problem concerning public safety, approximately 26 million Americans suffer from asthma (Asthma and Allergy Foundation of America, 2019). It is a chronic respiratory condition in which the lungs' airway become swollen upon exposure to cold and dry air, gases, dust or any other irritant, or allergens such as mold and pollen (Global Initiative for Asthma, 2017). The most common asthma relief and treatments are Short-Acting beta-agonist (SABA) and inhaled corticoresteroids. These two medications are used to treat asthma, but at times there are exacerbations caused by viral or bacterial infections and require additional treatment. Even though bacteria are not always responsible for exacerbations, antibiotics are commonly prescribed to pediatric asthmatic patients even though they do not aid the improvement of the illness (Mangione-Smith, Krogstad, 2011). This may cause bacteria to create an unnecessary resistance towards antibiotics and a burden to pharmaceutical's job to sinthesize new drugs. It is important to identify if this is a problem concerning Puerto Rico. Statistical and background information were collected to further understand the problem. Patients were selected from the hospital's medical records, admitted in June 2016-July 2017. Their demographic information was acquired and placed in Data Extraction Sheets. This data was analyzed with GraphPad Prism, calculating percentages and using a Mann-Whitney test to compare patients prescribed with and without antibiotic treatment and their length of stay.

.

COMMON MIRNA BETWEEN PARKINSON'S, ALZHEIMER'S AND HUNTINGTON'S DISEASE AND THEIR FUNCTIONS

Carola F. González-Lebrón, University Gardens High School, San Juan, Puerto Rico
Research Mentor: Rubén A. García-Reyes, Scientific Caribbean Foundation, San Juan, Puerto Rico

miRNAs have been shown to be important mediators in the gene expression process. Since the early 2000s, we have uncovered that miRNAs are involved in not only gene silencing but dysregulation, upregulation and downregulation of them. Furthermore, the association between miRNA and diseases have also been established, especially in the pathogenesis of neurodegenerative diseases. For this approach, we used bioinformatics programs such as miRbase, miRNET and Tarbase v 0.7 and ShinyGO that identified common miRNAs between Alzheimer's, Parkinson's and Huntington's and analyzed their functional annotation. Identifying common miRNAs expressed in these diseases may lead to important pathways and gene regulations in neurodegenerative diseases. Analyzing the miRNAs may lead to their role in the pathogenesis of these diseases and create a basis for new diagnostic and therapeutic methods. The miRNA hsa-mir-214 has been identified in all three neurodegenerative and has shown to have an affinity for downregulating genes related to protein modification; an important result given that all three neurogenerative disease present abnormal protein activity.

PH RESISTANCE OF V-TYPE PROTON ATPASE SUBUNIT TO ACIDIC MUTATION POINT MUTATIONS IN POSITIONING

Alexander Zambrano Tapia, Specialized School of Science, Mathematics and Technology (CIMATEC), Caguas, Puerto Rico.
Research Mentor: Diego G. Ortiz**,** Universidad del Turabo, Gurabo, Puerto Rico

Zooxanthellae are dinoflagellates that survive in symbiosis with other organisms such as with corals, these depend on each other to survive. When zooxanthellae are killed, it's known as whitening which is often caused by acidic waters. (Britannica, 2018) pH levels are how scientist measure acidity levels in water. (Mettler Toledo, 2019). An enzyme known to help zooxanthellae survive in acidic waters is "V-type proton ATPase subunit a". (UniProt, 2018). Such proteins can be overexpressed by creating a mutation with an RNA of the protein to manipulate the amino acids. The purpose of the research is to increase the pH resistance of zooxanthellae to lessen whitening and produce a more habitable environment by redirecting the RNA of the zooxanthellae to create more proteins to lessen whitening. UniProt is a program that finds all the information about a protein including the genetic sequence of the protein that was then put on another website called "I-Mutant" that predicts the protein stability of a mutation. The protein's information was added making the mutation on the 182nd position with the temperature of 27 Celsius, the independent variable would be the pH levels. The results would be sent through email to later be used in "Logger-Pro", a website that allows a user to make a chart to analyze the data. The results gave from 0.3 to -0.16 protein stability depending on the pH level. In conclusion, the mutation of the protein only had positive effects on acidic waters making it only viable in such extreme environments.

THE EFFECT OF SIMULATED MICROGRAVITY AND HYPERGRAVITY ON GENE EXPRESSIONS AND THE HUMAN BODY

Martín E. Fuentes-Quiñonez, Colegio San Ignacio de Loyola, San Juan, Puerto Rico
Research Mentor: Rubén A. García-Reyes, Scientific Caribbean Foundation, San Juan, Puerto Rico

On May 14, 2019, NASA administrator Jim Bridenstine publicized project Artemis. This striking mission would have the objective of landing the first woman and next man on the Moon by 2024, to learn like never before from the Moon's surface and use that knowledge to send astronauts to space by the 2030's. Nevertheless, an aspect of space travel came to light that was never considered before, microgravity and hypergravity. Gravity is the center of all living and non-living things in the universe, essentially, it is an invisible force that pulls a body towards the center of the earth or another physical structure containing mass. On a trip to Mars, an astronaut will feel sudden fluctuations in gravity, and this could be a very precarious situation. The transition from one gravity field to another can cause bad effects on hand-eye and head-eye coordination, spatial orientation, locomotion, balance, and will likely experience motion sickness. In addition, NASA has discovered that with a lack of gravity in the human body, bones will lose minerals, with density plummeting above 1% monthly. For these reasons, an alternative pathway needs to be pursued to pare down the dangers that an astronaut can face in space. A simulation was created to learn the effects of the instabilities in gravity in the human body and in gene expressions. Subjects will be tested among the areas of extremely low gravity, microgravity, and high gravity, hypergravity, to further study the topic. We ran bioinformatics analyses to examine possible homolog genes that could be involved in damage when exposed to gravity changes. With the information congregated from the Geneious software, comparisons were performed to test the integrity of the genes and their damage after suffering from vicissitudes in gravity. Different scenarios were probed to see the gene under hypergravity and microgravity to study a possible preventive measure for astronauts in their trip to Mars. Statistical analysis of all genetic data was obtained, and the intel gathered from the software systems was carried out. The expected results were that microgravity and hypergravity are the main causes for the effects in the human body while in the transition of gravity fields, due to the fact that, in the gap from Earth to Mars, one can experience intense fluctuations in gravity producing many negative effects in the human body. To finalize, the effects of changes in gravity in space are extremely dangerous to the human body and must be avoided at all costs with a safe and harmless solution for all astronauts to enlighten investigators about the human body and expand the human's knowledge of the cosmos.

PSYCHOLOGICAL TRAUMA DURING YOUTH: MEMORY LOSS DURING ELDERLY YEARS

Daina I. Ramírez-Ortiz, Academia Maria Reina, San Juan, Puerto Rico
Research Mentor: Rubén A. García-Reyes, Scientific Caribbean Foundation, San Juan, Puerto Rico

Trauma is a deeply distressing or disturbing experience, characterized by the antagonism toward someone or something, you feel has deliberately done you wrong. Anger is often a large part of a survivor's response to trauma. Anger helps us cope with life's stresses by giving us energy to keep going in the face of trouble or blocks. Yet anger can create major problems in the personal lives of those who have experienced trauma and those who suffer from PTSD. According to the American Psychological Association (APA) traumatic events that are known to deal with both repressed anger, and excessive anger can cause major physiological, and physical problems. Psychological problems caused by repressed anger include anxiety (that is linked to long term memory loss), which affects sleep (that is linked to short term memory loss), which then lowers your immune system, and causes other physical health problems. Furthermore, our project showed that people who suffered psychological trauma during youth, their memory during elderly years have problems completing the three basic steps of memory which are encoding, storage and retrieval. We focused on using data from the National Institute of Mental Health (NIMH) to gather information on psychologically stable people and patients with diagnosed with short- or long-term memory loss, that has had trauma during youth. Statistical analyses were complete and data was visualized in plots to understand in a more comprehensive manner how these dynamics work.

DYNAMICS OF SCHIZOPHRENIA: EFFECTS OF CLOZAPINE AND PROPABLE IMPROVEMENT

María F. Vázquez, Academia María Reina, San Juan, Puerto Rico
Research Mentor: Rubén A. García-Reyes, Scientific Caribbean Foundation, Puerto Rico

Schizophrenia is a chronic mental disorder that affects the person's thought process, actions, perceiving of reality, and interacting with others. This mental illness makes it difficult for the person to differentiate what is real from what is imagined. Currently, there is no cure for this mental illness, but there are medications, known as antipsychotics, that will help alleviate the patient's life. However, there are some reservations regarding antipsychotics because of the speculations that they may cause brain atrophy. The most efficient antipsychotic is the atypical antipsychotic, Clozapine. Clozapine helps patients with his or her symptoms and causes minimal brain atrophy. Even so, there are still improvements that can be made. Schizophrenic patients cannot take the antipsychotic for extended periods of time; instead, they have to change the medication because of the dependence the prescription may cause. This medication cannot be used for a long time since it may also lead to irreversible brain damage. Additionally, Clozapine has dangerous side effects such as heart attacks, strokes, seizures, head injury, brain tumors, diabetes, high blood pressure, etc. We aimed on identifying the composition of this antipsychotic with the means of taking the proper components and proposing an improved and less dangerous medication. An antipsychotic that will cause fewer side effects, less or no brain atrophy, and that the patient will be able to take it for more extended periods.

ACKNOWLEDGMENT

Research mentoring is the main driving force behind the scientific products (posters-oral-presentations) presented in this symposium. Our greatest appreciation and gratitude to all the mentors and assistant mentors who took part in the Spring 2020 Pre-College Research Symposium by working and training the next generation of scientists whose efforts are presented in this booklet, as well as to the many other researchers who support the Student Research Development Center of Scientific Caribbean Foundation and its goals and objectives. Our most sincere thanks are also extended to the organizations and individuals who helped to make this Spring 2020 Pre-College Research Symposium possible.

Scientific Judges:

Dr. Angel Arcelay, Ana G. Mendez University, Carolina, Puerto Rico
Fabiola D. Pagán, University of Puerto Rico, Bayamón, Puerto Rico

Research Mentors:

Rubén García, Scientific Caribbean Foundation, San Juan, Puerto Rico
Diego E. García, Ana G. Méndez University, Gurabo, Puerto Rico

Symposium Staff:
Universidad Metropolitan SACNAS Chapter senior staff

Symposium Coordinator:
Dr. Juan F. Arratia, Research Professor, Student Research Development Center, Scientific Caribbean Foundation, Inc.

INDEX OF PRESENTERS

We gratefully acknowledge the support and sponsorship for the Spring 2020 Pre-College Research Symposium

from:

POLYTHECNIC UNIVERSITY OF PUERTO RICO