

**BROTHER AUBERT HARRIGAN C.S.C.**

**Science Research Program  
2021**



**HOLY CROSS HIGH SCHOOL  
26-20 FRANCIS LEWIS BOULEVARD  
FLUSHING, NEW YORK 11358**



# ***This Evening's Events***

*Welcome*

**Mrs. Cathy Kenny, MPH**

*Science Department Chair &  
Science Research Coordinator*

*Opening Prayer*

*Student Poster Presentations*

*Senior Presentations*

*Closing Remarks*

# SCIENCE RESEARCH PROGRAM



**Mrs. Cathy Kenny, MPH**  
**Science Department Chair &**  
**Science Research Coordinator**

The Science Research Program at Holy Cross High School was started in the fall of 2006 with a class of four sophomore students and the help and support of Mr. James Harden, Class of 1969.

Science Research in the High School is a college course that is affiliated with the State University at Albany. During the three years that the student is involved in the program, they will be researching a topic of their choice with an outside mentor at a science related institution. This institution could be a hospital, laboratory or university campus. The student, under the guidance of their mentor, designs a science research project that they will work on throughout the three years of the course. The end goal of the program is to be able to enter the student's project into one of the national science research competitions or to have a research paper published.

Throughout the years, our students have researched topics such as cancer, heart disease, gene sequencing in kidney disorders, ballistics, and music therapy just to name a few. They have worked at Memorial Sloan-Kettering Cancer Center, Mt. Sinai Hospital, Lenox Hill Hospital, Columbia University, Manhattan College, Columbia Medical Center, New York Institute of Technology, and St. Francis Heart Hospital. Our alumni have attended St. Edward's University, Sienna College, the University of North Carolina, Fairleigh Dickenson College, Saint John's University, New York University, Fordham University, Rensselaer Polytechnic Institute, The College of Mt. Saint Vincent, The Merchant Marine Academy, and Brown University. Holy Cross High School is very proud of all that our students have accomplished over the years! One of the great features of our program is the extent to which our students work together as a community. As our seniors move on to new and exciting challenges, I wish them much success and happiness. I hope that their experiences in the Holy Cross High School Research Program will serve them well in their future studies and careers and that they will look back fondly on the time that they spent in our program!

# SCIENCE RESEARCH PROGRAM ADVISOR

**Dr. Anthony Paratore**  
Program Advisor



Dr. Anthony Paratore graduated from Holy Cross in 2000. He received his Bachelor of Science in Biology from St. Francis College in 2003 and his Master's Degree in Molecular-Cellular Biology from Long Island University in 2006.

In May 2015, he received his Doctorate in Biology from Saint John's University. Dr. Paratore was on the Holy Cross Board of Directors from 2008-2014 and has been advisor to the Science Research Program since 2013. Currently, he is an Adjunct Assistant Professor at New York University Tandon School of Engineering, St. John's University, and CUNY.

Dr. Paratore lives in Long Island City with his wife, Ornela, daughter, Adriana and son, Tony.



# CLASS OF 2021

## CHRISTOPHER CHAN



### **FDA Approved Drugs Pertaining to Diseases**

Throughout my years in the Science Research Program, I've mainly followed the clinical trials run by the Food and Drug Administration, specifically the trials that deal with drugs concerning diseases. These trials consist of four phases to find out if the drug is safe with minor side effects and if it functions to serve its purpose. The most important drug that my research has followed is BAN2401, a drug treating patients with Alzheimer's disease. In light of the recent pandemic, my research also shifted towards the vaccines being tested and released to the public, including the drugs developed by the companies Pfizer, Moderna, and J&J Pharmaceuticals.



# CLASS OF 2021

## MATTHEW CUTRONA

### The Hidden Truth of Male Breast Cancer

Under the mentorship of Dr. Mahmoud B. El-Tamer, breast surgeon at Memorial Sloan Kettering Cancer Center, I have continued working on my project “The Hidden Truth of Male Breast Cancer.” My project focuses on one of the most neglected medical fields, especially in males: male breast cancer. The core of my project is researching scholarly articles and research studies conducted by medical professionals nationally and internationally to develop a writing piece that can educate the ordinary person. In my article, I will also be including observations I noticed while viewing breast cancer patients, both male and female, during my time at Memorial Sloan Kettering Cancer Center. Observing both genders will further aid in the differentiation of this disease and the different effects it can have.



### MALE BREAST CANCER

### 7 FACTS TO KNOW

The main **RISK FACTORS** for breast cancer in men is elevated **ESTROGEN** levels, prior **RADIATION** exposure, and a **FAMILY HISTORY** of breast cancer.

Male breast cancer is a **RARE** cancer type and only comprises **1%** of all breast cancers.

The most common **SYMPTOM** of male breast cancer is a **LUMP** behind the nipple.

**SURGERY** is the most common initial treatment for male breast cancer. Other treatments include chemotherapy, hormonal therapy and radiation therapy.

Like breast cancer in women, the **PROGNOSIS** for male breast cancer largely depends on the **TUMOR STAGE**.

Male breast cancer **STAGING** (reflecting the degree of tumor spread) is identical to female breast cancer.

The most common type of male breast cancer is **INFILTRATING DUCTAL CARCINOMA**.

**EMPOWERED DOCTOR**  
By [www.EmpoweredDoctor.com](http://www.EmpoweredDoctor.com)



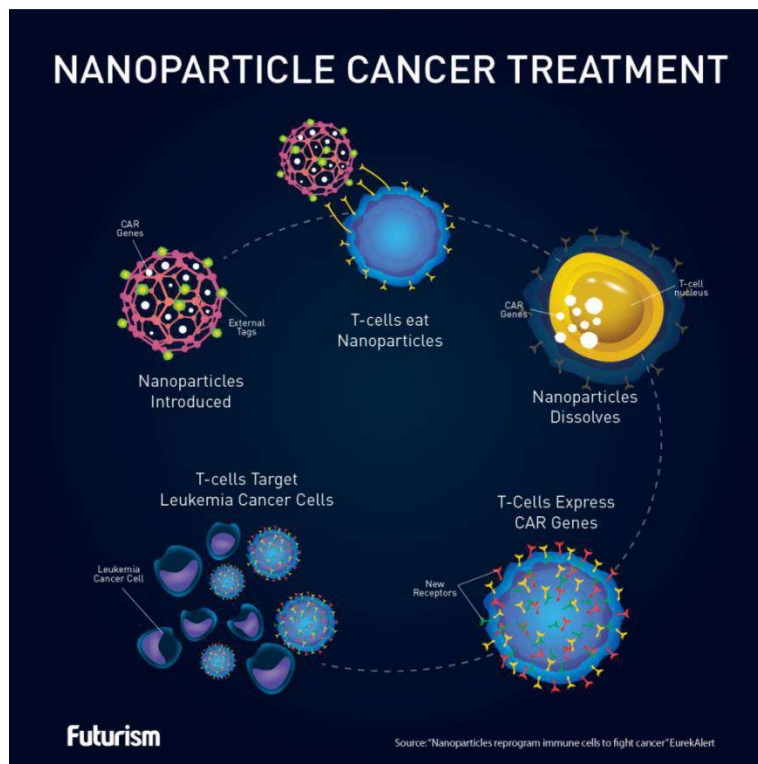
# CLASS OF 2021

## THOMAS GRAHAM



### Using Nanoparticles to Image and Treat Cancer

My research topic focuses on the effects of loaded nanoparticles compared to base drugs in regards to killing colorectal cancer cells. I have completed my research working with my mentor, Mr. Edwin C. Pratt, to test the effects of Loaded Nanoparticles versus the Base Drugs on Human SW1222 cells. This past year, due to COVID-19, I moved to home-based research in order to continue my work and finish my research with the help of my mentor and his colleagues. This research is important to the field of cancer treatment as it can provide a new and safer treatment option that can be made available to patients all across the world. I also want to thank Mrs. Kenny and Dr. Paratore for the past 3 years in the program and for helping me to realize and deepen my love for the medical sciences.



# CLASS OF 2021

## SAMUEL LEE

### Effect of Alcohol Intoxication of TBI

Traumatic Brain Injury (TBI) is defined as a sudden external force causing neurological deficits. Annually, 1.7 million individuals die from TBI. 10 million are hospitalized from traumatic brain injury, which accounts for one-third of all U.S. injury-related deaths. Alcohol intoxication is a known risk factor for injury and is frequently correlated with the development of TBI. In TBI patients, some studies record an incidence of acute EtOH intoxication of up to 50 percent. Together with my mentor, I have studied whether there is a correlation between acute alcohol intoxication and the outcome after TBI (i.e. mortality). The goal was to determine the association between positive hospital admission BAC and mortality following mild to serious TBI. In the early course of mild to extreme TBI, the presence of coagulopathy is widespread and is associated with elevated rates of injury and mortality. In comparison, in those with TBI with up to 54 percent of those with penetrating TBI and 33 percent of those with blunt TBI experiencing coagulopathy, the cause of injury seems to affect the occurrence of coagulopathy. Therefore, to examine the association between acute alcohol intoxication and mortality risk in patients within the framework of TBI, we tried to perform this updated meta-analysis.

The hypothesis that was tested in this study was that TBI patients who are present with acute EtOH intoxication have worse outcomes at discharge, possibly related to impairment in platelet function and or the coagulation cascade.





# CLASS OF 2021

## NICHOLAS MONIZ



### **Hamadryas Baboon Social and Grooming Behavior**

This year, my Science Research Project will continue to explore the social behavior of hamadryas baboons in one-male units (OMUs), specifically on male grooming behavior in relation to the other individuals. Hamadryas baboons have a unique social structure, in which there are four levels of organization, being the OMU, clan, band, and troop. OMUs are the foundation of hamadryas baboon survival, and it is important that the relationships between individuals of the same OMU are strong. The most prominent way of establishing and maintaining these relationships is through grooming. Last year, my project focused on the female hamadryas baboons in the OMUs, and my research showed that in both small and large OMUs, females groomed males for half of the total grooming time.

In small OMUs, females received about an equal amount of grooming time from males, but in the larger OMUs, there was a significant reduction in the amount of total grooming time females received from males. Analyzing the behavior of the male hamadryas baboons will be able to show grooming relations that were unable to be seen when only females were the focal. Likewise, having females as the focal showed relations that could not be found by focusing on a male. Lastly, I will also be looking at physical characteristics of male hamadryas baboons, such as facial features and color, which can show various levels of aggression and personality, and these can potentially reflect some of differences in grooming patterns between the males. Ultimately, the grooming behavior results from both the males and females will provide an accurate depiction of the social life of the hamadryas baboons and allow us to learn more about them. This information is beneficial, as hamadryas baboons share a similar physiology to humans as well as 94% of our DNA.



# CLASS OF 2021

## LUCA NITTI

### Injury Patterns Amongst Multisport and Single Sport Athletes

I have been researching with Dr. Halley at St. Charles Rehabilitation Center for the last three years and we have been analyzing injury patterns between specialized athletes and multi-sport athletes. Specialized athletes, also known as single sport athletes, focus their time and energy into one sport. Multi-sport athletes play a variety of sports and do not focus on one sport for the majority of the year. Instead, the athletes play different sports year round using different muscles. We have been working together to decide whether being a multi-sport athlete or a specialized athlete is more beneficiary based solely upon injury history. This year, I conducted the same survey, but with the study group being athletes attending Holy Cross High School. The data I received had outliers, as expected, but continued to follow the same general trend as last year's data: Multi-sport athletes suffered from injuries on the field that were a result of collision or contact. Specialized athletes suffered from injuries of overuse, fatigue, burnout and even stress fractures from repeating the same physical motions all year round.



**Holy Cross Science Research**

<<Please answer the following questions accordingly as your responses will remain confidential >>

Dear Holy Cross Students,

I am writing to you to ask for your support regarding my Science Research Project. I am a Senior here at Holy Cross, and I am conducting research regarding injury patterns of multisport and single sport athletes. I would greatly appreciate it if you could anonymously complete the google form attached to the best of your ability. The information being collected will be used for statistical analysis, while you remain anonymous. The survey should take about only 5 minutes to complete and will really be of great help. Thank you very much!

Thank you for your support,  
Luca Nitti  
Class of 2021

Your email address will be recorded when you submit this form.

Not [lnitti21@myhchs.org](mailto:lnitti21@myhchs.org)? [Switch account](#)

\* Required

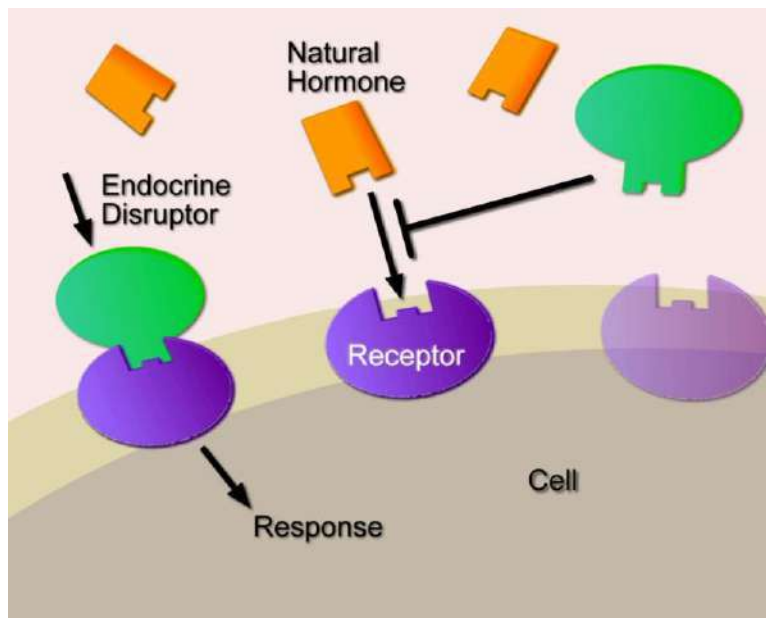
# CLASS OF 2022

## GABRIELLA AORDKIAN



### Exposure to Low Doses of Oxybenzone During Perinatal Development Alters Mammary Gland Morphology in Male and Female Mice

Endocrine disruptors are chemicals that imitate certain hormones; so when these disruptors or "imitators" are exposed to the body, they are recognized by cells as the actual hormone. The picture below shows that this is because the imitators have an identical binding shape as that of an actual hormone. So the endocrine disruptor binds to the receptor as easily as the actual hormone does. Under the guidance of my mentor Laura Weinberg, an avid researcher in endocrine disruptors and how they contribute to the pathogenesis of breast cancer, I will be focusing my research on estrogen imitators and how they contribute to breast cancer. I will be fulfilling my research in the summer with her colleague, Dr. Vandenberg, who also researches endocrine disruptors and the effects they manifest.



# CLASS OF 2022

## IRENE MAVROMICHALIS

### Risk Factors and Prevention of Diabetes

Under the mentorship of Dr. Jonathan Newman, I will continue to research the overlap between Metabolic Syndrome and Prediabetes. Prediabetes is a condition where blood sugar levels are high, but are not high enough to be considered diabetes. Prediabetes is more likely to develop among persons with Metabolic Syndrome. Metabolic Syndrome is a cluster of conditions such as increased blood pressure, high blood sugar, excess body fat, abnormal cholesterol levels, and high triglycerides which are fat-like substances in the blood. Having one of these conditions does not necessarily mean an individual has Metabolic Syndrome, instead those who have three or more of the five conditions listed most likely have metabolic syndrome. Healthy lifestyle changes such as weight loss, exercise, and a healthy diet can benefit those who have Metabolic Syndrome and reduce the risk of developing Prediabetes.





# CLASS OF 2022

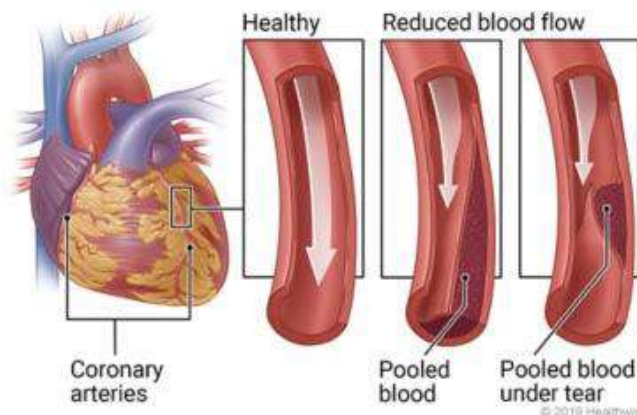
## KATERINA MAVROMICHALIS



### Spontaneous Coronary Artery Dissection and Myocardial Infarction in the Absence of Obstructive Coronary Artery Disease

Spontaneous coronary artery dissection (SCAD) is a condition caused by a blockage in the coronary artery from a dissection (intimal tear) or from the formation of a spontaneous intramural hematoma (IMH) in the coronary artery. SCAD can cause myocardial infarction (MI) in young patients with no atherosclerotic risk factors. Females, especially premenopausal women, are at a higher risk for SCAD. There are several causes for SCAD, none being genetic, although certain genetic conditions can make an individual more susceptible. SCAD is commonly brought on by extreme physical or emotional stress.

MINOCA, or myocardial infarction in the absence of obstructive coronary artery disease, is a heart attack not caused by significant coronary atherosclerosis. Heart attacks are considered a MINOCA as long as the arteries are more than 49% open. Similarly to SCAD, younger women are more likely to have MINOCA. MI due to SCAD is a MINOCA because the arteries can sometimes appear to look normal, or near normal since the dissection can taper over time, as well as there is no atherosclerosis. It is important to raise awareness for SCAD and MINOCA because young female patients with chest pains and no atherosclerosis are often misdiagnosed.



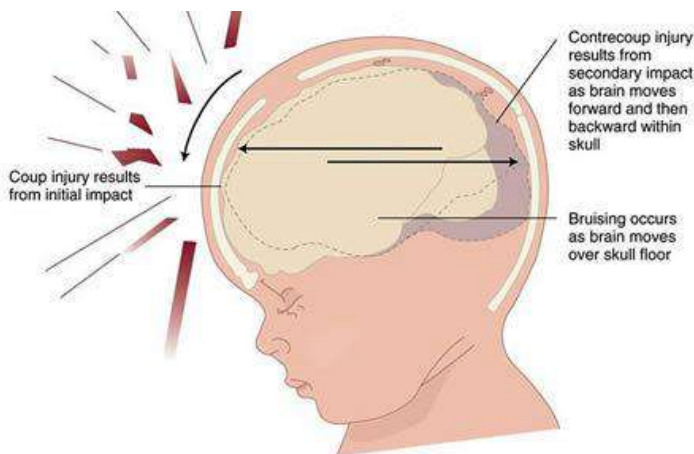


# CLASS OF 2022

## JULIET ROMERO

### Web-Based Rehabilitation Strategies for Treating Pediatric TBI

Traumatic Brain Injury (TBI) is a brain dysfunction that occurs as a consequence of violent blows to the head and can cause long term-deficits in affected patients. The main objective of my study is to explore web-based rehabilitation strategies in facilities that are used to reduce the negative outcomes of pediatric TBI. My purpose of placing a particular focus on adolescents is to emphasize the differences between adult and adolescent brain injury and the strategies specialized for children, primarily because of their contrastive brain development. By determining the specific rehabilitation strategies in children that are proven effective for the long term, clinicians may be able to utilize specific strategies that predict and decrease the outcome of pediatric TBI. I will continue collecting and analyzing clinical data under the guidance of Enna Selmanovic, Clinical Research Coordinator at Brain Injury Research Center at Mount Sinai in coordination with Dr. Kyrill Alekseyiv from the University of Delaware, who has been studying TBI with diverse populations.



# CLASS OF 2023

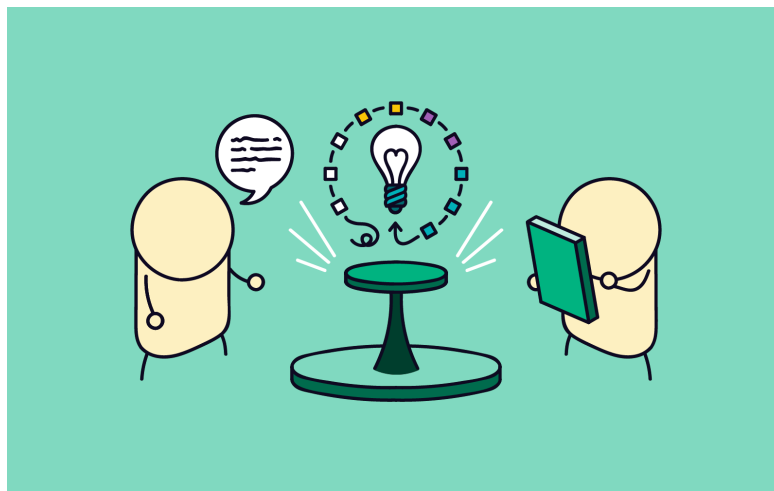
## ANDREW FAZIO



### **Expecting Parental Perspectives Towards L.G.B.T.Q. Children - A Qualitative Study**

This project will describe the perspectives that expecting straight parents have on the future sexual and gender identity of their child, especially if these identities are not heterosexual and cisgender. It will consist of four to six straight couples from around New York City. Data will be collected through open, in-person interviews. Parents will be asked how they will feel if their child was gay, lesbian, bisexual, or transgender. We are still exploring the most efficient and ethical ways to recruit and interview these couples. After obtaining and analyzing our results, we will explore the opinions towards having LGBTQ children, and explore whether future mothers differ in their perspectives from future fathers.

I will be continuing my research at Columbia University with my mentor, Dr. Theodorus Sandfort.



# CLASS OF 2023

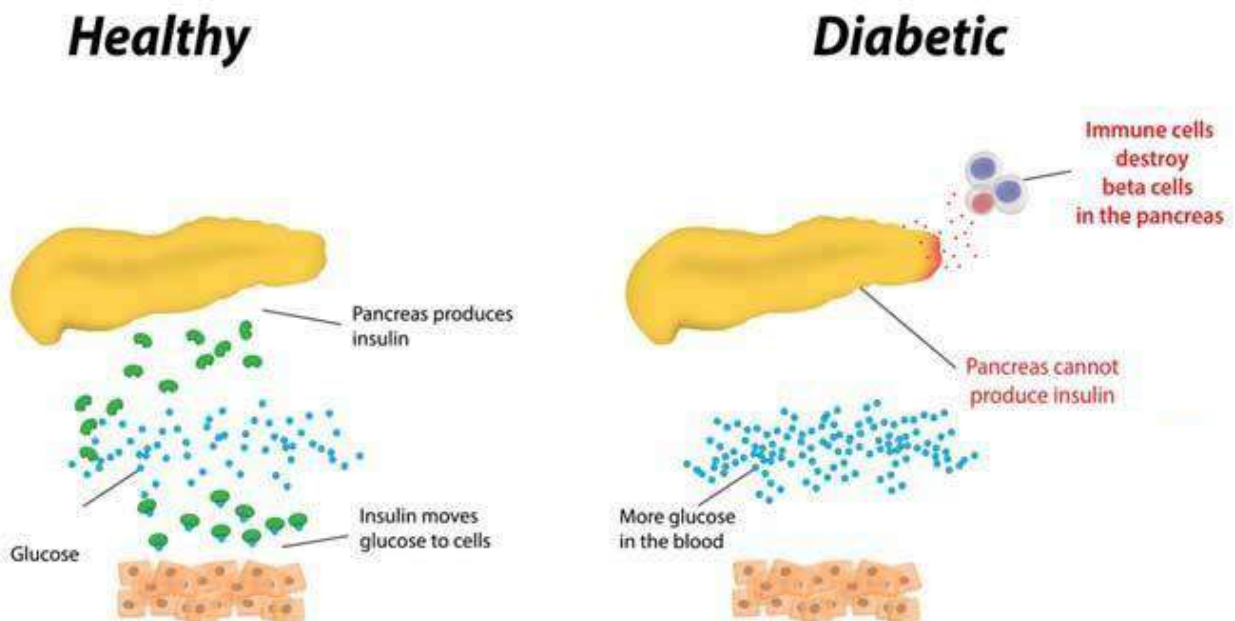
## EDWARD HARNETT

### Type 1 Diabetes

My research focuses on living healthy while being diagnosed with Type 1 Diabetes. My mentor's name is Audrey Koltun, and she works at Northwell Health. Type 1 Diabetes, also known as juvenile diabetes, is a disease in which the pancreas produces little to no insulin. A healthy pancreas will produce a sufficient amount of insulin, while the pancreas of a diabetic will produce little to no insulin. Type 1 Diabetes affects people of all ages. This disease is extremely difficult to manage due to the fact that you must constantly monitor your blood glucose. I will be examining how juvenile diabetes affects a person at different stages throughout their life. Other conditions are also associated with this disease such as diabetic ketoacidosis, and severe weight loss.



### Type 1 Diabetes



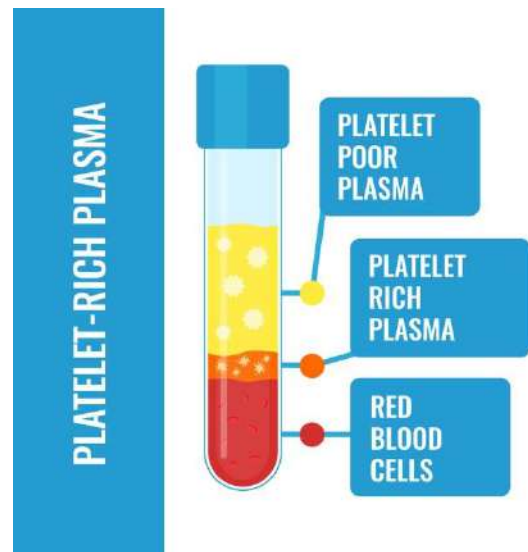
# CLASS OF 2023

## ALEXIS WIRTA



### The Use of PRP on Rotator Cuff Injuries

Platelet Rich Plasma (PRP) is a type of regenerative medicine technique that uses an individual's own plasma to treat musculoskeletal injuries via an injection. Research has shown that PRP can accelerate (although inconsistently) the healing process of injured tendons, ligaments, muscles and joints. The research I will be undertaking pertains to PRP treatment efficacy in shoulder rotator cuff injuries. Under the mentorship of Dr. Mario Haritos, I will be comparing the effectiveness of PRP in this type of injury in comparison to other treatment methods. PRP can potentially change the standard of care, decrease recovery times, and prevent invasive procedures for those who suffer debilitating musculoskeletal injuries.



# In Memoriam

## Brother Aubert Harrigan, C.S.C.



**BROTHER AUBERT HARRIGAN, C.S.C.  
PRINCIPAL 1967-70 • DIRECTOR STUDIES 1963-67**

**ENDOWMENT FOR SCIENCE RESEARCH  
ESTABLISHED 2006 BY JAMES HARDEN '69**

Brother Aubert Harrigan, C.S.C. pursued his higher education at the University of Notre Dame from which he was awarded a Bachelor of Arts degree in June, 1950. He did graduate studies at Fordham University, Bronx, N.Y. and at the Toronto School of Theology in Toronto, Canada. He received his Master's in Religious Education from the Toronto school in 1982. Brother Aubert's early years were spent in the apostolate of education in various schools conducted by the Brothers of Holy Cross in the United States. He held teaching and administrative positions in schools in New York, Ohio, Connecticut, and Rhode Island. From 1967 to 1970, he was the principal of Holy Cross High School in Flushing, New York. He also served as member of the Provincial Council of the Eastern Province of Holy Cross Brothers. Brother Aubert moved to St. Joseph Center in 1983 as director of development. From 1985 to his retirement in 1993, he was the administrator of St. Joseph's.

Brother Aubert Harrigan, C.S.C., passed way October 18, 2006 at St. Joseph Center, Valatie. He was 79 years old.



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**Holy Cross High School**

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The Science Research Program, taken in addition to another scheduled science course, is a three-year program designed to present to qualified students the opportunity to perform independent scientific research under the direct supervision of a mentor from a university or hospital. Students in this program may pursue college credit from the SUNY system through the University at Albany.



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