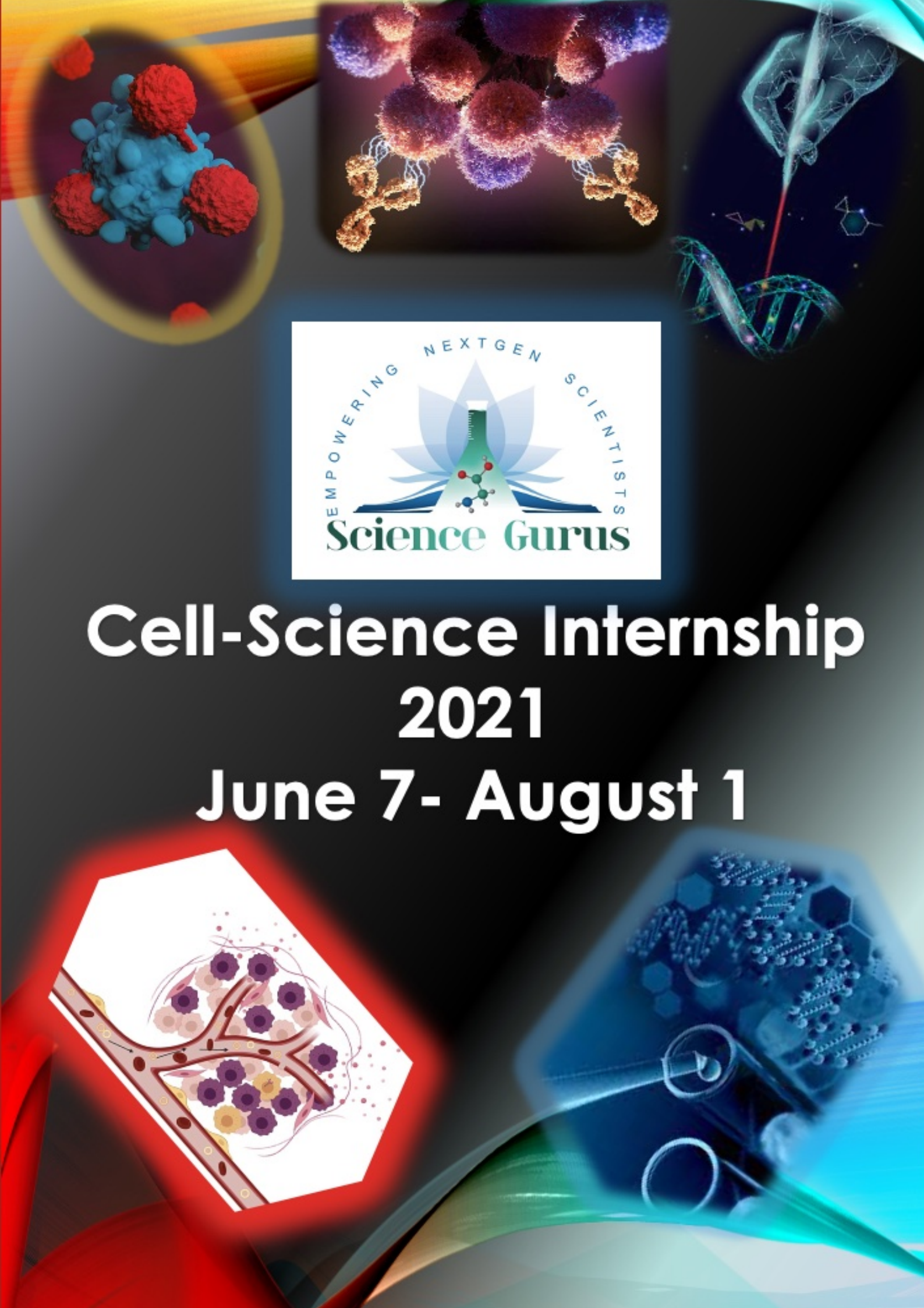

Cell-Science Internship 2021

June 7- August 1

ABOUT SCIENCE GURUS

To provide science-based education, training, and mentor platforms that enable students to excel in science careers.

Science Gurus was founded in December 2009 by enthusiastic volunteers passionate about science and dedicated to supporting budding scientists. Science Gurus is a registered non-profit charitable organization, and it offers insights into a plethora of opportunities in research and development for students interested in pursuing a career in life sciences. Given the rapid growth of the life science industry across the globe, an understanding of nature and career opportunities may lead to educated decision-making. In addition, this organization's key objective is to attract young talent from engineering, technology, and natural sciences to address challenging scientific questions in human health and diseases.

Science Gurus has been promoting charitable activities on supporting science education for deserving and needy students in the United States of America and in India by way of:

- Providing career growth mentoring to next-generation scientists
- Building Biotech/Pharma awareness among the youth
- Mentoring students to work on independent research projects
- Engaging the youth in STEM areas through hands-on teaching
- Recognizing and rewarding teachers to promote science education
- Sponsoring low-income students in obtaining science education in India
- Conducting drug discovery & development workshops in India
- Collaborating with academic institutions to build science curriculum in India

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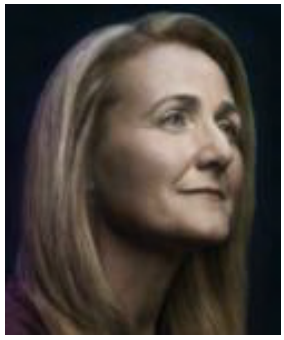

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54 Intern 48 different High Schools, 20 different states

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Abhinav Pasupuleti	South Forsyth High School	Cumming,GA
Akhhill Durainath	Basis Independent Silicon Valley (San Jose)	Fremont, CA
Akshat Singh	Monta Vista High School	Cupertino, CA
Alex Sriprathum	Mission San Jose High School	Fremont, CA
Anila Chundi	Evergreen Valley High School	San Jose, CA
Anirudh Srikanth	Mission San Jose High School	Fremont, CA
Ankitha Kasavaraju	Rock Ridge High School	Ashburn, Virginia
Anthonysujai Anthonydas	Washington High School	Fremont, CA
Ayush Patel	Irvington High School	Fremont, CA
Brandon Kwon	Leland High School	San Jose, CA
Caitlin Lee	California Academy of Mathematics and Science	Torrance, CA
Dennis Zakabluk	Adlai E. Stevenson High School	Lincolnshire, Illinois
Dhaanya Ghanta	Brighton High School	Rochester, New York
Ellie MacGregor	San Juan Hills High School	San Juan Capistrano, CA
Esther Chu	Oxford Academy	La Palma, CA
Gene Weng	Sayville High School	Sayville, NY
Harshika Rajupet	Independence High School	Frisco, Texas
Heer Nanda	Amador Valley High School	Pleasanton, CA
Jiyoung Pyo	Miss Porter's School	Farmington, Connecticut
Krisha Chichili	Lightridge High School	Aldie, Virginia
Kush Modi	The Charter School of Wilmington	Hockessin, Delaware
Lasya Nedunuri	South Brunswick High School	Kendall Park, NJ
Lisa Kovacs	Northport High School	Northport, NY
Maya Rajan	Silver Creek High School	San Jose , CA
Meghana Enugurthi	Canyon Crest Academy	San Diego, CA
Min Hur	Jericho Senior High School	Jericho, New York
Mohana Enugurthi	Canyon Crest Academy	San Diego, CA
Nandana Varier	John P. Stevens High School	Edison, New Jersey
Nandini Dube	Summit High School	Summit, NJ
Neha Matai	Flint Hill School	Herndon, VA
Nikhila Juluri	Dublin Highschool	Dublin, CA
Parisa Agrawal	Irvington High School	Fremont, CA
Prerana Somarapu	Irvington High School	Fremont, CA
Ria Bath	Granada High School	Livermore, CA

Riddhi (Ria) Banerjee	Troy High School, Fullertion California	Chino Hills, CA
Rushil Prajapati	Prospect High School	San Jose, CA
Samyuktha, Mohan	Bridgewater Raritan High School	Bridgewater, NJ
Sayara Thomas	Montgomery Blair High School	Silver Spring, MD
Sebastian Lira	Seven Lakes High School	Katy, Texas
Shifa Shaik	Tompkins High School	Katy, Texas
Shreya Krishnan	Westford Academy	Westford, MA
Shreya Sundar	Irvington High School	Fremont, CA
Shubhangini Shah	UWC-USA	Albuquerque, New Mexico
Smeet Shah	Whitney Gretchen High School	Cerritos, CA
Sreekari Samudrala	Irvington High School	Fremont, CA
Sriamsh Nallabelli	Evergreen Valley High School	San Jose, CA
Tony Joseph	Walt Whitman High School	Potomac, MD
Udhav Sharma	Mission San Jose High School	Fremont, CA
Vaishnavi Joshi	Parkland High School	Breinigsville, PA
Vedanth Phanimukla	Amador Valley High School	Pleasanton, CA
Vybhavi Kotireddy	Alpharetta High School	Alpharetta,GA
Ye Lee	Lowell High School	San Francisco, CA

Intern Reports

ACE2 Receptor and COVID-19

Mohana Enugurthi[1], NandanaVarier[2], ParisaAgrawal[3]

Canyon Crest Academy[1], John P. Stevens High School[2], Irvington High School[3]

Abstract

The SARS-CoV-2 virus, commonly known as COVID-19, has been present globally for 18 months and impacted countless lives as it runs its course. Lockdowns were put in place, mask mandates were enforced, and individuals were cautioned to stay at home except for essential travel. This virus shares approximately 79% of its genome with SARS-CoV-1, a virus that was first identified in 2003. Yet, though scientists have gathered a vast amount of data and research regarding SARS-CoV-2, the pandemic is still evidently present and numerous waves and variants of this virus are circulating around the world. This paper will cover the correlation between ACE2 receptors and COVID-19 and the structure of the virus. In addition along with targeted therapies (both those currently in clinical trials and those already given Emergency Use Authorization by the Food and Drug Administration (FDA) this paper will focus on signaling pathways and the SARS-CoV-2 Mutation Profile.

The Function of BTK and an Inhibitor, Zanubrutinib

Vedanth Phanimukla[1], Udhav Sharma[2], Anirudh Srikanth[3]

AmadorValley High School[1], Mission San Jose High School[2,3]

Abstract

In this report, we will discuss the immune system and its function in the human body. There are two components to the immune system: the innate and adaptive immune systems. The immune system consists of B and T cells, and each type has their own specific function with regards to combating infections. The cells in the immune system are created in many organs in the body including, but not limited to, the adenoids, bone marrow, lymph nodes, and lymphatic vessels. The immune system relies on cell communication, and one of the most important parts of transducing a signal is phosphorylation, the process of adding a phosphate group to a molecule. This is done by kinases, a special class of enzymes that modify lipids, carbohydrates, and other molecules. A unique type of kinase is Bruton's tyrosine kinase, which is a non-receptor kinase that plays a vital role in oncogenic signaling. The mutation of BTK can contribute to various cancers such as Mantle Cell Lymphoma and Chronic Lymphocytic Leukemia. The B cell receptor, CD19 co-receptor, and the Fc Gamma receptor use BTK to relay the signals. We then move on to discuss zanubrutinib, a BTK inhibitor that is commercially known as "Brukinsa." This drug is also used to treat patients with Mantle Cell Lymphoma.

C-C Chemokine Receptor Type 5

AyushPatel[1], SebastianLira[2], SriamshNallabelli[3]

Irvington High School[1], Seven Lakes High School[2], Evergreen Valley High School[3]

Abstract

This report discusses the various aspects and properties of C-C chemokine receptor type 5 (CCR5). CCR5 is a 1b GPCR that is expressed in multiple components of the immune system and is thought to be found in the common ancestor of chordates. Various conditions are linked to this chemokine receptor, including several solid tumors and the human immunodeficiency virus. Numerous small molecule and monoclonal antibody treatments such as maraviroc and leronlimab focus on binding to and inhibiting the implications of CCR5 in various diseases. This report also discusses the statistics and effects of the rare CCR5-delta 32 (CCR5-Δ32) variant; which, depending on the zygosity, can confer resistance to HIV.

CD20 Monoclonal Antibodies: Ofatumumab's Relationship with B-Cell Lymphomas

Heer Nanda[1], Meghana Enugurthi[2], Neha Matai[3]

Amador Valley High School[1], California Canyon Crest Academy[2], California Flint Hill School[3]

Abstract

Monoclonal antibodies have been studied extensively for the past few decades because of their promising properties and effects on cancer cells.CD20 is a transmembrane protein that is mostly found on the surface of B-cells and maintains a high relationship in the survival and growth of cancer cells as it is involved in cell signaling. While it has been proven to play a large role in inducing programmed cell death with the aid of monoclonal antibodies, this protein is present on healthy cells, allowing for unnecessary cell death in the immune system through CD20 recognition. A high expression of this protein has been found in cancer cells that use truncated forms of CD20 to promote cell growth and proliferation. The MS4A1 gene comes from theMS4Agene family and is responsible for coding CD20.Mutations in this gene and an increase in the number of copies are a hallmark of many B cell-related cancers. In this report, we discuss the two monoclonal antibodies CD20 rituximab and ofatumumab, and their relation to diseases and cancer.

Analytical Report on the CD19 Gene and Blincyto

Ankitha Kasavaraju[1], Ellie Macgregor[2], GeneWeng[3]

Rock Ridge High School[1], San Juan Hills High School[2], Sayville High School[3]

Abstract

The CD19 gene encodes for the CD19 protein which is expressed on B cells. The expression of this gene is important for B cell development. Additionally, the CD19 protein plays a crucial role in B cell signalling. Mutations or deficiencies in this gene can contribute to leukemias and lymphomas. On terms of cancer, this report will largely focus on Acute Lymphoblastic Leukemia (ALL). However, there are numerous other diseases associated with CD19. This report will also analyze the CD19 gene and protein from various angles using multiple bioinformatics tools. Our analysis will shed light on important aspects of CD19 such as its homology and mutation profile. By elaborating on these factors, we can see what role they play in CD19 research. Later in the report, we discuss treatment for CD-19 related diseases like B-ALL. We will primarily focus on the bi-specific monoclonal antibody Blinatumomab (brand name Blincyto) and CD19-targeted CAR T-Cell Therapy and their mechanisms of action.

CD30-ADCETRIS

Riya Banerjee[1], Shreya Krishnan[2], Shubhangini Shah[3]
Troy High School[1] ,Westford Academy[2] ,United World Colleges[3]

Abstract

CD30-ADCETRIS is an antibody drug that was approved by the FDA in 2011 to treat CD30 positive lymphomas, specifically Hodgkin's lymphoma. In this research article, we will first discuss the importance of the CD30 protein, its relevance to cancer, and the gene signaling pathways that are associated with it. Then, we will go on to describe the methods and bioinformatics tools we utilized in order to compile our data and obtain our results. After going over these results, we will conclude our research article with a section on the actual targeted therapy and go over its clinical trials.

The Role of the EGFR Gene in Cancer, Specifically Lung Cancer, and the EGFR Targeted Therapies Developed

Lisa Kovacs[1], Shifa Shaik[2], and Maya Rajan[3]
Northport High School[1],Tompkins High School[2], Silver Creek High School[3]

Abstract:

The EGFR gene is a gene important in coding for the EGFR protein which allows for cell processes such as growth, proliferation, and division. To carry out these cell processes the EGFR receptor on the protein binds to a ligand which activates a receptor complex and triggers these processes. The EGFR gene also utilizes the EGFR signaling pathway which regulates events including proliferation, migration, and apoptosis. The EGFR gene, protein, and signaling pathway are all vital to the normal functioning of many cells and tissues in the body, however when mutated they can lead to a variety of cancer types. This report will explore the link between the EGFR gene, protein, signaling pathway and cancer on a molecular level. To do this we will utilize many bioinformatic tools to provide the information and diagrams necessary to aid our analysis. After analyzing this link between EGFR and cancer the report will shift its focus to the targeted therapies developed to treat EGFR related cancers. There are many targeted therapy treatments being developed, the most promising being small molecule inhibitors and monoclonal antibodies. Each approach the treatment of cancer in a different way. Small molecule inhibitors aim to treat EGFR related cancer by disrupting the EGFR signaling pathway. These small molecule drugs bind to ATP pockets and stop activation and phosphorylation for pathways within EGFR that cause cell growth therefore cutting off the food supply for the tumor, in turn killing the cancer cells. Monoclonal antibodies aim to block the binding of ligands to the EGFR receptor on the protein. These monoclonal antibodies enlist natural immune system functions to fight the cancer. These drugs help the immune system by flagging cancer cells, blocking cell growth, preventing blood vessel growth, and blocking immune system inhibitors.

The research and analysis being conducted in this report is important for the future treatments of EGFR related diseases and cancer. EGFR is a gene that offers a target for drug treatments and has the potential to treat or even cure many types of cancer. Discoveries in this area of EGFR and targeted therapy treatments offer an opportunity to help millions of cancer patients throughout the world.

IDH1, Ivosidenib

Esther Chu[1], Yejin Lee[2], Jennifer Pyo[3]
Oxford Academy[1], Lowell High School[2], Miss Porter's School[3]

Abstract:

The IDH1 gene mutation exists in several forms of cancer, but since Ivosidenib is a targeted therapy treatment used for treating Acute Myeloid Leukemia (AML), aspects mentioned in this report will all be put in perspective of AML. Additionally, while there has been a sufficient amount of research done using the IDH2 gene in relation to AML, IDH2 is part of the same gene family as IDH1 and it has been established that both genes catalyze similar reactions. Therefore, it is appropriate to use past IDH2 research and correlate it with IDH1 gene functions. Overall, this report aims to demonstrate how the IDH1 gene, Ivosidenib, and AML interact with each other while going into more detail on the specific parts mentioned.

Interleukin-6 Receptor

Min Hur[1], Sreekari Samudrala[2], Smeet Shah[3]
Jericho Senior High School[1], Irvington High School[2],Whitney Gretchen High School[3]

Abstract

The interleukin-6 receptor protein and gene were heavily researched as a possible target for the treatment and cause of NMOSD, also known as neuromyelitis optica spectrum disorder. NMOSD is an inflammatory disorder in which the optic nerve and spinal cord are targeted, following with symptoms ranging from vomiting and nausea to rapid development of disabilities and visual impairment. Through the use of classical and trans signaling methods and the JAK/STAT gene signaling pathway, cells are able to communicate, however with the mutation of the IL-6 receptor, disorders and lesions occur at a neurological level. Through the use of bioinformatic tools, we dove deeper into the genomic code, both in terms of expression and in comparison to other homologs and orthologs, and viewed the protein structure and genomic layout in an attempt to further study both this receptor and its impact on the nervous system to lead to NMOSD. In addition, we discuss multiple targeted therapies, with a stronger lens at the drug Tocilizumab, and the mechanisms of action with the IL-6 receptor in mind.

Role of IL-23 in Psoriasis Development and Impact of Tremfya (Guselkumab) Treatment

Anila Chundi[1], Lasya Nedunuri[2], Vaishnavi Joshi[3]
Evergreen Valley High School[1], South Brunswick High School[2], Parkland High School[3]

Abstract

Psoriasis is an immune disease in which skin cells develop inflammation and form scales or bumps on the surface of the skin. The IL-23/Th17 axis plays a significant role in the pathogenesis of psoriasis as well as other immune diseases. IL-23 acts as a ligand in the signaling pathway that, when bound to the IL-23R receptor, triggers a phosphorylation cascade to produce more cytokines, thus creating a positive feedback loop that produces endless amounts of pro-inflammatory molecules in the skin. This makes IL-23 an ideal target to inhibit in order to treat psoriasis. This paper reviews how Tremfya(guselkumab) interacts with the protein IL-23 to treat psoriasis, and makes inferences on IL-23's role in perpetuating psoriasis. More specifically, we will discuss the signaling pathways and the genes and proteins involved in psoriasis. We will cover the IL23 isoforms, orthologs, the gene expression and copy number variants of IL23A and IL12B, and the mutation profile of keratins. By reviewing all aspects of the genes and proteins that perpetuate psoriasis, we can determine preventative measures for psoriasis and develop more efficient treatments.

JAK-1 Gene (Tofacitinib)

Krisha Chichili[1], Rushil Prajapati[2], Prerana Somarapu[3]
Lightridge High School[1], Prospect High School[2], Irvington High School[3]

Abstract

Janus Kinase 1 (JAK-1) is a human protein responsible for essential cell signalling in the immune system. JAK-1 plays a role in the proliferation, development, and function of immune cells. Tofacitinib is an oral JAK-1 inhibitor that competes with adenosine triphosphate (ATP) for the ATP binding site. It is commonly used for the treatment of rheumatoid arthritis.. Through major databases such as Ensemble, Cbioportal, NCBI, DICE, and RCSB, 21 different JAK-1 isoforms were discovered, of which, 8 have more than 100 amino acids within their protein chain. Homologs of JAK1 of humans are found in the different organisms, such as chimpanzees, Rhesus monkeys, dogs, cows, mice, Norwegian rats, chickens, frogs, and zebrafish are shown. There are three domains found in the structure of JAK-1, including the pseudokinase domain, the FERM domain and the SH-2 domain. Many mutations were discovered in the Pseudokinase gene.

MAPK Pathway

CaitlinLee[1], DhaanyaGhanta[2], SamyukthaMohan[3]
CAMS High School[1], Brighton High School[2], Bridgewater Raritan High School[3]

Abstract

The Mitogen-activated protein kinase (MAPK) pathway is a chain of proteins in the cell that communicates a signal from a receptor on the surface of the cell to the DNA in the nucleus of the cell which allows growth, proliferation, differentiation, migration, and apoptosis within cells. When certain mutations occur in this pathway and the pathway becomes hyperactive, the doors for cancer formation open, leading to tumor formation, spreading, and growth. In this report we chose to focus on the BRAF gene as well as other relevant proteins such as RAS. We will be discussing the pathway's relevance to cancer and we will also give a general overview as to what exactly the pathway does and how it works. We also researched the isoforms of BRAF and RAS along with their structures. We later dig into the targeted therapies that focus on the BRAF gene and their mechanisms of action.

Role of PARP1 in Breast Carcinoma

Tony Joseph[1], Kush Modi[2], Anthonysujai Anthonydas[3]
Walt Whitman High School[1],The Charter School of Wilmington[2], Washington High School[3]

Abstract:

PARP is a family of genes that are mainly involved in the detection of DNA damage in cells, and in the selection of a repair pathway. PARP, which regulates many mechanisms to repair damaged DNA, is extremely essential as it ensures that the DNA is replicated correctly as cancer cells divide quickly, ensuring tumor proliferation. PARP1, one of the proteins from the PARP gene family, is the protein that this article focuses primarily on. PARP1 addresses the single-stranded breaks (SSBs) in DNA by initially binding to it. While it is binded to the region, the PARP1 transfers ADP ribosyl moiety from NAD+ to acceptor proteins. This causes recruitment of DNA repair protein to the region of DNA breaks. The PARP1 protein may also cause repair of DNA through recruiting the homologous recombination (HR) pathway proteins. The PARP1 protein has opened many doors for targeted therapies, and in order to take a closer look at PARP1's role in the tumor development, this article explores several tools, including Xena Browser, Ensembl, cBioPortal, NCBI Entrez, NCBI BLAST, and UniProt. One of the results is that the PARP1 gene is highly conserved since there were little to no differences between the PARP1 protein sequence in humans, monkeys, chimpanzees, and mice. We also found that the 3 main domains in the PARP1 protein are the N-terminal DNA binding domain, C-terminal domain, and Catalytic domain, and the article explains in more depth the function of each. The mutation profile analysis proved that most of the mutations in PARP1 gene are missense mutations, while the copy number alterations analysis proved that the most common type of alteration is amplification. The article also focuses deeply on the relation between BRCA1 mutations in breast cancer and PARP1 genes. BRCA1, which is also involved in DNA repair through the HR pathway, cannot repair the DNA in BRCA1-mutated cells and the inhibition of PARP1 also prevents the repair of DNA resulting in cell apoptosis. This research of the inhibition of PARP1 leading to reduction of tumor growth led to the development of PARP1 inhibitors. PARP1 inhibitors work using several mechanisms of action,

PDGFA Gene+Avapritinib

Akshat Singh[1], Alex Sriprathum[2], Dennis Zakabluk[3]
Monta Vista High School[1], Mission San Jose High School[2], AdlaiE. Stevenson High School[3]

Abstract:

Understanding the overall genome of cancer is not simple, but by pinpointing a targeted gene, the entire process becomes much easier due to research in biotechnology that eventually led to drug discovery. The PDGFA gene plays a role in the emergence of a long list of malignancies, contributing to the encouragement of metastasis. After many years of the study of the gene itself, scientists have found an impactful treatment—Avaprinib—to inhibit the presence of upregulated expression. Bioinformatics tools have been applied to study the sequence of proteins as well as the frequency of alleles in individuals that have exhibited cancers correlated with the PDGFA gene. Throughout this process, a deeper comprehension has been developed in the manner that the underlying mutations have a correspondence with a list of emerging therapies. The analysis of PDGFA has instilled an intense perception about how complex the human genome really is. In biotechnology, the sequencing of genomes initiated drug development.

The Function and Regulation of Sphingosine-1-Phosphate Receptors in Multiple Sclerosis

Brandon Kwon[1], Abhinav Pasupuleti[2], Akhhill Durainath[3]
Leland High School[1], South Forsyth High School[2], Basis Independent Silicon Valley[3]

Abstract

The S1P receptor is a signaling lipid that plays an important role in regulating cellular processes in mammals, especially in adaptive immunity to modulate T-cell trafficking. In order to fight immune diseases, we could target S1P signaling pathways through drugs or other compounds since this could largely reduce the effects of many immune diseases. But not only would it help in immune diseases it also is an important regulator for inflammation, angiogenesis, vascular permeability, brain, cardiac development, cancer growth, and metastasis since it is a signaling lipid. Therefore, for example, the niche perspective of solving Multiple Sclerosis can be obtained through targeting S1P receptors like Ozonminodid or Fingolimod which was approved in 2010 as the first-line treatment to solve Multiple Sclerosis. Therefore it is imperative to understand the S1P signaling pathway in order to combat and reduce the effect of many diseases that prevail today.

TNF-Alpha

Aadavan Elangovan[1], Aashish Pandya[2], Shreya Sundar[3]
Collierville High School[1], John P. Stevens High School[2], Irvington High School[3]

Abstract:

This report discusses the various aspects and properties of TNF-Alpha. TNF-Alpha is a protein that is expressed in multiple components of the immune system and is thought to be found in the common ancestor of chordates. Various conditions are linked to this inflammatory cytokine, including rheumatoid arthritis and several inflammatory bowel diseases. Numerous monoclonal antibody treatments such as adalimumab and infliximab focus on binding to and inhibiting the implications of TNF-Alpha in various diseases and are discussed in this paper. This report also goes over the genomic sequence of TNF-Alpha, its mutation profile, and its orthologs and paralogs and other bioinformatic analysis.

TP53 Gene

Ria Bath[1], Harshika Rajupet[2], Sayara Thomas[3]
Granada High School[1], Independence High School[2], Montgomery Blair High School[3]

Abstract:

The TP53 gene is situated on chromosome 17 and is associated with various components of the cell cycle, including cell passing, cell reaction to DNA harm, separation, and vascular matters. The gene codes for a p53 protein that is present inside the nucleus of cells where it binds to DNA. p53 acts as a tumor suppressor and prevents cells from growing and proliferating in an uncontrolled manner, which is the reason for it being referred to as the "guardian of the genome" by some. As a result of mutations in the TP53 gene, cancer cells may develop and spread throughout the body.

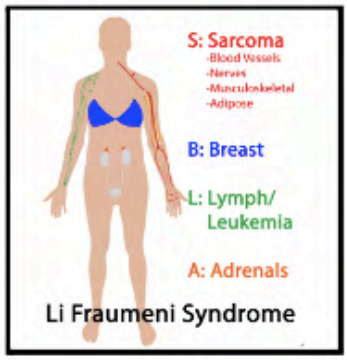


Figure 1: diagram of how Li Fraumeni Syndrome affects the body

Variations and alterations of the gene are found in many kinds of cancer, such as the hereditary disease known as Li-Fraumeni syndrome. Li-Fraumeni syndrome is a disorder that greatly increases the chance of one developing several types of cancer. The cancers most associated with the syndrome include breast cancer, breast cancer, osteosarcoma (bone cancer) , and cancers of soft tissue (soft tissue sarcomas). Other cancers commonly seen in this syndrome include brain tumors, cancers of blood-forming tissue, and a cancer known as adrenocortical carcinoma that affects the outer layer of the adrenal glands.

Analyzing the Role of VEGFa in Glioblastoma

Nikhila Juluri[1] , Vybhavi Kotireddy[2], Nandini Dube[3]
Dublin High school[1], Alpharetta High School[2], Summit High School[3]

Abstract:

This research project focuses on the effects of VEGFa on Glioblastoma, a malignant cancer that affects the brain or spinal cord and develops in astrocytic cells. The gene that is involved with this cancer belongs to the PDGF/VEGF family and has involved multiple signaling pathways including Wnt signaling, Ras and AKT, and PI3K. Using biotechnology tools such as Depmap, Xena Browser, Cbioportal, Ensemble, NCBI, and RCSB, we were able to perform homolog and ortholog analysis and protein feature analysis to generate figures and conclusions regarding the data. It was indicated that VEGF was overexpressed and influenced by epigenetic factors. The paper then discusses targeted therapies, such as Avastin, that are being used to treat Glioblastoma. We included data from published clinical trials that discussed the efficacy rates of Avastin, a drug that inhibits VEGF production which prevents the formation of blood vessels. From this, we found that the average period of time that patients with recurrent glioblastoma were tumor free was around 4.2 months. We also explored data on DCVax, a vaccine that is currently in clinical trials to be used as a treatment by engineering a patient's dendritic cells to attack tumor cells.

Reflections

Ashish Pandya
John P. Stevens High School, New Jersey

In the previous two months, I have been partaking in the 2021 Science Masters Cell Science entry level position, it has profited me incredibly and imparted me with the certainty and abilities fundamental for my future professions, particularly thinking about my arrangement to seek after a vocation in medication and biomedical engineering. The week by week tasks and exercises were incredible methods of keeping my mind sharp throughout the mid year, as they provoked me to give smart and sagacious outlines of intriguing recordings. Applying these stunts and dissecting my own conveyance assisted me with supporting the standards too. The Mentors helped extraordinarily during the last task, where I used certain developments and strategies that I would have in any case not drawn upon. This last task included exploration and utilization of data sets and different devices and innovation which were totally new to me, yet after this undertaking, they are not unfamiliar to me, which is valuable as I will undoubtedly be utilizing them later on. The overall cycle of examination and request are helpful abilities that I will use later on. Assembling an examination paper was difficult work, particularly throughout the late spring, so I accept that my hard working attitude has improved hugely too. Beside personal growth, I extraordinarily partook in the entry level position for the visitor speakers and information gave. Catching wind of various themes and spaces of examination was very intriguing. Dr. Jagath, Dr. Meenakshi, and Dr. Surya gave understanding on their intriguing, various foundations and were motivating for me to hear. I'm appreciative for the time and exertion that the organizers, guardians, and other in the background allies have all been placing into making this temporary job conceivable.

Akhhil Durainath
Basis Independent Silicon Valley, California

In a typical class for Biology, we would learn the basics of what we need to know for tests like AP's. Yes, they were fun, although they were often the same things that we were looking for. With the Cell Science Internship, I Was looking for more in-depth knowledge, which I received regarding the biotechnology field and for cancer. This internship was highly informative with high-achieving people in their respective sections of biology. That was awesome since we understood their perspective and job and seriously made me consider what biotechnology was and clarify my role in entering that field. I enjoyed participating in a smaller group during the Human Diseases and our final project since I didn't feel like a student in a class but rather in a group of friends. In the large group, I felt a bit awkward and did not feel comfortable expressing myself thoroughly. Although, with the immense amount of information given for each session, I often felt overwhelmed for multiple sessions. Especially when certain specialists either had a dry presentation or that I could not interpret. But the knowledge they carried once again was imperative to my learning. The homework before and after classes was elemental to my understanding in class, and I enjoyed some speakers as they clarified doubts that I had in class. Overall, I loved this program, and I would like to work in the future as a PA for this Cell Science Internship to help students experience what we have done.

Anila Chundi
Evergreen Valley High School, California

The Cell Science Internship has taught me a lot about bioinformatics, drug development, and cancer research, all of which shaped my view of how impactful medicine can be on our lives. I enjoyed learning about the signaling pathways that are involved in perpetuating cancer and autoimmune diseases, and how novel drugs such as monoclonal antibodies can specifically target the source of such diseases. I have learned so much about the pharmaceutical industry and biotech companies, and how they work together to create a final product that has the potential to save lives. I also became more aware of how the flaws in the process of creating a proper drug can lead to unreasonably high drug prices. These problems are what inspired me to take an interest in bioinformatics and computational biology, as research in such subjects could aid in personalized medicine, and thus potentially reduce the amount of drug screening and clinical trials that are required and are responsible for high drug prices. I owe it to this internship for motivating me to pursue biotechnology as a career.

Ankitha Kasavaraju
Rock Ridge High School, Virginia

When I first joined the introductory session for the Cell Science Internship, I was very much intimidated. I was so hesitant about joining, drug development and research was something I never got the opportunity to really know about which left me feeing unprepared. However, my qualms about joining were soon called upon the first few sessions where I was able to do the homework assignments and understand the basics. This let me build up knowledge and helped make the difficult assignments easier to understand. School never taught me about the intricacies of drug development and discovery so I was never able to learn about this new career field. But through this internship I was able to learn so much more about this field and the new opportunities I could explore.

Although parts of this internship were challenging, learning them through the guidance of experienced PhD specialists made getting through difficult material much more rewarding to learn. Overall, Dr. Jagath, Dr. Surya, and Dr. Meenakshi had helped make this internship so enjoyable.

Through this internship I was able to learn quite a few things specifically including how to use informational sites such as homologene, ensemble, uniprot, and gTEX, which I otherwise would know nothing about and not be able to understand. I was also able to learn about the specifics of writing a research paper, report, and learned how to deliver effective informational presentations.

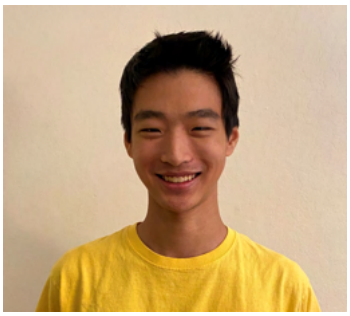
The cell science internship was also able to expose me to several like-minded students, and even though my interaction with them was limited, I genuinely enjoyed small conversations we had through Zoom and the Whatsapp chat.

Overall I would rate my experience in this internship a 10/10, although I do hope that more research projects are added on the side!

Ayush Patel
Irvington High School, California

Before the start of summer, I was extremely worried that I wouldn't be able to get into a good internship because of the unfortunate fact that I was born in July, and all of the internships I found were for individuals who turned 16 before June. As such, I turned to the Cell Science Internship in the hopes that I could gain an opportunity to learn more about some of my favorite subjects. After some time, Mr. Junutula allowed me to join as the only rising junior in the program, and I am extremely grateful for this opportunity. The Cell Science Internship taught me so many things that I didn't understand in much detail, such as the specifics of cancer and drug discovery. I am extremely glad to be able to take part in the Cell Science Internship; if I hadn't been allowed to join, I likely wouldn't have been able to find another opportunity that would provide me with the same wealth of information.

Of the many parts of the program, I think the parts that I most enjoyed were the human disease projects and the final projects. The option to research and present on influenza provided me with even more information about my favorite virus, and the final project taught me a lot about the human immunodeficiency virus, a pathogen that I did not know about. In addition, I got to learn heaps about a new protein that I didn't know much about. The workshops were also very engaging and I can't wait to implement those presentation methods in school presentations.



Brandon Kwon
Leland High School, California

Through the Science Gurus Cell Science Internship, I learned many lessons about biology and how to manage my career. One of the most important lessons that I learned through this internship was the importance of managing my time wisely. I learned that instead of being distracted by entertainment, I must grind out the work that must be done, no matter how hard or how long it takes me to complete the task. I also learned the importance of finding a mentor and how to find one. For a long time in my life, I was struggling to find someone who can help me and teach me the ways of life or a career. However, due to the great presentation given by Dr. Junutula, I finally had the tips and strategies needed to find a good mentor. This internship also opened my eyes to a variety of drugs, technologies, and strategies used by multiple fields of biology and science to combat cancer and help people around the world. I also gained background knowledge on how cancers operate and why they are such a formidable task to take care of such a formidable task to take care of.

Dhaanya Ghanta
Brighton High School, New York

This summer I was able to participate in the annual Science Gurus Cell Science Internship. Covid-19 caused havoc in the world and in personal lives but if I were to look back and choose one positive thing that came out of this experience, it would be having participated in this internship. The school year was very different this year with students not being in person five days a week like we were used to. Classes were different and teachers rushed to finish the curriculum as fast as they can in the little time they had with students. No classes were exempt from this type of situation, even my biology class. Towards the end of the year I felt that I needed to gain more information in biology since I was considering it when I for college. The experience that I had in this internship was like no other in the way that we were able to hear from so many people talking about their respective fields and that we were able to ask all the questions we wanted to. The projects that we did taught me more about scientific research and procedures as well as teamwork and time management. I was also interested in learning about all the bioinformatics tools as it was it was the first time I was exposed to such tools. Being surrounded by many peers made the internship an even better experience and I learned a lot from many of them. I would like to thank Dr. Jagath, Dr. Surya, and Dr. Meenakshi for putting in all the time and effort to make this internship possible to so many of us.

Esther Chu
Oxford Academy, California

The Cell Science Internship has definitely been a unique opportunity for me to learn more about Biology and develop a greater interest for the subject, something that I may possibly never have recognized if I had not taken on this opportunity or been accepted. Of course, when I first started this internship, little did I know what was in store for me since this was a completely different experience from any internship I have ever been a part of. Mainly, the differences laid in the level of passion and thoughtfulness that was placed into the design of the program, the challenge this internship presented, and how in-depth and detailed the internship went into Biology. I learned so much more than what I expected, which was amazing, and I also enjoyed how this internship presented interns with multiple hands-on opportunities such as creating meaningful presentations. I also enjoyed how this internship allowed me to create my first scientific reports in addition to presenting on scholarly biological topics that I would never have been able to do in high school. The well-constructed internship agenda could definitely be seen throughout the program and I appreciate the amount of time and effort that was placed. With that said, thank you so much to Dr. Jagath, Dr. Meenakshi, and Dr. Surya for all the hard work and dedication you all have shown and placed into this program for interns, like myself, to learn and grow! Last, but not least, thank you to everyone who worked behind the scenes for making the Cell Science Internship happen in addition to all the guest speakers and interns who made this a great experience!

Gene Weng
Sayville High School, New York

My original plan this summer did not include the Cell Science Internship. I was originally planning to join a different research program, but I did not get in. However, Dr. Jagath Juntula and Dr. Meenakshi Vengarai graciously accepted me into the Cell Science Internship, almost a month after the deadline. Looking back at it, I'm almost glad that I didn't get in the original program because I learned so much from the Cell science Internship. Through the Cell Science Internship, I learned a wealth of information about biology topics ranging from cancer to drug development. Not only did I learn more about biology, but my work ethic has also greatly improved since I have started this program. When I saw the very first assignment for the Cell Science Internship, I thought I would quit. To me, it looked like a long, complex assignment with a short deadline. However, I pushed through the assignment and acquired a lot of knowledge of cancer. Additionally, the latest research in cancer fascinated me. With each assignment and project, I learned more and more and began to make sense of increasingly difficult topics. For example, I thought that the Hallmarks of Cancer were so advanced until I thoroughly understood them. By the time we had the Human Diseases projects, I was fully aware of the Hallmarks yet confounded by topics like Acute Lymphoblastic Leukemia. Once we began to do our final gene projects, acute lymphoblastic leukemia seemed like an easy concept. All the work that we did in the Cell Science Internship built upon each other in logical and intricate ways, allowing me to dive deep into cancer and biotechnology. I want to thank Dr. Junutula and the Science Gurus team for setting up and carrying out the Cell Science Internship program. I want to also thank the biotech speakers that sometimes took their Friday nights off to speak to us and help us understand their work and research. In addition, I appreciated the Presentation and College Admissions workshops that really assisted me, giving me essential skills, especially at this point of my life.

Heer Nanda
Amador Valley High School, California

Throughout the 2021 cell science internship, I have learned so much new information that I wouldn't have learned in regular school. For example, in class, we generally follow a curriculum and do not get the opportunity to hear about personal experiences and about different scientists. What I found particularly interesting about this program is that I got to meet so many new people, work on several new projects that I wouldn't even think about pursuing outside of school, write a research paper, and learn about and use bioinformatics tools. I am thankful to have learned so much about drug discovery, biology in general, filing and understanding patents, and more. One workshop that stood out to me was Bob Figari's Effective Content Development & Delivery workshop. In this workshop, I was able to learn so much more about myself and people in general. I noticed that I do so many things while talking that I was unaware of. Working on our final projects was extremely fun for me as well since I got to make some amazing friends, and I got to learn and put my knowledge to use. Throughout this program, I got to learn more about Glioblastoma since I did my individual presentation on it and B-cell Lymphomas along with CD20 since I did my final presentation on it. I am super grateful to have done this program since I have come out of this program with many more skills, have improved on myself, and have learned so much important information in the biology/biotechnology field.

Jiyoung Pyo
Miss Porter's School, Connecticut

The past six weeks of my experience with the Cell Science Research Internship have been the most exciting, challenging, and disciplinary weeks. I remember struggling to understand the speakers and homework videos in the first week and half, but as time went on and as I was more exposed to cancer - related topics, I found myself understanding most materials that the speakers brought. In the first information session, Dr. Jagath said that by the end of the session, all interns would be experts in this field. In the first week, I didn't believe it, but now, after completing the internship and the final project, I can now see the improvement I made. When I began the final project, I was sceptical. I didn't know how effective our group would be since I am in the completely opposite time zone. Meetings were often held at 5am (my time), and communication wasn't the best since everything was online. However, I am very content with my group's achievements. Learning about IDH1/Ivosidenib was a difficult but rewarding pro cess. The most challenging part of the project was navigating through cBioPortal, Ensembl, and NCBI. It took me long hours to understand the websites. Overall, I am so happy that I participated in this internship. I learned so much and gained so much confidence

Lasya Nedunuri
South Brunswick High School, New Jersey

The 2021 Cell Science Internship was an incredible experience that I will be eternally grateful for. The wide range of topics covered during the course of the program allowed me to earn a great deal of knowledge and pick up important skills. I thoroughly enjoyed having so many guest speakers who presented on topics including bioinformatics, drug discovery, and cancer in general. The homework assignments were also centered around videos that had a lot of information in them, so I was constantly learning something new, whether it was in or out of class. I also enjoyed the workshops: the college workshop and the Bob Figari presentation skills workshop. I gained an immeasurable amount of knowledge on not only biology, but on how to properly present, write a report, and work with others.

The rigor of this internship taught me time management skills and the ability to focus for a longer period of time. I had to learn how to balance everything in my life to get the work done for the internship because it was a top priority. It was challenging, but I believe that I am incredibly lucky to have been able to seize this opportunity. I did wish that the class timings were more in the morning, as I reside in the East Coast, but it was difficult to coordinate timings with everyone from all over the country. However, this did help me learn to focus later in the night. I was able to make some great friends and connections in this internship and left with so much more knowledge than I entered with.

Lisa Kovacs
Northport High School, New York

Have you decided what you want to major in or study in college? That was a popular question people asked me late in my junior year of high school. I knew I wanted to study the sciences, and was leaning toward the biological sciences, but I was not sure. Then, I was afforded the opportunity to intern in the 2021 Cell - Science Internship Program. Not only did I learn a lot about bioinformatics and cancer research/drug discovery, but in this internship I was exposed to new areas of the biological sciences that now interest me, including molecular biology, neurobiology, and biotechnology. From this program I learned more than just the science, I learned life skills that will allow me to be successful in any career path. I learned the importance of communication (and having the confidence to ask questions and interact with knowledgeable guest speakers), the value of hard work and perseverance, and the benefit of doing background research on a speaker - thank you Dr. Jagath, I already used this valuable tool in inter viewing with an admissions counselor. One of my favorite sessions was with Heather Maecker, Director of Immuno - Oncology at AbbVie, on cancer immunotherapy which discussed a new approach to treating and possibly curing cancer by using the body's natural defense, the immune system, to target the cancer cells. I found this talk very interesting because it introduced an approach to cancer research and treatment I had never heard of. It offered me a new way to look at cancer treatment and showed me the value of creativity and thinking outside the box. Furthermore, I grew as a person as I learned multiple skills to improve my speaking presentation, in particular better eye contact and hand gestures, from Bob Figari founder and CEO of InnerTrek. I also learned the significance of teamwork as I connected and worked with my partners from California and Texas on our final research project on EGFR & Targeted Therapies. Thus, my Cell - Science Internship has been one of my most rewarding and motivational experiences and has left me with a series of technical and personal skills that I know will make me more successful in college, in my career, and as a person. I am very grateful for the opportunity to participate in this program and appreciate all the time and dedication of Dr. Jagath, Meenakshi Vengarai, Surya Narayanan, Anay Limaye, and all the 2021 Cell - Science Internship staff, teaching assistants, and guest speakers

Min Hur
Northport High School, New York

This internship was a roller coaster ride. Some days it was really difficult to absorb the information that was given to us and other days the hours of the lecture went by so quickly. Overall, this internship has provided me an invaluable opportunity to learn more about the biological and scientific field to an extent that I never would have been able to in class. I was able to grow my passion for biological studies and also absorb more knowledge that would provide me with the background I need to further study this field. Even taking it a step further from just the knowledge alone, I was able to learn valuable skills that I will take with me for the rest of my life, ranging from organizational skills to bioinformatic tool usage to time management. The tools that this internship has provided has given me so many opportunities to create beautiful presentations and reports throughout the two months.

Thank you so much for the opportunity to write a research paper using bioinformatic tools I would have never attempted to learn about previously. Thank you for the numerous hours spent to help boost our presentation skills and teach us about different hand gestures. Thank you for taking the time to prepare guest speakers and lectures for all of us interns to learn so much information about so many different ideas in the span of two months. This internship was so rewarding thanks to the hard work of Dr. Jagath, Dr. Surya, and Dr. Meenakshi and so many other individuals who put in their time and sleep into this internship. Thank you for the amazing opportunity and this is a summer internship I will never forget.

Mohana Enugurthi
Canyon Crest Academy, California

The Cell - Science Internship indeed was both a valuable but difficult experience. Walking into the internship on June 7 had me nervous for the amount of commitment that was required to get through the 8 week vigorous regimen of class three times a week with an occasional fourth here and there. But, interestingly I was surprised to see myself committed to the long term program and found my new excuse to avoid leaving my house, “sorry, I've got internship work to do.” I learned that this internship not only cultivated a mindset of growth, but encouraged qualities like discipline, commitment, curiosity, and open - mindedness. Knowing that this internship may not adhere to the more philosophical and liberal arts career I somewhat committed to, I became even mor e confused half way into the program. I am both curious in science and law related subjects, and I hope to use this culmination of interests in my future career choice. I am exceptionally grateful for all the speakers who took the time to spend a few hours of their day to speak with 54 passionate interns. One of my favorite speakers was Heather Maecker who presented on Immuno - Oncology. The passion and dedication that she showed was undeniably an inspiring moment. It was incredible to see how research c an help the human body fight its own body that it constantly recognizes as a foreign object. I also really enjoyed Mr. Robert Figari’s workshop on public speaking and presenting. This was yet again an aspect that was applicable in all stages of life. Mr. Figari was extremely understanding of our concerns and delivered an interactive workshop that nurtured confidence. I was always hesitant in my public speaking capabilities, but with tips and tricks that we learned, I feel more at peace with how to present a captivating speech. Finally, another speaker that I appreciated was Dr. Meenakshi’s talk on bees. As bees are so small and delicate, I could only imagine how attention to detail was a necessity in conducting experiments. I remember being amazed when a bee was placed in a small custom stand and then freed after information was collected. With so much intricacy in such a small animal really had me thinking of all the small moments we miss in such a fast paced world. Thank you to Dr. Jagath, Dr. Meenakshi and Dr. Surya for holding an internship that can be applied in several different parts of life. I was grateful to learn more about myself and about other youth just like me. I can’t believe 8 weeks have gone by so quickly, but I am proud to have made it this far. I appreciate this opportunity, and I hope to give back to the Science Gurus community in the future for all the influence it had on me.

Nandana Varier
John P. Stevens High School, New Jersey

I entered the Cell-Science Internship both curious and confused, unsure of how the internship would operate virtually. However, I was pleasantly surprised as each day of the internship I acquired immense knowledge that was unlike anything I had learned in school. Moreover, I had not expected myself to grasp complex topics such as nanoparticle therapeutics nor behavioral neuroscience. Yet, after each meeting, despite it being past 11 pm in my time zone, I was stunned at the vast array of information the speaker had explained in a clear and engaging manner.

I thoroughly enjoyed every Cell-Science Internship session and follow-up homework assignment. I'm beyond grateful at this invaluable opportunity for it gave me exposure that is not readily available for students at this age. In addition, both the individual project and the final project not only expanded my knowledge but equipped me with the skills necessary to conduct comprehensive research for all future ventures. My time-management skills along with team-working and organizational abilities improved tremendously through these eight weeks.

I could not have asked for a better way to spend eight weeks of my summer and I'm incredibly grateful for the effort invested by Dr. Jagath, Dr. Meenakshi, Dr. Surya, all the speakers, TAs, and every other member that made this internship possible.

Neha Matai
Flint Hill School, Virginia

I have been fascinated by the cross field of Biology and Chemistry since the age of twelve and this interest has grown since then. When I completed a scientific paper on oncogenic viruses and a potential CRISPR treatment last year, I realized that I was pi ning to understand more about the pharmaceutical industry and drug discovery side of cancer treatments. After searching for many months, I was lucky to stumble upon the Science Gurus Cell Science Internship website and I decided to apply. Today, I am so th ankful that I did apply for a number of different reasons. Firstly, the passion that Dr. Jagath, his fellow organizers, and the guest speakers that we heard from is nothing short of purely inspiring. Secondly, I am proud to walk away from this amazing expe rience knowing that I now have both a well - rounded and deep insight into the pharmaceutical industry. Not only did I nurture my interest in cancer drug discovery, but I was also exposed to the business aspect of the broader biotech industry as well as the many new technologies that are emerging through the collaboration of different stem fields. Overall, this internship was a life changing experience and the highlight of my 2021 summer. I am truly thankful for everyone who made it possible.

Nikhila Juluri
Dublin Highschool, California

I had joined the Cell Science Internship to learn more about my passion for science. But I ended up getting a lot more out of this program. I was able to learn topics that have never been covered in my school curriculum. The best part of this learning process was that I was able to explore and find the answers myself. It was different from the regular teaching methods where the answers are given to you, because this internship simply gives you the tools needed but the ultimate final product is up to you. I believe that this led me to better understand the topics we were taught and helped me become interested in the curriculum. The best part of how we were taught is that the lectures we were given were from people who were experts in their fields, so that we could also see how these processes were applicable in their lives.

On top of learning new material, I was also able to develop my writing skills. Previous to this internship, I never had experience writing a scientific research article and I most likely would not have had the opportunity to do so. But by partaking in this program, I was able to write two research papers and learned more about biotechnology. In addition to this, I feel that my presentation skills have also improved through the workshops that we attended. I learned how to properly put together a good slide deck and how we were supposed to use hand gestures to enhance our presentations.

This internship has been a wonderful experience and I am so glad I participated in it. But none of this would have been possible if it wasn't for the hard work put in by Dr. Jagath, Dr. Meenakshi, and Dr. Surya and the countless others who put in their valuable time to bring this program to us. Thank you all so much for your time and dedication to helping us succeed!

Rushil Prajapati
Prospect High School, California

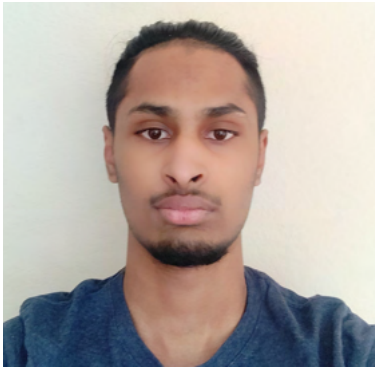
For a long time, I have had a fierce passion for biology. It was always my favorite thing to study in school and has become my dream to peruse a career. However, after going through the cell science internship, I found out that I wanted to make this my life, not a job. I will be forever grateful to Dr. Jagath and his team for providing me with opportunities to learn more about cancer and bioinformatics tools, that I am sure I would have never learned about in school and college. Providing this foundation has given me a greater understanding of the field of biology and the process of drug development from a biological perspective, but financial and judicially as well. Bob Figari's workshop helped me better speak and present, which I always feared. The inclusion of IPs helped my understanding of what goes through the creation of patents. I am also grateful for the homework assignments that made me sharpen my self-study skills, which I no doubt will need in the future. This Internship not only helped me progress my understanding of drug development but also helped me progress as a person.

Sebastian Lira
Seven Lakes High School, Texas

I truly enjoyed the Cell Science Internship. I was exposed to a grand and exciting new perspective on science and its applications to the real world. I found great respect and interest in drug development and the dedication and compassion scientist must have to an idea. I made new connections to kind individuals all across the country and was able to collaborate and create presentations and papers I would've been unable to create by myself. Most of all, I found understanding complex and futuristic aspects of cell science to be extremely rewarding and saw how this could open up many opportunities in my future. I am thankful for the Science Gurus team for this program and was glad I attended and was surrounded by diverse and dedicated students.

Shreya Krishnan
Westford Academy, Massachusetts

I joined the Cell-Science Internship to learn more about the field of biotechnology, but this internship provided me with so much more than just that. During these 7 weeks, I was able to acquire knowledge on not only biotechnology, but also human diseases, public speaking, clinical trial design and execution, and business development to name a few. In addition, these topics were covered with so much detail, making them highly informative and thought provoking. The amazing guest speakers that were organized took learning this new material to the next level. Each presentation was different from one another and exposed me to so many areas within science that I would not have otherwise had the opportunity to learn about. They all had their own unique and interesting stories, and I am so grateful that they all took the time to speak at our sessions. Along with meeting the fantastic guest speakers, it was also nice to meet like-minded high schoolers. During this internship, I got to work with a diverse set of individuals who were interested in many of the same things as me. I also learned from my peers through their wonderful presentations and thoughtful questions. Finally, I am so thankful for all the hard work and effort that Dr. Jagath, Dr. Meenakshi, Dr. Surya and the rest of the Science Gurus team put into making this internship possible and being there for me and all the other interns.



Sriamsh Nallabelli
Evergreen Valley High School, California

This cell science and cancer research internship has been a very enriching and memorable experience for me. Going into this internship, I had somewhat mixed feelings; even though I signed up for it, it was the first time I had ever done research on a subject to this extent, and I didnt know what to expect. Dr.Jagath's standards seemed very strict in the beginning, but as time went on, I slowly realized the importance of why this internship was structured the way it was. The various mentors who came and presented about important subjects unique to the medical industry, really opened my eyes to how big it truly is. Not only was it an educational experience in the field of biology, it was also a very good life experience. Dr.Jagath's strict expectations engraved the concepts of timeliness, time management, teamwork and proper communication in me. While I was faced with a roller coaster of emotions and states of mind going through this internship due to its rigor, I can most definitely say that I am willing to do it all over again. I am very grateful for being presented with such an amazing opportunity and I will be sure to take this experience and make the best out of it moving forward in life.

Tony Joseph
Walt Whitman High School, Maryland

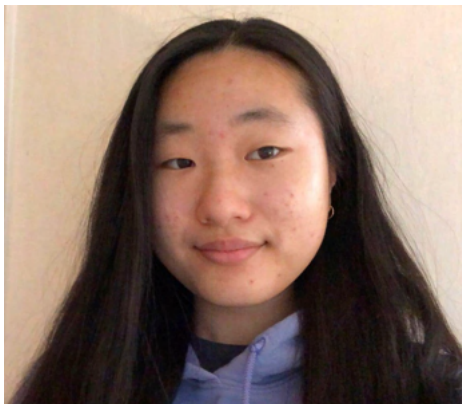
When I first sent in my application to this program, I was hoping to find an experience that would introduce me to the research aspect of medicine. Little did I know, this opportunity was much more. Between the amazing mentors, wonderful guest speakers, and various projects, my whole perspective on medicine has been changed. In the first project, I had the chance to research Hodgkin's Lymphoma, atopic I would not have delved deep into before. In addition, along with Bob Figari's public speaking workshop, I was able to improve my presentation and speaking skills. When presenting my final project on the PARP1 gene, I had the opportunity to apply these tips and immediately see the difference in my message and tone throughout the presentation. However, this internship was more than just a learning experience. It was a chance to form connections, find mentors, and find my passion. Working with my team on the final project allowed me to form strong connections with my peers. Additionally, working with the Cell Science Internship, consisting of Dr. Jagath, Dr. Meenakshi, and Dr. Surya and the TAs, I was able to find the mentorship and guidance to help find and lead me in the right directions. These past 8 weeks in the Cell Science Internship program led by Dr, Jagath Junutula has been a truly eye-opening opportunity that has both allowed me to grow as a researcher and as an individual. Every session, whether it be a guest talk or learning bioinformatics tools, was enlightening in the sense that every individual is unique-yet, all strive to reach one common goal: to help others. Whether that be through leading innovation in the pharmaceutical sector or even just helping students to find their passion, I have always come back to the same conclusion: to help yourself is to help others and give back to your community. Such realization from this internship program both reinforced my motivations to enter the biotechnology/medical field, but also reminded me of what this career path entails: to save the lives of others. Itis with this mindset and the lessons I have gained from Dr. Junutula's internship that I take to conquer whatever lies in my future.

Vaishnavi Joshi
Parkland High School, Pennsylvania

In the past two months, I have been taking part in the 2021 Science Gurus Cell Science internship, and I believe that it has benefited me greatly and instilled me with the confidence and skills necessary for my future careers, especially considering my plan to pursue a career in medicine and health- oncology, to be specific. The weekly assignments and activities were excellent ways of keeping my brain sharp during the summer, as they prompted me to provide thoughtful and insightful summaries of fascinating videos. The human disease presentation provided not only a great opportunity to learn more about Non Hodgkin's Lymphoma, which I would otherwise not have investigated so deeply, but this presentation also offered me an opportunity to improve my public speaking and presentation delivery skills. On the subject of presentation delivery, the workshop by Bob Figari helped me immensely as well, as it provided me with tips and tricks that I have not heard anywhere else. Having to apply these tricks and analyze my own delivery helped me reinforce the criteria as well. This workshop helped greatly during the final project, where I utilized certain movements and tactics that I would have otherwise not drawn upon. This final project involved research and usage of databases and other tools and technology which were completely new to me, but after this project, they are not new to me, which is useful as I will most likely be using them in the future. The general process of research and inquiry are useful skills that I will be using in the future. Putting together a research paper was hard work, especially during the summer, so I believe that my work ethic has improved immensely as well. Aside from self-improvement, I greatly enjoyed the internship for the guest speakers and knowledge bestowed. Hearing about different topics and areas of research was extremely fascinating. Dr. Jagath, Dr. Meenakshi, and Dr. Surya gave insight on their interesting, diverse backgrounds and were inspiring for me to hear. I am grateful for the time and effort that the coordinators, parents, and other behind-the-scenes supporters have all been putting into making this internship possible.

Vybhavi Kotireddy
Alpharetta High School, Georgia

The Cell Science internship has allowed me an opportunity to delve deeper into the field of bioinformatics and drug discovery, while encouraging me to synthesize and analyze different sources and tools. Throughout this program, I have become increasingly interested in targeted drug therapies and its valuable applications in the field of medicine. The speakers' presentations were extremely valuable, as we received information and advice from leaders in their fields. The experiences from this internship were unique to me because I was able understand the level of passion behind the program and assignments, the challenges we were presented, and the learning curve that was presented. Being able to present about a highly complex topic, while collaborating with like-minded peers, was an experience that offered the steep learning curve and allowed me to realize that impactful science and analyses can be performed with existing open-source tools. I really appreciated the strict schedule and organization of the program, allowing me to understand the logistics from the beginning. I also appreciate the time that the mentors and speakers spent to organize this program



Yejin Lee
Lowell High School, California

The cell science internship was definitely an experience that changed my perspective on biology and life. At first, I was hesitant about joining the internship due to high expectations of commitment, creativity, collaboration, and communication Dr. Jagath and his team had. However, I realize how important these standards are. They are the basis of being a part of any team, organization, program, relationship etc. I also learned from the program the importance of forming a network and how it is not only beneficial for me in the long run, but also rewarding to meet and learn about new peers around the country. Moving on to biology, this program has opened my eyes to the world of biology. I always believed I was not fit to have a career in biology, but through the various guest speakers I learned that biology was not a one way street, but the roots of a large tree with thousands of branches into various fields of interests. The speakers inspired me with their passion for their work and I learned that although I may not completely know what my career will be, I know that the field of biology incorporates a little bit of everything. I am truly blessed to have been given the opportunity to take part in this inspiring and life-changing program.