CDCL
Centro para el Desarrollo de Competencias Lingüísticas
Universidad de Puerto Rico, Recinto de Río Piedras

¿Cómo funciona el programa de internados para estudiantes subgraduados?

Objetivos

Centro para el Desarrollo de Competencias Lingüís
Universidad de Puerto Rico, Recinto de Río Piedras

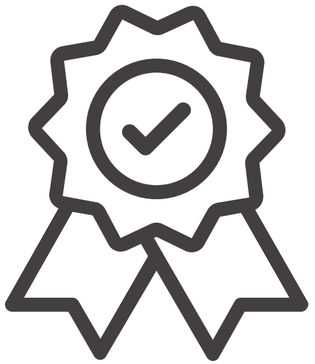
- Examinar los diferentes internados disponibles de investigación.
- Conocer los requisitos para solicitar internados.
- Explorar los beneficios que ofrecen los internados.
- Mostrar ejemplos que sirvan de guía en la solicitud de oportunidades académicas.
- Presentar algunos enlaces de interés en la solicitud de oportunidades académicas.

Oportunidades Académicas

CDCL
Centro para el Desarrollo de Competencias Lingüís
Universidad de Puerto Rico, Recinto de Río Piedras

Internados de investigación

Intercambios estudiantiles



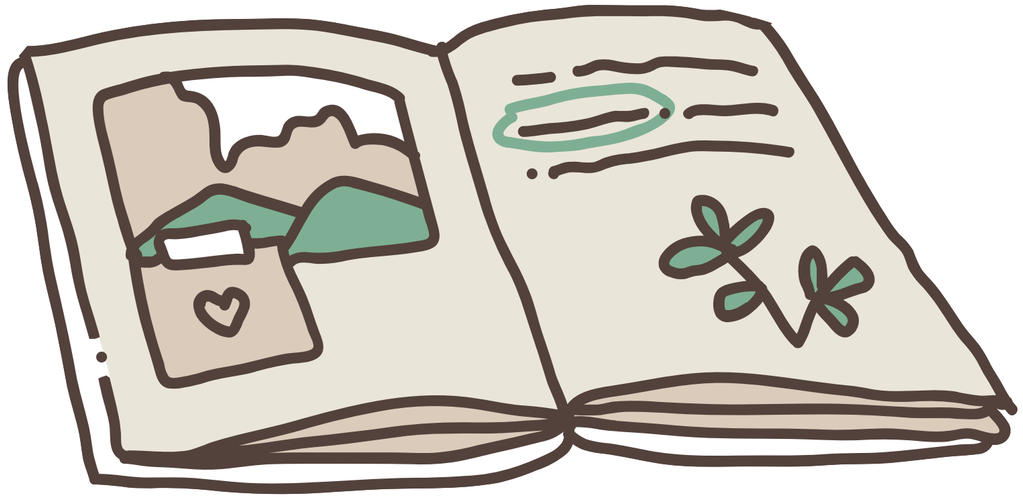
Becas

Oportunidades de Internado

Centro para el Desarrollo de Competencias Lingüís
Universidad de Puerto Rico, Recinto de Río Piedras

¿Por qué solicitar un internado de verano?

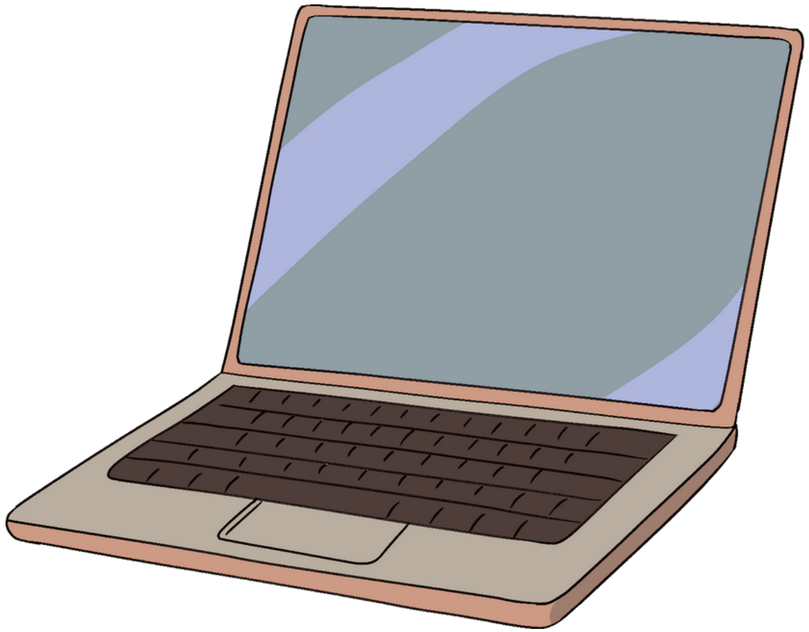
- Experiencias académicas
- Beneficios económicos
- Fortalecer tu Currículum Vitae
- Presentación de afiches
- Conferencias



¿Qué necesitas para solicitar?

Centro para el Desarrollo de Competencias Lingüís
Universidad de Puerto Rico, Recinto de Río Piedras

- CV o Resumé
- *Personal Statement*
- Cartas de recomendación
- Transcripción de crédito



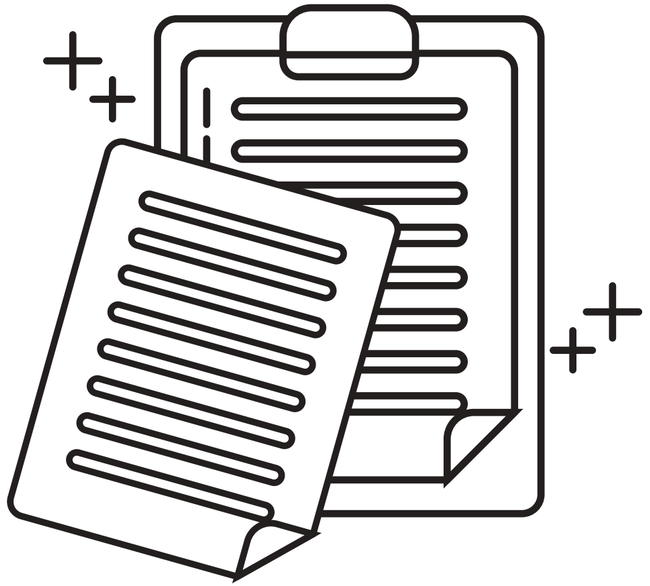
Personal Statement

Centro para el Desarrollo de Competencias Lingüís
Universidad de Puerto Rico, Recinto de Río Piedras

- Es un ensayo en el cual explicas quién eres, tú trasfondo e intereses.

- Debes añadir cualquier experiencia (investigativa/académica) relevante.

- Delimitar tus metas y explicar cómo el ser admitido o admitida al programa te ayudará a desarrollarlas.



Fecha límite para solicitar

Centro para el Desarrollo de Competencias Lingüís
Universidad de Puerto Rico, Recinto de Río Piedras

- Es importante estar pendiente de las fechas límites para solicitar.
- Usualmente las solicitudes comienzan en **octubre, noviembre o diciembre** y terminan en **febrero o marzo.**
- Cada universidad tendrá un periodo diferente para solicitar.

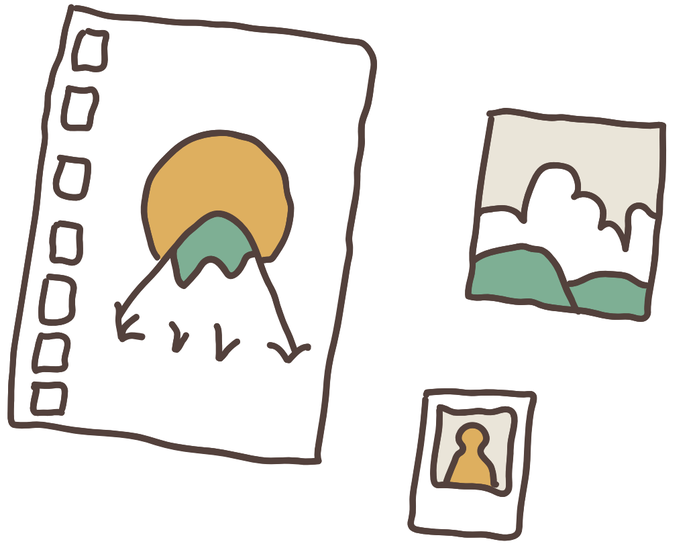
Cartas de recomendación

Centro para el Desarrollo de Competencias Lingüís
Universidad de Puerto Rico, Recinto de Río Piedras

- Debes identificar profesores y profesoras que puedan hablar sobre tus habilidades.
- Usualmente los programas solicitan de **2** a **3** cartas de recomendación.
- Es importante que soliciten sus cartas con al menos **2 semanas** de anticipación.

Beneficios:

- Estipendio
- Comida y alojamiento
- Experiencia
- Talleres
- Presentaciones



Centro para el Desarrollo de Competencias Lingüís
Universidad de Puerto Rico, Recinto de Río Piedras

Ejemplos de beneficios

- Research Experiences for Undergraduates Program
- Eligibility
- Research
- Housing
- Program Schedule
- Application
- Contact Us

CONTACT US

Research Experiences for Undergraduates Program

The University of Michigan Interdisciplinary REU Program (Research Experiences for Undergraduates) in the Structure and Function of Proteins is designed to provide undergraduate students with a 10 week research experience in the areas of biochemistry, biophysics, cheminformatics, computational chemistry, enzymology, marine biology, molecular biology and plant biology. The research projects featured in this program all involve studies of the structure and function of proteins.

REU Faculty Mentors represent the departments of Biochemistry; Chemistry; Medicinal Chemistry; Molecular, Cellular and Developmental Biology; Pathology, Pharmacology and Pharmaceutical Sciences.

Program Dates: May 25 - August 5, 2022
Application Deadline: March 1, 2022 (Extended deadline)
Participant benefits:

- $6000 stipend
- Free housing
- $900 meal allowance
- Scientific communication workshops
- Graduate school preparation workshops and more...

COVID-19 Policies
In accordance with University of Michigan policy for students, staff and faculty, all program participants are required to be fully vaccinated (including recommended boosters) against COVID-19 and must submit their vaccination information. Program regulations regarding the use of face coverings in UM buildings, facilities and laboratories will also be in line with current University of Michigan campus policies.

About the SIREN Program

The Neuroscience Graduate Department hosts the REU Site: Summer Intensive Research Experiences in Neuroscience (SIREN) program. This 10 week program, provides undergraduate students with a research experience in the areas of behavioral and systems neuroscience, cognitive neuroscience, molecular and cellular neuroscience, developmental neuorscience, sensory neuroscience, computational neuroscience, and clinical neuroscience.

Participant Support:

- $6,250 stipend
- Housing provided by program
- $800 meal allowance
- $500 travel allowance for round-trip travel to the program site

Program Dates: May 28, 2023 - August 5, 2023

Application

You can **apply online** starting December 1st. Applications are due January 15, 2022 and will include a personal statement, resume or CV, and unofficial transcript(s).

Letters of Recommendation- two letters of recommendation are required. One letter must be from someone at your current institution. One letter must be from someone who knows you academically (can be from your current institution or a previous institution). If one letter writer fits both criteria a second letter is still required. Letters must be uploaded by January 20, 2023.

Centro para el Desarrollo de Competencias Lingüís
Universidad de Puerto Rico, Recinto de Río Piedras

Ejemplos de internados

Internados

- REU

Research Experiences for Undergraduates

- SROP

Summer Research Opportunities Program

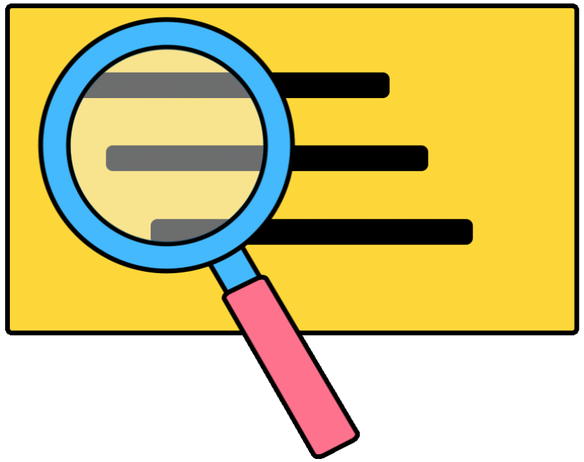
- UROP

Undergraduate Research Opportunity Program

CDCL
Centro para el Desarrollo de Competencias Lingüís
Universidad de Puerto Rico, Recinto de Río Piedras

Centro para el Desarrollo de Competencias Lingüís
Universidad de Puerto Rico, Recinto de Río Piedras

Criterios de eligibilidad



SROP Eligibility

Please note: The SROP program is not for students pursuing professional degrees such as law, medical, and MBA degrees. Students who have completed an undergraduate degree are not eligible.

Students wishing to participate in SROP must meet all of the following criteria:

- Have a cumulative GPA of 3.0 or higher (4.0 scale)
- Be a citizen or a permanent resident of the U.S.
- Be enrolled in a degree-granting program at a college or university in the United States, Puerto Rico, or other U.S. territory
- Have completed at least two semesters of undergraduate education by the time of the summer experience
- Have at least one semester of undergraduate education remaining after completing the summer research experience
- Have a strong interest in pursuing a Ph.D.

Selected participants will be expected to complete 40 hours of research each week. Participants must be willing to devote full-time to the program during the eight- to 10-week session. Due to the intense research schedule, SROP participants are not allowed to work an additional job during the summer program.

CDCL
Centro para el Desarrollo de Competencias Lingüís
Universidad de Puerto Rico, Recinto de Río Piedras

Centro para el Desarrollo de Competencias Lingüís
Universidad de Puerto Rico, Recinto de Río Piedras

Búsqueda de internados

Research Experiences for Undergraduates (REU)

- REU Program Overview
- Program Solicitation
- Search for an REU Site
- For Students

For Faculty

- REU Contacts

Home

Search for an REU Site

- Astronomical Sciences
- Atmospheric and Geospace Sciences
- Biological Sciences
- Chemistry
- Computer and Information Science and Engineering
- Cyberinfrastructure
- Department of Defense (DoD)
- Earth Sciences
- Engineering
- Ethics and Values Studies
- International Science and Engineering
- Materials Research
- Mathematical Sciences
- Ocean Sciences
- Physics
- Polar Programs
- Small Business Innovation Research (SBIR)
- Social, Behavioral, and Economic Sciences
- STEM Education

CDCL
Centro para el Desarrollo de Competencias Lingüís
Universidad de Puerto Rico, Recinto de Río Piedras

University of Michigan Summer Programs

Centro para el Desarrollo de Competencias Lingüis
Universidad de Puerto Rico, Recinto de Río Piedras

- Big Data Summer Institute
- Cardiovascular Center Summer Research Fellowship
- Cancer Research Summer Internship Program (CaRSIP)
- Department of Pharmacology Summer Research Programs
- Interdisciplinary Research Opportunities in Biophysics
- Neuroscience Undergraduate Research Opportunity (NURO)
- Perrigo/Life Sciences Institute (LSI) Summer Fellows Program
- Physics Summer Research Experience for Undergraduates
- Summer at Michigan for Undergraduate Research Training UM-SMART
- Short Term Educational Program (STEP) towards Digestive and Metabolic Physiology
- Molecular and Integrative Physiology Summer Undergraduate Research Fellowship (SURF)

UNIVERSITY OF MICHIGAN

Presentación de afiches

Centro para el Desarrollo de Competencias Lingüís
Universidad de Puerto Rico, Recinto de Río Piedras

- Durante tu internado, estarás realizando una investigación sobre un tema de tu interés.
- Al final de tu internado, presentarás los resultados de tu investigación mediante una presentación de afiche durante un simposio.
- Por ende, aprenderás a preparar tu propio afiche de investigación.

Centro para el Desarrollo de Competencias Lingüís
Universidad de Puerto Rico, Recinto de Río Piedras

Ejemplos de afiches

Genome Instability of Human Centromere Sequences

Nashley Fuentes-Sanabria[1]; Rafael Contreras-Galindo, PhD[2]
Department of Biology, University of Puerto Rico at Arecibo[1]; Department of Internal Medicine, University of Michigan[2]

OHEI

Centro para el Desarrollo de Competencias Lingüís
Universidad de Puerto Rico, Recinto de Río Piedras

INTRODUCTION

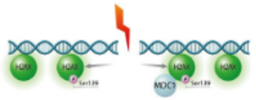
The integrity of the genome is critical for the propagation of genomic information to following generations. Genome instability is known as an increased tendency of the genome to acquire mutations. DNA mutations are defined as irreversible changes caused by the misrepair or erroneous replication of the nucleotide sequence containing the lesion. The mechanisms leading to genome instability include inherited or acquired defects in DNA repair, DNA replication, cell cycle control or chromosome segregation. Genome instability is represented by either nucleotide substitutions, nucleotide deletions or insertions, DNA breaks, and/or abnormal numbers of chromosomes (aneuploidy). A variety of exogenous genotoxic agents, such as ultraviolet light, oxidative stress and chemical mutagens, can induce DNA breaks leading to a loss of genome integrity. In response to DNA breaks, the DNA repair machinery recruits γ-H2AX at the site of the break followed by DNA repair enzymes.

In this study we tested the effect of DNA damage at the centromere. The centromere is the condensed region within the chromosome responsible for the accurate segregation of the replicated chromosomes during mitosis and meiosis. During mitosis, the centromere is the structure to which the spindle fibers bind to pull apart the chromatids to opposite poles of the cell. Failure to do any of these functions results in chromosome missegregation. The effects of DNA breaks at human centromere sequences and the DNA repair pathways that would correct them remain unknown.

BLEOMYCIN: CHEMICAL MUTAGEN

An example of a chemical mutagen than can cause DNA breaks to the cells is bleomycin. Bleomycin sulfate is a water soluble anticancer chemotherapeutic agent commonly used to treat Hodgkin lymphoma. Bleomycin acts as an anticancer agent by causing single and double stranded breaks (DSBs) in the DNA.

DNA BREAKS: γ-H2AX ACTIVATION



H2AX is a histone H2A variant composed of a central globular domain, an N-terminal tail and a unique C-terminal tail consisting of an evolutionarily conserved motif. This motif contains the omega-4 serine that is phosphorylated upon DSB formation. In response to genotoxic stress, the H2AX is phosphorylated (γ-H2AX), and it can be visualized using an anti-γ-H2AX antibody. H2AX play synergistic roles in DNA damage responses.

BACKGROUND

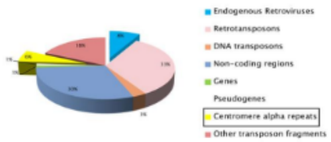


Figure 1: Centromere repetitive elements

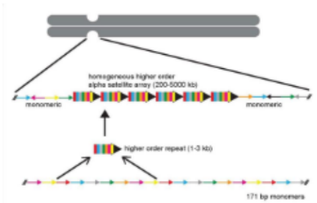


Figure 2: Composition of the Human Centromere Sequences

The centromere is composed of consecutive blocks of 171 base-pair (bp) units termed alpha-satellite DNA that can extent megabases of nucleotide sequence. Every human centromere has a distinct array of alpha satellites.

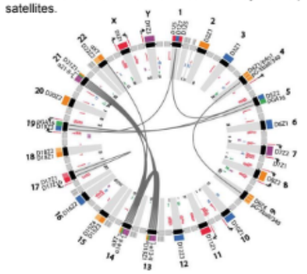


Figure 3: Alpha-repeats in human chromosomes

An integral number of alpha repeat monomers give rise to a higher order repeat array that is specific for each chromosome.

METHODS

Time exposure (h)	0 µM	1.7 µM	3.5 µM	7.0 µM
1	Replicated 90% confluent	Replicated 15% death detach	Replicated 20% death detach	Replicated 5% death confluent
2	Replicated 90% confluent	Replicated 10% death detach	Confluent replicated 25% death detach	Replicated 40% death arrested
3	Replicated 90% confluent	Replicated 15% death detach	Replicated 10% death arrested	Replicated 20% death arrested

For this experiment, we made two cell culture plates of Bj-5ta cells. Cells were treated with bleomycin at the following concentrations: 0 µM, 1.7 µM, 3.5 µM and 7.0 µM. The negative control cultures were treated with vehicle only. In one of the plates, cells were harvested 1, 2, and 3 hours post-exposure and the proteins isolated for γ-H2AX Western Blotting. The other plate was cultured for 24 hours after Bleomycin treatment to allow recovery. The size of human centromeres arrays was measured by qPCR in DNA isolated from treated cells.

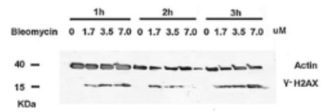


Figure 4: Activation of γ-H2AX in Bj5ta cells upon DSBs induced by Bleomycin

A western blot was used to confirm that the DNA breaks were induced. The blot shows that Bj-5ta cells treated with bleomycin have higher γ-H2AX concentrations.

RESULTS

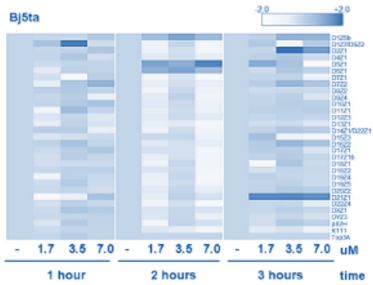


Figure 5: Centromere Instability after DSBs

Real-Time PCRs were made to assess the size human centromere arrays in all chromosomes based on the content of DNA alpha repeats. The size of centromeres in treated cells was compared to the untreated cells.

CONCLUSIONS

- Bleomycin induced centromere instability in every treatment condition.
- Bj-5ta cells treated with bleomycin presented major deletions and insertions of megabases in length.
- Treatment of 7.0 µM bleomycin at 2 hours of exposure. produced major deletions of centromere arrays
- DNA repair pathways of Homologous Recombination or Non-homologous End joining appear to be involved in producing large deletions or insertions.

REFERENCES

- Aldrup-MacDonald, M. E., and Sullivan B. A. (2014) *The Past, Present, and Future of Human Centromere Genomics.* Genes (Basel). Jan 24;5(1):33-50.
- Hayden KE. (2012). *Human centromere genomics: now it's personal.* Chromosome Res. 2012 Jul;20(5):621-33.
- Langie, A.S et al. (2015) *Causes of genome instability: the effect of low dose chemical exposures in modern society.* Carcinogenesis. Jun;36 Suppl 1:S61-88.
- Scarpato, R et al. (2013) *Kinetics of nuclear phophorilazion (γ-H2AX) in human lymphocytes treated in vitro with UVB, bleomycin and mitomycin C.* Mutagenesis. Jul;28(4):465-73.

Evaluation of the synaptic proteins expressed in rods versus cones synapses

Nashley Fuentes-Sanabria[1]; Justin Elem, Joseph Laird, and Sheila Baker[2]
[1] University of Puerto Rico at Arecibo, Department of Biology; [2] University of Iowa, Department of Biochemistry

INTRODUCTION

Retina

- Layer of nervous tissue that covers the inside of the eyeball, in which light pass through to reach the photoreceptor cells

Photoreceptors

- Rods - Represent 97% of all photoreceptors in the human or mouse retina and are used for night vision, by translating the light information into electrical impulses that travel through the synapses to the bipolar neurons.
- Cones - Represent the other 3% of all photoreceptors but are used the majority of the time for seeing in daylight, detecting colors, and providing high acuity vision.

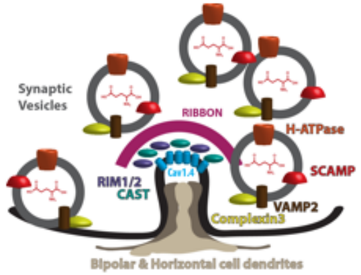
Synapses

- Rod synapse - Rods have a synapse in the shape of the spherule.
- Cone synapse - Cones have a much larger synapse in the shape of a pedicle.

Figure 1: Rod synapse

Figure 2: Cone synapse

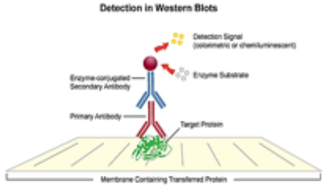
The synaptic proteins evaluated in this study:

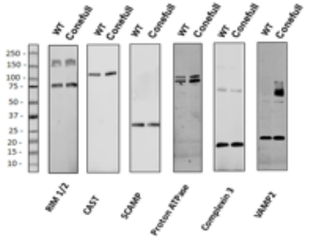


- **RIBBON** – a filament that helps to organize synaptic vesicles
- **Cav1.4** – a calcium channel needed for development of the synapse and to let calcium enter the synapse to trigger release of glutamate from synaptic vesicles
- **RIM 1/2** – Scaffold proteins that link the calcium channels to CAST
- **CAST** – Scaffold proteins that link RIM1/2 to the ribbon
- **SCAMP** – Secretory Carrier Membrane Protein 1, a protein that helps to form synaptic vesicles in the correct shape
- **Proton ATPase** –an enzyme that acidifies the inside of synaptic vesicles
- **VAMP2** – a SNARE protein on vesicles needed for the vesicle to fuse to the plasma membrane
- **Complexin 3** – Regulates the calcium dependent activation of SNAREs (i.e. VAMP2)

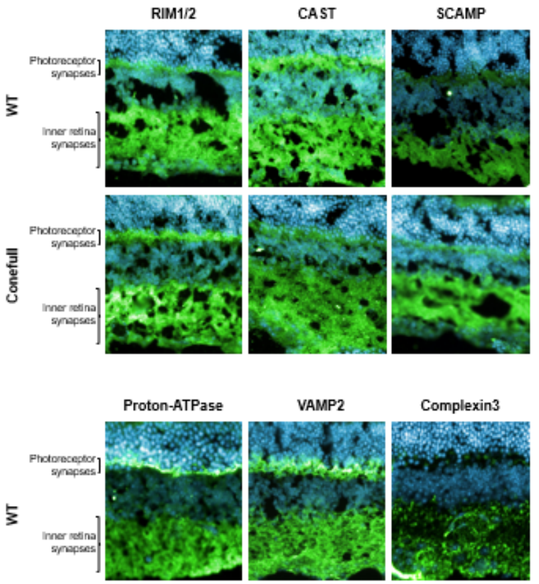
WESTERN BLOTTING

Western Blot was used to evaluate the *presence* of individual synaptic proteins
Then Immunohistochemistry was used to determine *where* in the retina the synaptic proteins are found





IMMUNOHISTOCHEMISTRY

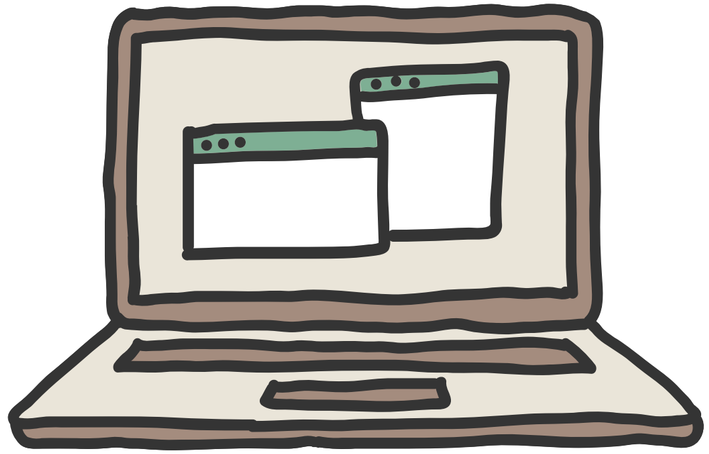


CONCLUSIONS

- By Western blotting, all of these synaptic proteins were found in both WT and conefull retinas.
- With IHC, all of the synaptic proteins tested in this study were found in the outer synaptic layer in both WT and conefull mice.
- It is therefore possible that therapies designed to improve photoreceptor synaptic function will work for both rods and cones.

Enlances

- https://btaa.org/resources-for/students/srop/eligibility
- https://ohei.med.umich.edu/files/mhsura-groupjpg
- https://www.nsf.gov/about/research_areas.jsp
- https://cre.fsu.edu/undergradresearch/urop
- https://grad.uiowa.edu/dei/srop



¡Gracias por utilizar los servicios del CDCL!

CDCL
Centro para el Desarrollo de Competencias Lingüísticas
Universidad de Puerto Rico, Recinto de Río Piedras

Conozca más sobre nuestros servicios virtuales:
http://generales.uprrp.edu/competencias-linguisticas/