TRANSFERRING THE BREAST CANCER SUMMER RESEARCH EXPERIENCE TO THE CLASSROOM

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ROLE OF SEPT9_V1 IN THE CELL DIVISION PROCESS OF THE TRIPLE NEGATIVE INFLAMMATORY BREAST CANCER CELL LINE SUM149

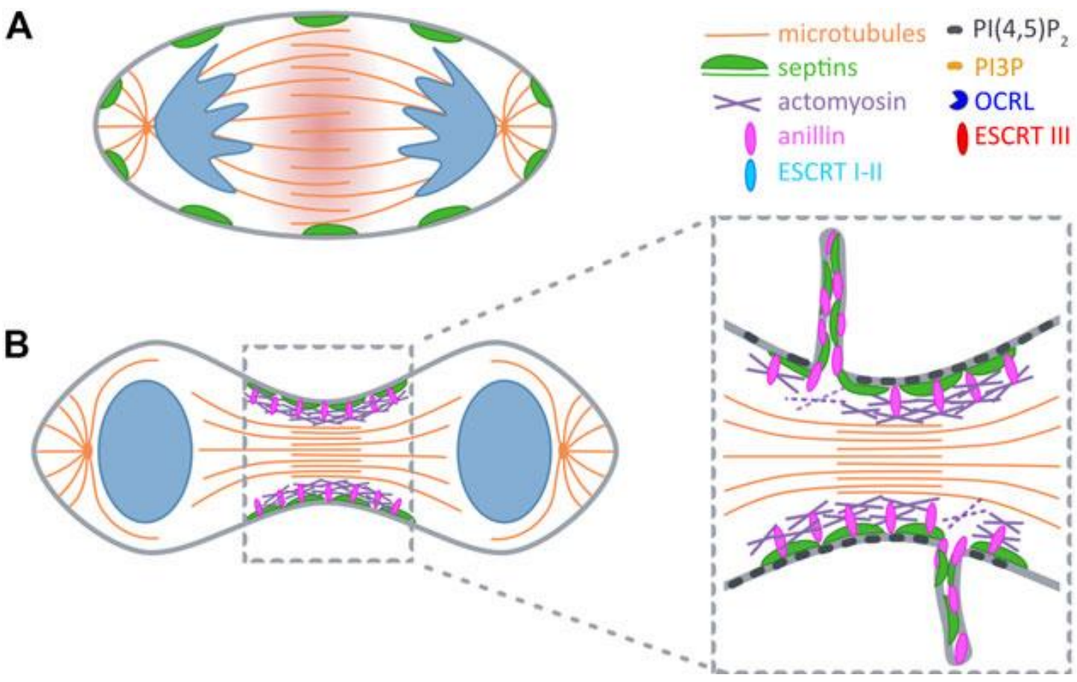
SEPT9

- Cell cycle-related protein
- Involved in many biological processes such as cytokinesis, polarization, vesicle trafficking, membrane reconstruction, deoxyribonucleic acid repair, cell migration, and apoptosis (Sun et al, 2020)
- May serve as a marker for early screening, diagnosis, and prognosis of some malignant tumors, and have the potential to become a new target for anti-cancer therapy (Sun et al,2020)

- **SUM149**
  - Is a Triple Negative Inflammatory Breast Cancer (IBC) cell line
    - Triple negative breast cancers are cancers whose cells don't have receptors for the hormones **estrogen** and **progesterone** and **Human Epidermal Growth Factor Receptor 2 (HER2).**

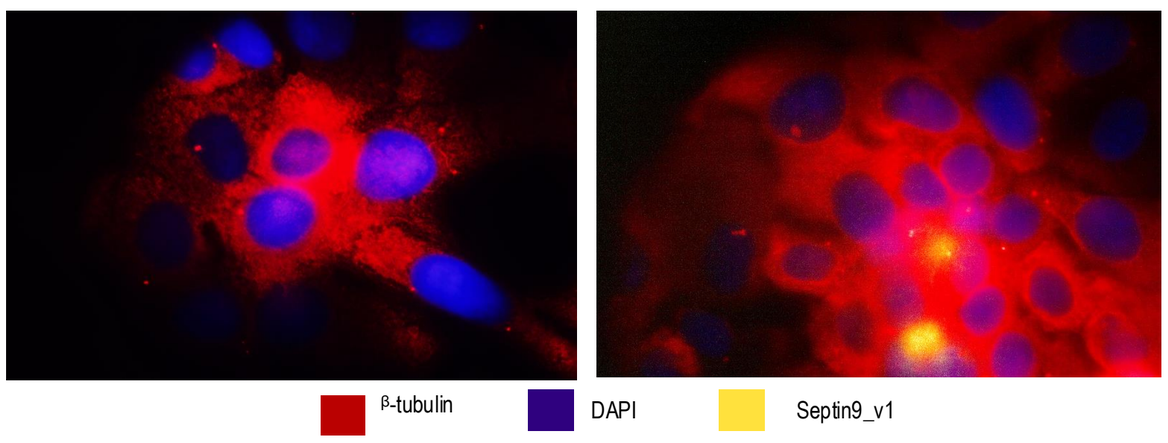
AIM 1:

- Determined the role of SEPT9_v1 protein in the cell division process of the triple negative inflammatory breast cancer cell line SUM149.
  - Do immunofluorescence to detect Septin 9 in SUM149; treat cells with colcemid to detect Septin 9 in cells arrested in metaphase.
  - Use procyanidin B3 as a Potential Inhibitor of Human Septin 9 (Vakhrusheva e*t al*, 2021) and see the effects over SUM149.

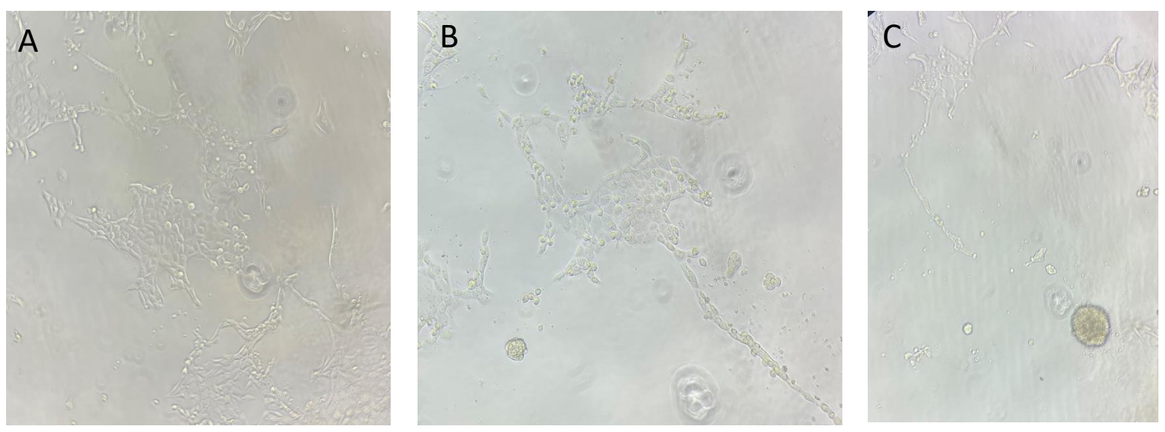


Russo & Krauss (2021)

Immunofluorescence of SUM149 treated with COLCEMID to arrest SUM149 cells in metaphase for the detection of Septin9_v1



Treatment with Procyanidin B3 to inhibit Septin9_v1



SUM149 cells treated with Procyanidin B3 and COLCEMID after 24 hours. (A) SUM149 cells non treated with Procyanidin B3 and treated with Colcemid; (B) Cells treated with Colcemid and 12.5 µM Procyanidin B3; (C) Cells treated with Colcemid and 200 µM Procyanidin B3

IMPORTANCE OF PRACTICE, RELEVANCE AND TEACHING RESOURCES: USING THE TOPIC OF CARCINOGENS TO DEVELOP BERKLEY'S RESEARCH COMPETENCIES IN PUERTO RICAN HIGH SCHOOL STUDENTS

AIM 2:

- Create a Carcinogens class module to transfer the acquired knowledge in the research experience to the classroom; and use Action Research to demonstrate the effectiveness of it.
  - Prepare metaphase spreads from SUM149 cells.
  - Design didactic material: Cell cycle, Mitosis, Meiosis and syndromes and abnormalities
  - Construct educational instruments to measure students previous and acquired knowledge.

Metaphase Spreads SUM149

Metaphase Spreads of SUM149 cells treated COLCEMID.

Carcinogens

Physical | Biological | Chemical | Environmental

Alan Berkley Thomas' (2004) list of competencies:

- Have specialized knowledge in your field
- Understand related topics
- Know how to search for information
- Design and conduct research
- Understand research methods
- Obtain numerical and qualitative data
- Write and summarize texts
- Persuade and make logical arguments
- Speak in public
- Be proficient with technology
- Plan and manage time
- Work well with a supervisor
- Gain support from others
- Make connections and network
- Know research standards
- Be creative and innovative
- Understand and control emotions
- Maintain a steady pace
- Adapt to overcome obstacles

Carcinogens Module

- **Theory:**
  - Cancer
  - Carcinogens
  - Common types of cancer
- **Activities:**
  - Lab: Onion Roots exposure to carcinogens to see cells in mitosis.
  - Carcinogens
    - Definition and examples for each type of carcinogens
  - Primary Literature
    - Select a type of cancer and search two different research's related to that cancer.
    - Do a summary of the research papers
  - Research Report
  - Oral presentation
    - 1 minute presentation of results.

CANCER, TYPES OF CANCER AND CARCINOGENS - PRE AND POST RESULTS

20 items form. Administered: First day of activity, before starting to explain activity and at the end of theory of activity. Collected results analyzed by Paired T-Test in Intellectus.

Table 1. Two-Tailed Paired Samples t-Test for the Difference Between Pre and Post

	Pre		Post				
Group	**M**	**SD**	**M**	**SD**	**t**	**p**	**d**
11th	11.39	4.61	15.86	3.93	-7.72	< .001	1.46
11-1	11.33	5.21	14.80	4.71	-4.84	< .001	1.25
11-4	11.46	4.03	17.08	2.43	-6.60	< .001	1.83

For 11th grade: Note. N = 28. Degrees of Freedom for the t-statistic = 27. d represents Cohen's d.
For 11-1: Note. N = 15. Degrees of Freedom for the t-statistic = 14. d represents Cohen's d.
For 11-4: Note. N = 13. Degrees of Freedom for the t-statistic = 12. d represents Cohen's d.