Undergraduate Research Symposium
ADVANCING RESEARCH AND STEM FIELD ENGAGEMENT
PROJECT 40

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Minor: **Chemistry**

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In-vitro Research on the Effects of Ricinus communis and Taxus baccata on Basal Cell Carcinoma

According to the Skin Cancer Foundation, basal cell carcinoma (BCC) is the most common form of skin cancer. It affects more than 4 million Americans every year (0.3%). High incident rates were recorded in Australia with more than 1000 per 100,000 person-years (1.0%), followed by Europe with 98 per 100,000 person-years (0.98%) as well. Although people over the age of 40 are found to be more susceptible to this form of cancer, anyone with an extended sun exposure, light colored skin, blond hair, many moles or even someone with close relatives who have had skin cancer can also be more susceptible. The number of people suffering from BCC is also increasing. In white populations in North America, it has increased by more than 10% a year. Though it is considered treatable, the increasing number of patients with BCC, rising healthcare costs, and lack of dermatologists in certain countries might pose as threats in identifying and treating BCCs, which can lead to reoccurrences, and in severe cases, to death. The goal of this research is to find an alternative or supplemental cure to BCC though in-vitro methods using Urtica dioica, and Ricinus communis. These plants have been shown to be cytotoxic against certain types of cancers, but they were not tested against BCC cells. We will examine the cytotoxic effects of the plants against basal cell carcinoma. The higher rate of cell death of treated cells compared to control non-treated cells will indicate the effectiveness of these plant extracts in killing the cancer cells and may also help determine which one is the better treatment. The extracts from the plants will be prepared in the lab and used. A basal cell cancer cell line, the TE 354.T (ATCC CRL-7762), extracted from the skin of a female was used. It was grown using ATCC-formulated Dulbecco's Modified Eagle's Medium. Fetal bovine serum to a final concentration of 10% was added to the base medium and the cells were placed in an incubator with 5% CO_2 and grown at 37°C. The cells were then split multiple times and grown. Later, the cells were treated with the extracts and tested for effectiveness.

Acknowledgments: ***Dr. Darryl Aucoin; Roksana Korbi***

IN-VITRO RESEARCH ON THE EFFECTS OF URTICA DIOCIA (STINGING NETTLE) ON BASAL CELL CARCINOMA (BCC)

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Purpose

- To test the effects of stinging nettle on Basal Cell Carcinoma.

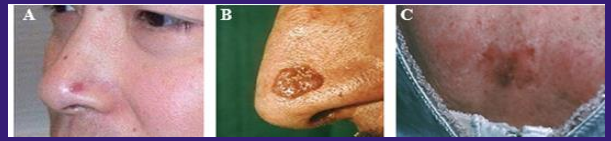

Figure 1: Various stages of BCC. A:Nodular BCC, B:Pigmented BCC, C:Superficial BCC

What is Basal cell carcinoma? Why Stinging Nettle?

- Most common form of NMSC (Non Melanoma Skin Cancer).
- Looks non-threatening but can metastasize and kill.
- Proven to be cytotoxic against various forms of cancer but never tested against BCC.

Materials and methods

- (TE 354.T) was cultured in 10% Fetal Bovine Serum + 2.5µg/mL of Amphotericin B, and 50µg/mL of Gentamicin
- 10% of the medium was replaced with stinging nettle solutions (0.1g/mL, 0.5g/mL,1g/mL and 2g/mL) or with sterile water for negative control.
- The cultures were evaluated on the basis of their confluency, and cell death using light microscope and trypan blue

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INDEPENDENT COLLEGE FUND OF NEW JERSEY

PURPOSE

- To test the effects of Urtica dioica on Basal Cell Carcinoma (BCC).

INTRODUCTION

- Most common NMSC which affects more than 4 million Americans every year (1.2%).
- Anyone above the age of 40, extended sun exposure light colored skin, blond hair, many moles or even someone with close relatives who have had skin cancer can be susceptible.
- Treatable available but there are many threats to it.
- Urtica diocia cytotoxic but has never been testes on BCC .

Figure 1. Various Types of Basal Cell Carcinoma. Panel A is a representative of a nodular basal cell carcinoma, Panel B demonstrates a pigmented basal cell carcinoma, and Panel C shows a superficial basal cell carcinoma.

MATERIALS

- Fetal Bovine Serum
- Sterile Hood
- Sterilized pipettes
- Cell Culture Flasks
- Light Microscope
- Hematocytometer
- Stinging nettle leaf Tea bags
- 0.25% Trypsin-EDTA
- Dulbecco's Modified Eagle's Medium
- TE 354.T Cell Line

Figure 2: Eagle's Medium

Figure 3: Stinging Nettle

Figure 4: Stinging Nettle Teabag

RESULTS

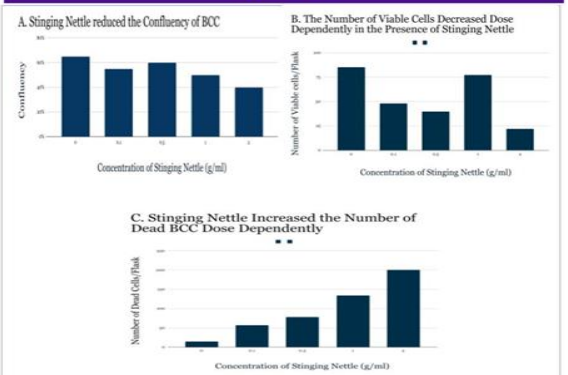

Figure 5: The effect of Stinging Nettle on confluency and cell death. A. Confluency of the cell culture plates with or without treatment. B. Total viable cell counts using hematocytometry. C. Total dead cell counts using hematocytometry.

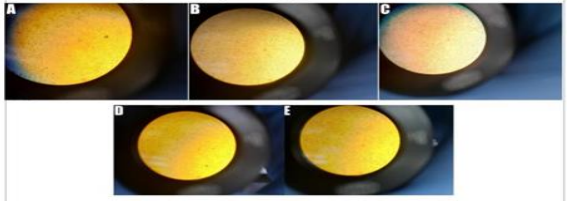

Figure 6: A. Control Culture Plate. The cells were grown in the presence of 14mL of medium and 2mL of distilled water. B. Culture plate: The cells were grown in 14mL of medium, 0.1g/mL of stinging nettle tea and 1.9mL water. C. Culture plate: The cells were grown in 14mL of medium, 0.5g/mL of stinging nettle tea and 1.5mL water. D. Culture plate: The cells were grown in 14mL of medium, 1g/mL of stinging nettle tea and 1mL water. E. Culture plate: The cells were grown in 14mL of medium, 2g/mL of stinging nettle tea and 0mL water.

METHODS

- (TE 354.T) was cultured in 10% Fetal Bovine Serum+ 2.5µg/mL of Amphotericin B, and 50µg/mL of Gentamycin
- 10% of the medium was replaced with stinging nettle solutions (0.1g/mL, 0.5g/mL,1g/mL and 2g/mL) or with sterile water for negative control.
- The cultures were evaluated on the basis of their confluency, and cell death using light microscope and trypan blue.

CONCLUSION

The plant was effective in reducing cell growth and increasing cell death.

FURTHER RESEARCH

- Identify the component in stinging nettle which induces the cell death.
- Test the effects of Ricinus communis on BCC and determined the better treatment between the two.

LIMITATIONS

- One kind of stinging nettle was used.
- The extracted ricin might have had some impurity.
- The effects of the treatments was not evaluated on a healthy tissue.
- Cultured skin tissue are more vulnerable so the effects of the two treatments could have been more profound compared to the cancer cells in the body.

ACKNOWLEDGEMENTS AND CONTACTS

- Roksana Korbi
- Favour Garuba
- Caldwell University
- Independent College Fund of New Jersey

REFERENCES/CONTACT

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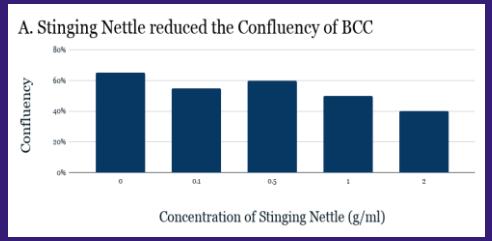
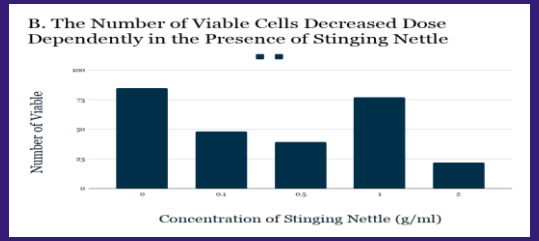
Results





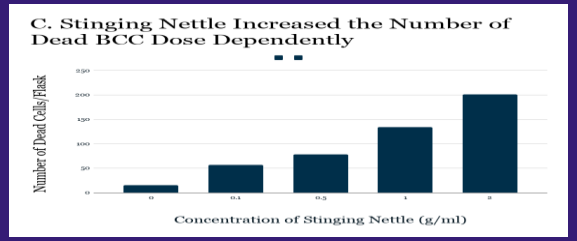


Figure 2: The effect of Stinging Nettle on confluency and cell death.
A. Confluency of the cell culture plates with or without treatment. B. Total viable cell counts using hemocytometer. C. Total dead cell counts using hemocytometer.

Conclusion

The plant was effective in reducing cell growth and increasing cell death.

References

Further research

- Identify the component in stinging nettle which induces the cell death.
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