

Honey bee venom selectively targets breast cancer

CRC for Honey Bee Products research has contributed to the discovery of new compounds in bee venom to treat aggressive types of breast cancer.

Melittin, a component of honey bee venom, can suppress the growth of breast cancer cells, particularly aggressive triple-negative breast cancer. The CRC has identified an additional venom compound that protects the surrounding normal cells.

Bee venom has many medical applications and contributes to alternative medicine known as apitherapy.

Bee venom is a mixture of proteins and small molecules. The main component is melittin, a peptide that makes up half of the venom's mass. Both melittin and honey bee venom are effective against cancers such as leukemia, lung cancer and breast cancer. However, the use of venom has been shown to be more effective than melittin.

Breast cancers have four primary molecular subtypes, defined by hormone (ER+, PR+) or protein (HER2+) receptors. When none of these receptors are present, the cancer is classified as triple-negative, the most aggressive and hardest to treat.

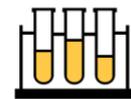
Researchers found that honey bee venom and melittin significantly, selectively and rapidly reduce the viability of triple-negative breast cancer and HER2-enriched breast cancer cells.



CRC HBP
FOR HONEY BEE PRODUCTS



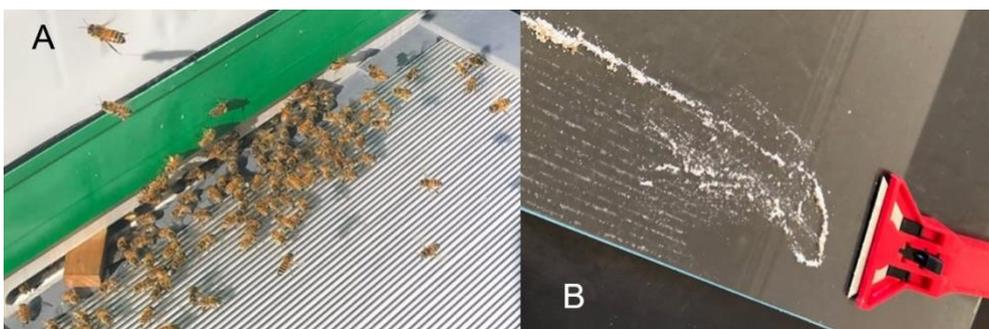
medicinal properties



chemical analysis



collaborate



An electric plate near the hive entrance (A) applies a shock to bees. The bees respond by spraying their venom. The venom is then collected using a scraper (B).





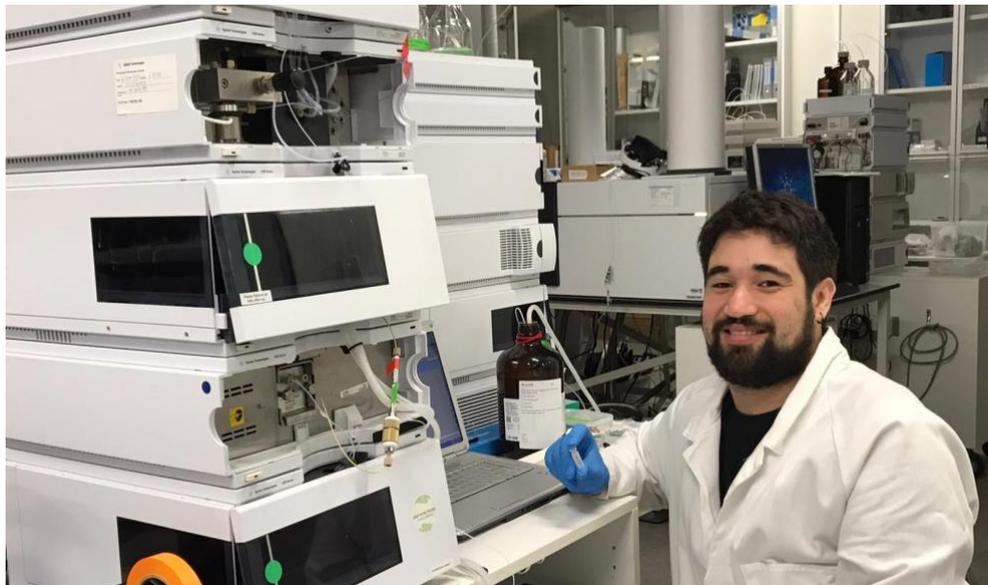
The CRC for Honey Bee Products became involved through a collaboration between Dr Julia Grassl and Professor Blancafort – who leads research into the melittin-cytotoxic effect on breast cancer. The CRC research identified other proteins in venom that protect normal cells from the toxic effects of melittin without reducing its efficacy.

The first step was to separate the complex honey bee venom into fractions, identifying their composition using mass spectrometry. Each fraction was applied to cultured cancer cell lines, individually, mixed with melittin and with other fractions to discover where the protective activity was located, and its nature. Immunofluorescent imaging tracked antibodies of specific markers.

This CRC research verified that bee venom and melittin effectively kill triple-negative breast cancer cells. Notably, a new component of bee venom was discovered that interacts with melittin to improve the survival of normal surrounding cells while destroying aggressive breast cancer cells. The mechanism appears to be related to the control of cell division, with the new component stimulating cell division, while melittin inhibits the division of breast cancer cells.

This research highlights the value of honey bee biology, providing a pathway for developing more specific anti-cancer therapeutics with fewer side effects.

Honey bees contribute in many ways, and this is just another example of their worth and the value of discovery-research to humankind.



CRC Masters student Daniel Juarez Payes separating bee venom samples in the laboratory

Dr Julia Grassl and Professor Pilar Blancafort
University of Western Australia
Email: pilar.blancafort@uwa.edu.au
www.crchoneybeeproducts.com



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