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Is Honeybee's venom a useful medicine?

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Recent studies have stated that human epidermal growth factor receptor 2 (HER2)-enriched breast cancer cells and triple-negative breast cancer cells can be killed rapidly by venom from honeybees. It has also been proven that the side effects of normal cells are not highly affected. Over 20,000 species of honeybees are present globally. The first study using honeybee’s venom focused on reducing the growth of plant tumour. The key objective of this study was melittin, a major component of honeybee venom. Melittin is responsible for the lethality and pain produced by bee stings. Melittin is an amphipathic, 26-amino acid peptide and is positively charged. The study indicates that it has many anticancer properties. In mice, tumour growth was highly reduced when it was treated with a combination of melittin and docetaxel (chemotherapy agent). By shutting down the activity of the overexpressed molecules in breast cancer, melittin targets the cancer cells. The study also reports that the estimated time taken by a particular concentration of melittin to completely induce cancer cell death is about one hour. However, the toxicity level to normal cells is very low. Further, arginylglycylaspartic acid (RGD) is a peptide responsible for cell adhesion sites. To enhance melittin’s target activity, the RGD peptide can be attached to the surface of melittin (RGD1-melittin). Melittin suppresses the activity of receptors in breast cancer by signalling modulation. Various researches are being conducted to study the activity of melittin in other cancer cells. So far, treatment options for triple-negative breast cancer are also limited. The positives of choosing honeybee’s venom is that it is cost-effective and available all over the world. Recent studies show that melittin has anticancer effects on breast cancer cells by upregulating the genes Bax and Mfn1 and downregulating Bcl2 and Drp1. Therefore, further research in this aspect could make melittin an effective treatment for various types of cancer.

Keywords: Honeybee, Melittin, Breast cancer, HER2, Triple-negative cancer cells, Arginylglycylaspartic acid

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