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RGCB scientists find way to detect cancer cells hiding in surgical margin

By Sunderarajan Padmanabhan

New Delhi, Feb 18: One of the treatment modalities for cancer, if it has not spread, is surgical excision of the tumor mass. Complete removal of tumor cells is critical for the success of surgery. If the tumor is not fully removed it reappears after some time. In certain forms of cancer like, oral cancer, it is very difficult to define the surgical margin. It is very difficult to some of the sophisticated techniques like MRI and CT for tongue or buccal cavity. In this scenario, a technique that identifies left over tumor cells in surgical margin and detects nearby lymph nodes that harbor tumor cells will be of immense use to a surgeon.

A team of research of RGCB led by Dr. Tessy Thomas Maliekal, who specialize on oral cancer, tried to address the issue by using certain peptides. Peptides are very short protein molecules, or part of protein molecules, usually of 15-30 amino acid in length. A peptide named TM1 that recognize a protein called GRPR was used for the study. GRPR expression on many cancer cells including oral cancer cells is very high. They modified the peptide and tagged it with a chemical called NIR- fluorophores (TM1-IR680).

The study was carried out in collaboration with Dr. Paul Sebastiaan and Dr. B. Balagopal, of Regional cancer Centre (RCC), Thiruvananthapuram. RCC provided surgical samples and Dr. Tessy's group used this human tissue to generate tumors in mice. Using mouse models, they showed that if TM1-IR680 is injected 42 hours before surgery, the dimensions of the primary tumor and lymph nodes where the disease is spread can be imaged, using suitable imaging platforms. Further, they found that a small biopsy of the margin tissues can be used for cryosectioning and subsequent immunofluorescent detection of the cancer cells using the same peptides. The detection by this peptide was very fast. The whole process could be completed within an hour. It might give the surgeon a chance to assure that surgical margins are free of cancer cells. Alternatively, surgeon may widen the area of excision.

In a paper published in Scientific Reports, the authors showed that this peptide is very safe for internal applications like iv injections.

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