

New tumour-killer shows great promise in suppressing cancers

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Scientists from Nanyang Technological University (NTU) and Lund University, Sweden, have bioengineered a novel molecule which has been proven to successfully kill tumour cells.

This molecule is based on a natural protein present in human breast milk, which has been found to have strong and wide-ranging tumour killing properties when bound to certain lipids. Lipids are organic molecules like amino acids and carbohydrates, made up of carbon and hydrogen, and help to store energy and to form biological membranes.

The protein-lipid molecule complex, is known as HAMLET, which stands for Human Alpha-lactabumin Made Lethal to Tumour cells. It has been proven to be safe and effective as it only targets tumour cells, leaving healthy human cells intact.

HAMLET has most recently been shown to successfully suppress colon cancer in laboratory mice.

The scientists have also successfully identified and isolated specific components of HAMLET called peptide-oleate bound forms, which have the tumour-killing effect. Peptides are short chain amino acids commonly found in the human body.

These latest breakthroughs are led by Professor Catharina Svanborg and Dr Manoj Puthia from Lund University, Sweden, and Professor Gerhard Grüber from NTU's School of Biological Sciences. The HAMLET complex was first discovered by Professor Svanborg's research group.

The findings were published recently in *Gut* and in *PLoS ONE*, two top ranking peer-reviewed academic journals. The researchers found that laboratory mice genetically modified to develop colon cancer, were protected to a large extent when fed with HAMLET-laced water. This suggested that HAMLET was killing emerging tumour cells faster than these cells could grow and proliferate.

On the new concept of a synthetic version of the tumour-killing molecule, Prof Grüber said, "By studying the original protein, we have and will continue to identify key components to make a synthetic peptide, a short-chain amino acid, carrying the properties of HAMLET and yet more resilient than the original protein complex."

"By synthetically constructing the key components, this helps the peptide to be much more resilient and to 'survive' in different environments,

such as in the human body or in drinking water, which is an ideal delivery medium, before it reaches its tumour target."

The ability to recreate HAMLET in synthetic form opens up possibilities of turning it into a drug to kill tumours.

Next steps

Prof Svanborg, who is a doctor and a scientist, said she had seen promising results from the human trials using HAMLET in Sweden.

"We are now ready to test HAMLET as a therapeutic and preventive agent in colon cancer, especially in families with the genetic predisposition, where preventive options are limited," Prof Svanborg said.

"After completing the various clinical trials, we hope to develop a commercially available product for doctors' use for cancer treatment in the next five to ten years," she added.

The two lead scientists added that they are also looking to trial HAMLET in Singapore and are in talks with local institutions and industry.

Provided by Nanyang Technological University

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