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Novel molecule to treat cancer shows promise

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Molecules collected in cancer cells destroy them on exposure to light.— photo: SPECIAL ARRANGEMENT

Combating certain types of cancer using photodynamic therapy could become less expensive in the near future with a novel, indigenously-synthesised molecule showing promising results in studies conducted in vitro.

The molecule is a photosensitiser and a derivative of porphyrin. It was found to be three times more efficient than a similar, commercially available US Food and Drug Administration-approved drug, according to Dr. Ch. Mohan Rao, Director, Centre for Cellular and Molecular Biology (CCMB), Hyderabad which carried out the experiments in collaboration with National Institute of Inter-Disciplinary Science and Technology (NIIST) and Rajiv Gandhi Centre for Biotechnology, both located in Thiruvananthapuram.

Explaining the importance of photodynamic therapy, he said normally a cancer drug would kill any dividing cell and as a result new cells required for hair and nails growth, throat and stomach lining also get destroyed. But in photodynamic therapy which targets certain types of cancer, including skin and stomach, the molecule gets accumulated in cancer cells. When exposed to light, it generates toxic substance which would destroy only the cancer cells. "Therefore you can locally control and treat it", he added.

After it is given, the molecule would be retained for 24 to 48 hours by the cancer cells and would cause toxicity when irradiated with specific wavelength of light.

Under the project launched with funding from the Department of Science and Technology, the synthesised molecule penetrated into cells more efficiently than the commercially available one. Subsequent to in vitro experiments, similar results were obtained in animal studies too. The water-soluble molecule destroys the cancer cells by enhancing apoptosis. He said clinical trials to test the toxicity and efficacy would be taken up after getting permission from the government.

Dr. Rao said the molecule could also be used for imaging since it penetrates into the cell's nucleus. It could be used as NMR contrast agent.

Another advantage with the molecule was that near infra-red light could be used. Therefore the depth of penetration would be less and it would cause less damage as mere exposure to light would not be harmful to normal cells.

He said it was also being studied whether the synthesised molecule could also be used for treatment of eye-related disorders, particularly diabetic retinopathy.

Other scientists who collaborated in the project are: Dr. K. Sridhar Rao, Dr. B. Madhuri from CCMB and Dr. D. Ramaiah and Dr. T.K. Chandrashekar from NIIST (National Interdisciplinary Institute of Science and Technology) Thiruvananthapuram.