Developing an advanced formulation of curcumin for targeted therapy of triple negative breast cancer

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Breast cancer is the most common malignancy and the second leading cause of cancer-related death among Australian women despite existing progress in the development of novel therapeutic strategies. Triple-negative breast cancer (TNBC) accounting for 10-17% of all breast carcinomas, is an aggressive histological subtype. It represents an important clinical challenge because these cancers do not respond to the available targeted agents. Thus, there is an urgent demand for specific therapies that target other receptors that are overexpressed in TNBCs. We have designed and synthesized a novel drug delivery system, which targets curcumin to the breast cancer cells through a ligand of luteinizing hormone-releasing hormone (LHRH) receptors. LHRH receptors are overexpressed in breast cancer cells including MBC and TNBC cells while they are not expressed detectably in most visceral organs. We have taken advantage of this differential receptor expression by attaching a new derivative of the LHRH peptide (as a targeting moiety) to the outer surface of novel polymer nanoparticles. These nanoparticles encapsulate curcumin, a non-toxic plant extract that has recently attracted much attention in medicine due to its remarkable therapeutical actions. It is called the next generation multi-purpose drug and is the active constituent of the Indian spice turmeric. However, it suffers from a very poor metabolic stability and bioavailabilty due to low water solubility. We have used an advanced formulation strategy to overcome hurdles to make it effectively used as a medication and also target it specifically to the TNBC cells via LHRH receptors.

Speaker Biography

Pegah Varamini is an early career Researcher, Lecturer and Group Leader in Cancer Theme within the Faculty of Pharmacy. She is the Leader of Breast Cancer Targeting-Drug Delivery Group. She was awarded the prestigious National Breast Cancer Foundation (NBCF) fellowship in Jan 2016. She completed her Doctorate degree in Pharmacy (PharmD) in May 2005 and was awarded her PhD degree in Medicinal Chemistry and Pharmacology in December 2012 (UQ, Australia). She has won 2012 Dean's Award for Research Higher Degree Excellence. Her work was selected by the Australian Academy of Science in August 2016, resulting in her personal presentation at the inaugural Falling Walls Lab in Canberra (a gathering of 25 selected Australian and New Zealand researchers, entrepreneurs, engineers and innovators).

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