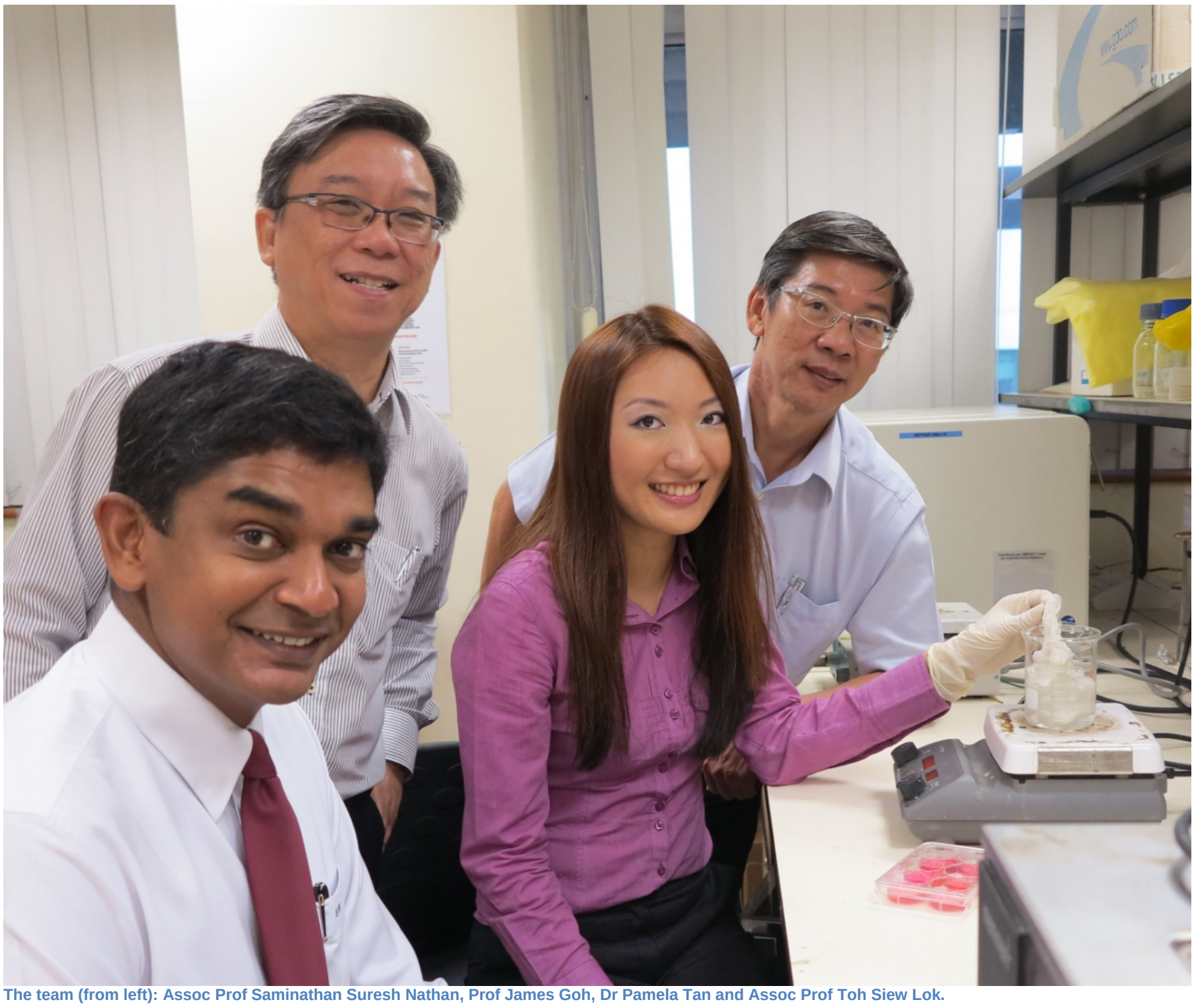
24 June 2013

Bioengineering team builds realistic 3-D tumour model using silk scaffolds



The team (from left): Assoc Prof Saminathan Suresh Nathan, Prof James Goh, Dr Pamela Tan and Assoc Prof Toh Siew Lok.

A BIOENGINEERING team working with the NUS Department of Orthopaedic Surgery has developed a highly realistic three-dimensional (3-D) tumour model, able to track the effectiveness and progress of drug therapy. Their model has the potential to be a more effective method for studying tumours than in-vitro and even in-vivo methods.

The team comprising Professor James Goh, Associate Professor Toh Siew Lok and Dr Pamela Tan from the Department of Bioengineering, and Associate Professor Saminathan Suresh Nathan from the Department of Orthopaedic Surgery, carried out their study using osteosarcoma, the most prevalent form of paediatric primary bone cancer.

Dr Tan said: “Despite the urgent need to develop cancer therapeutics, little progress has been made due to the lack of good pre-clinical drug testing models. Current laboratory drug testing methods yield results that differ largely from animal testing because of the use of 2-D cell culture systems which cannot replicate the 3-D properties of the tumour tissue.”

The team used silk to fabricate the scaffolds onto which the osteosarcoma cells were grown. Silk has been demonstrated to have excellent properties for cell attachment and growth. This is the first time that a realistic 3-D tumour has been constructed in a laboratory using silk scaffolds in a pressurised bioreactor.

Their 3-D bioreactor tumour model was able to express markers that indicate the ability of a tumour to initiate blood vessel growth at levels almost identical to that of the mouse model. The tumour constructs also responded to drugs that prevent blood vessel formation in a manner similar to that observed clinically.

Said Assoc Prof Nathan, “Dr Tan’s recent contribution has shed remarkable insight into mechanisms of angiogenesis that were previously taken for granted and may now have to be re-addressed. Clinically this will have significant bearing on other drugs as well.”