Spoonful of sugar helps wounds recover

Two University of Queensland biochemists are leading the world in wound and bone repair from Singapore.

UQ's Professor Victor Nurcombe and Dr Simon Cool are compiling a library of sugars in our bodies they believe will lead to improved human tissue and bone repair.

The Brisbane duo are the joint principal investigators and managers of the Stem Cell and Tissue Repair Laboratory at A*STAR — Singapore's top government science and technology agency.

A*STAR is the centrepiece of the country's strategy to be a biomedical leader to counter its small size and lack of exports.

Professor Nurcombe and Dr Cool were seconded to Singapore two years ago to set up and run a “bench to bedside” stem cell laboratory.

Stem cells are the “mothers” of all human cells until they are directed to grow an organ, skin, muscle or bone.

Adult muscles, intestinal tracts and skin have healthy reserves of stem cells because of their high “wear-and-tear” while major organs such as the heart, brain and kidneys have almost none.

Stem cells can be used to heal sick organs, but usually grow slowly so there is a need to harvest them more quickly, efficiently and in a more pure form.

Professor Nurcombe and Dr Cool have overcome the tricky process of growing pure stem cells in their laboratory, a first in itself, but they have done so in half the time compared to conventional lab methods.

Now they are compiling a list of a certain class of sugars in the body called heparan sulfates, which can be used to help direct and cue stem cells to “rev up” the body's natural repair process.

They do this by coupling growth-promoting proteins to receptors on the stem cell surface.

Each tissue has its own library of heparan sulfates which direct the cellular protein traffic for different purposes in different cells.

“Heparan sulfate is like putting petrol in the car. The car won't go unless you put petrol in it,” Dr Cool said.

“If you take heparan sulfate out of the body, then the key won't get into the ignition. You can't even get the car going.”

The duo has created a bone paste out of the most active heparan sulfates, which has been successfully tested on rats with broken legs.

Professor Nurcombe and Dr Cool want a therapeutic device or a pharmaceutical drug ready for human testing before their five year contracts end.

Professor Nurcombe said their research into sugar-based treatments was a riskier scientific path then mainstream genomic- or protein-based methods.

He said one of the few, but spectacularly successful, sugar treatments ever developed was the anti blood clotting drug Heparin.

“That one bit of sugar is worth billions of dollars and saved tens of millions of lives.

“Imagine if you could find the next biologically relevant variant of the large heparin family. That's our justification that sugars are very likely to be interesting and therapeutically important.”

Amongst their 30-odd lab staff are four UQ PhD students.

They are: Emma Luong Van, Arjuna Kumarasuriyar, Martin Gruenert and Rebecca Jackson.

Ms Jackson has finished her thesis and is now working in another nearby A*STAR lab.

UQ based in Brisbane, Australia, is Queensland`s oldest and largest university which consistently ranks as one of Australia`s most outstanding research and teaching and learning universities.

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