MONASH University

MONASH INNOVATION

SURGICAL IMPLANT FOR OSSEOINTEGRATION

Implants on amputated limbs require time to bond to together. Researchers from the National Trauma Research Institute and the Alfred Hospital have designed a surgical implant for amputated limbs that will improve osseointegration by reducing the stress placed on the limb.

- **No reaming of the bone required**
- **Improved load transfer to bone**
- **Reduced damage to surrounding blood vessels**
- **Early mobilisation leading to reduced bone atrophy**

THE CHALLENGE

Before a prosthetic can be attached to an amputated limb, an interface between the limb and the new prosthetic must first be attached. This interface is an implant that is mounted onto the bone.

The speed at which the implant becomes adequately secured to the bone is important, as short timeframes reduce bone atrophy. The previous state of the art process required that the limb and implant be unloaded for an extended period, while the implant integrates with the limb.

Existing devices also require the bone to be reamed or pre-tapped prior to the installation of the device. This generates excessive heat that can cause damage to the surrounding blood vessels, limiting the speed of osseointegration between the amputated limb and the implant, and thereby increasing the recovery time of the amputee.

The current invention focuses on reducing the amount of time required for osseointegration of the implant.

THE TECHNOLOGY

This invention addresses implants that are attached to the end of amputated limb such as an arm or a leg. Initially a CT scan is taken of the limb for which an implant is to be attached. A stress analysis is carried out on the limb as depicted in Figure 1, which allows for optimum design of the implant.

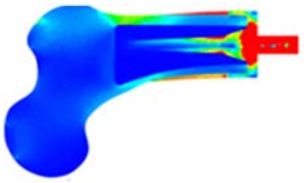

Figure 1. Stress analysis of limb.

Figure 2 shows a 3D model of the current invention. The device contains a central intramedullary stem, designed to minimise the stresses loaded onto the bone. The central stem helps compact the marrow and can lead to initial stability of the implant when installed.

Extramedullary struts are designed to fit the bone on which they are placed, such that they reduce stress shielding.

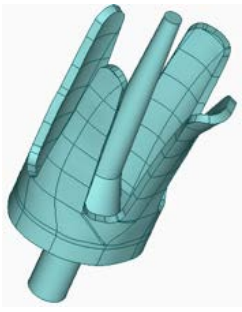

Figure 2. 3D Model of the current invention.

To further improve osseointegration, the implant is coated with a hydroxyapatite.

The device is press-fit onto the terminal end of an amputated bone (Figure 3).

Figure 3. Model of device press-fitted onto terminal end of amputated bone.

The advantage of this novel design comes from the fact that it is press-fitted onto the bone, meaning that damage to surrounding blood vessels is limited. The extramedullary struts distribute stresses better and thus the limb can be used almost immediately, reducing atrophy. The design also allows for easier replacement in the future.

Intellectual Property: International patent application PCT/AU2018/050596 filed.

THE OPPORTUNITY

Monash seeks a partner to further develop and utilise this unique technology.

The team behind this technology are experts in the field. The lead researchers are Prof W K Chiu from Monash University, Dr M K Russ and Prof M Fitzgerald from the National Trauma Research Institute and the Alfred Hospital.

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Produced by Monash Innovation: March 2019