

## Research Project

If a leg, arm, finger or thumb has had to be amputated, or is missing at birth, an artificial substitute (known as a prosthetic limb or prosthesis) may be fitted. Prosthetic limbs usually have a socket and are held in place either by suction or by being strapped to the stump of the missing limb. However, this leads to major drawbacks such as irritation of the stump or phantom limb syndrome. In this context, the implantation of intraosseous transcutaneous prostheses (ITAP) was described as the most physiological, and thus probably successful, approach to prevent the previously evoked problems. In this procedure, a metal implant is inserted through the skin and into the centre of the bone of the stump. A prosthetic limb is then attached to the metal implant. The aim is to produce a more comfortable and securely attached prosthetic limb.

Unfortunately, the point where ITAP exits from the human body is often the site for infections which could be potentially eliminated by proper integration of dermal and epidermal tissues around the implant, creating a soft tissue seal around it. In addition, a complete prevention of the infection also requires endowing the prosthetic device with bacteria-killing properties.

Accordingly, our objective is to provide titanium (which is the material used to build-up orthopaedic implants) with two functional properties that are both likely to prevent bacterial colonization. These properties are 1) the capability of promoting skin cell adhesion and spreading on the surface; this is a passive functionality and 2) providing the surface with antibacterial properties; this is an active functionality.