

## UFRGS and Hospital de Clínicas partner up to test dressings that heal ulcers in

### The dressings produced in Brazil will be a more accessible option to patients

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A partnership between groups of researchers from the Federal University of Rio Grande do Sul (UFRGS) and Hospital de Clínicas de Porto Alegre (HCPA) to create collaboratively a dressing that meets the needs of diabetic patients suffering from diabetic foot lesions began in April. Peripheral neuropathy is a condition that affects the nerves and causes loss of sensation in areas such as feet and hands. It is a common complication in patients with diabetes, especially after having the disease for some years. In more extreme cases, the loss of sensation makes them less capable of noticing bruises on the feet, which can become infected and turn into ulcers if not treated properly.

The UFRGS Laboratory of Ceramics (Lacer) developed a synthetic dressing that might be able to meet the different needs of all impairment grades. With the electrospinning technique, fibers with nanoscale diameters – tens of thousands of times smaller than a strand of hair – are produced and used to create a framework that will serve as the base of medical dressings for various uses. After testing some variations, the team arrived at a combination of polyhydroxybutyrate (PHB) and hydroxyapatite (HAp). The hydroxyapatite has the same characteristics of the human bone and holds affinity with water, promoting the regeneration of the cells. The polymer PHB, formed of carbon molecules, has biocompatible and biodegradable properties. Before the dressing can be sold to the public, the toxicity and biocompatibility tests developed by the UFRGS' team will be followed by HCPA's implementation of the required protocols for real-world clinical testing.



Then, additives are injected into the synthetic dressing so that it can perform different healing functions. In the case of foot ulcers, there are several stages of treatment, each with a different need. At times, it is necessary to absorb moisture; in others, to moisturize the wound. "Formerly, the dressing used to be a piece of cloth, but today you have synthetic fabrics to which you can add other substances. They are all called dressings because they have a direct application, but they are nothing more than an evolution of that old bandages that we already know", says [Rogério Friedman](#), a professor at the Faculty of Medicine of UFRGS and the HCPA. The initial phase of the project, the development of the fabric, lasted about three years and has already been completed. In addition, some possible additives were tested, such as titanium oxide and zinc oxide, with bactericidal function. Now the Hospital intends to continue the research and make the dressing available for healthcare use and large-scale sale. "There is a repressed demand for specialized dressings in this area. An easily manufactured, lower-cost Brazilian product will play an important role," says the researcher. Without import taxes, the Brazilian product will become more accessible than its foreign counterparts.

Currently, there are many good dressing options on the market, but they are all imported and expensive. "They are not widely available on SUS, and patients generally do not have access to them. What we are looking for is to validate our local solution that offers the possibility of a dressing with the same effectiveness, with wide availability and lower price," explains Friedman. This collaboration is in an early stage, and it is still necessary to study what kind of additives our research partners want to use and test. It is necessary to plan the project, seek financial support and set up a multidisciplinary team to work with the development and testing of the dressings. The efficacy of the product will be evaluated in real clinical situations and a comparison will be made between our dressing and those currently available on the market and the traditional treatments without dressings, which may take a few years to be completed. While these dressings can be used to treat other aspects of patient care depending on the additives placed in the framework developed by the Lacer team, the diabetic foot is common enough to be the project's starting point.

Patients with diabetes have an increased risk of developing ulcers, especially on the feet. With peripheral neuropathy, they may have circulation problems. This complication affects a high percentage of patients, especially those who have had diabetes for a long time or have not managed the disease properly. This condition, however, can be easily managed with some basic care. To prevent the development of diabetic foot, doctors teach patients the daily examination of the feet for bruises that may go unnoticed. "It will mostly happen in patients who have not been well-educated or who do not follow the recommendations we make", Friedman explains. When ulcers develop, a lot of local care is needed, and even an infection can occur. The treatment is long and expensive, both for SUS (Brazilian program of free healthcare) and for patients, who need to spend on dressings and antibiotics. "It's worth doing everything we can do to improve the healthcare service. If you can treat a small ulcer at an earlier stage and do it more efficiently by having better materials, you avoid getting many people hospitalized," says Professor Friedman.

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