

# BIOMATERIALS

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## Silkworm gut fibers as novel biomaterials for tissue engineering applications

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Silk fibroin has been largely studied in tissue engineering due to its excellent physical and biological properties. Based on this, we have developed a new biomaterial consisting of high performance fibers produced directly from the silk glands of silkworms (*Bombyx mori*) called silkworm gut fibers. This novel biomaterial could be a potential solution in tendon and ligament repair, as these are very common injuries and the traditional surgical reconstruction including auto/allograft and ligament prostheses implants can involve several complications. With this aim, we have braided the silkworm gut fibers, in order to explore the possibility to create a consistent scaffold for ligament repair. The production of the silkworm gut fibers is based on a traditional procedure that consists of immersion of the silk glands in an acidic solution and a subsequent stretching. We evaluated the mechanical properties of 3 silkworm gut fibers weaved in three-strand braids. The biocompatibility assay was also performed by seeding bone marrow adult human mesenchymal stem cells (*ahMSCs*) on the braided material. 7, 14 and 21 days after seeding, adhesion and proliferation, the cells were studied by SEM and MTT assay, respectively. Our results showed a good and remarkable mechanical strength, with Young's modulus values of  $80\pm 20$  MPa and an ultimate strength of  $18\pm 2$  MPa. Moreover, cell adhesion and proliferation were excellent, the cells appeared well spread and attached to the silkworm gut fibers surface, connecting to neighbouring cells and organizing a monolayer over the braided material at day 21 post-seeding. We conclude that silkworm gut fibers combine good mechanical and biological characteristics to be considered a potential biomaterial in tissue engineering applications.

### Biography

Ana Pagán obtained a degree in Biology from University of Murcia. She has completed her PhD from the same university with a research stay at the Division of Nutrition and Metabolic Diseases, LMU University, Munich, Germany. She works as a Postdoctoral Researcher in the Imida Murciano Institute for Agricultural and Food Research and Development (IMIDA, Murcia, Spain), in the Department of Biotechnology, working on premier biomaterials in tissue engineering.

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