



**Project:** Tough hydrogels for cartilage repair

**Short description:** Cartilage damage is a hallmark of osteoarthritis, leading to bones rubbing against each other and causing pain. Biomaterials have the potential to replace and regenerate damaged cartilage. Hydrogels made of natural materials like collagen are highly biocompatible and provide the biological cues to promote normal cell function, but they have weak mechanical properties. Crosslinked hybrids of natural and synthetic materials improve compression moduli of hydrogels to values similar to those of cartilage, and promote cartilage production by chondrocytes, but require photoactivatable crosslinking, limiting their translational potential as arthroscopically delivered medical devices. However, injectable hybrid hydrogels have compression moduli 30-50 fold lower than those of cartilage and of photo-crosslinked hydrogels.

**Objective:** Optimisation and characterisation of a prototype injectable, tough hydrogel that provides the biological and mechanical environment for cartilage regeneration.

**Technical skills:** Polymer chemistry, hydrogel fabrication, rheology, cell culture, metabolic assays, PCR.

Openings offered: 1 Master thesis

Language: English

Director MS thesis: Dra. Nuria Oliva

Location: GEMAT