BACKGROUND
Cartilage is the hydrated tissue that lines the surface of articular joints, providing lubrication and distribution of loads. Once damaged, articular cartilage has little capacity to heal due to its avascular nature. Approaches based on the delivery of cells to restore the damaged area may provide an effective treatment method for cartilage damage. Although autologous chondrocyte transplantation has shown promising results (1), the use of bone marrow-derived mesenchymal stem cells (MSCs) may be more feasible, as their allogenic use is possible and would avoid costly in vitro GMP expansion and they have the potential to differentiate towards a chondrogenic phenotype.

Recently, Notochordal cell (NC)-conditioned medium (NCCM) enhanced matrix production of IVD chondrocytes (2,3) and directed MSCs towards a chondrogenic phenotype. (4,5) Subsequently, pulverized notochordal cell (NC)-rich matrix (NCM) has shown to induce an even stronger anabolic response of intervertebral disc (IVD) chondrocytes compared to NCCM. As IVD chondrocytes are similar to articular chondrocytes, NCM might have anabolic effects on cartilage as well. In addition, this NCM powder can be dissolved at a high concentration to form a hydrogel. Such a bioactive hydrogel may, in combination with MSCs, be able to restore the damaged cartilage
area upon injection. It is however unknown whether NCM can induce chondrogenesis of human MSCs, similar to NCCM.

**AIM**
The aim of this project is to determine, as a first step, whether NCM can direct human MSCs in alginate bead cultures towards a chondrogenic phenotype.

**APPROACH**
During this project, you will learn diverse cell culture techniques under sterile conditions in the cell lab. Furthermore, you will learn to perform analytical techniques such as biochemical assays, qPCR and histological and fluorescent stainings.

**SUPERVISION**
This project will be supervised by dr. ir. Stefan de Vries (postdoc) and prof. Keita Ito (prof.) of the Orthopaedic Biomechanics group.

**REFERENCES**