Yu Moriguchi

Yu Moriguchi is a spine research fellow in Roger Härtls team, with a background in orthopedic and spine surgery. Dr. Moriguchi currently studies the feasibility of injectable biomaterials for enhancing intervertebral disc repair in an animal model. His long-term research interests involve development of a minimally invasive regenerative treatment for disc degeneration.

Yu Moriguchi et al., demonstrated that riboflavin crosslinked high density collagen gels (HDC) can facilitate Annulus Fibrosus repair in vivo.

42 rats, tail disc punctured with an 18-gauge needle, were divided into 3 groups: untreated (n=6), injected with crosslinked HDC (n=18), and injected with Annulus Fibrosus cell-laden crosslinked HDC (n=18). Ovine AF cells were mixed with HDC gels prior to injection. X-rays and MRIs were conducted over 5 weeks, determining disc height index (DHI), nucleus pulposus (NP) size, and hydration. Histological assessments evaluated the viability of implanted cells and degree of annular repair.

Although average DHIs of both HDC gel groups were higher than those of the puncture control group at 5 weeks, the retention of disc height, NP size and hydration at 1 and 5 weeks was significant for the cellular group compared to the punctured, and at 5 weeks to the acellular group. Histological assessment indicated that AF cell-laden HDC gels have accelerated reparative sealing compared to acellular HDC gels.

AF cell-laden HDC gels have the ability of better repairing annular defects than acellular gels after needle puncture.

This project addresses the compelling demand of a sufficient treatment strategy for degenerative disc disease (DDD) perpetuated by annulus fibrosus (AF) injury, a major cause of morbidity and burden to health care systems.

The study is designed to answer the question of whether injectable, photo-crosslinked, high density collagen gels can seal defects in the annulus fibrosus of rats and prevent disc degeneration. Furthermore, they investigated whether the healing of AF defects will be enhanced by the delivery of AF cells (fibrochondrocytes) to these defects. The use of cell-laden collagen gels in spine surgery holds promise for a wide array of applications, from current discectomy procedures to future nucleus pulposus reparative therapies [1)].

1)
Moriguchi Y, Borde B, Berlin C, Wipplinger C, Sloan SR, Kirnaz S, Pennicooke B, Navarro-Ramirez R, Khair T, Grunert P, Kim E, Bonassar L, Härtl R. In Vivo Annular Repair using High-Density Collagen Gel Seeded with Annulus Fibrosus Cells. Acta Biomater. 2018 Jul 4. pii: S1742-7061(18)30402-1. doi: 10.1016/j.actbio.2018.07.008. [Epub ahead of print] PubMed PMID: 29981494.