

DETAILED ANALYSIS OF THE GLYCOSAMINOGLYCAN CONTENT OF HUMAN AUTOLOGOUS CHONDROCYTE IMPLANTATION REPAIR TISSUE.

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INTRODUCTION: Cartilage repair strategies such as autologous chondrocyte implantation (ACI) are routinely used to treat damaged cartilage. To date, techniques to assess the glycosaminoglycans (GAGs) in the repair cartilage are limited because they often require large amounts of starting material and are time consuming. Fluorophore-Assisted Carbohydrate Electrophoresis (FACE) is a rapid and sensitive technique¹, which is useful for profiling GAGs from repair cartilage biopsies. Since the GAG component of any repair tissue is likely to have a major influence on its physiological functioning², we used FACE to quantitate and profile the amount and nature of GAGs in ACI repair cartilage removed 1-yr post-operatively. **METHODS:** Using a bone marrow biopsy needle (Manatech), biopsies (1.8 mm in diameter) were taken perpendicularly from the articulating surface through the full depth of cartilage and subchondral bone, from 8 patients who had undergone ACI 12 months previously. In all of the patients biopsies were taken from femoral condyle (5 medial, 3 lateral). Biopsies were selected from patients between 22 and 52 years in age. They were assessed comparatively with age and anatomical site matched cadaver tissue.

RESULTS: The repair tissue in all ages was composed predominantly of chondroitin sulphate (CS) (Fig 1A). Hyaluronan (HA) accounted for significantly more of the total GAG ($p < 0.01\%$) when compared with the age matched cadaver samples (Fig 1). Disaccharides and non-reducing termini of all GAG populations; HA, CS and keratan sulphate (KS), were significantly reduced when compared with the age and anatomical site matched cadaver tissue ($p < 0.01\%$) (Fig 2). Within the ACI repair tissue decreases, although not significant, were detected in concentrations of both unsulphated and sulphated HA, CS and KS disaccharides with increasing age (Fig 2).

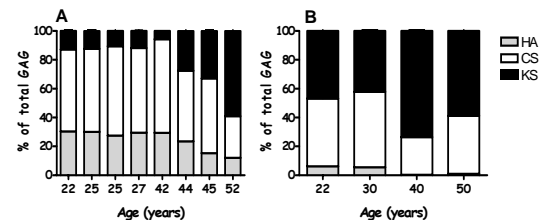


Fig 1: The percentage of HA, CS, and KS in cartilage biopsies taken from (A) patients 12 months post-ACI and (B) age and anatomical site matched cadaver tissue.

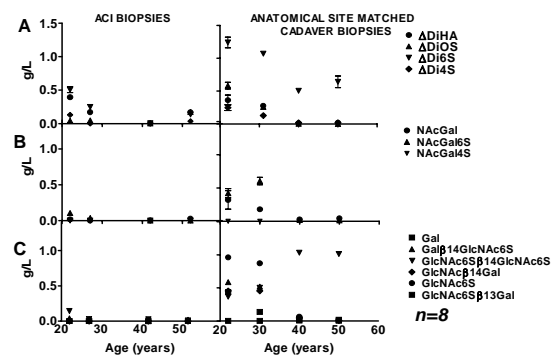


Fig 2: Levels of (A) HA and CS disaccharides, (B) CS non-reducing termini and (C) KS disaccharides in both ACI repair and cadaver cartilage.

DISCUSSION & CONCLUSIONS: FACE has provided new information about GAGs within repair tissue. The increase in the proportion of HA observed in the repair tissue may be important because the early stages of wound healing involve the generation of a HA rich matrix which aids cell migration and proliferation into the site of injury³.

REFERENCES: ¹Calabro A, Hascall VC, Midura RJ. *et al.*, *Glycobiology* 2000; 10(3):283-293. ²Bader DL, Kempson GE, Egan J *et al.*, *Biochim Biophys Acta* 1992, 1116:147-152. ³Toole BP. *Semin Cell Dev Biol* 2001; 12(2):79-87.

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