

Title

Recovery effect of normal synovium in response to damaged cartilage

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Purpose

Normal synovium plays an important protective role for cartilage, while inflamed synovium can lead to degenerative changes. The effect of normal synovium on damaged cartilage remains unknown. This study aimed to investigate the effect of normal synovium on the healing response of damaged cartilage.

Methods

Fresh human tibia and femoral condyles from 2 human donors with no history of joint disease were collected. Only specimens with normal gross morphology (Collins grade 0) were used. Cartilage explants (8 mm) from both joints and grossly normal synovium from the knee joint were harvested and randomly assigned to one of four treatment groups: (1) non-treated cartilage without synovium; (2) non-treated cartilage with synovium; (3) IL-1 β -treated (10 ng/ml) cartilage without synovium; (4) IL-1 β -treated (10 ng/ml) cartilage with synovium. IL-1 β was added to cartilage explants 48 hours before co-culture. Samples from cartilage explants and synovium were collected at 0, 2, and 14 days and assessed for Live-Dead assay and histology with hematoxylin & eosin and Safranin O.

Results

There were no significant differences in the %Live cells between non-treated cartilage with or without synovium. While neither IL-1 β -treated group fully returned to the baseline %Live cells in Group 1's superficial zone (86.7 ± 4.5 %), Group 4 explants exhibited a significantly greater %Live cells within the superficial zone than Group 3 explants after two days (74.0 ± 4.4 %, 48.7 ± 7.9 %, $p < 0.01$) (Figure 1). Group 4 explants continued to trend towards greater viability than Group 3 explants at day 14 (77.4 ± 8.9 %, 59.2 ± 18.4 %, $p = 0.17$). On histological analysis, Group 3 explants revealed pronounced hypocellularity and reduced matrix staining when compared to Group 4 explants (Figure 2).

Conclusion

When applied to damaged cartilage, healthy synovium improves both cell viability and histological features. These findings suggest a potential recovery mechanism for damaged cartilage.

Figure 1.

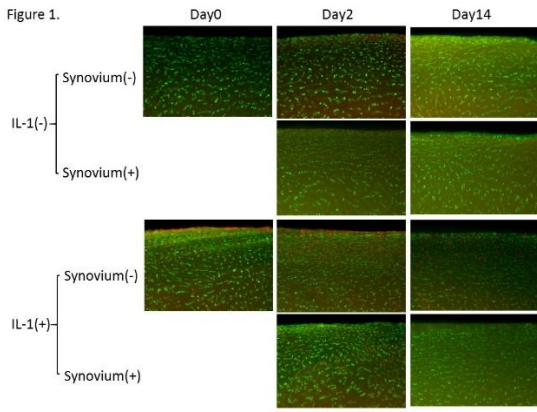


Figure 2.

