Mechanical and Histological Properties of Articular Cartilage that Load Through Menisci:
Experiment Study Using Porcine Knee

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Purpose: To investigate differences in the mechanical and histological properties and in the collagen architecture, particularly the superficial layer, between the regions covered by menisci and those not covered by menisci.

Methods: Osteochondral plugs were obtained from porcine tibial cartilage that was either covered or not covered by menisci. Plugs obtained from each region were subjected to mechanical analysis by the indentation method, histological analysis by safranin O staining, and analysis of collagen fiber ultrastructure by scanning electron microscopy.

Results: The axial creep was larger in cartilage covered by menisci than in cartilage not covered by menisci. Safranin O staining revealed a low proteoglycan content in cartilage covered by menisci than that not covered by menisci. The superficial layer of the collagen was less dense in cartilage covered by menisci than in that not covered by menisci.

Conclusions: The results of our study confirmed that cartilage covered by meniscus that load through menisci has a low proteoglycan content. Thus, cartilage covered by menisci may be deformed by loading after meniscal injury or meniscectomy to a greater extent than that not covered by menisci.