**Table 3:** Synthetic **s**caffold-based meniscal tissue engineering

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| **Material** | **Model** | **Growth Factors** | **Follow-up** | **Results** | **Ref** |
| ***In Vivo*** |  |  |  |  |  |
| **Carbon Fibre** |  |  |  |  |  |
| Carbon fibre | Leporine | - | 17 weeks | Excessive fibrosis in 57%. None to partial repair in 43%. Fibrocartilage present oriented along carbon fibres. | 134 |
| Carbon fibre-PLLA-poly-urethane | Canine | - | 19 weeks | Ingrowth of fibrous tissue, fibrocartilage and vessels. Synovitis due to carbon fibre. | 135 |
| Carbon fibre-polyester | Leporine | - | 26 weeks | Fragmentation and inflammation around polyester fibres. Osteophyte formation and no cellular ingrowth visible. | 99 |
| **Repair Materials** |  |  |  |  |  |
| Estane | Canine | - | 26 weeks | Formation of degenerative lesions localized to inner rim of implant. Integration to periphery. Collagen I present in vascularised neomatrix. Inferior compressive properties to native meniscus. | 140 |
| Poly (ethylene, terephthalate) (Ethibond®) | Ovine | VEGF | 8 weeks | No improvement in healing seen for VEGF coated sutures compared to controls | 141 |
| Octyl cyanoacrylate suture | Leporine | - | 4 weeks | Edema. Necrosis of transplanted menisci and erosion of tibial plateau. Suturing proved to be best form of repair. | 142 |
| Gelatin hydrogel | Leporine | Platelet-rich Plasma | 4, 8, 12 weeks, | No degeneration of articular cartilage. Chondrocytic cells present in repair tissue. Safranin-O staining present after 12 weeks. Fibrocartilage generation. | 143 |
| **Polymers** |  |  |  |  |  |
| PLLA-PPD | Leporine |  | 14 weeks | Collagenous tissue present. Some collagen alignment. Fibrochondrocyte infiltration. | 100 |
| PCL-Hyaluronan | Ovine | - | 6 weeks | Soft tissue swelling in 4 cases (2 each) and both meniscectomies. Tissue ingrowth and vascularisation at periphery. Synovium regenerated. Graft extrusion and wrinkling. | 102 |
| PCL-polyurethane | Canine | - | 26 weeks | Fibrocartilage ingrowth. Collagen I in peripheral fibrous zones and collagen II in central cartilaginous zones. Small synovial reaction to polymer. Giant cells and macrophages present. | 145 |
| PCL-polyurethane | Canine | - | 24 months | Zonal tissue formation with thin fibrovascular rim and larger avascular cartilage-like inner zone. Collagen I, II and proteoglycans present. Fragmentation of scaffold. Cartilage degeneration similar to meniscectomy group. | 146 |
| PCL-polyurethane | Canine | - | 6, 24 months | Cartilage degeneration seen at 6 months with further degeneration into calcified zone seen after 24 months. | 147 |
|  |  |  |  |  |  |
| PLLA | Canine | - | 24 weeks | No articular cartilage damage. Complete healing (n = 2) and partial healing (n = 3) in avascular region of dogs receiving scaffold. No healing in controls. Load to failure was 52% for scaffold-treated menisci compared to intact menisci. Trephined menisci had zero strength. | 101 |
| PLLA and ε-caprolactone | Canine | - | 26 weeks | Fibrocartilage ingrowth. Formation of fibrocartilage linked to compressive modulus of scaffold. | 148 |
| Polyurethane | Canine | - | 52 weeks | Ingrowth of fibrocartilaginous tissue. Presence of collagen I and II. Giant cells, macrophages and lymphocytes present on polymer surface. | 149 |
| Polyurethane | Canine | - | 28 weeks | Ingrowth of fibrous tissue. Presence of collagen I and II. Giant cells, macrophages and lymphocytes present. Degeneration of cartilage. | 96 |
| Polyurethane | Ovine | - |  | 4.5 ± 1.3 MPa and 0.3 ± 0.1 MPa at 70% and 25% strain, respectively. Decreased mean contact area compared to intact knee. | 150 |
| Polyurethane | Ovine | - | 3, 6 and 12 months | Tissue infiltration into scaffold. Lower equilibrium modulus than intact meniscus after 12 months. | 151 |
| Polyurethane (Actifit®) | Human | - | 24 months | Ingrowth of vascularised matrix. No cartilage damage. Zonal tissue formation. | 152 |
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