**Table 6:** Natural cell-based meniscal engineering

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| **Material** | **Model** | **Cells** | **Growth Factors** | **Follow-up** | **Results** | **Ref** |
| ***In Vivo*** |   |   |   |   |   |  |
| **Injectable** |  |  |  |  |  |  |
| - | Murine | 107 Synovium-derived MSCs | - | 12 weeks | Formation of meniscus tissue. Collagen II expression increased in time-dependent manner. Stem cells appeared morphologically similar to meniscal cells. | 155 |
| - | Murine | 5x106 Synovium-derived MSCs | - | 2, 4, 8, 12 weeks | Formation of meniscus tissue. Collagen II expression increased in time-dependent manner. Synovium derived stem cell genetic profile similar to meniscal cells | 130 |
| **Meniscus** |  |  |  |  |  |  |
| Decellularised meniscus | Porcine | Autologous chondrocytes | - | 9 weeks | Repair not homogeneous. GAG production. | 115 |
| Devitalized meniscus | Murine | 2x105 BM MSCs per scaffold | - | 8 weeks | Expression of ECM. Degeneration comparable to meniscectomised knees. | 106 |
| Devitalized meniscus and woven PLGA mesh | Murine | Porcine chondrocytes at 1, 2 and 5 x106 cells per mL | - | 12 weeks | Most homogeneous cell attachment found using dynamic oscillation. Integration of devitalized meniscus scaffold.  | 157 |
| Fibrin | Leporine | Fibrochondrocytes | - | 8 weeks | Matrix production and cell proliferation | 158 |
| Hyaluronan-gelatin 70:30 | Leporine | 1.5x106 MSCs per scaffold | - | 12 weeks | Defects filled with dense ECM. Collagen II present. Integration to native meniscal tissue. | 132 |
| ***In Vitro*** |   |   |   |   |   |  |
| **Collagen** |  |  |  |  |  |  |
| Collagen | Human | 105 fibrochondrocytes per scaffold | TGF-β1 | 2 weeks | Presence of collagen I and II, and chondroitin sulphate. Significant increase in proteoglycan production when exposed to TGF-β1. | 122 |
| Collagen I-GAG | Bovine or Canine | 1.8x107 fibrochondrocytes per cm3 |  | 3 weeks | Shrinkage to 54% of original size. Fibroblast-like and chondrocyte-like cells present. GAG and collagen production. | 123 |
| Collagen II-GAG | Bovine or Canine | 1.8x107 fibrochondrocytes per cm3 |  | 3 weeks | 12% shrinkage. Cells distributed throughout scaffold. Presence of collagen I and II, and GAGs. | 123 |
| Decellularised meniscus | Ovine | 105 fibrochondrocytes per mL | - | 4 weeks | Non-toxic. Higher stiffness and compressive modulus to native meniscus. | 128 |
| **Hyaluronan** |  |  |  |  |  |  |
| Hyaluronan | Human | 3.9x107 fibrochondrocytes per cm3 in mixed flasks | - | 4 weeks | Bi-zonal tissue formation. Inner region rich in GAG and stiffer in compression. Outer region rich in collagen and stiffer in tension. Meniscus-like collagen organization. | 124 |
| Hyaluronan-Chitosan | Murine | 2x104 meniscal cells per well |  | 2 weeks | Collagen I/II + chondroitin sulfate surface triggered redifferentiation of dedifferentiated meniscal cells. | 162 |
| Silk fibroin | Human | 0.8x106 BM-MSCs per layer of scaffold | bFGF, TGF- β3 | 4 weeks | Increase in collagen and GAG content. Evidence for differentiation of MSCs to chondrogenic phenotype. Doubling of compressive modulus in cultured scaffolds compared to scaffold alone. | 131 |
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