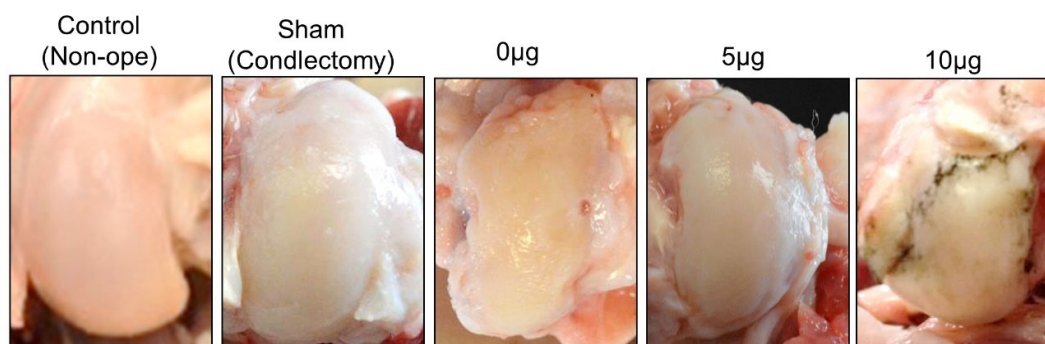


Appendix Figure A1. Macroscopic photos of femoral articular surface

Supplemental Fig. 1



Appendix Video. Surgical procedures

Online video supplement

Appendix Table A1. MRI: Meniscus score (meniscus allograft transplantation)

The score ranges from 0 (best) to 11 (worst).

MRI: Meniscus score		
Position	0	No Extrusion
	1	< 1/3
	2	1/3-2/3
	3	>2/3
Signal Intensity Fibrocartilage	0	Hypointense
	1	Hyperintensity < 1/3
	2	1/3-2/3
	3	>2/3
Size	0	Normal
	1	Reduced by 1/3 or >
Capsular Healing	0	Completely healed
	1	Partially detached
	2	Completely detached
Morphology	0	Intact
	1	Tear
	2	Displaced Tear

Appendix Table A2. MRI: Articular cartilage degeneration score

MRI: Articular cartilage degeneration score

Modified Noyes Score (Cartilage)	0	Normal
	1	Hyper intensity
	2	< 50% thickness damaged
	3	>50% thickness damaged
	5	Subchondral bone exposed
	10	Erosion of bone
Osteophyte	0	None
	1	Small (<2mm)
	2	Large (>2mm)
Subchondral sclerosis	0	Absent
	1	Mild (<1cm ²)
	2	Severe (>1cm ²)

Articular cartilage in the tibial plateau and femoral condyle were scored separately, whereas a combined score was calculated for osteophyte and subchondral sclerosis. The total score comprises cartilage in femur, cartilage in tibia, osteophyte, and subchondral sclerosis (0 best – 24 worst).

Appendix Table A3. Macroscopic grading score for meniscus, articular cartilage, and synovitis.

Macro score	
Meniscus	
0	Normal
1	Scaffold intact, good position, well integrated into capsule
2	Small scaffold crack or minimally displaced, or not fully integrated
3	Degenerated or displaced or minimally integrated
Articular cartilage	
0	Normal
1	Partial thickness loss
2	Full thickness loss

Appendix Table A4. Histology: Meniscus regeneration score (modified Pauli score).

Histology: Meniscus regeneration score

I. Size

0	Normal
1	Almost normal
2	Clearly different than normal
3	Not observed

II. Morphology

0	C-shaped like normal meniscus
1	Partial C-shape
2	Abnormal shape compared to normal meniscus
3	No appearance of meniscus

III. Surface integrity

0	Smooth
1	Slight fibrillation or slightly undulating
2	Moderate fibrillation or markedly undulating
3	Severe fibrillation or disruption

IV. Integration with native meniscus

0	Complete integration without detectable border
1	Incomplete integration with detectable border
2	Separated with narrow space
3	Displaced from native meniscus

V. Cellularity of meniscal cells

0	Normal cell distribution
1	Nearly normal cell distribution
2	Hypercellularity or hypocellularity
3	No meniscal cells

VI. Cell morphology

0	Similar to normal chondrocyte
1	Round shape, but small or hyperplastic
2	Mix of round cells and other cell shapes
3	No chondrocyte/fibrochondrocyte-shaped cells

VII. Collagen fiber organization

0	Collagen fibers well organized, no separations or tears
1	Collagen fibers moderately well organized, slight separations or tears
2	Collagen fibers unorganized, moderate separations or tears
3	Collagen fibers poorly organized, severe separations or tears

VIII. Matrix staining

0	Well stained similar to normal meniscus
1	Moderately stained
2	Slightly stained
3	No stain

The first four criteria analyzed the whole meniscus and the final four analyzed three subsections (zone 1, zone 2 and zone 3). The final score was then summed up (0 best – 45 worst).

Appendix Table A5. ICC analysis of histological regenerated meniscus score.

ICC: Histological meniscus regeneration score

	ICC	95% CI
Size	0.933	0.827-0.974
Meniscal Morphology	0.917	0.783-0.968
Surface Integrity	0.846	0.610-0.940
Integration	0.930	0.816-0.973
Meniscal Cellularity	0.904	0.773-0.953
Cell Morphology	0.906	0.833-0.947
Collagen Organization	0.746	0.566-0.851
Matrix Staining	0.907	0.840-0.945
Total Score	0.980	0.909-0.994

Appendix Table A6. Histology: Articular cartilage degeneration score (modified OARSI score for sheep and goat).

Grade	
A Structure	
0	Normal
1	Slight surface irregularities (surface barely disturbed)
2	Moderate surface irregularities (surface roughened)
3	Severe surface irregularities (disruption, fissuring/fibrillation to <10% depth)
4	Fissures to transitional zone (1/3 depth)
5	Fissures to radial zone (2/3 depth)
6	Fissures to calcified zone (full depth)
7	Erosion or severe fibrillation to mid zone (1/3 depth)
8	Erosion or severe fibrillation to deep zone (2/3 depth)
9	Erosion or severe fibrillation to calcified zone (full depth)
10	Erosion or severe fibrillation to subchondral bone
B Chondrocyte density	
0	Normal
1	Increase or slight decrease
2	Moderate decrease
3	Severe decrease
4	No cells
C Cell cloning	
0	Normal
1	Several doublets
2	Many doublets
3	Doublets and triplets
4	Multiple cell nests or no cells in section
D Interterritorial Toluidine blue	
0	Normal

- 1 Decreased staining to mid zone (1/3 depth)
- 2 Decreased staining to deep zone (2/3 depth)
- 3 Decreased staining to calcified zone (full depth)
- 4 No staining

E Tidemark/calcified cartilage/subchondral
bone

- 0 Intact subchondral bone plate / single tidemark
 - 1 Intact subchondral bone plate / duplicated tidemark
 - 2 Blood vessels penetrate through subchondral bone plate to calcified cartilage
 - 3 Tidemark penetrated by blood vessels
-

Stage

- 0 No damage
 - 1 <10% surface area with most affected area
 - 2 10-25% surface area with most affected area
 - 3 26-50% surface area with most affected area
 - 4 51-75% surface area with most affected area
 - 5 >75% surface area with most affected area
-

The articular surface was divided into three zones and the articular cartilage was scored respectively. The most severe lesion was scored by five subcategories to determine stage. The percentage of affected surface area was scored as grade. The final score was calculated by multiplying stage and grade and adding up the three zones. (0 best – 360 worst)

Appendix Table A7. Histology: Synovitis score (OARSI score for sheep and goat).

Histology: Synovitis score

Intimal hyperplasia

- 0 Normal (one cell deep only)
- 1 Mild, focal (2- 4 cells deep, and <20% area)
- 2 Mild diffuse (2- 4 cells deep, and >20% area) or
Moderate focal (five or more cells deep, and <20% area)
- 3 Moderate diffuse (five or more cells deep, and >20% area)

Inflammatory cell (lymphocytic/plasmacytic) infiltration

- 0 Normal (occasional cell)
- 1 Mild focal infiltration, no lymphoid aggregates
- 2 Moderate diffuse infiltration, no lymphoid aggregates
- 3 Marked discrete lymphoid aggregates

Sub-intimal fibrosis (loose connective tissue areas only)

- 0 None
- 1 Light, focal (<20% area) collagen staining
- 2 Heavy focal (<20% area) or slight diffuse collagen staining
- 3 Heavy diffuse collagenous staining

Vascularity

- 0 0-2 vascular elements per 100× field
 - 1 3-4 vascular elements per 100× field
 - 2 5-8 vascular elements per 100× field
-

Each sample was scored in four different locations and the average total score was recorded (0 best – 12 worst).