SCE 0802 Public Evidence Appendix

Musculoskeletal medicine

Literature review date: September 13, 2026

Controlling principle. Evidence is condition-specific and product-specific. Findings in one musculoskeletal tissue, product configuration, dose, route, or procedure should not be generalized automatically to another.

Evidence map

Domain	Evidence posture	Interpretive boundary
Knee osteoarthritis	Largest musculoskeletal MSC evidence base; mixed randomized and controlled findings across heterogeneous products.	Pain, function, structural imaging, and durability should be interpreted separately; class-wide efficacy is not established.
Hip osteoarthritis	Much thinner and more heterogeneous human evidence base than knee osteoarthritis.	Knee results should not be transferred to the hip.
Cartilage defects	Early trials report favorable signals, often as part of multicomponent surgical procedures.	Effects cannot be attributed confidently to the cell component when scaffolds, microfracture, or surgery differ.
Tendon injury	Small studies and varied products suggest possible benefit in selected settings.	Optimal product, dose, route, timing, and rehabilitation strategy remain uncertain.
Ligament injury	Direct regenerative evidence remains limited and in many settings preclinical or very early.	Mechanistic plausibility is not clinical proof of ligament regeneration.
Rotator-cuff disease	Small randomized and dose-escalation studies exist, but products, tear types, controls, and delivery methods differ.	Routine-care conclusions are not justified from small heterogeneous studies.
Meniscal injury	Limited clinical research suggests possible symptom or structural signals.	Evidence remains insufficient to establish standardized regenerative treatment.
Bone defects	Some clinical and translational studies support scaffold- or surgery-associated use in selected defects.	Multicomponent procedures make cell-specific attribution difficult.
Nonunion	Clinical use has been explored in difficult fractures, typically alongside fixation or grafting.	Healing cannot be attributed solely to MSC-related intervention without appropriate controls.
Intervertebral-disc disease	Randomized development is more advanced than in several other musculoskeletal indications, with mixed results.	Symptom improvement, imaging change, and true disc regeneration should not be conflated.

Key evidence conclusions

Musculoskeletal indications are not interchangeable. Joints, cartilage, tendon, ligament, meniscus, bone, and disc have distinct biology and clinical endpoints.

Product heterogeneity is substantial. Culture-expanded MSCs, stromal vascular fraction, bone-marrow aspirate concentrate, and proprietary cell products are not equivalent interventions.

Biological plausibility is not sufficient. Controlled human trials with prespecified patient-important outcomes remain necessary to establish benefit.

Null findings matter. Negative randomized data should receive the same evidentiary weight as favorable signals from smaller studies.

Principal references

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