Orthopedic Models for Medical Devices

**Capabilities and Expertise:**
- Bone fracture/defect repair models
- Spinal fusion and non-fusion models
- Joint/cartilage and soft tissue repair models
- Osteoinduction and ectopic bone models
- Dental and craniomaxillofacial models

**Preclinical Safety and Efficacy Assessment of Orthopedic Devices and Specialty Orthopedic and Musculoskeletal Studies**

Charles River evaluates orthopedic medical devices and biologics from the proof-of-concept to regulatory testing under GLP. State-of-the-art imaging modalities include computer tomography imaging (CT scanner), magnetic resonance imaging (MRI), high-definition radiography (Faxitron™), and micro-computed tomography (Micro-CT). Diverse histological endpoints are quantitatively assessed using manual and software-guided automated histomorphometry. A full histopathological analysis and quantitative report is provided by experienced veterinary pathologists. Our team can also perform biomechanical testing in parallel on designated explants and healing sites.

**Bone Fracture/Defect Repair Models**

Our bone repair models encompass the safety and efficacy evaluation of bone graft substitutes and orthobiologics using long bone osteotomy and ostectomy (e.g., critical-size segmental defects), press-fitted insertion, and gap models. Typical endpoints include bone remodelling and bridging, bone-implant contact (BIC), osseointegration, and bone ingrowth quantification.
Spinal Fusion and Non-Fusion Models
We offer a range of spinal fusion and non-fusion models, including intervertebral fusion cages, posterolateral lumbar intertransverse spinal fusion (PLIF), disc arthroplasty, and nucleus pulposus replacement.

Joint/Cartilage and Soft Tissue Repair Models
Our musculoskeletal expertise covers a wide range of joint and cartilage models, including knee articular cartilage repair, osteochondral defect repair, microfracture defects, osteoarthritis (OA) models (e.g., via anterior cruciate ligament transection or other instability models), ACL reconstruction and fixation models, meniscal reconstruction, and rotator cuff repair models.

Osteoinduction and Ectopic Bone Models
Highly-specialized osteoinduction evaluations include ectopic bone formation using intramuscular pouch models.

Dental and Craniomaxillofacial Models
Our range of dental and craniomaxillofacial (CMF) models include cranioplasty, parietal bone and mandibular defects, maxillofacial fracture fixation, alveolar ridge augmentation, guided bone regeneration (GBR), and dental implantation/ extraction models.

Operating from our sophisticated orthopedics and biomaterials labs, our team is prepared to assist clients with the study design and the development of both short- and long-term animal studies that are fully compliant with regulatory agencies regarding the safety and efficacy evaluation of orthopedic medical devices and biologics. Charles River facilities are fully accredited by AAALAC International and CCAC, and successfully audited for GLP compliance by the US FDA and SCC.