

Techniques in Skeletal Phenotyping

Skeletal Biology

Organism Level

Whole Mount Staining

Gross Skeletal Measurements (DEXA)

Serum & Urine Biochemistry

Tissue Level

3-Dimensional Microarchitecture (MicroCT)

Static Bone Morphology (Von Kossa, Goldner)

Bone Formation Dynamics (Dual fluorescence labeling)

Bone Reabsorption Dynamics (TRAP)

Protein Localization (IHC)

Bone Matrix Composition (FTIR)

Cellular Level

Bone Marrow Stromal Cell Culture

Mineral Deposition and Absorption (Alizarin Red, Von Kossa)

Cellular Function (ALP, TRAP)

Molecular Level

Gene Expression Profiling (qPCR)

RNA Localization (In situ hybridization)

Skeletal Biomechanics

Organism Level

In Vivo Loading & Unloading

Fracture In Vivo

Tissue Level

Cortical Bone Macromechanical Properties (3-point bending)

Fracture Toughness (Notched 3-point bending)

Trabecular Bone Macromechanical Properties (Compression test)

Matrix Material Properties (Nanoindentation)

Cellular Level

In Vitro Loading (Fluid flow compression)

Molecular Level

Atomic Force Microscopy