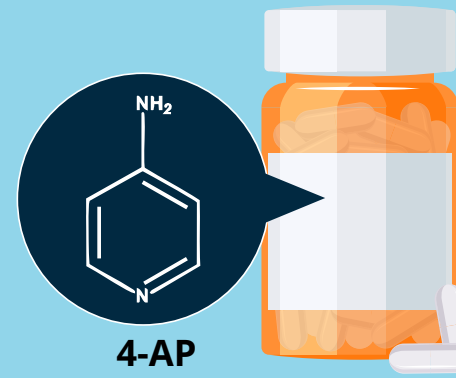
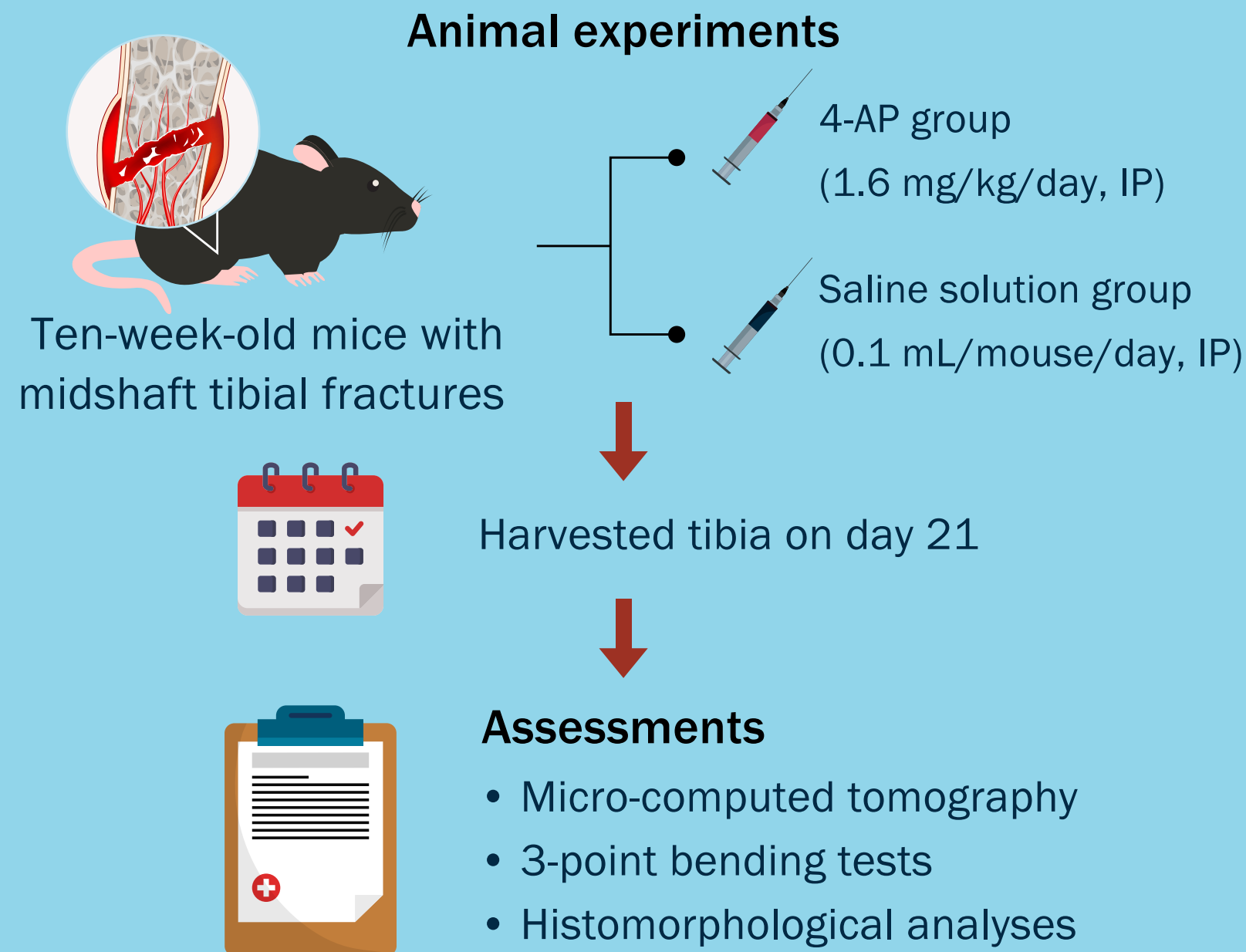


4-Aminopyridine Accelerates Fracture Healing in Mice

4-aminopyridine (4-AP) is a voltage-gated potassium channel antagonist with electrical stimulatory properties and has shown benefits in nerve, wound, and multi-tissue limb healing

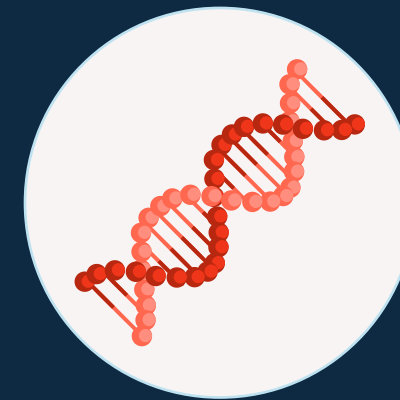


Does 4-AP play a direct role in improving bone fracture healing?



Cell studies (hBMSCs and hOBs)

4-AP upregulated osteogenic genes and proteins



4-AP
↓
↑ **BMP2**

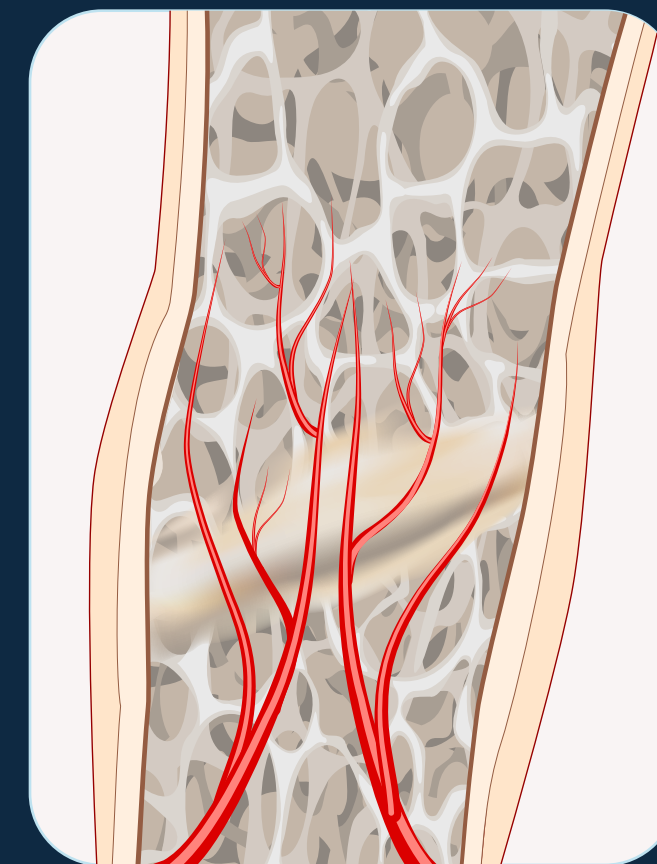
↑ **RUNX2**
↑ **BSP**
↑ **OSX**
↑ **OPN**
↑ **OCN**

4-AP enhanced osteoblast function



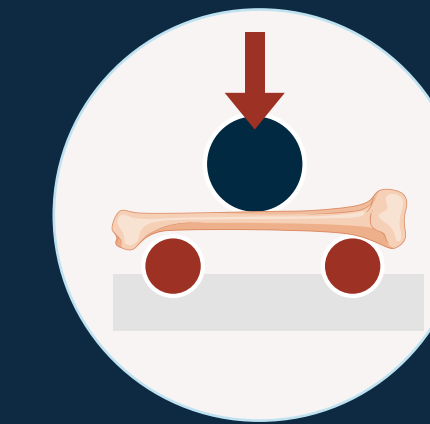
↑ Migration ↑ Collagen deposition
↑ Proliferation ↑ Matrix mineralization

In comparison with the saline group, the 4-AP improved:

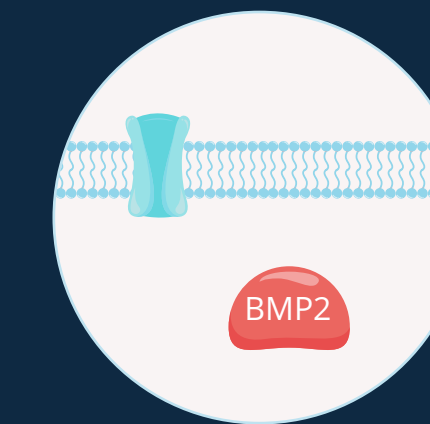


Tibial fracture healing

- Bone mineral density (687.12 vs 488.29 mg hydroxyapatite/cm³) [$p \leq 0.0021$]
- Bone volume/tissue volume (0.87 vs 0.72) [$p \leq 0.05$]
- Trabecular number (7.50 vs 5.78/mm) [$p \leq 0.05$]
- Trabecular thickness (0.08 vs 0.06 mm) [$p \leq 0.05$]



Tibial fracture biomechanical properties: (stiffness, 27.93 vs 14.30 N/mm; $p \leq 0.05$)



Endogenous BMP2 expression and matrix components in healing callus

IP: intraperitoneal; hBMSCs: human bone marrow mesenchymal stem cells; hOBs: human osteoblasts; BMP2: bone morphogenetic protein 2

4-AP accelerates fracture healing, strengthens bones, and promotes BMP2 expression that helps differentiation of mesenchymal stem cells into bone-forming osteoblasts

4-Aminopyridine Promotes BMP2 Expression and Accelerates Tibial Fracture Healing in Mice

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