

OSTAAT™ – A WEARABLE CREW-HEALTH COUNTERMEASURE FOR BONE LOSS IN MICROGRAVITY AND PARTIAL GRAVITY

A Wearable Solution for Mission-Relevant Bone Loss in Long-Duration Spaceflight

Designed to support targeted bone health at vulnerable skeletal sites with minimal crew burden

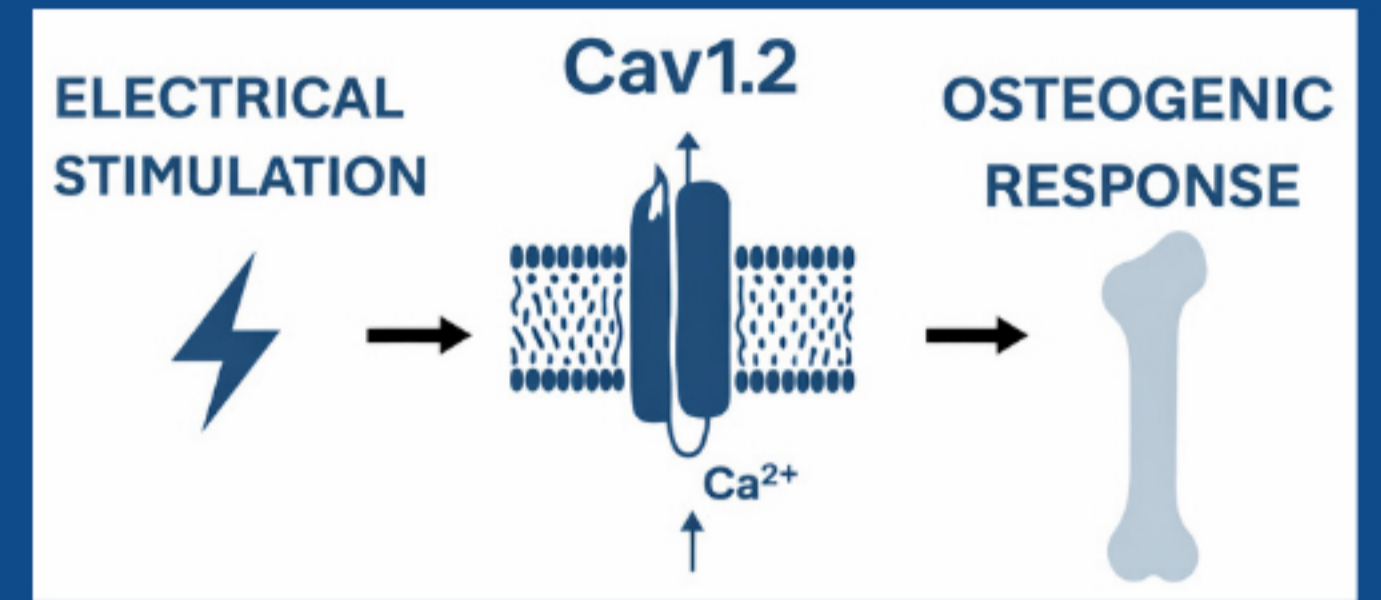


RATIONALE

Microgravity and partial gravity induce rapid, site-specific bone loss, particularly in the hips and lumbar spine, with declines of 1–2% per month in bone mineral density.

Current countermeasures mainly slow resorption through resistive exercise, nutrition, or pharmacology, but are not optimized for targeted bone-health support at vulnerable skeletal sites.

OSTAAT™ addresses this gap through low-intensity electrical stimulation designed to engage osteogenic pathways, informed by preclinical findings, including Cav1.2-related calcium signaling.



TECHNICAL SPECIFICATIONS

- < 1 kg, lightweight, rechargeable wearable system.
- Compressive smart shorts with integrated conductive-polymer textile electrodes.
- Compact detachable electronic module.
- Impedance monitoring, programmable delivery, and built-in safety lockouts.
- Software-guided setup, session monitoring, and traceable data logging.
- Designed for cleanability and repeatable operational use over time.

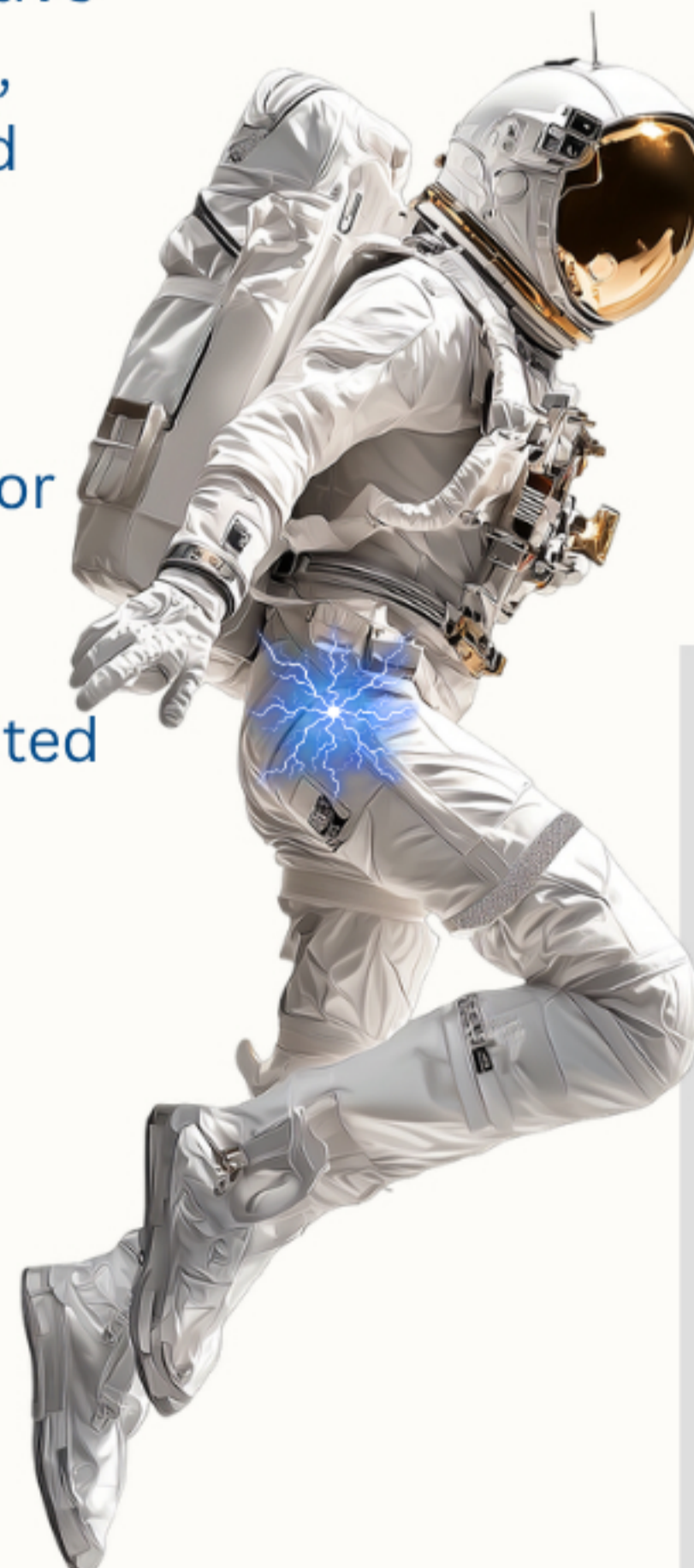
MISSION INTEGRATION

DURING IN-ORBIT OPERATIONS

- Daily use compatible with crew routine
- 60 minutes per session
- Low-power, low-burden wearable use under standard clothing

TARGETED BONE-HEALTH SUPPORT IN SPACE

- **Problem:** Microgravity-induced bone loss threatens astronaut health, mission performance, and post-flight recovery.
- **Limitations of current countermeasures:** Resistive exercise remains essential but is time-intensive, hardware-heavy, and not optimized for targeted skeletal sites.
- **OSTAAT™ innovation:** A lightweight wearable targeting the hips and lumbar spine, designed for minimal crew time and simple daily use.
- **Targeted advantage:** Designed to support targeted bone health at vulnerable skeletal sites within constrained exploration environments.



EXPECTED OUTCOMES

| Primary | Secondary |
|---|--|
| Support preservation of bone health at targeted skeletal sites during long-duration missions. | Support post-flight re-adaptation, mission readiness, and a lower-burden complement to existing countermeasures. |

RESEARCH & VALIDATION

Phase 1

Phase 2

Phase 3

Ground Analog Validation (bed-rest & lab)

In-Orbit Demonstration

Operational Deployment

www.katinnovation.com

ADVANTAGES FOR ASTRONAUTS

- **Lightweight and wearable:** No large station hardware required for targeted use.
- **Operationally efficient:** Minimal setup, low crew burden, and simple routine integration.
- **Dual-use value:** Earth analog and terrestrial applications can accelerate validation, scale-up, and supply-chain maturity.