

The Department of Biomedical Engineering  
*Presents:*

## **Calcium Waves in Osteocyte Network under Mechanical Loading**

*By*

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### **ABSTRACT:**

The formation of neural network circuits in the brain is the key to permanent memory in cognitive functions. Osteocytes in mineralized bone tissue also form elaborate cellular networks. It is well known that mechanical usage modulates the shape, mass, and microstructure of bone. Does the osteocyte network hold the key to cellular memory of mechanical loading history and distribution in bone tissue? Using soft lithography, contact microprinting, and surfaces modifications with self-assembled monolayers, two-dimensional (2D) bone cell networks of controlled connections and spacing were created. Real-time intracellular calcium waves were examined in bone cell network under various mechanical loading using various types of bone cells, including osteocytes, osteoblasts, and primary osteoblasts from knockout mice. In a neural network, the circuit patterns and connections determine the permanent memory in cognitive functions. The results from our studies suggest a novel hypothesis of mechanical memory in bone tissue: the bone cell network may determine how bone tissue remembers its mechanical loading history and distribution.

**3:35 – 4:30 P.M.**

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**Room 2-101 NHH**

BME 8601 Graduate Seminar

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