

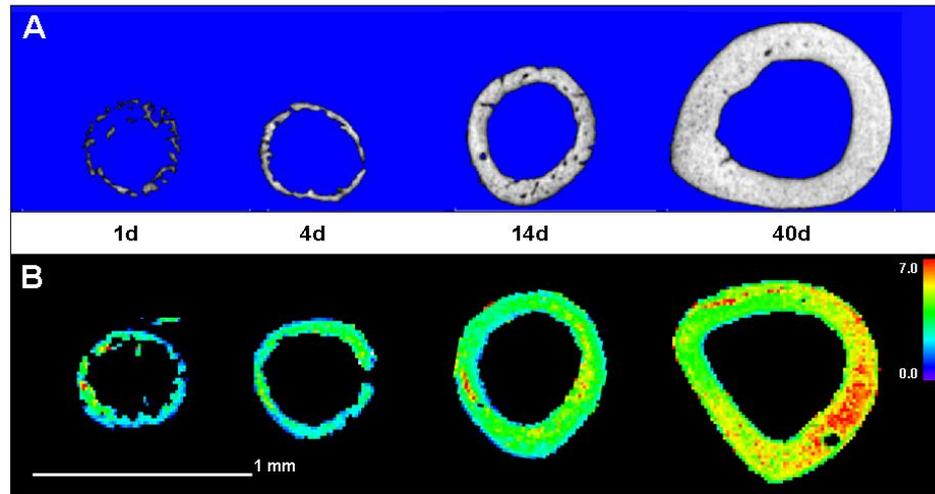
Pinpointing the Cause of Stiffening in Bones

L.M. Miller¹, W. Little², A. Schirmer¹, F. Sheik², B. Busa², and S. Judex²

¹BNL-NSLS; ²Stony Brook University

U10B

- The chemical composition and mechanical properties of bone change with age, but the relationship between bone's chemical makeup and its corresponding mechanical properties is still poorly understood.
- After using an infrared microscope at the NSLS to study mouse tibia during the first 40 days of life, researchers found that specific chemical and structural properties modulate bone's stiffness during early growth. They also found that the intrinsic stiffening of the bone falls behind the initial mineral formation, emphasizing the importance of bone mineral quality for optimizing strength.
- Their findings lead the way to enabling the diagnosis, prevention, and treatment of poor bone quality that can cause debilitating fractures in diseases such as osteoporosis.



(A) Micro-CT and (B) FTIRM phosphate/protein images of the mouse mid-diaphysis at 1d, 4d, 14d, and 40d of age. All images for each technique are plotted on the same intensity scale for direct comparison. Results showed that the spatial variability in mineralization across the mid-tibia was very high for the early time points and declined over time.