Orthopaedic injuries, such as rotator cuff tears, are often complicated by factors associated with age, injury magnitude and tissue degeneration. Additionally, healing outcomes following surgical repair of rotator cuff tears are dependent on cellular and mechanical cues that can enhance or impair healing. This talk will first explore how two structurally and mechanically dissimilar materials, tendon and bone, form a robust connection during fetal and postnatal development. The well-orchestrated developmental program will then be contrasted against tendon-to-bone healing in the adult. Our recent findings have shed light on poor healing outcomes that are driven by mechanical loading and are associated with failed rotator cuff repairs. Taken together, these studies have begun to elucidate the mechanobiological regulation of musculoskeletal tissue modeling and healing. Further understanding of the developmental processes can be used in future work to motivate strategies for improving orthopaedic repair and healing.

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