

Type I Collagen Exists as a Distribution of Nanoscale Morphologies in Teeth, Bones and Tendons

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Type I Collagen Exists as a Distribution of Nanoscale Morphologies in Teeth, Bones and Tendons

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Abstract:

This study demonstrates that collagen, the most abundant protein in animals, exists as a distribution of nanoscale morphologies in teeth, bones, and tendons. This fundamental characteristic of Type I collagen has not previously been reported and provides a new understanding of the nanoscale architecture of this ubiquitous and important biological nanomaterial. Dentin, bone, and tendon tissue samples were chosen for their differences in cellular origin and function, as well as to compare mineralized tissues with a tissue that lacks mineral in a normal physiological setting. A distribution of morphologies was present in all three tissues, confirming that this characteristic is fundamental to Type I collagen regardless of the presence of mineral, cellular origin of the collagen (osteoblast versus odontoblast versus fibroblast), anatomical location, or mechanical function of the tissue.

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