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Matrix mimicry and nuclear biophysics: biostructures are maintained where stresses are high DENNIS DISCHER, University of Pennsylvania — You are more collagen than any other protein. We will describe various collagenous assemblies as thin and thick matrices that help elucidate how important matrix physical properties are to cells. We start with tissues analyses that reveal power law scaling of collagen levels versus of the stiffness of real tissues conform to polymer physics. Our unbiased 'omics methods also reveals similar scaling for a main structural protein of the nucleus, a filamentous coiled-coil protein akin to collagen but in the same family as keratin in your hair and nails. This nuclear protein called lamin-A protects DNA from stresses that differ between tissues as stiffness does. Ultimately, the data suggests lamin-A is mechanosensitive in ways similar to collagen: degradation and turnover is repressed by stress – which is distinct from the conventional "stress it and break it" of dead materials.

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