Mechanics of the Nuclear Envelope in Health and Disease

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The nucleus is delineated from the cytoplasm by the nuclear envelope, which comprises outer and inner nuclear membranes, nuclear pore complexes and nuclear lamina. Lamins are the major components of the nuclear lamina, which appears as a meshwork structure underneath the inner nuclear membrane. Mutations in the genes encoding for lamin and its binding partners have been associated with a variety of human diseases. Here, we study the mechanics of nuclear envelope by conducting experiments on isolated nuclei and interpreting the results using a robust computational model, which enables us to distinguish the distinct structural role of each nuclear elements in normal and pathological conditions. This study helps shed light on the structural role of the nuclear envelope and gain insight about the etiology of diseases promoted by lamin mutations.

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