

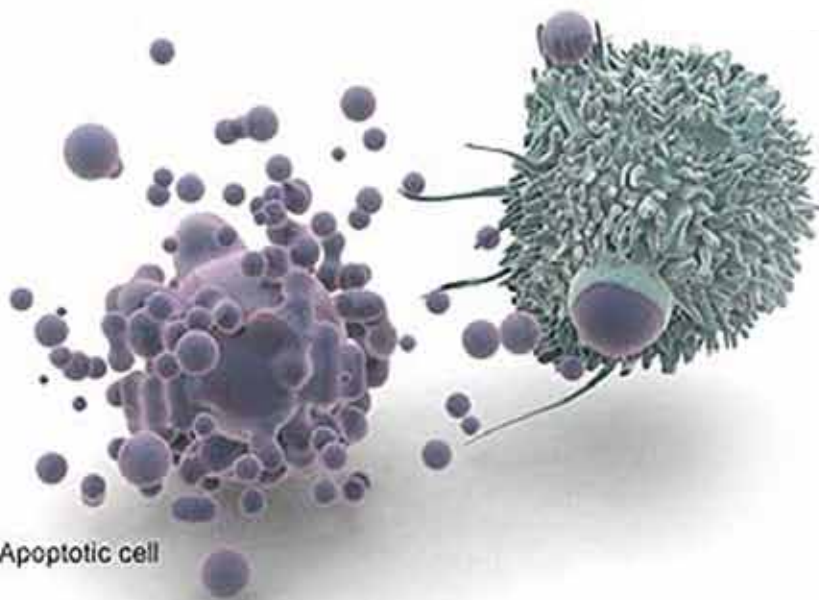
Mechanical Forces Due to Cell Destruction: Biophysical Investigation of the Role of Apoptosis (Programmed Cell Death) in Tissue Dynamics

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Abstract:

Understanding tissue dynamics during embryo development requires knowledge of how cells produce and respond to mechanical forces. Using the approach of biological physics, including in vivo imaging, laser microsurgery, quantitative analysis, gene manipulation, and theoretical modeling, we have characterized a novel role for apoptosis (programmed cell death) in tissue dynamics. During the long journey from egg to adult, the number of cells is finely controlled as the cells collect into distinct tissues that undergo patterned movements to form the adult body. Apoptosis is the process that eliminates cells which are no longer biologically necessary. For example, the tadpole tail vanishes before the tadpole becomes a frog and all of us have webbed hands and feet before individual digits are sculpted by apoptosis. During the apoptotic process, the dying cell is squeezed out from the tissue by mechanical forces produced within the cell and by forces produced within the neighboring cells. We experimentally demonstrated that the forces that squeezed out the apoptotic cell also contributed to tissue movements during development in the *Drosophila* (fruit fly) embryo. This role is not classically attributed to apoptosis. This research raises questions as to whether evolution may have harnessed the apoptotic force in other ways.



Date: Friday, 25 Sept 2009
Time: 4pm
Venue: LT 20
Host: Prof Paul Matsudaira

Apoptotic cell