

Forcing a living cell to perish: challenge of the future

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Abstract

Evolution has shaped the survival and death pathways under conditions of stress, normal development, differentiation and growth through selection pressure. Cell death, perceived as a negative event is essentially a positive occurrence as it can save an organism from abnormal physiological functions occurring due to stress and infection. As continued growth would hamper survival, animal cells have evolved the capability to kill themselves by turning on gene-encoded cell suicide programs. During the life-time of an organism, a crucial balance has to be maintained between cell death and cell division for proper homeostasis. A number of death processes have been defined and whether a particular cell will live or die are tightly regulated by many different signals originating both from within the cell and from its environment. The complexity of the cell death processes require that a full understanding would have to be addressed from various angles as the molecular mechanisms differ in different organisms. Information on how the processes evolved in both unicellular and multicellular organisms could generate interesting insights into regulation of death pathways. Since killing of cancer cells and infectious agents are central to disease treatments, understanding of the mechanisms of cell death have helped develop ways to eliminate unwanted cells. Evolving events pose a great challenge to our understanding of survival and death matters. The basic understanding of cell death processes in model organisms and their potential applications will be discussed.