



Pathobiology in Focus

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The cancer stem cell hypothesis: in search of definitions, markers, and relevance

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Abstract

Cancer is a disease of genes. Inherited or somatic alterations in genes are what make a normal cell ignore growth-controlling signals and form a tumor that eventually leads to the destruction of the organism. Based on accumulated knowledge on the genetic composition of cancer cells, the clonal evolution model of tumorigenesis was established, which explains multiple aspects of human disease and clinical observations. However, the recently popularized cancer stem cell hypothesis questions that all or most tumor cells can participate in tumor evolution and restricts this property to a subset of them defined as 'cancer stem cells' due to their stem cell-like characteristics. Enthusiasm surrounding this area of investigation and its presumed clinical implications led to a spurt of studies in various cancer types and model systems. Rigorous study design and critical data interpretation have to be employed to test the scientific and clinical relevance of the cancer stem cell hypothesis and its relationship to the clonal evolution model.

Keywords: tumor progression, clonal evolution, selection, cancer stem cell, heterogeneity