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# Recent reemergence of an evolutionary model of cancer growth

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## Abstract

Complex diseases: evolutionary models, systems and explanations (Skipper, Plutynski, Morange, Bertolaso)

In an evolutionary model of cancer growth, development of a tumour is compared to evolution of organisms. Cancer growth is the consequence of mutations that lead to the formation of different cell clones competing one with the other.

An evolutionary vision of cancer growth is not new. The idea that cancer cells are in competition with other cells, and in particular normal cells, was present in models of oncogenesis as diverse as those proposed by Otto Warburg and John Cairns. It was not foreign to the well accepted idea that tumours " progress " through successive steps.

Nevertheless, the recent reemergence of the evolutionary model of cancer growth is the consequence of technological developments permitting the fast sequencing of full genomes. These technologies were initially introduced to discover new oncogenes and tumour suppressor genes. The reemergence of an evolutionary vision of cancer growth was a collateral effect of these research programs, and a consequence of the development of deep sequencing methods.

Evolutionary models used to account for tumour development are different from those of the past. Evolution of tumour cells is seen as an open process. The importance of neutral mutations and exaptations, as well as of catastrophic events, is highlighted. The role of cancer cells in modifying their own environment (their niche) is also pinpointed.

Whether this renewed evolutionary vision of cancer growth will open new therapeutic perspectives remains an open issue.

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