

## DARWINIAN EVOLUTION OF TUMORS

The idea that tumors evolve through Darwinian processes had long been proposed, but it was the advent of single-cell analysis that finally provided direct experimental evidence. In 2011, Navin et al. (1) showed, using single-cell genomic analysis, that tumor evolution follows a Darwinian process. By resolving copy-number variation at the level of individual cells, his team reconstructed clonal expansions and phylogenetic relationships within tumors, using analytical approaches borrowed from evolutionary genetics.

Now, Ashford et al. (2) extend this evolutionary perspective further. Studying lung tumors, they identify a hallmark feature of Darwinian evolution: the diversification and potential neofunctionalization (acquisition of a new function) of duplicated genes and paralogs. Their analyses suggest that gene duplication can expand the adaptive landscape of cancer cells, enabling functional innovation that may enhance tumor fitness.

Together, these studies reinforce a powerful concept: tumors are not static masses of cells but evolving ecosystems, shaped by variation, selection, and innovation.

1. <https://www.nature.com/articles/nature09807>
2. <https://genome.cshlp.org/content/early/2026/02/18/gr.278663.123>