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Immuno-oncology from the perspective of somatic evolution

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Abstract

The past years have witnessed significant success for cancer immunotherapies that activate a patient's immune system against their cancer cells. At the same time our understanding of the genetic changes driving tumor evolution have progressed dramatically. The study of cancer genomes has shown that tumors are best understood as cell populations governed by the rules of evolution, leading to the emergence and spread of cell lineages with pathogenic mutations. Moreover, somatic evolution can explain the acquisition of mutations conferring drug resistance in the ever-lasting battle for reaching even fitter cell states. Here, we review the current state of the art of somatic cancer evolution and mechanisms of immune control and escape. We also revisit the principles of immunotherapy from the perspective of somatic evolution and discuss the basic rules of resistance to immunotherapies as dictated by evolution.