

Abstract

# Resveratrol in Cancer Prevention and Treatment: Focusing on Molecular Targets and Mechanism of Action <sup>†</sup>

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**Abstract:** Resveratrol (3,5,4'-trihydroxystilbene) is a phytoalexin occurring in grapes, red wines, peanuts, berries and other vegetables that has been reported to provide protection against several human diseases, including metabolic diseases and cancer. More than one thousand preclinical investigations, performed *in vitro* and in animal models, indicate that resveratrol efficaciously affects the development and progression of various tumors such as breast, lung, prostate and colon carcinomas, leukemias, skin tumors and melanomas. On this basis, resveratrol and its derivatives are under investigation in humans as cancer chemopreventive and/or chemotherapeutic agents. Resveratrol mechanism of action has been widely studied in cancer cells and in experimental models of senescence, inflammation, obesity and metabolic diseases. Its molecular targets act at different levels: (1) specific molecular pathways (like NF- $\kappa$ B, MAPK/JNK/p38 Kinase, PKC, PI3K-AKT and several others); (2) epigenetic control of gene transcription through sirtuin activation; (3) cell division cycle and differentiation; (4) apoptosis and autophagy; (5) cellular redox homeostasis. In addition, the phytoalexin might modify microbiome composition and mimic hormone activity. Particularly, we recently reported that the molecule is able to substitute insulin in adipogenesis induction of mesenchymal stromal cells derived from human bone marrow. The relevance of these mechanisms and their translation in clinical therapy will be discussed.

**Keywords:** resveratrol; cancer; molecular targets



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