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Genetic basis and gene therapy trials for thyroid cancer.

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Abstract

Gene therapy is regarded as one of the most promising novel therapeutic approaches for hopeless cases of thyroid cancer and those not responding to traditional treatment. In the last two decades, many studies have focused on the genetic factors behind the origin and the development of thyroid cancer, in order to investigate and shed more light on the molecular pathways implicated in different differentiated or undifferentiated types of thyroid tumors. We, herein, review the current data on the main genes that have been proven to (or thought to) be implicated in thyroid cancer etiology, and which are involved in several well-known signaling pathways (such as the mitogen-activated protein kinase and phosphatidylinositol-3-kinase/Akt pathways). Moreover, we review the results of the efforts made through multiple gene therapy trials, via several gene therapy approaches/strategies, on different thyroid carcinomas. Our review leads to the conclusion that future research efforts should seriously consider gene therapy for the treatment of thyroid cancer, and, thus, should: (a) shed more light on the molecular basis of thyroid cancer tumorigenesis, (b) focus on the development of novel gene therapy approaches that can achieve the required antitumoral efficacy with minimum normal tissue toxicity, as well as (c) perform more gene therapy clinical trials, in order to acquire more data on the efficacy of the examined approaches and to record the provoked adverse effects.