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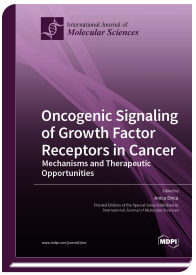
Oncogenic Signaling of Growth Factor Receptors in Cancer: Mechanisms and Therapeutic Opportunities



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At the molecular level, the activation of growth factor receptors (GFRs) induces a mitogenic response and maintains cancer cell growth. The majority of malignant diseases are related to aberrant intra- and intercellular communication, associated with the GFR-mediated pathways. Moreover, the evasion of apoptotic signals and the requirement of angiogenesis were also found to be of fundamental importance for tumor progression and metastasis. In this context, a high expression of GFRs aids blood vessel formation, cell migration, and the inhibition of apoptosis. GFR-directed therapy that would theoretically selectively kill malignant cells and reduce the toxicity associated with nonselective conventional chemotherapy may be a promising treatment for cancer.

Many intracellular proteins involved in GFR signal transduction can also function as oncogenes. Mutations affecting key proteins in the RAS/MAPK and PI3K/AKT pathways are known to be crucial in maintaining the malignancy of different types of cancers. This information has guided the development of compounds designed to target one or more of these pathways in cancer cells.

Even though there have been important advances in our understanding of GFRs and their signaling, certain essential information is still lacking, and these membrane receptors are still being laboriously studied by several research groups, to find therapeutic solutions to unmet medical needs.

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