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Cancer and Wnt Pathway

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Abstract

Today, mutations in genes, diet and lifestyle play a major role in causing cancer. Genetic factors are much lower on the list. Stress in particular can affect all our bodily functions, causing cancer cells to form and multiply uncontrollably. Stress and other factors negatively affect our immune system, making it unable to fight cancer stem cells. The Wnt/β-catenin pathway, which is an important pathway in cancer development, constitutes a key point for cancer treatment. In this proceeding review study, we will briefly discuss Wnt pathway in cancer.

Introduction

In humans,19 proteins belonging to the Wnt gene family have been identified [1]. Wnt genes encode for a group of glycoproteins that are rich in cystein. The Wnt protein family consists of at least 19 glycoproteins that are highly conserved across species [2]. Activation of the Wnt pathway in the postnatal period causes cancer pathogenesis [1].

Wnt signaling pathway is divided into 3[1].

1. Wnt/ β-catenin Signaling
2. Wnt/ Ca^2 Signaling
3. Wnt/Planar Cell Polarity Signaling

Cancer development is caused by the canonical pathway Wnt/β-catenin pathway. Mutations in the Wnt pathway are linked to cancer formation [3].

Results

The β-catenin gene is evolutionarily conserved in living things. In the embryonic period, the Wnt/β-catenin pathway has a signifcant role in tissue and organ development; in adulthood, it is involved in cell renewal in organs [4]. The degradation complex phosphorylates β-catenin, which is normally in excess in the cell. However, in mutations, degradation is stopped by the Wnt pathway and β-catenin begins to accumulate in the cell. This leads to cancer formation [4]. In the absence of Wnt signaling pathway ligands, there is phosphorylation of the cytoplasmic β-catenin [5]. Cancer stem cells cause cancer initiation, metastasis and cancer recurrence. Cancer stem cells can self-renew and differentiate. Governed by the Wnt/β-catenin pathway [6].

Conclusion

Mutations in the Wnt pathway cause type 2 diabetes, leukemia, Alzheimer's, colon and breast cancer [6]. The Wnt pathway binds to the cysteine-rich receptor, disrupts the β-catenin degradation complex and triggers cytoplasmic accumulation [2]. If the function of this degradation complex is not disrupted, cancer stem cells cannot be formed to stimulate the cancer development. Since Wnt pathway is crucial for the stem cell maintenance, cell differentiation and organ development, having mutations or alterations in this pathway leads to tumor cell generation and eventually the development of the cancer [7]. More studies should be conducted to determine the role of Wnt pathway proteins specifically for each cancer case. This will enable the target determination for drug development and cancer stem cell targeting as therapeutic option to eradicate the tumor cells.

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