Literature Review for Thyroid Cancer

RQ: How does the expression of COL13A1 and COL23A1 impact the progression and prognosis of Thyroid Carcinoma?

Or,

What are the potential therapeutic targets for targeting COL13A1 and COL23A1 in the treatment of Thyroid Carcinoma?

Answer:

Thyroid Carcinoma is a relatively uncommon form of cancer that affects the thyroid gland, which is located in the front of the neck. It is more common in women than in men, with an estimated lifetime risk of 0.8% for women and 0.3% for men. The incidence of thyroid cancer appears to be increasing, and it is currently the eighth most common cancer in women. Thyroid cancer can be classified into different types, with the most common being follicular and papillary variants, collectively known as differentiated thyroid cancer. Other rare forms of thyroid cancer include medullary thyroid cancer, thyroid lymphoma, anaplastic carcinoma, Hurthle-cell carcinoma, squamous cell carcinoma, and intrathyroid sarcoma.**[1]**

Thyroid Carcinoma (TC) is divided into three main histological types: differentiated (papillary and follicular TC), undifferentiated (poorly differentiated and anaplastic TC), and medullary TC.

- Differentiated TC includes papillary thyroid carcinoma (PTC) and follicular thyroid carcinoma (FTC), which account for more than 90% of thyroid malignancies.
- Poorly differentiated thyroid carcinoma (PDTC) and anaplastic thyroid carcinoma (ATC) are rare tumors associated with aggressive behavior and shorter survival times.
- Medullary thyroid carcinoma (MTC) arises from parafollicular C cells and represents 5% of TC.**[2]**

Role of COL13A1 and COL23A1 in Thyroid Carcinoma:

Collagen family genes play an important role in the formation of the extracellular matrix and may be promising therapeutic targets for PTC treatment.**[3]**

- COL13A1 and COL23A1 are members of the collagen family that have been implicated in cancer progression and metastasis.
- COL13A1 has been found to be overexpressed in various tumors and is associated with tumor growth and invasion.
- Both COL13A1 and COL23A1 may serve as potential biomarkers for cancer detection and prognosis.
- Understanding the molecular basis of the interactions involving these collagens may provide insights into cancer diagnosis, prognosis, and the development of new therapeutic targets.**[4]**
- COL23A1 is a transmembrane collagen that is highly expressed in thyroid and cardiovascular systems. It is associated with metastatic tumor cells and has been found to be closely related to renal cell carcinoma. It is derived from module 2 and has an important paralog, COL5A1, which is related to various cellular pathways including ECM-receptor interaction, protein digestion and absorption, focal adhesion, amoebiasis, and the PI3K-Akt signaling pathway.
- In the study, COL23A1 was identified as one of the hub differentially expressed genes (DEGs) in anaplastic thyroid cancer (ATC). The expression level of COL23A1 was found to be associated with the prognosis of ATC, suggesting its potential as a biomarker for ATC.**[5]**
- In a study analyzing the correlation of differentially expressed proteins (DEPs) in thyroid cancers, COL23A1 was found to be one of the downregulated DEPs in invasive papillary thyroid carcinoma (iPTC).**[6]**
- COL13A1 and COL23A1 were found to be among the top 10 hub genes associated with THCA.
- Both COL13A1 and COL23A1 were validated as prognostic biomarkers in THCA.
- Low expression of COL23A1 was observed in THCA tumor tissues compared to normal tissues.**[7]**

Study about biomarker research in Thyroid Carcinoma:

- Biomarker research in thyroid carcinoma has made significant progress, providing important insights into the complexity of the disease.
- Proteomics and genomics advances have revealed specific genetic abnormalities and molecular changes associated with different subtypes of thyroid cancer.
- Liquid biopsies, such as evaluating circulating tumor DNA, offer a non-invasive way to track the course of the disease and detect recurrences early.
- Integrating molecular profiling into clinical practice can improve patient outcomes, risk classification, and personalized treatment plans.**[8]**

Targeted therapies for Thyroid Carcinoma:

- Recent discoveries in the molecular pathogenesis of thyroid cancer have led to major advances in the treatment and management of aggressive tumors.
- Several novel drugs that target cell proliferation, angiogenesis, apoptosis, immunosuppression, metabolomic reprogramming, and epigenetic changes have been tested.
- These targeted therapies have demonstrated significant clinical benefit in preclinical and clinical studies.
- Immunotherapy has also shown promise in the treatment of advanced thyroid cancer.**[9]**

References:

1. https://doi.org/10.1111/j.1368-5031.2005.00671.x
2. https://doi.org/10.3389/fendo.2020.00102
3. https://doi.org/10.1007/s12020-022-03175-9
4. https://doi.org/10.3390/ijms232012415
5. https://doi.org/10.21203/rs.3.rs-378231/v1
6. https://doi.org/10.7150/jca.47290
7. https://doi.org/10.1080/21655979.2021.1940615
8. https://doi.org/10.3389/fendo.2024.1372553
9. https://doi.org/10.3389/fendo.2020.00082