

Role of Galectin-3 in Thyroid Cancer

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Thyroid cancer (TC) is the most common endocrine malignancy with a rising incidence. It has a wide spectrum of clinical behavior and varied therapeutic responsiveness. Among the various forms of TC, papillary thyroid cancer (PTC) accounts for 85% of all TCs. It is the most common form compared to follicular carcinoma (FCA) and other rare forms such as medullary carcinoma (MCA), anaplastic carcinoma (ANA), poorly differentiated carcinoma (PDTC), undifferentiated thyroid carcinoma (UDTC), Hurthle cell carcinoma (HCA) and Insular carcinoma (Ins). In the past, PTC and FCA were generally identified by the difference in their clinical nature and the characteristic morphological features by using the conventional way of microscopy, following the guidelines from the World Health Organization (WHO). PTC is identified by its peculiar nuclear features and the papillary pattern whereas in FCA it is from its follicular pattern. The main criterion for the diagnosis of PTC is the occurrence of enlarged, round to oval shaped overlapping ground-glass nuclei, well known as Orphan-Annie eyes. The delicate papillary pattern of growth and the presences of laminated calcifications (psammoma bodies) are also diagnostic. For the FCA it is based on its closely packed follicular pattern and its tendency in invasiveness. However, there is a difficulty in identifying one sub type of TC known as papillary thyroid carcinoma follicular variant (PTCFC). Henceforth, with the development in immunohistochemical (IHC) techniques, experiments have been performed to find out novel molecular markers for TC, where Galectin-3 (Gal-3) has been identified as the most useful tumor marker among other galactoside-binding proteins such as Gal-1 and Gal-7.

Studies on the role of Gal-3 in thyroid cancer has been extensively done, since in the past almost 30 years. It has been identified in the cytoplasmic and nuclear components of TC cells. To date, Gal-3 has been recognized to play a significant role as a diagnostic biomarker for thyroid cancer. It has been claimed to be the most extensively studied molecule in thyroid cancer particularly in its diagnostic property.

However, the role of Gal-3 in its action at the molecular level is not yet well clarified. Gal-3 is a member of the β -galactoside-binding protein family that plays an important role in cell to cell adhesion and in cell to matrix interaction. Cellular expression of Gal-3 is assumed to be correlated with cancer aggressiveness and metastasis. Interestingly, while PTC prefers lymphatic spread, FCA is well-known for its capsular and vascular invasion. This characteristic difference in the nature of spread between these two major forms of TCs is a crucial focus for further exploratory research on the role of Gal-3 in TC metastasis. In the 6th International Symposium on Hormonal Oncogenesis (6ISHO), Gal-3 has been highlighted for its probable role play in the advancing thyroid cancer cells from its preferential expression in the advancing TC cells. It is an initial small scale study that has been presented to start pulling the string for a further research niche area in understanding the action of Gal-3 at molecular level in tumourigenesis. Further exploratory researches concerning the role play of Gal-3 in angiogenesis to understand the difference in metastatic potentials between PTC and FCA will still be in need, to understand additional role of Gal-3 as an adjunct to cytomorphologic evaluation of fine needle aspiration biopsy, and as a target for therapy.

This article mainly referred to the author's abstract for a poster presentation in The Sixth International Symposium on Hormonal Oncogenesis (6ISHO) September 12-16, 2010, Tokyo, Japan: Differential Expression of Galectin-3 in the advancing thyroid cancer cells: A clue towards understanding tumor progression and metastasis, and the full text article of it in the Singapore Medical Journal 2010; 51(11): 856-859. Online link: <http://www.mdlinx.com/internal-medicine/news-article.cfm/3403551>. The author also would like to acknowledge an extensive and thorough review article by Connie G. Chiu et.al: Diagnostic Utility of Galectin-3 in Thyroid Cancer from The American Journal of Pathology, 176 (5) May 2010; p 2067-81.

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Received August 10, 2012; **Accepted** August 12, 2012; **Published** August 16, 2012

Citation: Htwe TT (2012) Role of Galectin-3 in Thyroid Cancer. Thyroid Disorders Ther 1:e103. doi:10.4172/2167-7948.1000e103

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