

Tumor biology of laryngeal cancer which is of practical importance

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Introduction:

Recent advances in tumor biology and genetics have increased our understanding of the basic mechanisms involved in the development of laryngeal malignancy and in predicting its clinical course. The following genes / enzymes may be of use in diagnosis & in predicting the prognosis of various malignant lesions involving the larynx.

Telomerase:

A brief introduction to this enzyme is a must. A telomere is a repeating DNA sequence at the end of the chromosome. They can reach a length of 15,000 base pairs. These telomeres function by preventing the chromosome from losing base pair sequence at their ends. They also prevent chromosomes from fusing with each other. Each time a cell undergoes division some amount of telomere is lost. When the telomere becomes too short the chromosome reaches a critical length and can no longer multiply. The cell which contains this critical length chromosome is considered to be too old and undergoes cell death (apoptosis).

The length of the telomere is controlled by two mechanisms:

Erosion – Occurs each time a cell divides

Addition – This is determined by the activity of telomerase

Telomerase is an enzyme made of protein and RNA subunits. It elongates the chromosomes by adding TTAGGG sequences to the end of the existing chromosomes. This enzyme is found in abundance in fetal cells, germ cells and tumor cells. If this enzyme telomerase is activated in a cell it continues to grow and divide and is known as the “Immortal cell”.

This enzyme has been linked to carcinogenesis of larynx. The presence of this

enzyme in the laryngeal cancer specimen serves as a marker in diagnosing persistent malignancy after irradiation. It is very helpful in picking up radio resistant cases / recurrent cases following irradiation.

PH-20:

This is a hyaluronidase usually expressed by malignant tissues. It is usually found to be elevated in metastatic lesions and hence can be used as a valuable tumor marker in identifying early nodal metastasis.

Herpes simplex virus DNA:

Polymerase chain reaction can be used to identify Herpes simplex virus DNA. This is found to be positive in nearly 75% of patients with laryngeal malignancies. This is due to the fact that this virus protein is a proved carcinogen.

Mutations involving gene p53:

Mutations involving gene p53 correlates with the clinical outcome of patients with laryngeal cancer.

Retinoblastoma protein:

Negative expression of this protein has been associated with higher likelihood of lymph node metastasis with significantly lower 5 years survival rates.

Cyclin D1:

This has been identified by immunohistochemical staining of paraffin embedded specimen. Low levels of cyclin D1 have been associated with radio resistance.