

Scientist at NIBGM discovered new diagnostic for oral cancer

By Dr. Bilqeesa Bhat

Team of researchers headed by Dr. Partha Majumder at National Institute of Biomedical Genomics (NIBMG) Kalyani has developed new molecular diagnostics to correctly predict the lymph node metastasis in oral cancer patients.

For the first time scientists have identified alterations in DNA, multiple genes and pathways associated with local lymph node metastasis in oral cancers. Metastatic lymph nodes carry cancer from primary sites too other sites. Team employed robust and stringent methods to analyze exome-wide sequence and genome-wide copy number data and identified both heritable and non-heritable genomic alterations associated with lymph node metastasis.



Team of researchers at NIBMG Kalyani who carried out the novel research on oral cancer

Oral cancer is considered one of the most predominant cancers found among men in Indian subcontinent. It is mostly caused by chewing of tobacco of all kinds. The cancer is often diagnosed later stages which results in poor survival rates among patients. The available research

data indicated that all cancers are essentially genomic diseases. Most of the oral cancer reported globally are found in developing/underdeveloped regions including India where per capita consumption of tobacco is high. In spite of much therapeutic advancements, there has been no significant improvement in survival outcome for cancer sufferers in the last decade.

The Department of Biotechnology (DBT), Government of India, has been participating in the large scale international initiative of International Cancer Genome Consortium to identify genomic changes that drive oral cancer through two collaborating organizations. The Advanced Centre for Treatment, Research and Education in Cancer (ACTREC) conducts the clinical arm of the research, and the National Institute of Biomedical Genomics (NIBMG) at Kalyani, West Bengal carries out the genomic analysis part.

The study carried out at NIBMG, Kalyani has discovered five biomarkers which can make it possible to tell in advance if a person with oral cancer of the gums and cheeks has lymph node metastasis before undergoing surgery. With such diagnostics, the presence/absence of lymph node metastasis in oral cancer patients can be predicted with 80-90% accuracy. The DNA alterations in specific genes provide cancer cells the ability to spread aggressively.

Out of all biomarkers, two are rare heritable DNA changes in BRCA2 and FAT1 genes. The protein coded by FAT1 gene acts as an adhesion molecule that keeps the cells together. The loss of adhesion potential of cancer cells leads to spreading of cancer cells to secondary sites. The human BRCA2 is a caretaker gene and it acts as tumor suppressor agent. Another novelty of this study is that it reported some rare alterations in BRCA2 genes (usually cause breast cancer) which cause metastasis.

The other three biomarkers are the non-heritable DNA alterations in genes belonging to mitotic G2/M cell cycle pathway, homologous recombination, non-homologous end joining DNA-repair pathways, recurrent deletion of genes for DNA repair by homologous recombination; and chromosomal instability.

The results have to be validated in a large number of patients enrolled for this study. Scientists have found a close association between DNA alterations in oral cancer patients with other

pathways involved in promotion of lymph node metastasis. Results have been published in high impact factor journal '*International Journal of Cancer.*'

The study predicts that oral cancer patient without lymph node metastasis survives for longer in disease-free state after receiving standard oral cancer treatment compared to other oral cancer patients who suffer from metastasis of the lymph node.

Contact person:

Dr Bikarm Roy, e-mail: br1@nibmg.ac.in

NIBMG, Kalyani, West Bengal