Look out for a protein pair to detect early onset of oral, breast cancer

Indrani Basu

The abnormal appearance or absence of a pair of keratin proteins might just become the key to detect oral and breast cancer at an early stage. This finding based on cancer cell study instituted by Advanced Centre for Treatment, Research and Education in Cancer (ACTREC), Kharghar can become a big breakthrough in the diagnosis and early detection of oral and breast cancer.

Dr Milind Vaidya, principal investigator at ACTREC in Tata Memorial Centre's (TMC) Kharghar campus, has identified a pair of keratin proteins (fibrous protein forming the main structural constituent of hair, feathers, hoofs,horns etc)—K8 and K18 — whose abnormal appearance, according to him, helps the cells of the oral cavity to become cancerous.

Dr Vaidya, along with a group of scientists, has been conducting research at ACTREC, TMC, Kharghar, on the development of biomarkers (A biological molecule found in blood, body fluids or tissues that is a sign of a normal or abnormal process, condition or disease) for human oral and breast cancer for several years.

Dr Vaidya explained, "Since the success of treatment for cancer depends on the stage at which it is diagnosed, the development of biomarkers for early detection of cancers remains the topmost priority in cancer research. The epithelial cells form sheaths or a kind of layer of cells that cover the internal body parts and are generally found in human mouth, stomach, breasts and intestine. The cells of such layers are constantly damaged and destroyed due to exposure and must be replaced continuously. This may be one of the reasons that 90 per cent of all cancers are of epithelial origin and referred to as carcinomas."

His 20-year-long study is based on a group of proteins called keratins. Epithelial cells from different regions of the body express different pairs of keratins, and can be easily distinguished based on the presence of specific keratins. Dr Vaidya and his group had shown that keratins from epithelial cells derived from membranes covering the oral cavity may undergo cancer specific changes. His research findings disclosed the fact that the abnormal appearance of two keratins, namely, keratin 8 and keratin 18 can predict the early stages of cancers of the oral cavity or mouth as well as for assessing the progression of tumours. Further work indicated that this abnormal appearance of K8/18 is probably one of the root causes of the cells becoming cancerous.

Dr Vaidya has concluded another surprising finding. "The same pair of keratins is actually playing an opposite role in epithelial cells from the breast. In this case, the disappearance of this keratin pair is believed to play an important role for developing breast cancer."

TEST, FIND AND TEST SOME MORE

Jagatdeep Singh

BREAKTHROUGH: Dr Milind Vaidya (middle, front row) with his research team

The director of the centre, Dr Rajiv Sarin shared the details of the finding and the next line of action with this newspaper. "Any exciting lead is generally tested independently by other scientific groups, and consistent, relevant finding are then supported with intramural and extra mural research grants. We have special forums for interaction of scientists and the experts who would then test them in clinical studies."

Dr Vaidya's team experimented with collected tumour specimen or pre-malignant lesion collected from the patients, and it was seen that this keratin pair was also present abundantly in tumours from the oral cavity region. The findings have been made known worldwide with the help of international publications like 'Journal of Cell Science' (2011) and recently, in the January 15 edition of PLOS ONE journal.

Changing lifestyle can make a big difference

Among all cancers, oral or mouth cancers are the sixth largest group of cancers worldwide, and the single largest group of cancer in Indian men, mainly because of chewing tobacco and gutkha habit. Breast cancer is the second most common cancer affecting women in India, and the most common female cancer in metropolitan India. Some of the factors that can cause cancer include use of tobacco and alcohol, obesity, excessive consumption of red meat, pollution and family history. Leading a healthy lifestyle can prevent most of the ailments, including cancers.

The research team has concluded that the same proteins appear to play opposite roles in different cells. "This is an uncommon phenomenon for proteins that are thought to be mainly involved in the maintenance of the structural integrity of cells. The results provide yet another proof that individual proteins in our cells can wear multiple hats. These observations could prove useful in the development of novel prognostic markers for a variety of cancers and could also be useful targets for the treatment of cancer," concluded Dr Vaidya.

Dr Vaidya was assisted by Sarda Sawant and Prena Dang and Ph.D students Deepak Alam and Swapna. "Now our main aim is to put this finding as marker." It would take another five to 10 years to translate this research into a diagnostic tool and reach the pathology clinic, he added. "We would finally like to approach to Indian Council of Medical Research (ICMR) for definitive approval," said Dr Vaidya brimming with hope and excitement.