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NCBS METHOD TO DETECT VIRUS ASSOCIATED WITH A RARE SKIN CANCER

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A team from National Centre for Biological Sciences, Bengaluru, has developed a diagnostic system to detect the presence of Merkel cell polyomavirus in Merkel cell carcinoma tumours. Merkel cell carcinoma is a rare and aggressive type of skin cancer. The researchers have developed a test using the CRISPR-CAS12 technology that can identify the virus in the tumour and give off a fluorescence to indicate the presence of the virus. This is an important development, both, from the point of view of diagnostics and giving a prognosis for the condition.

Merkel cell carcinoma is associated with old age, excessive exposure to ultraviolet light and a weak immune system.

A virus that is part of the normal skin flora – the Merkel cell polyomavirus – can get integrated in the human genome and undergo a mutation which causes it to promote the cancer. In studies, in about 60-80% of Merkel cell carcinoma patients, the tumours were found to test positive for the virus. It is important to know this from the point of view of targeting treatment as well as for giving a prognosis. Earlier studies have shown that the Merkel cell carcinoma caused by the virus is less aggressive and progresses slower than that caused by excessive exposure to ultraviolet light.

“Our test, though presently in initial stages, combines the exciting new CRISPR technology with diagnostics and viral detection and holds promise for use in clinics [sometime] in the future” says Reety Arora from NCBS in an email to *The Hindu.* She is the corresponding author of a paper on the work published in *Frontiers in Molecular Biosciences*.

The team adapted a system named DETECTR (DNA endonuclease-targeted CRISPR trans reporter) to help them in this endeavour. The system consists of three components: identifier, switch and reporter. The identifier is a “guide RNA” which can recognise and bind to a section of the Merkel cell polyoma virus. The switch is a DNA-cutting enzyme known as Cas-12a which gets attached to the guide RNA after it finds its target DNA. The reporter consists of a single stranded DNA tagged with a fluorescent molecule.

When the guide RNA attaches itself to the viral DNA segment, the attached Cas-12a enzymes get activated and start cutting the “target” virus DNA. They also are enabled to cut up the single-stranded DNA tagged with fluorescent molecule.

This then causes the fluorescent molecules to glow, which can be detected. Also, the strength of the glow depends on the number of activated Cas-12a molecules, which in turn depends on the number of virus DNA copies recognised in the tumour DNA. This therefore gives a measure of the number of viruses in the tumour.

“We tested the amount of MCV DNA that can be detected by our system. And we find that if MCV is present at even femto-moles (10 to the power of minus fifteen moles) we can detect MCV DNA [and thereby diagnose],” says Dr Arora.

“Our future plans include developing this as a diagnostic test and hopefully in a colourimetric format,” she says. A colourimetric test would use an indicator that is visible to the naked eye, hence, it will eliminate the need for a fluorescence reader to see the test results.

“This way, we won’t need any special equipment or training to perform the test and the test will be easy to use in clinics,” she adds.

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The WHO had to come up the name in line with the 2015 guidelines between the global agency, the World Organisation for Animal Health and the Food and Agriculture Organization.

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