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Researchers at IISc design simple sensor for liver cancer detection

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The team has designed the assay as a simple paper-based sensor

Researchers at the Indian Institute of Science (IISc), Bengaluru have developed a unique luminescent probe that uses terbium, a rare earth metal, to sense the presence of an enzyme called ?-glucuronidase, which can potentially aid in the detection of liver cancer.

?-glucuronidase is an evolutionarily conserved enzyme found across life forms – from microbes to plants and animals. Its core function is to break down a sugar acid called glucuronic acid. Beyond its biological omnipresence, the enzyme also doubles as a critical biomarker for liver cancer. In fact, an upsurge in ?-glucuronidase often accompanies colon, breast, and renal cancers, as well as infections of the urinary tract and AIDS.

The roots of the project trace back nearly a decade, beginning with the team's experiments on metal ions and their gel-forming properties. The team found that terbium ions couched in a gel matrix derived from bile salts can emit green fluorescence.

Within the same gel matrix, the team added an organic molecule called 2,3-DHN (2,3-Dihydroxynaphthalene) masked with glucuronic acid. When ?-glucuronidase slices this modified molecule, 2,3-DHN gets released. The researchers then shined UV light on the sample.

For ease of application, the team designed this assay as a simple paper-based sensor by anchoring the gel matrix onto a paper disc. When ?-glucuronidase pre-treated with modified 2,3-DHN is added, the disc exhibits a much stronger green glow under UV light.

The researchers say that clinical studies will still need to be carried out to validate the assay. But they are hopeful that such sensors can bring down the cost of detecting clinically significant biomarkers.