



Cancer screening using acetic acid and visual inspection appears promising

Can screening for cervical [cancer](#)— usually a complex, costly exercise — be made into a home-based test? A team of researchers spanning several Indian institutes have made firm steps towards realising this.

“We intend to develop a calorimetric-based kit for cervical cancer detection. The ultimate goal is to develop an affordable and sensitive screening method which women could use themselves,” Dr. Aravind Kumar Rengan, Department of Biomedical Engineering, Indian Institute of Technology (IIT) Hyderabad, told *The Hindu*.

A pap smear — a gold standard test — for cervical cancer screening may not be feasible in India due to inadequate infrastructure, lack of trained doctors, and the relatively high cost. On the other hand, say experts, cervical cancer screening using visual inspection with acetic acid (VIA) appears promising.

A large clinical trial using VIA screening carried out by Dr. Surendra Sashtri and others from Mumbai’s Tata Memorial Centre, employed trained health workers, and showed the efficacy of the technique. More so, using acetic acid for cervical cancer screening is inexpensive and can reduce the lifetime risk of cervical cancer by nearly 25% to 36%.

Currently, detection of cervical intraepithelial neoplasia (CIN) on application of acetic acid is through visual inspection. Therefore, it needs trained technicians.

Dr. Rengan and his colleagues hope to do away with them.

How it works

Compared with normal epithelium, precancerous lesions contain an abnormally higher load of cellular proteins. Acetic acid applied on the cervix reacts with the proteins in precancerous lesions leading to protein coagulation. The protein coagulation appears opaque and white. Identifying the white patch can be tricky in some cases leading to reduced sensitivity of the VIA technique.

More acetic acid gets used up when there is CIN and Dr. Rengan's team is relying on the reduced amount of retrieved acetic acid for quantification. The acetic acid retrieved is made up to a fixed volume through the addition of reacting components such as gold chloride and other reactants. The reactants will form gold-based nanoparticles. Depending on the amount of retrieved acetic acid, the shape and size of the gold-based nanoparticles will vary resulting in difference in colour of the solution.

Developing on this, the researchers aim to remove the flaws involved in the visual inspection method and make it more robust. "The visual method is currently a yes or no procedure. Our method will allow grading of the pre-cancerous lesions based on severity," said Tejaswini Appidi from the Department of Biomedical Engineering, Indian Institute of Technology, Hyderabad. (She who won the BIRAC-SRISTI Gandhian Young Technological Innovation award for this innovation. The award comes with ₹15 lakh seed funding to develop a product.)

The challenge will be to deliver acetic acid to the cervical site and recover the unused acetic acid. "In collaboration with Prof. Rohit Srivastava's lab at IIT Bombay, we are developing a device that can directly deliver acetic acid to the site of cervix. We are in the process of filing a joint patent," Dr. Rengan added. The team has developed the protocol and completed preliminary testing.

They are in the process of tying up with hospitals to get clinical samples. "It will take two-three years to develop the final product," he says.

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