New epigenetic cervical cancer test has 100 per cent detection rate

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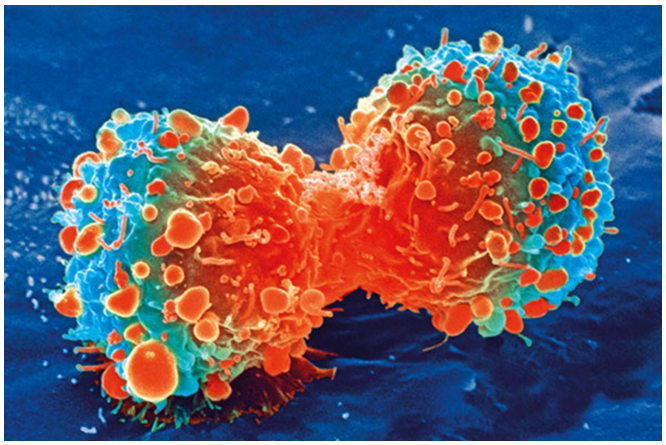

Cancer cell during cell division. Credit: National Institutes of Health

A new test for cervical cancer was found to detect all of the cancers in a randomised clinical screening trial of 15,744 women, outperforming both the current Pap smear and human papillomavirus (HPV) test at a reduced cost, according to a study led by Queen Mary University of London.

The study, published in the *International Journal of Cancer*, compared a new 'epigenetics-based' cervical cancer test with Pap smear and HPV tests, and investigated how well it predicted the development of cervical cancer up to five years in advance in a large study of women aged 25-65 in Canada.

As opposed to checking for patterns in the DNA genetic code itself that are indicative of the HPV virus, the new test looks at the naturally-occurring chemical markers that appear on top of the DNA, making up its 'epigenetic profile'.

'An enormous development'

Lead researcher Professor Attila Lorincz from Queen Mary University of London, who also helped develop the world's first test for HPV in 1988, said: "This is an enormous development. We're not only astounded by how well this test detects cervical cancer, but it is the first time that anyone has proven the key role of epigenetics in the development of a major solid cancer using data from patients in the clinic. Epigenetic changes are what this cervical cancer test picks up and is exactly why it works so well.

"In contrast to what most researchers and clinicians are saying, we are seeing more and more evidence that it is in fact epigenetics, and not DNA mutations, that drives a whole range of early cancers, including cervical, anal, oropharyngeal, colon, and prostate."

Screening to prevent cervical cancer is typically done through the Pap smear, which involves the collection, staining and microscopic examination of cells from the cervix. Unfortunately, the Pap smear can detect only around 50 per cent of cervical pre-cancers.

A much more accurate cervical screening method involves testing for the presence of DNA from the human papillomavirus (HPV) - the primary but indirect cause of cervical cancer. There are estimated to be around 10 million women in the UK who are infected by HPV.

However, the HPV test only identifies whether or not women are infected with a cancer-causing HPV, but not their actual risks of cancer, which remain quite low. This causes unnecessary worry for the majority of HPV-infected women who receive a positive result but will eventually clear the virus and not develop the disease.

Predicting a person's risk of cervical cancer

The new test was significantly better than either the

Pap smear or HPV test. It detected 100 per cent of the eight invasive cervical cancers that developed in the 15,744 women during the trial. In comparison, the Pap smear only detected 25 per cent of the cancers, and the HPV test detected 50 per cent.

The study also looked more closely at a subset of 257 HPV-positive women which were representatively selected from the large study. The new test detected 93 per cent of pre-cancerous lesions in those women, compared to 86 per cent detected using a combination of the Pap smear and HPV test, and 61 per cent detected using the Pap smear on its own.

Reducing the number of screening appointments needed

Professor Lorincz added: "This really is a huge advance in how to deal with HPV-infected women and men, numbering in the billions worldwide, and it is going to revolutionise screening.

"We were surprised by how well this new test can detect and predict early cervical cancers years in advance, with 100 per cent of cancers detected, including adenocarcinomas, which is a type of cervical cancer that is very difficult to detect. The new test is much better than anything offered in the UK at present but could take at least five years to be established."

The authors say that using this test in the clinic would reduce the number of visits to the doctor and screening appointments, as high-grade disease would be detected from the start. They also say that if it was fully implemented, it would be cheaper than the Pap smear.

More information: Darrel A. Cook et al, Evaluation of a validated methylation triage signature for human papillomavirus positive women in the HPV FOCAL cervical cancer screening trial, *International Journal of Cancer* (2018). DOI: 10.1002/ijc.31976

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