

## Artificial intelligence can predict survival of ovarian cancer patients

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Intermediate magnification micrograph of a low malignant potential (LMP) mucinous ovarian tumour. H&E stain. The micrograph shows: Simple mucinous epithelium (right) and mucinous epithelium that pseudo-stratifies (left - diagnostic of a LMP tumour). Epithelium in a frond-like architecture is seen at the top of image. Credit: Nephron /Wikipedia. CC BY-SA 3.0

The artificial intelligence software, created by researchers at Imperial College London and the University of Melbourne, has been able to predict the prognosis of patients with ovarian cancer more accurately



than current methods. It can also predict what treatment would be most effective for patients following diagnosis.

The trial, published in *Nature Communications* took place at Hammersmith Hospital, part of Imperial College Healthcare NHS Trust.

Researchers say that this new technology could help clinicians administer the best treatments to patients more quickly and paves the way for more personalised medicine. They hope that the technology can be used to stratify <u>ovarian cancer patients</u> into groups based on the subtle differences in the texture of their cancer on CT scans rather than classification based on what type of cancer they have, or how advanced it is.

Professor Eric Aboagye, lead author and Professor of Cancer Pharmacology and Molecular Imaging, at Imperial College London, said:

"The long-term survival rates for patients with advanced ovarian cancer are poor despite the advancements made in cancer treatments. There is an urgent need to find new ways to treat the disease. Our technology is able to give clinicians more detailed and accurate information on the how patients are likely to respond to different treatments, which could enable them to make better and more targeted <u>treatment</u> decisions."

Professor Andrea Rockall, co-author and Honorary Consultant Radiologist, at Imperial College Healthcare NHS Trust, added:

"Artificial intelligence has the potential to transform the way healthcare is delivered and improve patient outcomes. Our software is an example of this and we hope that it can be used as a tool to help clinicians with how to best manage and treat patients with ovarian cancer."

Ovarian cancer is the sixth most common cancer in women and usually



affects women after the menopause or those with a family history of the disease. There are 6,000 new cases of ovarian cancer a year in the UK but the long-term survival rate is just 35-40 per cent as the disease is often diagnosed at a much later stage once symptoms such as bloating are noticeable. Early detection of the disease could improve survival rates.

Doctors diagnose ovarian cancer in a number of ways including a <u>blood</u> <u>test</u> to look for a substance called CA125—an indication of cancer—followed by a CT scan that uses x-rays and a computer to create detailed pictures of the ovarian tumour. This helps clinicians know how far the disease has spread and determines the type of treatment patients receive, such as surgery and chemotherapy.

However, the scans can't give clinicians detailed insight into patients' likely overall outcomes or on the likely effect of a therapeutic intervention.

Researchers used a mathematical software tool called TEXLab to identify the aggressiveness of tumours in CT scans and tissue samples from 364 women with ovarian <u>cancer</u> between 2004 and 2015.

The software examined four biological characteristics of the tumours which significantly influence overall survival—structure, shape, size and genetic makeup—to assess the patients' prognosis. The patients were then given a score known as Radiomic Prognostic Vector (RPV) which indicates how severe the disease is, ranging from mild to severe.

The researchers compared the results with blood tests and current prognostic scores used by doctors to estimate survival. They found that the software was up to four times more accurate for predicting deaths from <u>ovarian cancer</u> than standard methods.



The team also found that five per cent of patients with high RPV scores had a survival rate of less than two years. High RPV was also associated with chemotherapy resistance and poor surgical outcomes, suggesting that RPV can be used as a potential biomarker to predict how patients would respond to treatments.

Professor Aboagye suggests that this technology can be used to identify patients who are unlikely to respond to standard treatments and offer them alternative treatments.

The researchers will carry out a larger study to see how accurately the software can predict the outcomes of surgery and/or drug therapies for individual <u>patients</u>.

The study was funded by the NIHR Imperial Biomedical Research Centre, the Imperial College Experimental Cancer Medicine Centre and Imperial College London Tissue Bank.

This research is an example of the work carried out by Imperial College Academic Health Science Centre, a joint initiative between Imperial College London and three NHS hospital trusts. It aims to transform healthcare by turning scientific discoveries into medical advances to benefit local, national and global populations in as fast a timeframe as possible.

## Provided by Imperial College London

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