Healthcare Innovation - What to expect for the future?

Pacific Life Re
Re:think

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Introduction

Earlier this year, we were fortunate enough to hear from Dr Jack Halligan, a Policy Fellow in Health Innovation at Imperial College London's Institute of Global Health Innovation. There they have a team of 250 professionals across a range of areas:

- Helix Centre – design and development of healthcare technologies
- Streams – evaluation of technology to help companies demonstrate the value of technology to stakeholders
- Healthcare policy – improving cybersecurity in the NHS and maximising the value of healthcare data collected
- Education and training – design and running of the NHS digital academy (three Masters programmes)

Dr Halligan presented a webinar on healthcare innovation and the following article is a summary of what was discussed.

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AI-enabled Cancer Screening

Cancer Research UK data shows that more than 50% of cancers detected through UK screening programmes are at an early stage of disease (stage 1), and therefore more likely to be successfully treated. However, only c.6% of all cancers are detected via screening. The most common route to diagnosis is via the NHS '2 week wait' (urgent referral) system and the uptake of screening programmes remaining a challenge; UK figures show 74% of women attend breast screening, 70-73% attend cervical screening and between 50-58% of people attend bowel screening.

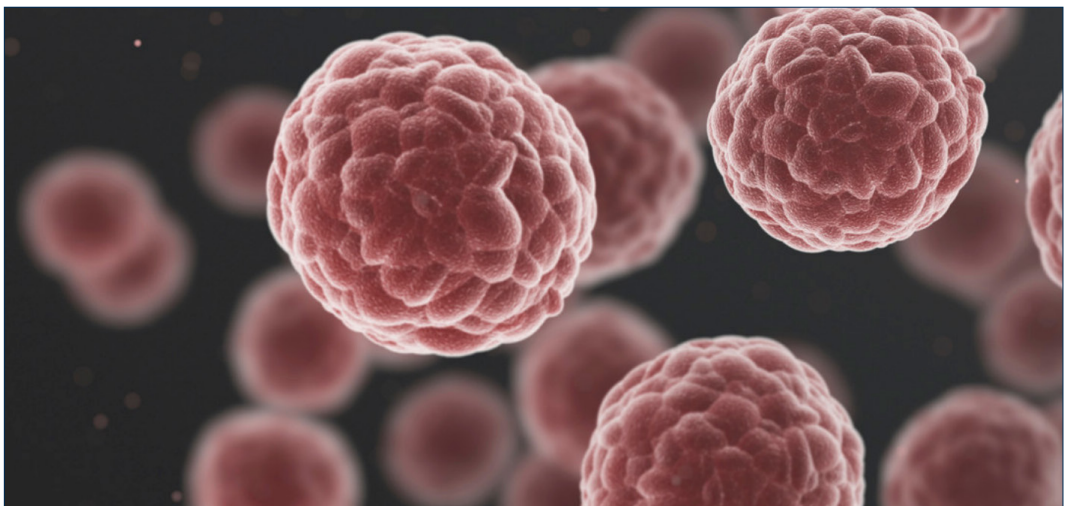
The most advanced use of AI in healthcare is for interpreting imaging, as this provides a large amount of structured data for training AI models. Such use cases include (all are pre-market with evidence continuing to be gathered):

- Using AI systems to replace the "2nd reader" for breast imaging. Currently, two radiologists read breast imaging for signs of cancer. Multiple clinical trials are being conducted to see if AI systems can replace this second reader

- Lung cancer screening of chest imaging

- Detecting cancer on pathology imaging

There remains an 'AI chasm' in healthcare: Algorithms with high performance accuracy have struggled to get from "code to clinic" and demonstrate value for health systems. This may because of the need to restructure clinical pathways, train users on AI systems, and conduct robust clinical trials to generate clinical and economic evidence. One study found the average time for an innovation to address a known clinical gap in healthcare at 17 years.



Immunotherapy Innovation

There are two vaccines in widespread use that can prevent the development of cancer: Human Papillomavirus (HPV) for cervical cancer and Hepatitis B to reduce the likelihood of liver cancer. HPV vaccines have been offered in the UK since 2008, but only c.25% of the world's 10-year old girls live in a country where the vaccination has been introduced.

In the past 10 years there has been an explosion of approved immunotherapies, which are manufactured in three ways:

1. Traditional immunortherepy (such as monoclonal antibodies). Manufactured in the laboratory and administered via an injection.

2. CAR-T cell therapy: Blood is taken from the patient, additional immunity is added to this blood, and the blood is reinjected the blood.

3. Cancer vaccines: A vaccine that is used to "turn on" or increase the immune response to fight specific cancer cells.

Immunotherapy has become the fourth pillar of cancer treatment, alongside surgery, chemotherapy and radiotherapy, but it is not the 'silver bullet' some thought it might be. It remains expensive, difficult to manufacture and is currently very effective in a relatively small number of cancers.

Lung cancer is the most common cause of cancer death in the UK. Non-small cell lung cancer is the most common form and of these approximately 30% are good candidates for immunotherapy. A US study showed that if the biomarker known as PDL-1 is highly expressive, then 5-year survival may be increased by 5% to 25% in this cohort. However, 75% of these candidates will have a shorter than 5-year survival rate.

CAR-T cell therapy is also very expensive and currently effective in a small number of cancers. However, it shows much promise in the treatment of blood cancers, such as lymphoma and leukaemia.

In recent years, there has been much talk of vaccines to treat cancer by inciting an immune response. Many are mRNA vaccines, which offer significant hope for cancer patients and are being trialled for many cancer types, though only one vaccine is presently on the market in the USA for prostate cancer. The vaccine prompts the body to build an immune response and attack the specific cells where cancer is growing and have the potential to treat a broad range of cancers. They are very versatile, relatively fast and cheap to manufacture, and may be personalised for individuals based upon biomarkers (this process takes longer and is more expensive, but early trials are encouraging).

Final Thoughts

Although this is all hugely innovative and exciting, there is unfortunately no silver bullet on the horizon for cancer treatment. In many cases, these innovative potential solutions are hugely expensive and / or ineffective and so cancer prevention combined with early detection through cancer screenings remains crucial for cancer treatment and survival.

Although there is hope surrounding mRNA vaccines, progress is likely to be incremental and therefore maintaining a healthy lifestyle remains, by far, the most effective means of preventing cancer (as well as many other major conditions).

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