National Pathology Imaging Co-operative (NPIC): scaling up digital pathology and transforming the UKs diagnostic industry through AI

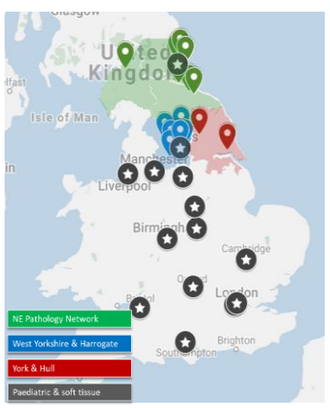
Daljeet Bansal[1], Basharat Hussain[1], David Brettle[1], Bethany Williams[1], David Hogg[2], Darren Treanor[1,2,3]

1. Leeds Teaching Hospitals NHS Trust, Leeds, UK; 2. University of Leeds, Leeds, UK; 3. Department of Clinical Pathology, and Department of Clinical and Experimental Medicine, Linköping University, Linköping, Sweden.

Introduction & Aims

National Pathology Imaging Co-operative (NPIC) is an NHS program for development and evaluation of digital pathology, and use of Artificial Intelligence (AI) to speed up the diagnosis of diseases such as cancer.

The program is led by Leeds Teaching Hospitals NHS Trust and includes a network of nine NHS hospitals, seven universities and ten industry partners including Leica, Roche and Sectra. NPIC is part of a UK-wide network of Digital Pathology and Imaging AI Centres of Excellence, supported by £37m of Government funding and £11m industry contribution.



40 NHS Trusts

29 Pathology Networks

6 million people

2.4 million images per year

3 Petabytes of data per year

1 vendor neutral archive

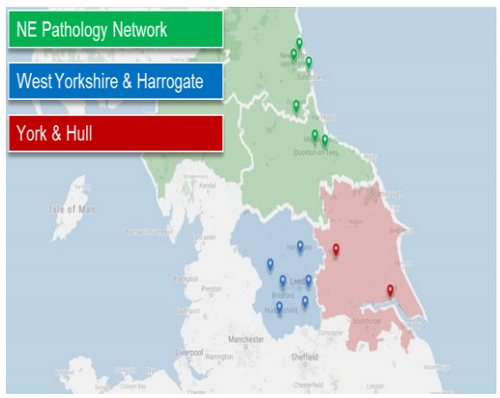


Figure 1: NPIC network and scale-up

Methods

The program will consider the end to end process of AI development including deployment of digital pathology, data ethics, data sharing practices, patient and public engagement activities, interoperability and standards (DICOM), quality assurance, clinical validation and clinical exemplars for the real world evaluation of digital pathology.

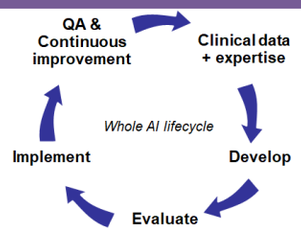
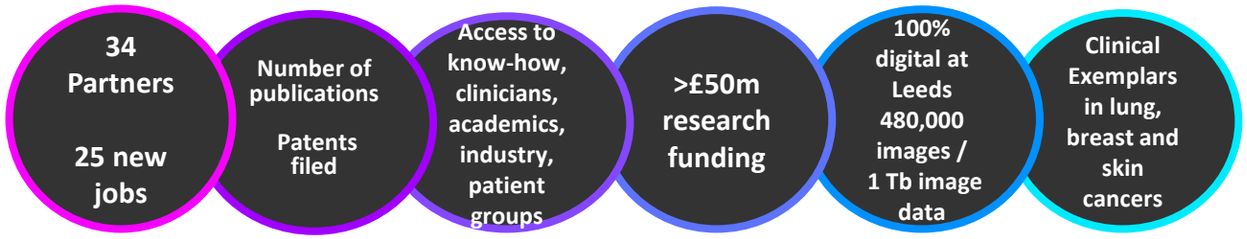


Figure 2: NPIC vision

Results

- NPIC has established an infrastructure in the North of England, created over 25 new jobs and working with over a number of new partners.
- The program is deploying digital pathology across NHS laboratories in the North of England; At Leeds Teaching Hospitals, 100% of glass slides are scanned and available for primary diagnosis with 1400 glass slides and 1TB image data per day. The new generation of Leica GT450 scanners have been installed. Finally, progress has been made with region-wide capturing of COSD synoptic cancer reports (mTuitive), National Pathology Exchange system (NPEX), and migration to regional Sectra PACS solution. A further 5 sites will go-live by 2021 and remaining sites will be fully digitised by the end of 2023.
- A number of publications to highlight the benefits of digital pathology are available and further work in the evaluation of Quality Assurance tools - Scanner calibration tools, QA display tools, stain quantification, DICOM conformance specification and testing are in progress.
- Recruitment of an expert PPI panel, a literature review of clinical adoption of AI and projects initiated in clinical exemplars for lung, breast and skin cancer.
- A new international training centre which will open in 2021.
- NPIC at scale will see a rapid deployment of scanners across over 40 hospitals, includes all 29 pathology networks in the whole country, fully digitising cases over a population of 6 million people, scanning over 2.4 million images/ 3 petabytes of data per year in a single vendor neutral archive.



Conclusions

NPIC builds on the fully digital lab at Leeds and will create a globally leading infrastructure for digital pathology and AI. The AI technologies being developed through the training of algorithms on diagnostic data, will provide benefit patients, streamline diagnostics and provide a platform for further research and innovation.

References and Acknowledgements

References are available on request. Work has been supported by the NPIC team and partners.
Illustrations provided by Dr Alex Wright, Leeds. All authors are funded by NPIC (Project no. 104687) is supported by a £50m investment from the Data to Early Diagnosis and Precision Medicine strand of the government's Industrial Strategy Challenge Fund, managed and delivered by UK Research and Innovation. (UKRI)

https://npic.ac.uk/

Contact:
daljeet.bansal@nhs.net