Artificial Intelligence used to automate assessment of the 'asbestos cancer', Mesothelioma

- *AI system able to find and measure a complex tumour without any human input*
- *Potential to improve decision-making on treatment responses and reduce barriers to trials of new therapies*
- *Cancer Innovation Challenge provided over £171,000, helping to secure further £5m award for Mesothelioma research*

Patients receiving treatment for the "asbestos cancer", Mesothelioma, are being assessed with Artificial Intelligence (AI) as part of a prototype imaging system which could revolutionise the way people with the disease are cared for. Scotland currently has the highest incidence of Mesothelioma in the world, a reflection of the historical use of asbestos in many UK industries, including shipbuilding and construction.

Canon Medical Research Europe, a Scottish firm specialising in next generation medical imaging software, and the University of Glasgow are set to publish clinical findings from a study evaluating a new, world-leading AI-driven cancer assessment tool, developed as part of the Cancer Innovation Challenge.

The study team, which comprises AI and data scientists at Canon Medical and University of Glasgow clinical researchers based at the Queen Elizabeth University Hospital, and NHS Greater Glasgow and Clyde Research and Innovation staff, created a prototype AI system able to automatically find and measure Mesothelioma on CT scans, which are used to assess patient's response to drug treatments like chemotherapy. The AI was trained by showing it over 100 CT scans, on which an expert clinician had drawn around all areas of the tumour – showing the AI what to look for. The trained AI was then shown a new set of scans and was able to find and measure the tumour extremely accurately, without any human input.

The tool, which could revolutionise the fight against cancer, intentionally focused on Mesothelioma given its prominence in Scotland and because it is one of the most difficult-to-measure cancers on CT scans. This is because it grows like a 'rind' around the surface of the lung, forming a complex shape - rather than a round ball like most tumours. The successful results of the project will provide a strong foundation for similar tools to be developed in the assessment of other cancers.

At present, treatment options for Mesothelioma are limited and clinical trials are critical for discovery of new, more effective treatments. The AI tool streamlines tumour measurements, potentially making clinical trials of new drugs less expensive, less time-consuming and more accurate. After further validation work, which is now ongoing as part of an international 'accelerator' network funded by Cancer Research UK, the AI tool may soon be available to help doctors measure Mesothelioma on scans during treatment with greater precision and at a reduced cost.

Keith Goatman, Principal Scientist at Canon Medical, said: "The speed and accuracy of the AI algorithm could have a wide-reaching impact on Mesothelioma treatment. Accurate tumour volume measurements are much too time-consuming to perform by hand. Automating these measurements will open the way for clinical trials of new treatments, by detecting even small

changes in the tumour size. Ultimately, it could be used routinely in hospitals to decide the best treatment for each individual.

"The funding and support from the Cancer Innovation Challenge has been vital in bringing this idea to life, and we are looking forward to continuing our work with the excellent team at the University of Glasgow in the years to come. This work is a strong first step towards real change in the treatment of all cancers – not just Mesothelioma."

Professor Kevin Blyth, Professor of Respiratory Medicine in the University of Glasgow, and Honorary Consultant Respiratory Physician at Queen Elizabeth University Hospital, NHS Greater Glasgow and Clyde, said: "To our knowledge, this study is world-leading in its successful use of AI to assess treatment response in Mesothelioma. Using external data sets to validate our results, we have shown that tumours can be accurately measured by AI, giving us a new tool that will help us make better decisions for patients on treatment and reducing barriers to development of new treatments in clinical trials.

"The results, which are testament to the expertise of Canon Medical and made possible by the Cancer Innovation Challenge funding, have acted as a springboard towards our next project, the PREDICT-Meso Accelerator, which is now allowing us to further develop the AI so that it can start benefiting patients soon."

Launched in 2017, the Cancer Innovation Challenge is a £1 million project funded by the Scottish Government through the Scottish Funding Council to encourage collaboration between innovation centres, medical professionals and cutting-edge healthcare businesses to help Scotland become a world-leader in cancer care.

The project brings together three Innovation Centres, led by The Data Lab in collaboration with Digital Health and Care Institute (DHI) and Precision Medicine Scotland.

Steph Wright, Director of Health & Wellbeing Engagement at The Data Lab, added: "The work to develop this world-leading tool from Canon Medical and the University of Glasgow, represents an incredibly exciting healthcare innovation. Not only does it have the potential to revolutionise Mesothelioma cancer care through more targeted treatment, but it may also be able to be applied to a number of other cancer types in the future.

"It's been a privilege to play a part in helping to deliver the Scottish Funding Council's Cancer Innovation Challenge initiative, supporting and spotlighting the companies carrying out valuable work that can help make Scotland a leader in data-driven cancer support. Through projects like this, we really can show that data saves lives."

Following publication of the initial study results, the team will continue to work together, supported by part of a £5million funding award made by CRUK, for the PREDICT-Meso Accelerator led by Prof Blyth. In addition to AI optimisation, this project aims to understand how asbestos-driven inflammation develops into Mesothelioma and develop new treatments for the disease. Canon Medical is a key collaborator on this project.

Find out more about the Cancer Innovation Challenge at www.cancerchallengescotland.com

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For further information, please contact Caroline Docherty at BIG Partnership – caroline.docherty@bigpartnership.co.uk / 07593 586 354.

1. **About Canon Medical Research Europe**

   Canon Medical Research Europe is a leading medical software research and development centre of excellence, generating breakthrough technologies and valuable intellectual property for Canon Medical Systems. Based in the diverse city of Edinburgh we employ over 100 people working as Software Engineers, Scientists, Clinical Specialists, Testers and Business Support and are part of a global corporation headquartered in Japan. We develop next generation medical imaging software to integrate with Canon Medical scanners and other diagnostic healthcare solutions which are installed in hospitals and healthcare centres across the globe.

2. **About University of Glasgow Mesothelioma Team**

   The University of Glasgow Mesothelioma team is led by Professor Kevin Blyth and is based between the Beatson Institute of Cancer Research and the Queen Elizabeth University Hospital, NHS Greater Glasgow & Clyde. The team hosts the multidisciplinary Macmillan Scottish Mesothelioma Network which coordinates care and access to potentially life-changing clinical trials for all of Scotland's patients. Prof Blyth also leads the PREDICT-Meso Accelerator Network which brings Glasgow scientists together with researchers from around the UK, Spain, Italy, Belgium and Brazil. The initiative is funded by Cancer Research UK and its partners in Spain and Italy, FAECC & IARC, (£5m over 5 years) and aims to understand how asbestos-driven inflammation develops into MPM. Clinicians, pathologists, research scientists, bioinformaticians and clinical trial experts within PREDICT-Meso are working to translate these findings into effective early diagnosis and treatment for patients.

3. **About The Data Lab**

   The Data Lab is Scotland's innovation centre for data and AI. Through hubs in Edinburgh, Glasgow, Aberdeen and Inverness, we foster innovation through collaboration, build skills and grow talent, and champion Scotland's data science community. We help Scotland maximise value from data and lead the world to a data-powered future.

4. **About Innovation Centres**

   The Innovation Centres, which were launched in 2014 and in the latter part of 2013, sit within the construction industry, oil and gas, stratified medicine, digital health, industrial bio-tech, and sensors and imaging. Each Centre aims to establish bonds between Scotland's universities and their respective industry sectors, translating the knowledge and expertise into commercially viable products and companies to benefit the country's economy.