



Artificial Intelligence for oncology

REVIEWING PRACTICE AND EVIDENCE OF ARTIFICIAL INTELLIGENCE, MACHINE LEARNING AND DEEP LEARNING IN ONCOLOGY.

Artificial Intelligence (AI) in cancer care has arrived and will transform healthcare roles and skills. Evidence and emerging practice are demonstrating that AI tools are a powerful assistant to oncologists, helping them improve the speed of diagnosis and data analysis – and ultimately the quality of care.

A competition between man and machine was organised in China two years ago, in an image analysis challenge pitting 15 radiologists against an artificial intelligence computer. The medical team had 30 minutes to interpret MRI data; the computer had 15 minutes. The computer won the contest.

Against this background, participants in the Artificial Intelligence session engaged in lively discussions on the future of medical professions in today's 'AI' age. One fact was confirmed: Artificial Intelligence already impacts every aspect of our lives. But concerns that machine learning and AI could threaten the value of interactions between healthcare professionals and patients were suggested as over-stated during the session. Indeed, time may well be freed for doctors and other healthcare professionals to spend more time with patients.

This session looked at the implications and benefits that learning algorithms have on the quality of care in respect to radiology and cancer screening. Looking to a near future where hospital radiology teams – already submerged with data to interpret – will be

KEY MESSAGE

The ability of Artificial Intelligence to analyse massive volumes of data and images will almost instantly free oncologists to focus on problem solving and to spend more time with patients. To unleash AI's full potential to improve discovery, research, cancer care and prevention, some key issues need to be addressed – including the ethics of storing patient data, and ensuring data quality and access.

faced with an increasing flood of information, AI tools can be a godsend, it was suggested.

So, rather than having a turf battle with the computer, discussants saw that radiology departments can benefit by harnessing these new tools to process massive volumes of information more efficiently. This frees radiologists to focus their knowledge on high-complexity interpretation. It also allows them to spend more time interacting directly with patients and other healthcare professionals, adding value and helping to personalise care to a greater degree than might otherwise be possible.

The panel's bottom line for AI and improved patient care: if a computer application can process and interpret millions of data points in seconds, it is an excellent right-hand assistant for oncologists. This also improves the quality of diagnostics, treatment decisions and targeted therapies, they said. The challenge is now to learn how to best harness this potential.

As Artificial Intelligence and its related techniques of machine learning and deep learning bring benefits, they will also require a rethinking of medical processes and practices. AI's disruptive effects on existing models of care were therefore discussed. Ethical concerns of processing and sharing large amounts of medical records and data were also raised. The use of AI needs to find a balance between protecting patients' data and unlocking the potential of these tools for learning and innovation – tapping their ability to process and compare vast amounts of data, almost instantly.

Recent evidence on AI, machine learning and deep learning in cancer care was presented in several case studies.

- » In medical imaging analysis a study assessed neural networking's ability to do complex analysis of MRI data to assess traumatic brain injuries. It concludes that the method has potential for use in a variety of research and clinical settings. The source code to this application is publicly available. <http://bit.ly/2ntwMiU>
- » A breast cancer study compared the ability of deep learning algorithms to detect metastases in images of lymph nodes of women with breast cancer, with pathologists' diagnoses. It found that the algorithms outpaced the analysis of 11 pathologists. This potential of improve diagnostic accuracy now needs assessment in a clinical setting. <http://bit.ly/2Op3E7k>
- » For skin cancer detection, a study compared the ability of neural networks to analyse more than 100,000 clinical images against some 2,000 diseases with the accuracy of 21 dermatologists. The algorithm classified skin cancer conditions at the same level of accuracy as the specialists. There then exists the exciting potential to link deep neural networks to mobile phones to benefit detection activities by patients outside the clinic. Looking at the estimated 6.3 billion smartphone users projected for 2021, this kind of innovation opens a wealth of options for low-cost universal access to diagnostic care. <http://bit.ly/2VldCbg>

Artificial Intelligence: Breaking down borders in cancer care in ways not yet known?

Led by the European Society of Radiology (ESR)

How is AI impacting cancer care today and what can we expect for future impacts?

Prof Ivana Isgum, Image Sciences Institute, UMC Utrecht: Artificial Intelligence in cancer care

Panel perspectives:

Saila Rinne, Programme Officer – EU Policies, European Commission DG CONNECT

Laura McDonald, Associate Director, Real-World Research, CORDS, Bristol-Myers Squibb

Dr William Allum, Consultant Upper GI surgeon, Royal Marsden NHS Foundation Trust, UK

Prof Vincenzo Valentini, Past President European Society for Radiotherapy and Oncology (ESTRO)

Dr Adrian Brady, Chair of the ESR Quality, Safety and Standards Committee

Moderators:

Prof Regina Beets-Tan, ECCO Board Member, EU Cancer Mission Board Member and 2nd Vice-President, European Society of Radiology (ESR)

Sema Erdem, ECCO Patient Advisory Committee and Europa Donna

“
I think AI will give us better focus, with better imagery of anatomy, as we will have better accuracy of where we need to operate. We could use also AI, to learn from the data of previous operations.
”

– Dr William Allum, consultant surgeon at the Royal Marsden Hospital

From left: Prof Regina Beets-Tan, ESR; Prof Ivana Isgum, UMC Utrecht; Saila Rinne, European Commission DG CONNECT; Dr Adrian Brady, ESR; Laura McDonald, CORDS, Bristol-Myers Squibb; Dr William Allum, Royal Marsden NHS Foundation Trust; Prof Vincenzo Valentini, ESTRO; Sema Erdem, ECCO Patient Advisory Committee and Europa Donna

