

# The Changing Role of the Radiologist in the Age of AI

The increasing integration of digital technologies in imaging opens up new ways of working, but also entails new tasks. In the future, radiologists may see themselves as data communicators – and work with more interdisciplinarity than before.

Text: Martin Lindner | Photo: Getty Images



**W**hile the use of artificial intelligence (AI) could transform a wide variety of medical fields, this applies in particular to radiology. For decades, medical images have been generated and archived in digital form. Now, breakthroughs in computer vision also open up the possibility for their automated interpretation. The question therefore arises: How is the role of the radiologist changing?

Of course, the effects of AI cannot be conclusively predicted. “It is not yet clear what the full or final role of AI methods, or their impact on radiologists, will be in imaging,” writes James Thrall and his colleagues of Harvard Medical School in a recent position paper.[1] Moreover, the visionary potential of artificial intelligence is by no means uniformly assessed and, for example, tends to be viewed more cautiously in Europe than in the U.S.[2]

Nevertheless, most experts agree that intelligent algorithms will increasingly find their way into radiological routine over the next five to 10 years. A probable scenario is therefore that radiologists will need to adapt their methods and ways of thinking – and to work in a far more interdisciplinary way in their clinical and scientific activities than before.

## AI will be a tool for radiologists, not a threat

Meanwhile, the concern that diagnostic computer algorithms might soon replace radiologists has largely been put into perspective and a more realistic picture is gaining ground. “I am convinced that AI is not a threat but a tool that we can use to support our work and to improve results,” noted Bernd Hamm, President of this

year’s European Congress of Radiology, in his welcome to delegates.[3]

On the one hand, automated image interpretation could prove an indispensable aid to cope with increasing workloads. According to an analysis by the Mayo Clinic in the U.S., radiologists there now have an average reading time per CT or MRI image of only three to four seconds.[4] “It is no secret that radiologists could use some help,” remarks neuroradiologist Christoph Stippich and his colleagues of University Hospital Basel, Switzerland.[5]

On the other hand, AI is also a promising research tool. Drawing on extensive image data sets, intelligent algorithms, for example, may allow the performing of noninvasive tumor profiling to predict the course of disease or the response to therapy.[6] More generally, AI could increase the explanatory power and value of medical images.

Notwithstanding, there are many good reasons, “why AI will not replace radiologists,” as Royal College of Radiologists informatics committee member Hugh Harvey emphasizes in a blog post.[7] Thus, the work of radiologists is by no means limited to viewing and interpreting pictures – rather, radiologically trained doctors are involved in patient care. They carry out various interventional procedures. Not least, they maintain legal responsibility for their actions.

## Embracing a mathematical mindset

In addition, radiologists are in demand as experts in order to implement AI in clinical medicine at all. While building an AI algorithm can be comparatively easy, converting an algorithm into a robust diagnostic tool is far more difficult and requires carefully annotated image databases for validation. Radiologists themselves therefore play a central role in the transformation of their discipline.

In the process, a new mindset is needed. Stefan Schönberg of University Hospital Mannheim, Germany, speaks of a “mathematical revolution in radiology.” Given the possibility of using machine algorithms to analyze multi-parametric image data sets with voxel accuracy (“radiomics”) or to correlate them with genetic information about the patient (“radiogenomics”), “it is not clear if we are still looking at images or at statistical parameters,” says Schönberg. Radiology is getting close to data science.

Radiologists may increasingly adopt the role of putting these complex data analyses into context – and conveying them to patients, as well as clinical colleagues. “I can certainly envisage radiologists as data communicators,” says Harvey. Also, the cooperation with other data-driven and AI-supported disciplines, such as genetics or pathology[8], will become all the more important the more the idea of personalized diagnostics begins to take hold as a standard of care.

## Strategic steps to take

These developments may soon be felt on a broader basis, as a recent white paper from the Canadian Association of Radiologists predicts.[9] Accordingly, AI will be integrated into the current Picture Archiving and Communication Systems (PACS), particularly for routine tasks in image reading. “In the next five years, radiologists will see more competent AI applications incorporated into PACS workflows, especially for laborious tasks prone to human error, such as detection of lung nodules on x-rays or bone metastases on CT scans.” Upstream and downstream processes in the radiology workflow, such as image data acquisition and reporting, are likely to be increasingly managed with AI algorithms as well.

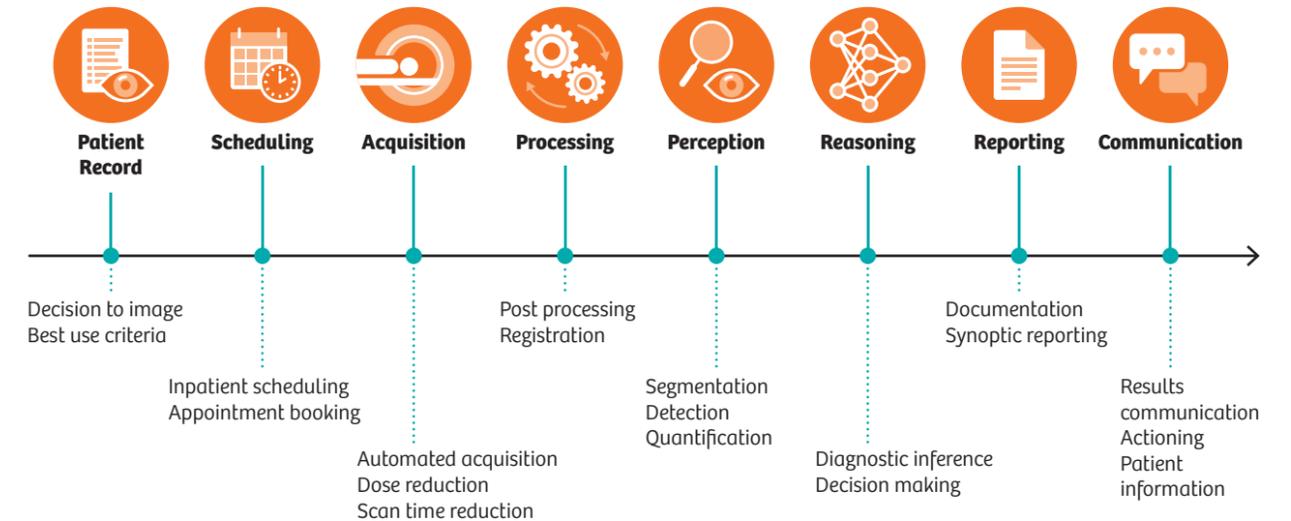
For radiology as an academic discipline, this means that it will have to work more closely with IT and computer science departments in the future. Leading hospitals in particular need to invest in hardware and human capital in order to set up specialized AI laboratories, similar to other medical fields.

Radiological education and training will also change. “If radiologists have to learn about the physics of MRI, then I think learning about the basic principles of imaging informatics is at least as important,” emphasizes Sergey

## The radiology workflow, with examples of possible AI applications

Simplified schematic of the diagnostic radiology workflow, with examples of where AI systems can be implemented.

Source: drhughharvey



Morozov, president of the European Society of Medical Imaging Informatics.[10] While radiologists in the U.S. have been able to acquire an additional certificate as Imaging Informatics Professional for some time now, the area has only recently been included in the European curriculum for subspecialty training in radiology.[11]

This also opens up new job profiles and career opportunities. “Once an area is recognized as important, capable people quickly populate it,” notes Thrall and his colleagues of Harvard Medical School. It would come as no surprise to see the AI-savvy radiologist more frequently in the future. ●

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