The Future arrived yesterday

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The scientific literature typically describes transformational artificial intelligence (AI) tools in radiology with modifiers such as "impending" or "available soon." This makes it feel as if the true promise of AI is still waiting in the wings, anxiously waiting to come onstage.

It is true that, for most radiologists, what currently passes for AI is underwhelming and uninspiring compared to the futuristic visions of an "AI fellow" that can do most of our work for us (if not replace us entirely). Simplified and unremarkable algorithms—what I like to call "AI-lite—" have gained traction in many practices to help with a variety of important, but hardly revolutionary, functions: patient scheduling, editing of voice-activated dictations to ensure right- and left-sided correlation and gender agreement, and providing auto-text fill-ins for best practice follow-up recommendations.

True AI is playing in Peoria

The fact is that true AI tools are already available and deliverable to perform far more useful and exciting tasks. Every day at our clinic in Peoria, IL, my colleagues and I stand at our workstations and let the Change Detector MRI AI software (AIAnalysis, Inc., Seattle, WA) locate, compare, and report changes in multiple sclerosis plaque load; measure

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changes in enhancement; measure true brain tumor volumes; and detect strokes.[1] A report automatically names the pulse sequences and the date of current and comparison studies, which the software also locates automatically. Advanced statistical comparisons, volume calculations and other novel diagnostic information are already contained in the report.

We radiologists can immediately electronically inform the referring provider of all details contained in the report through recorded voice clips or HIPAA-compliant texts that also contain our treatment and follow-up recommendations. We can communicate in similar ways with patients, who can also pay their bills by text.

Using FDA-approved AI software from Heartflow (Redwood City, CA), we can create color flow maps of cardiac wall perfusion and calculate fractional flow reserve from CT images, thereby providing more useful information to our cardiologist colleagues.[2] Our FDA-approved perfusion CT software "iRAPID" (iSchemaview, Menlo Park, CA)[3] is vital to acute stroke team workups.

And we're not the only ones currently using advanced AI tools.

To wit, Johns Hopkins Hospital radiologists detect pancreatic neoplasms earlier and with greater accuracy[4] using artificial intelligence. AI software is detecting intracranial hemorrhage and moving these positive cases to the top of the worklist for earlier detection.[5,6] Outpatient clinics in New York and New England are beginning to use AI to accurately triage chest radiographs[7] so that patients can leave the health center without worrying that the radiologist will change the preliminary report.

> # *Far from an "impending" advance in health care, artificial intelligence has already begun transforming radiology.*

Best-practice recommendations are automatically entered, communicated and applied.

Our own use of structured reporting has become more standardized and will assist with communicating our diagnostic information to referring physicians.[8] Highly accurate and efficient bone-age calculations using AI are currently offered without charge on the EnvoyAI (Durham, NC) platform.[9] Lower dose usage of gadolinium contrast material is a reality and can reduce gadolinium retention and NSF.[10] Genetic mutations in a brain tumor can now be determined using AI.[11] Ezra software (Folsom, CA) assists in active surveillance of prostate cancer.[12]

What has AI done for me lately?

Other AI applications may not yet have FDA approval, but they are being tested, trialed, and used for research. Most AI startup companies, universities, and manufacturers are eagerly seeking volunteer institutions for beta testing. Working with a hospital system's IT team, practice leaders, and innovation directors is less daunting than one might think, as many institutions see the value of becoming early adopters of AI technology. At this stage of development, AI software engineers are readily available to make adaptations to one's own workspace requirements. The American College of Radiology is developing standards and providing platforms to accelerate the adoption of AI algorithms.[13] PACS companies, such as Sectra (Linkoping, Sweden), have engineered their systems to facilitate open sourcing that welcomes the use of third party AI software.[13]

Will AI replace radiologists?
Not any time soon

While it may sound like AI tools could one day replace radiologists, they won't. Instead, they are assisting with and improving upon tedious and repetitive tasks so that radiologists can devote more time to directly communicating with patients, consulting with physicians, recommending better therapies, and other more productive tasks. Radiologists will remain essential to high-quality healthcare delivery. To paraphrase Mark Twain, "reports of our early demise are greatly exaggerated." It will take a radiologist to separate artifacts from truly subtle, real lesions. Every patient is unique, and even millions of machine learning examples cannot cover every contingency. Electronic tools will garner experience, but they cannot acquire wisdom. Patient-centered care will become universal.

Far from an "impending" advance in health care, artificial intelligence has already begun transforming radiology; AI software is readily available to those radiologist/early adopters who want it. Indeed, exciting opportunities lie ahead for radiologists to work with AI for the ultimate benefit of patients. Make no mistake: Radiology will become more patient-centric than ever.

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