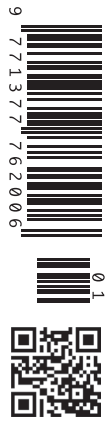




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Reimagined Hospitals



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A Gentle Warning

Professor Stephen Baker provides an overview on how artificial intelligence is challenging the role of a radiologist.

Over the past five years, I have been fascinated by the impress of artificial intelligence (AI) on the current practice of medicine and the exciting prospects it offers for the near future. The power of big data has shown itself clearly in investigations of diagnostic incisiveness. Conclusions previously drawn from relatively small samples have been challenged by the correctives gained from evaluation of much larger aggregations. And in no field of healthcare is this application more apparent, even at first glance, than in diagnostic imaging where detection and quantification of size, number, and configuration are the keystones for which determinations of disease existence, persistence, and resolution are made.

wings of the clinic, or in stand-alone offices nearby, or even at remote sites.

Yet this disjunction, despite some plaintive cries for closer consultation, was amenable for the way we decided to work with the array of imaging tools at our disposal and under our proprietorship. Moreover, by and large by dint of their cost and spatial demands, we “own” them in a functional sense if not just in a commercial sense, allowing us to enjoy the benefits accorded to the possessor of a monopoly, at least by the way American medicine allotted responsibility.

The result of this self-reinforcing notion is that imaging is ours and that every innovation related to it

The future lies with integrating ourselves in the clinical process personally and dependably

This linkage of our specialty to objective information primarily, if not exclusively, was not an inevitability but we decided years ago to define and largely confine our realm of inquiry to the pictorial manifestation of abnormality, relegating patient examination and interaction as being largely outside our immediate concern. Protestations to the contrary aside, except for interventional radiology and breast imaging, we usually don’t talk to the patient whose images we diagnose. We generally don’t see them and most often we know very little about their history, their attitudes towards their illness, or their appreciation of their condition. All these are essential features of the diagnostic considerations that informs the daily concerns of our referring physicians.

About fifty years ago, we hitched our wagon to exciting newly invented technologies that came our way and we largely steered those wagons to our role as the physicians’ expert consultant. We serve that function largely away from caregiver-patient exchanges as we situated ourselves in distant parts of the hospital or separate

is perforce within our purview. There are the occasional turf wars to be sure but overall they have been relatively minor matters. We have lost some but won most.

But now AI has come along and is not just going to be another advance. It strikes at the heart of what we do. And what we do is spatial recognition. In the brain with both CT and MR, we examine the pattern of densities and their distribution. For the most part our initial evaluation is not to render a specific diagnosis but to state if an abnormal pattern is present. AI determination can be rendered after incorporating normal and abnormal images in much greater number than an individual radiologist could look at during training and beyond. In this sense, he or she is less experienced than the realisable capabilities of an AI dataset.

With chest images, we look at the presence, configuration, and number of findings that are delimited by their distinction from normal cardiopulmonary contours, vessel distribution, and extent of variation. There is nothing the radiologist as a pattern describer brings to the process



that AI is theoretically less capable of determining. So initial recognition is surely a radiologist's function but so too will it be an AI function.

What about charting the growth, or shrinkage of masses or their number over time? Surely this is a major task of radiologists in service to oncological diagnosis and treatment but sequential imaging to chart, for example responses to therapy with AI is a simple recognition issue, one that artificial intelligence can match or exceed that of a well-trained human eye.

It is not just the chest or the brain that the competition with AI will be profound. Any area of the body where the presence and configuration of an abnormality can be observed will be within the capability of AI recognition.

Then where will that leave the radiologist? Technology seers and other futurists, even those whose gaze is not far ahead, regard radiology as a discipline that will be severely challenged and likely to contract in the face of this new disruptive technology. Hence our old model of business as usual may be obsolete. We must change or

fear becoming extinct. What to do? First off, if we remain physically remote from our colleagues we don't stand a chance. It's likely that oncologists as a group will buy or control their own CT. They will think not to need us if they sense that we provide no added value if AI is available and if we remain aloof from direct interaction from patient care.

In my view, our one hope is to become active, onsite, hospital based, or group clinic based actors, participating in the choice of tests that further diagnose and enhance treatment. This is a role that may not be congenial for established radiologists. Once chosen for the job by temperament and accustomed to be an image reader predominantly. The future lies with integrating ourselves in the clinical process personally and dependably. And not, by default, we may follow the quaint example of town criers who in the 18th century were expert communicators in urban settings but lost their value when that new technology, the telegraph, came online. ■

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Key Points

- In no other field of healthcare is the application of big data more evident than in diagnostic radiology.
- In the past, there were turf wars, but AI strikes at the heart of radiology practice.
- What radiologists do is spatial recognition - and AI does it just as well.
- To keep with the times, radiologists need to become active, onsite actors participating in diagnostics and treatment tests.