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Artificial Intelligence in Breast Imaging Will Shift the Landscape

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The development and refinement of Artificial Intelligence (AI) for use in radiology practice continues. However, this development leads to many questions and concerns. Prof. Baker provides an overview.

The development and refinement of Artificial Intelligence (AI) for use in radiology practice is advancing. Scientific journals continue to publish promising data on AI performance, including a recent report published in Nature entitled "International Evaluation of an AI system for Breast Cancer Screening" by McKinney et al. (2020). In this study, two large data sets were evaluated, one from the UK consisting of the records of mammographic evaluations of more than 25000 women at two English screening sites and the other from an American academic medical centre at which, over 17 years, 3097 mammograms were assessed. In both nation's collections, the initial examinations were supplemented by one or several follow-up studies - at three years in England and every one-to-two years in the US. In both populations, the results revealed a reduction of 5.7% and 1.2% (USA and UK) in false positives and 9.4% and 2.7% (USA and UK) in false negatives.

If further studies confirm the superiority of AI as a means of rendering readings of breast lesions and/or the establishment of mortality reduction, a possible concatenation of disruptive outcomes may be seen. A comparison study may be launched assessing the capability of artificial intelligence in the diagnosis of an abnormality as rendered by MR, with an anticipated confirmation of AI's superiority in regard to sensitivity and specificity. Hence, if the incorporation of either, or both, mammography and breast MR AI becomes adopted by even a few pioneers, so to speak, then, the setting of breast diagnosis will be called into question.

The issue likely to emerge will be the on-site role of a radiologist. Should one be available for diagnostic purposes, if his or her reading will be shown to be inferior to those realised through AI assessment? No machine or algorithm alone can perform biopsies – although that possibility is not impossible to imagine. Yet does the biopsy operator need to be adjacent to a diagnostic facility?

Remember also that mammography and MR are nearly always performed on healthy, mobile women, usually in no distress except for anxiety in anticipation of the study. Does she need to come to a hospital to have the examination? Does she need to go to a breast centre separately defined but still staffed with radiologists? Or should breast diagnosis be done not at a physical centre, but at a public health facility, as routine and as private as other routine gynaecologic screening functions, separate from the provocative nature of a clinic that cares for the sick?

AI more fully realised offers the promise of a procedure performed on otherwise well women who need to get it over with, with as little pressure and intimidation as possible. In this scenario, where would the place be for a radiologist if a superior means of diagnosis exceeding his or her capabilities has been established? Would the radiologist be held responsible for determination of the presence or absence of cancer made by an algorithm? And if an aberrant AI diagnosis is involved, where would the responsibility of an error be placed? If it remains with the radiologist, he or she will bear the major risk without a means of defence. If the radiologist is absolved, or now irrelevant, the facility in which the study was performed and the diagnosis rendered could be held culpable.

Questions such as these will continue to be raised as more promising data on AI in radiology emerges. This one study can be considered a landmark article in its outcomes, scope, and publication in a high impact journal. The disruption is yet to come, but whether it is coming is now a settled question.

Conflict of Interest

None.

REFERENCES

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