MODULE: MD3B4
STUDENT ID: U2043586
SUBMISSION DATE: 22/03/23

Can artificial intelligence solve the radiologist workforce crisis?

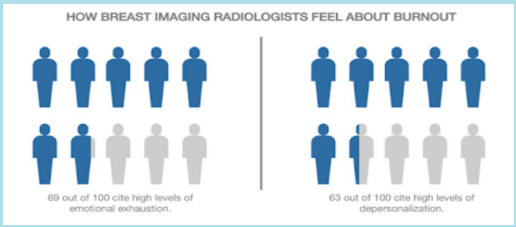


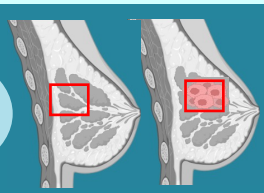
Figure one – 69% of radiologists have high levels of emotional exhaustion (Abdolell, 2020).

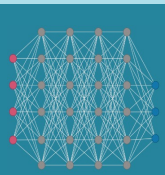
- When women attend mammograms, the decision to recall women is based on radiologists' opinions.
- Currently, there is a growing shortage of radiologists which is subjecting **4000 women** to the risk of overdiagnosis from false recalls (Taylor-Phillips et al., 2022).

Mammography intelligence assessment – reader (MIA-R) is an artificial intelligence CE-marked computer-aided detection (AI-CAD) technology which aids radiologists in breast cancer detection. (Kheiron Medical, n.d.).

MIA-R

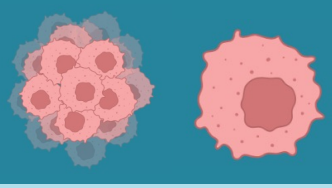
MIA-R was given **retrospective mammograms** with cancerous and benign breast lesions. MIA-R analysed mammograms through deep learning – a form of **machine learning** (Kheiron Medical, n.d.).





Machine learning is a technology becoming more efficient without being programmed by humans. MIAR uses **deep learning** which is composed of neural networks that try to recreate the stimulus of a human brain (Nichols et al., 2018).

Once deployed MIA-R analyses digital mammograms for lesions and provides suggestions to radiologists on whether to recall or not (Kheiron Medical, n.d.).



90.6%
Specificity

Previous research calculated that mammograms analysed by MIA had a 90.6% specificity compared to the 88.6% specificity of radiologists (Hickman et al., 2021).

Evaluation

Multi-disciplinary team (MDT) will be essential when teaching radiologists about MIA-R.

To ensure **GDPR** Radiologists must gain informed consent from patients for their data to be stored. (Rigby, 2019).

MIA-R requires large data storage, hospitals that cannot meet the requirements will not have access. (Hickman et al., 2021).

MIA-R is supporting radiologists in detecting breast cancer - reducing false recalls. MIA-R is promising, however, MIA-R is still susceptible to errors, therefore must be used in conjunction with radiologists instead of as a replacement (Ethics and governance of artificial intelligence for health, 2021).

Reference list
Abdolell, M. (2020). *How AI Can Help Reduce Burnout in Your Mammography Practice*. [online] Imaging Technology News. Available at: https://www.itnonline.com/article/how-ai-can-help-reduce-burnout-your-mammography-practice [Accessed 13 Mar. 2023].
Ethics and governance of artificial intelligence for health. (2021). World Health Organization.
Hickman, S.E., Baxter, G.C. and Gilbert, F.J. (2021). Adoption of artificial intelligence in breast imaging: evaluation, ethical constraints and limitations. *British Journal of Cancer*. doi:https://doi.org/10.1038/s41416-021-01333-w.
Hickman, S.E., Woitek, R., Le, E.P.V., Im, Y.R., Mouritsen Luxhøj, C., Aviles-Rivero, A.I., Baxter, G.C., MacKay, J.W. and Gilbert, F.J. (2021). Machine Learning for Workflow Applications in Screening Mammography: Systematic Review and Meta-Analysis. *Radiology*. doi:https://doi.org/10.1148/radiol.2021210391.
Home. (n.d.). *Home*. [online] Available at: https://www.biorender.com.
Kheiron Medical. (n.d.). *Mia: Mammography Intelligent Assessment - a Radiology Reader*. [online] Available at: https://www.kheironmed.com/products/mia-reader/.
Nichols, J.A., Herbert Chan, H.W. and Baker, M.A.B. (2018). Machine learning: applications of artificial intelligence to imaging and diagnosis. *Biophysical Reviews*, [online] 11(1), pp.111–118. doi:https://doi.org/10.1007/s12551-018-0449-9.
Rigby, M.J. (2019). Ethical Dimensions of Using Artificial Intelligence in Health Care. *AMA Journal of Ethics*, 21(2), pp.E121-124. doi:https://doi.org/10.1001/amajethics.2019.121.
Taylor-Phillips, S., Seedat, F., Kijauskaite, G., Marshall, J., Halligan, S., Hyde, C., Given-Wilson, R., Wilkinson, L., Denniston, A.K., Glocker, B., Garrett, P., Mackie, A. and Steele, R.J. (2022). UK National Screening Committee's approach to reviewing evidence on artificial intelligence in breast cancer screening. *The Lancet Digital Health*, [online] 4(7), pp.e558–e565. doi:https://doi.org/10.1016/S2589-7500(22)00088-7.