

# Using Artificial Intelligence for Breast Cancer Risk Assessment

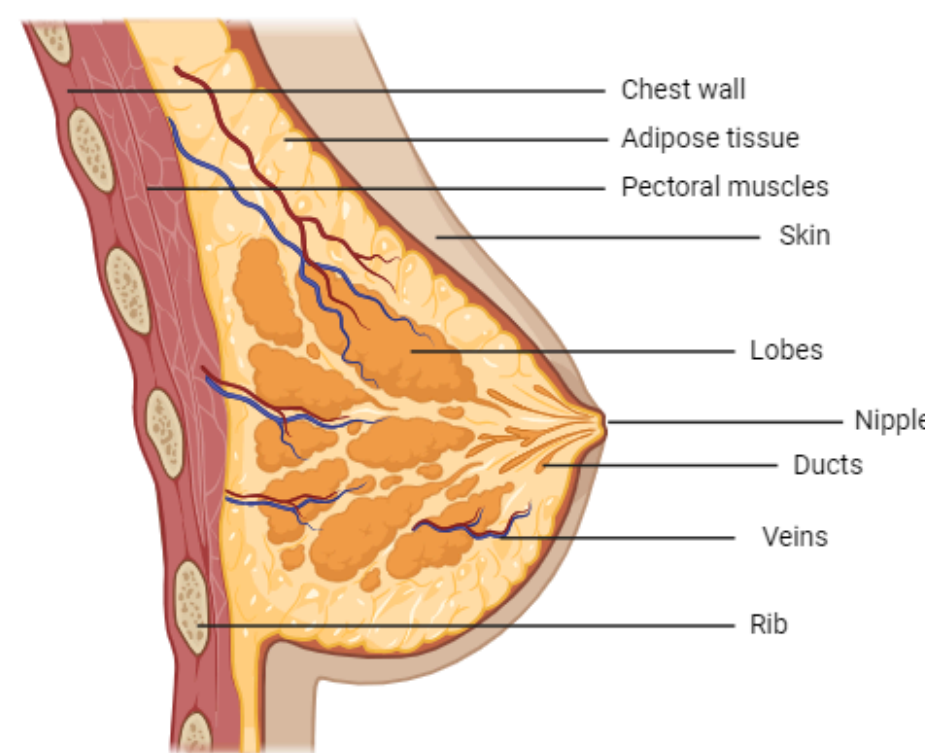
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## Background



- Breast cancer is one of the most common cancers worldwide, but is more treatable at early stages<sup>1</sup>
- Breast density:** proportion of glandular tissue in the breast
- A high breast density is linked to a greater cancer risk<sup>2</sup>

## The Challenge

- No routine breast density reporting in the UK
- 'Gold standard': visual mammogram assessment
- Time-consuming & subjective → resource strain
- Our aim:** an automatic & reliable estimation tool, using **spectral X-ray imaging & AI analysis** for risk assessment during breast cancer screening

## Our Approach

### Spectral imaging:

- HEXITEC: spectral X-ray detector from STFC
- 'Colour X-ray imaging': extra information analogous to



Standard vs 'colour'

- Spectra contain tissue properties → breast density

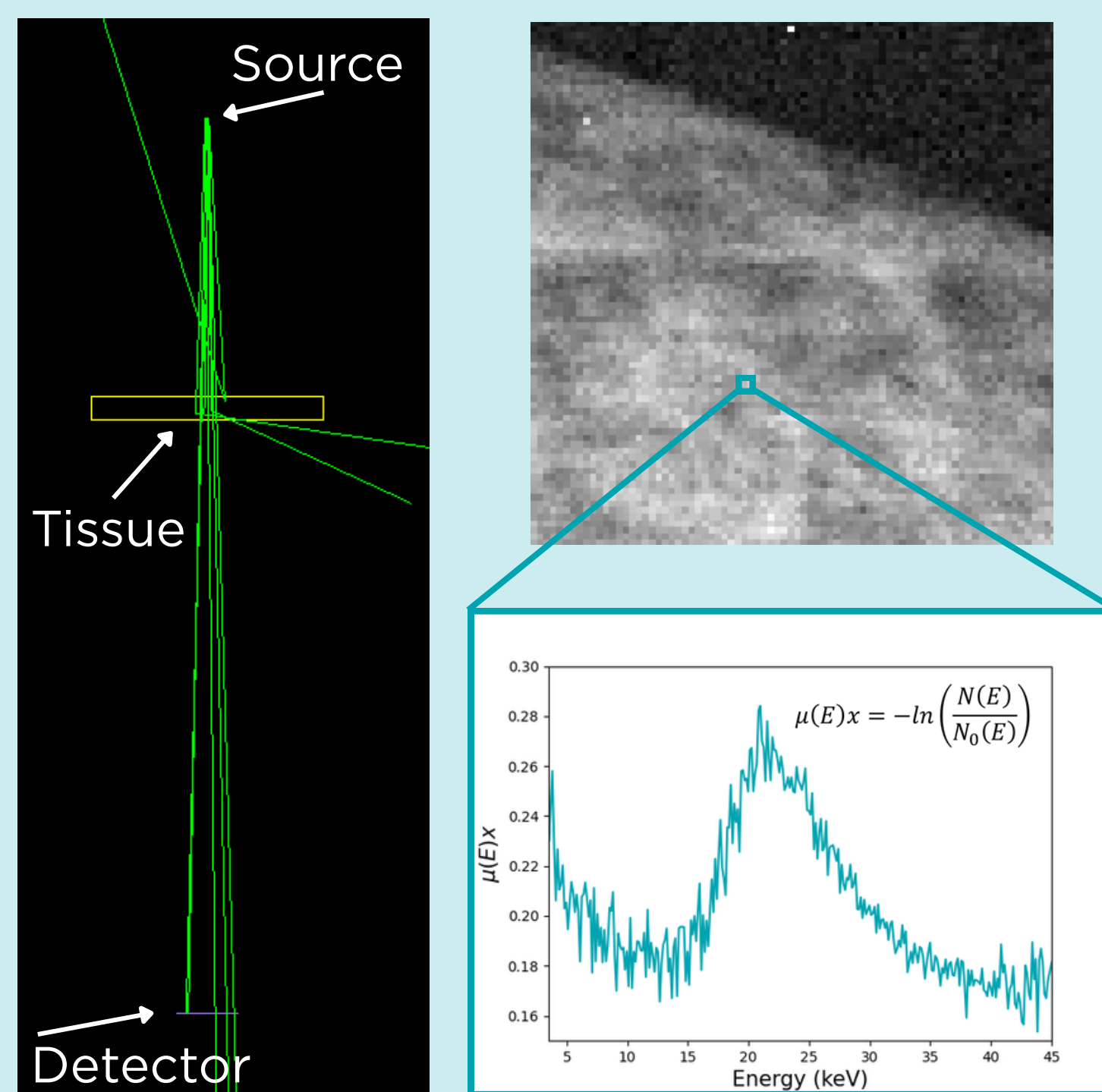
### AI analysis:

- Fast results → low workload

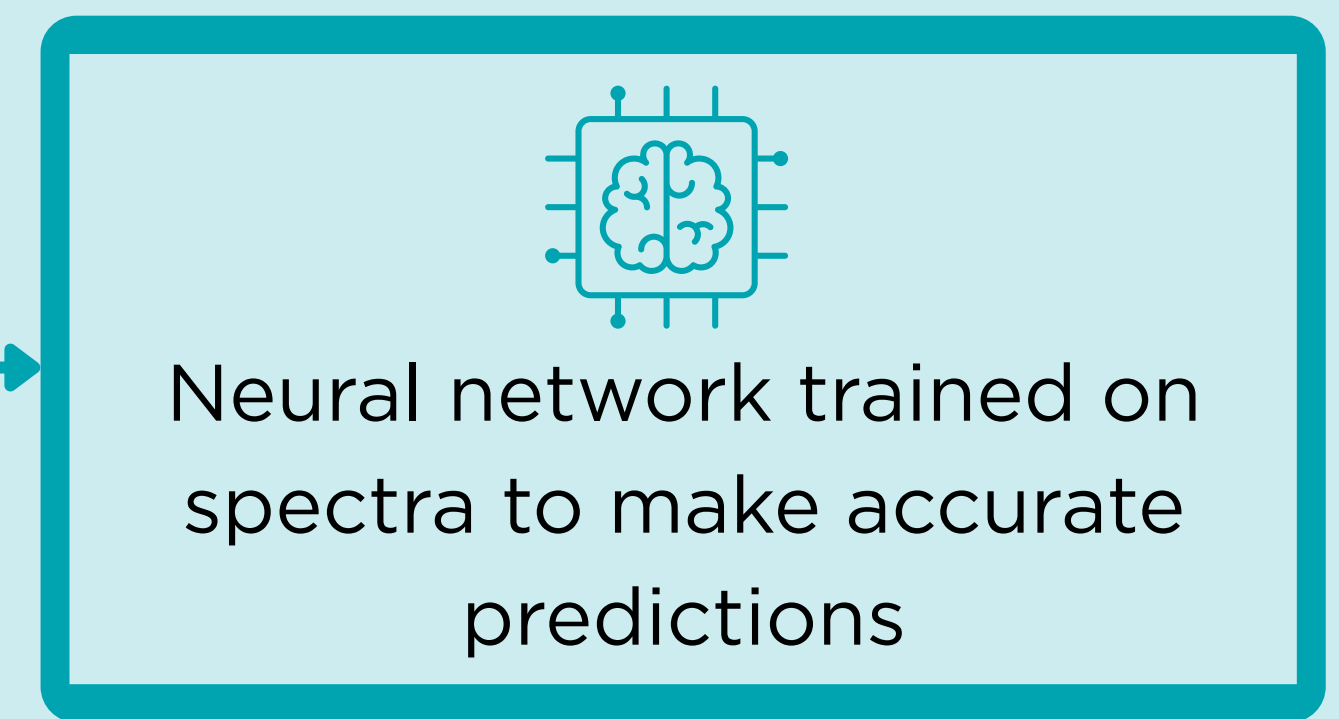
## How it Works

### Inputs:

Imaged tissue-equivalent test objects and post-processed spectra



### AI model:



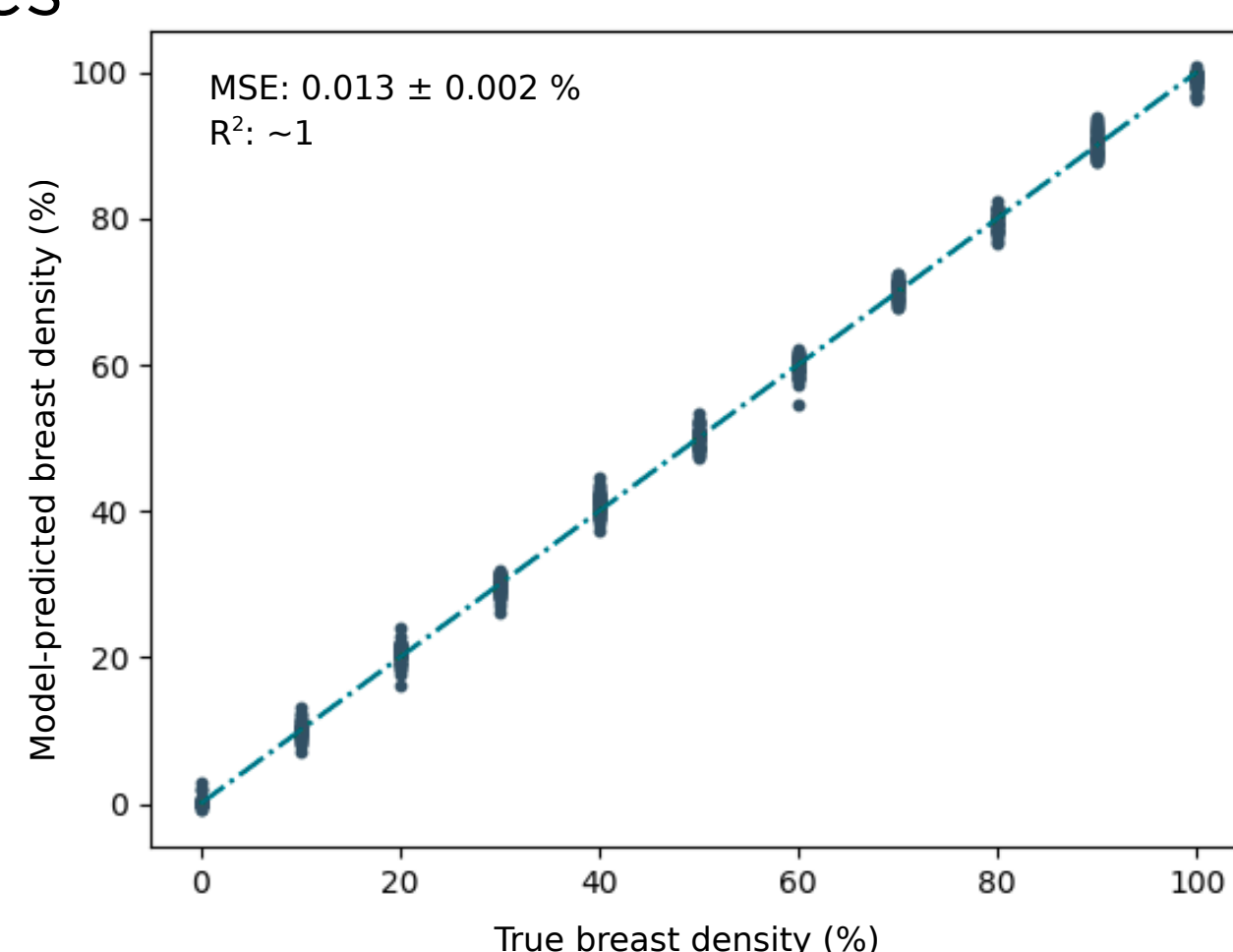
### Outputs:

Our model estimates the percentage breast density

This can be used by clinicians to assess cancer risk & personalise screening pathways

## Proof-of-Concept Study

- The AI model was trained on 2,000 simulated spectra
  - Tissue-equivalent slabs over a realistic range of thicknesses & densities
- Results show excellent agreement between true breast density & the AI model's predictions
  - $y = x$  trend
  - Limited data spread



## Conclusions

- AI can be used to determine breast density from spectral X-ray data
- Future work will focus on increasing breast realism, including experimental data, & investigating model explainability
- A reliable estimation tool will help inform tailored screening pathways, improving patient outcomes & optimising healthcare resources

### References

- Survival for Breast Cancer, Cancer Research UK, en. June 2023, URL: <https://www.cancerresearchuk.org/about-cancer/breast-cancer/survival>
- Jacoby Patterson et al. Additional Screening with Ultrasound After Negative Mammography Screening in Women with Dense Breasts: A Systematic Review. Tech. rep. UK National Screening Committee, 2019