



LEBANESE  
UNIVERSITY FACULTY  
OF SCIENCE.



AI IN HEALTHCARE

# Breast Cancer Detection

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Exploring the Role of AI in  
Advancing Early Diagnosis.

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## AI IN HEALTH CARE DOMAIN

Artificial intelligence is transforming healthcare by enhancing **diagnostics**, **optimizing treatment plans**, and improving **patient care**. It enables **disease detection** through advanced pattern recognition, supports personalized medicine by analyzing patient-specific data, and improves medical imaging with accurate anomaly detection. This presentation focuses on AI's role in revolutionizing **breast cancer detection and care**.





# Breast Cancer



Breast cancer is a malignant tumor that develops in breast tissue, posing a significant health challenge worldwide. It is characterized by symptoms such as lumps, changes in breast size or shape, and skin abnormalities. The disease is categorized into invasive, spreading to surrounding tissues, and non-invasive types. Treatment options include chemotherapy, radiation, and targeted therapies.

✓ **Early detection significantly enhances survival rates.**





## AI in Breast Cancer Detection



Artificial intelligence plays a pivotal role in breast cancer detection by analyzing medical images such as mammograms, ultrasounds, and MRIs. Using advanced techniques like machine learning, deep learning, AI can detect irregularities with high precision, even those invisible to the human eye. This capability leads to **early detection**, reduces the likelihood of **human error**, and accelerates the diagnostic process, ultimately **improving patient outcomes**.





# Real world application



## ➤ NHS in the UK

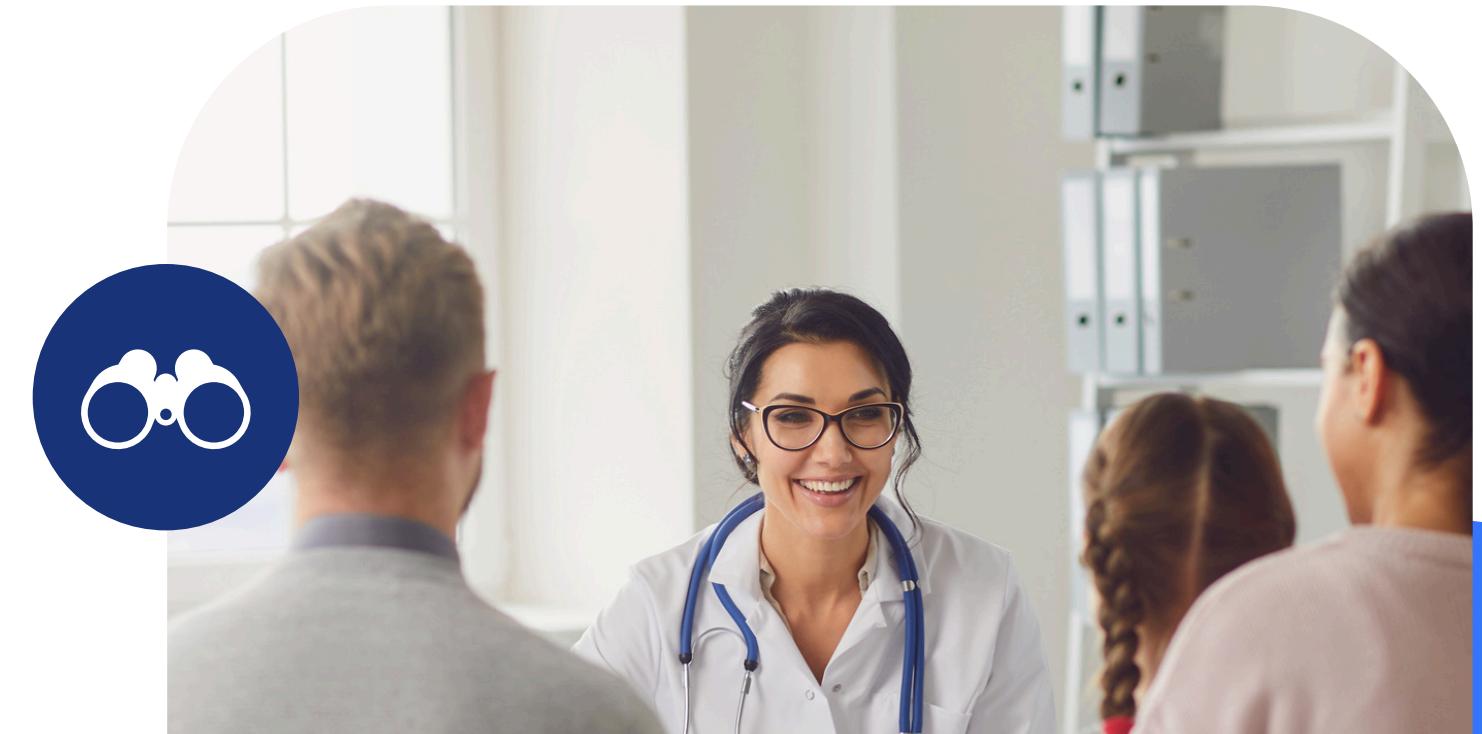
NHS in the UK implements AI for risk prediction and anomaly detection.

## ➤ Tata Memorial Hospital in India

employs AI systems for early-stage cancer diagnosis in resource-constrained settings.

## ➤ Mayo Clinic

utilizes AI-assisted mammography to identify early signs of cancer.



# Improvements due to AI

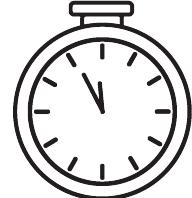


The integration of AI into breast cancer detection has significantly transformed the diagnostic process, delivering benefits that improve patient outcomes and healthcare efficiency.



## Accuracy

Enhanced detection rates and fewer false positives/negatives.



## speed

AI systems analyze large datasets within minutes, enabling quicker diagnosis and treatment planning.



## Accessibility

AI tools bridges the gap in healthcare availability and improve equity in medical services.





# Limitations

Despite its advancements, AI in breast cancer detection faces several challenges that limit its full potential.

## Dataset Diversity

Many AI models are trained on datasets that underrepresent certain demographics, such as Black patients, leading to reduced accuracy and effectiveness.

## Cost

The development, deployment, and maintenance of AI systems require significant financial investment, making them less accessible to smaller healthcare facilities.

## Reliance

AI systems are highly dependent on the quality and quantity of the data they are trained on. Insufficient or biased datasets can compromise the reliability and accuracy.



## Possible Improvements



To overcome the current challenges, several improvements can enhance the effectiveness and equity of AI in breast cancer detection:

- **Diverse Datasets:** Expanding datasets to include samples from diverse ethnicities, age groups, and regions will improve AI model accuracy and ensure equitable healthcare for all demographics.
- **Affordability:** Developing cost-effective AI solutions through open-source platforms and subsidized technology can make advanced diagnostics accessible to resource-constrained healthcare systems.
- **Ethics:** Implementing rigorous ethical standards and practices to address bias in AI models will promote fairness and ensure reliable diagnostic outcomes across all patient groups.





# Conclusion

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AI is revolutionizing breast cancer detection by enhancing accuracy, efficiency, and early diagnosis, leading to better patient outcomes. While challenges such as dataset diversity and high costs persist, continuous advancements in technology and collaboration among researchers, healthcare providers, and policymakers hold the promise of a more equitable and effective future.

**Call to Action:** Increased research efforts and collaborative initiatives are vital to addressing these limitations and unlocking the full potential of AI in healthcare.



● ● ● Breast Cancer Detection

# Thank You.

For Your Attention

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