bioinfo 4women

Barcelona Supercomputing Center
Centro Nacional de Supercomputación

European Innovation Council

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LIMITATIONS IN SCREENING AND DIAGNOSIS OF BREAST CANCER DUE TO BREAST DENSITY

2,261,419 new cases in 2020, 685,000 deaths & most common form of cancer
World Health Organization, 2021. GLOBOCAN 2020.

5-year survival rate of ~95% in cases detected early (stage 1)
Cancer Research UK, 2020

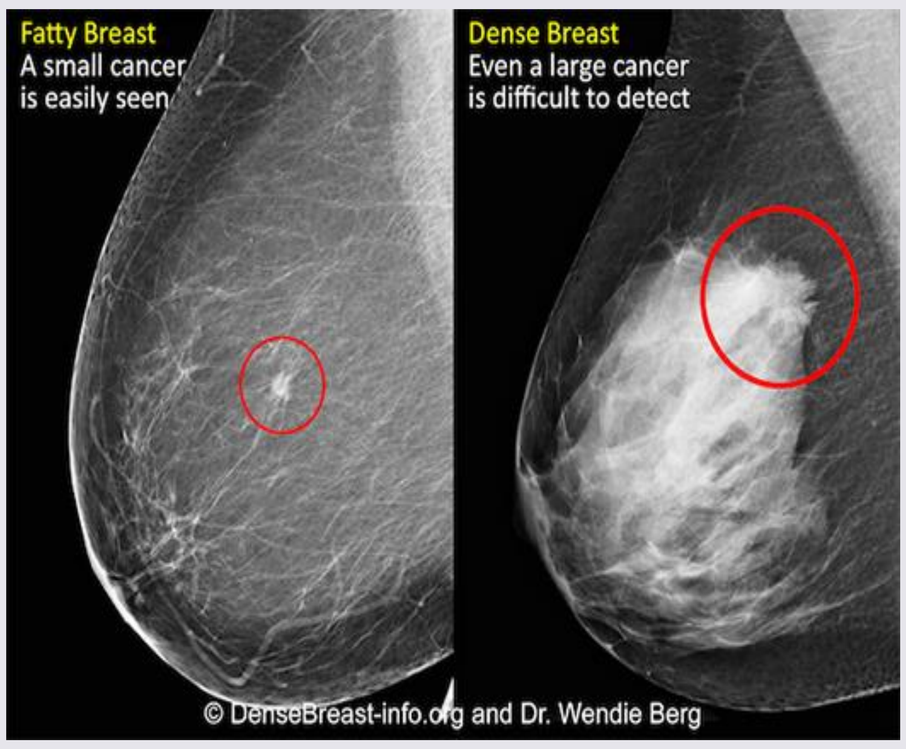
Dense breasts are a risk factor for breast cancer. Tumors may be hidden in mammograms
National Cancer Institute, 2021

Dense breasts are more common in women that are young
National Cancer Institute, 2021

Even so, ~50% of all women 40+ who get mammograms are found to have dense breasts
The Cleveland Clinic, National Cancer Institute, 2018

Mammograms used for screening:

+ Have about a 10% chance of finding a false positive [1].
+ Can lead to overdiagnosis [2], leading to overtreatment in 1%-10% of diagnosed cases.
+ Are based upon X-ray radiation, which can induce tissue mutations leading to cancer and high-risk population are excluded (e.g. pregnant women).
+ Have difficulties identifying even large tumours for dense-breast women.



Sources: [1] Hubbard et al. 2012; [2] American Cancer Society; https://densebreast-info.org/

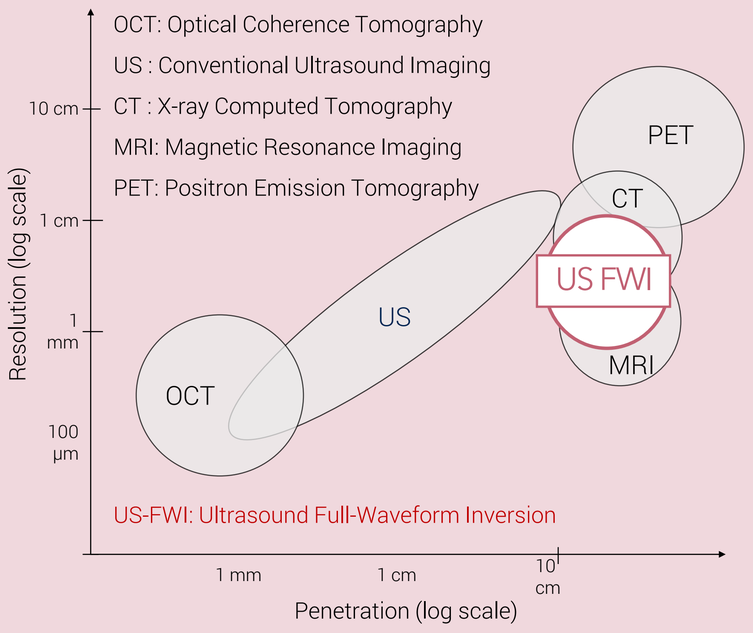
"Your mammogram shows that your breast tissue is dense. Dense breast tissue is common and is not abnormal. However, dense breast tissue can make it harder to evaluate the results of your mammogram and may also be associated with an increased risk of breast cancer. This information about the results of your mammogram is given to you so you will be informed when you talk with your doctor. Together, you can decide which screening options are right for you."

Legislation from the FDA; American Cancer Society

QUSTom

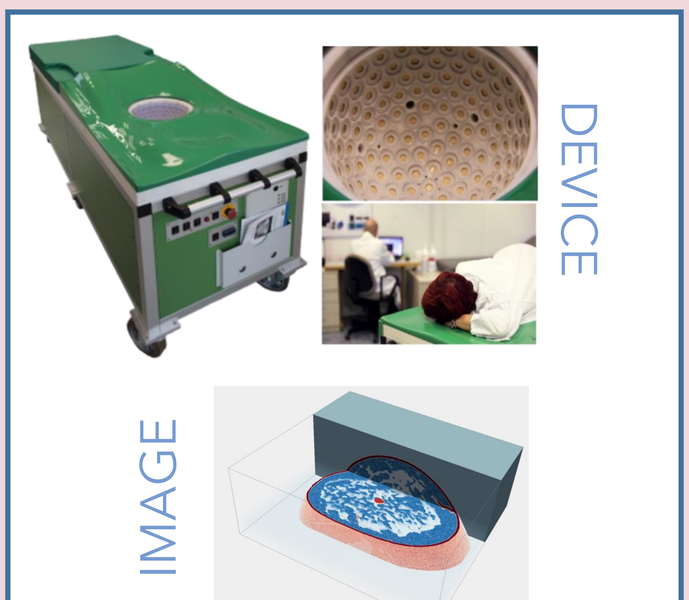
Technology

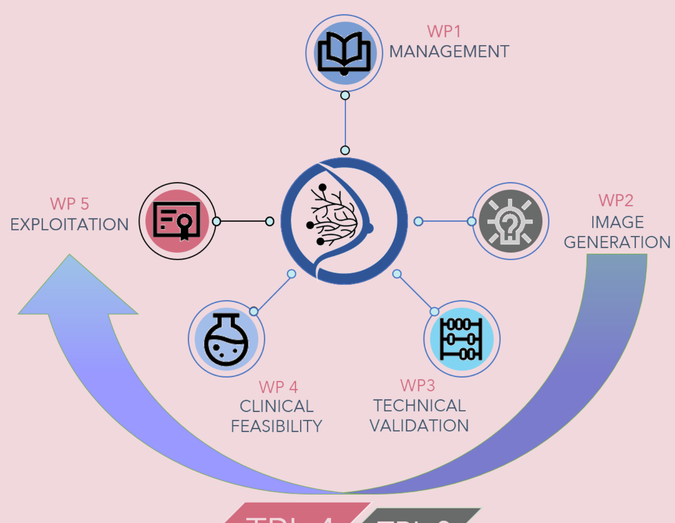
+ Employ 3D Ultrasound Computer Tomography (USCT) acquisition devices for breast imaging.
+ Adopt HPC-based Full-Waveform Inversion (FWI) to produce multimodal images.
+ Virtually immune to tissue density issues.
+ No radiation, high specificity, comfortable for the patient.



	MRI	Mammography (CT)	US	US FWI
Cost	High	Medium	Low	Low
Resolution	High	Medium	Low	High
Penetration	High	High	Low	High
Radiation	Non-ionising	Ionising	Non-ionising	Non-ionising
Time	Very high	Medium	High	Low

QUSTom is an EIC PATHFINDER OPEN project coordinated by BSC, awarded ***2.7 million EUR*** to develop breakthrough imaging technology for breast cancer imaging. It hosts 5 partners and one associate partners and will be active for ***24 months***, since April 2022. Find us at ***www.qustom-project.eu*** and ***@QUSTomproject*** !





Milestones and goals:

+ Obtain simultaneously images of mean and variance (UQ-FWI).
+ Enable cloud deployment for its mass scalability.
+ Clinical validation at Hospital de la Vall d'Hebron.
+ Lead exploitation to FrontWave Imaging, BSC and Imperial spin-off.

Imperial College London
KIT Karlsruher Institut für Technologie
frontwave IMAGING
Vall d'Hebron Institut de Recerca
ARCTUR

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