Personalised breast cancer screening

Breast cancer is the most common cancer in women, with hundreds of thousands of new cases diagnosed in the EU each year. Assessing the personalised risk factors and the suitability of the mammographic screening test could improve prevention.

Routine screening for breast cancer in the majority of women of a specific age range is performed by X-ray mammography. However, this approach is unsuitable for some women or not as effective for those with a genetic predisposition.

The suboptimal performance of current breast cancer screening tools leads to a significant proportion of undetected tumours. This was the main societal driver of the EU-funded ASSURE (Adapting breast cancer screening strategy using personalised risk estimation) project.

Researchers proposed to develop a more tailored approach for breast cancer screening. Towards this goal, partners developed new personalised screening protocols based on image analysis and machine learning techniques. This involved risk pattern quantification based on the distribution and amount of mammographic density.

To study the effectiveness of the methods, researchers analysed large databases of screening mammograms of over 50,000 women across Europe. Their methods accurately modelled the reduced performance of mammography in women with high breast tissue density. In addition, they found significant relations between new imaging biomarkers and breast cancer risk.

Two models were developed for providing risk estimates of cancer development and masking. The former relied on risk factors derived from the routine mammogram only, while the latter included other known risk factors in addition to mammographic variables.

Furthermore, more sensitive screening techniques were developed that utilised alternative imaging modalities. Coupled with advanced software applications for automated breast ultrasound and MRI, the ASSURE approach provided a cost-effective stratification method.

Taken together, the ASSURE project brought together expertise in breast cancer research and image-based medicine to provide a new screening method for breast cancer. Personalised screening will minimise the risk of misdiagnosis, resulting in decreased mortality and increased quality of life due to less radical treatment options.