



## HORIZON 2020

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# Personalising breast cancer screening

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Breast cancer is a leading cause of death for women, despite screening programmes cutting mortality rates. EU-funded researchers have developed new tools for personalised screening programmes to improve detection and prognosis – several of which are ready for use.

In the EU, one in eight women is diagnosed with breast cancer during their lifetime. Screening programmes have cut mortality rates, and early detection means less invasive treatment, but much remains to be done.

“Unfortunately, not all cancers are detected in screening,” says Nico Karssemeijer, coordinator of the EU-funded ASSURE (<http://www.assure-project.eu/>) project. Some 30% of breast cancers are detected between screening rounds and a retrospective review reveals that almost a third of these could have been picked up in an earlier screening round had the then-present signs of cancers been spotted at the time, he says.

Clearly, there is a need for improvement. The question is how to do this cost-effectively, to help as many women as possible. Personalised screening – adjusting breast cancer screening to a patient’s specific circumstances – offers an answer.

Currently, nearly all breast screening programmes use x-ray examination – mammography – but this is not always the best method for everyone. Scientists have singled out one reason in particular – high breast density – which increases the risk of cancer and, due to dense glandular and supportive tissue, makes tumours difficult to find on x-ray mammograms.

### Personalised ultrasound

The ASSURE project set out to help personalise breast cancer screening, based on risk and breast density. They have succeeded in building imaging tools to supplement mammography, using magnetic resonance imaging (MRI) and ultrasound, as well as computer models to assess risk and design personalised screening programmes.

“We are working with two clinical centres where – if the breast density exceeds a certain threshold – we offer supplemental screening with whole-breast ultrasound,” explains Karssemeijer. “We use special screening software, built by one of the SMEs in the project, to quickly screen the whole breast volumetrically.”



([http://ec.europa.eu/programmes/horizon2020/sites/horizon2020/files/styles/h2020\\_large/public/newsroom/fotolia\\_30814621\\_subscription\\_s\\_8622\\_48.jpg?itok=Syq72ZAa](http://ec.europa.eu/programmes/horizon2020/sites/horizon2020/files/styles/h2020_large/public/newsroom/fotolia_30814621_subscription_s_8622_48.jpg?itok=Syq72ZAa))

Whole-breast ultrasound scans generate a lot of data – and the images must be compared with the previous screening session – a new challenge for cost-effective screening programmes.

“So we are also developing tools to help the radiologist do this more efficiently and with a higher quality,” says Karssemeije, “meaning less risk that they miss certain aspects of the images.”

The software combines visualisation tools with computer-aided detection to automatically find abnormalities in the images. “We are currently testing the system using databases of existing cases,” continues Karssemeijer. “We ask the radiologists to read these cases twice – once without the tools and once with – so we can determine improvements.”

The project is also applying these databases – assembled with the help of their academic partners – to developing cost-effective personalised screening programmes. Breast density is one of the most important elements in calculating individual risk of breast cancer, but due to a lack of objective measures it is not used in current risk models.

ASSURE is changing this by integrating objective and quantitative density assessment into the computer models. By identifying density-based risk factors, including changes over time and ‘texture’, it may be possible to design a more balanced screening programme, inviting low-risk women less often while increasing the availability of screening for those at a higher-risk – especially for younger women.

“In the highest breast-density category we now see that the sensitivity of mammography is less than 60%,” says Karssemeijer. “These findings, based on a large volume of screening data and objective computerised density measurement, did not exist in the literature before – so to get these data on the table is quite a big achievement.”

### **Out of the lab and into the clinic**

“There’s already a lot of interest in the breast density measurement tools – now being extended to look at tissue texture,” explains Karssemeijer, “these products are going to be essential for introducing personalised screening.”

“The software that we have developed could already be used next year,” says team member Bram Platel. “The breast density measurements are already approved products, so they can be used right away, and we are working on completing the computer-aided detection tools for ultrasound and MRI.”

### **See Also:**

CORDIS ([http://cordis.europa.eu/project/rcn/106433\\_en.html](http://cordis.europa.eu/project/rcn/106433_en.html))

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