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The Spectra-BREAST Project Kicks Off: A Revolution in Breast-Conserving Surgery

The **Spectra-BREAST** research project, which aims to improve breast-conserving surgery for breast cancer treatment, has officially started. Funded by the **European Innovation Council** under the **Pathfinder Open 2024** programme for a total of **€3 million**, the four-year project involves a consortium of six top institutions with the goal of developing a tool to provide surgeons with real-time information on the presence of residual tumour cells during resection, thereby reducing the risk of recurrence and the need for repeat operations.

The project is led by **IRCCS Maugeri in Pavia** in collaboration with **NIREOS** (Italy) and the **Consiglio Nazionale delle Ricerche – Istituto di Fotonica e Nanotecnologie (CNR-IFN)** (Italy), experts in hyperspectral imaging and spectroscopy. Other participants include the **Politecnico di Milano (POLIMI)** (Italy), with its engineering expertise in optics and robotics; **RiverD**, a company specialising in the use of Raman spectroscopy in medicine; and the **Universidad Politécnica de Madrid (UPM)**, which is engaged in developing artificial intelligence models.

*'One in eight women will develop breast cancer and when possible, breast-conserving surgery is the first choice for treating the disease in its early stages,' explains **Fabio Corsi**, the head of the Breast Unit at ICS Maugeri. 'However, tumour cells remaining on the surgical margins after resection is not uncommon and necessitates a second operation to avert the risk of recurrence, with inconveniences for patients and costs for the National Health System.'*

This is because surgeons removing tumour masses do not have access to tools that allow them to immediately determine whether a sufficient area of tissue has been removed, and they must wait for results from the anatomical pathology lab to determine whether more tissue needs to be removed.

*'The light-based, non-destructive tool we are working on can be used in real time during surgery and could become an innovative solution that allows surgeons to obtain precise information, even during surgery, on the presence of disease on the margins of the removed tissue,' explains **Dr Carlo Morasso**, project coordinator and head of the Nanomedicine and Molecular Imaging Laboratory at IRCCS Maugeri in Pavia.*

The Spectra-BREAST project combines **hyperspectral imaging** and **Raman spectroscopy** to analyse tissue composition, along with **robotics and artificial intelligence** to provide surgeons with immediate feedback during surgery. The combination of these optical systems will help to distinguish tumour cells from non-tumour cells. The hyperspectral camera makes an initial survey and flags suspicious parts, which are then analysed in more detail using Raman spectroscopy. Artificial intelligence is used to analyse the collected data, providing the surgeon with precise indications on excision margins.

*'IFN-CNR is involved in data acquisition, integration and validation, with the aim of bringing Raman spectroscopy closer to clinical application,' says **Renzo Vanna**, head of the CNR-IFN unit in Milan. 'SpectraBREAST offers an excellent opportunity to put technology to the test in a real setting, working with highly complementary teams in an atmosphere of mutual respect.'*

The project is divided into three phases. The first 18-month period is for **technological development**. The second is to **train artificial intelligence algorithms** to recognise cancer cells, and the third is for **clinical validation**, conducted by ICS Maugeri on a **sample of about 100 patients**.

*'The Politecnico di Milano will be responsible for coupling the two techniques (hyperspectral and Raman spectroscopy) to create a "complete" tool for surgeons, so that they can see the excised tissue on the screen in false colours and identify tumour areas or areas at risk of tumour infiltration,' explains **Dario Polli, head of the unit at the Politecnico di Milano**. 'To achieve the objectives of SpectraBREAST, we will combine different skills — photonics and electronics, robotics and artificial intelligence — to increase the technological development of the device, patenting all the inventions that arise from the scientific research and determining the best implementation of the device for its future testing in the clinic and marketing in the long term.'*

Spectra-BREAST stems from experience gained in the field of clinical research and optics applied to medicine, with the aim of making breast cancer surgery **more effective, safer and less invasive**.

For more information: <https://spectrabreast.eu/>



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