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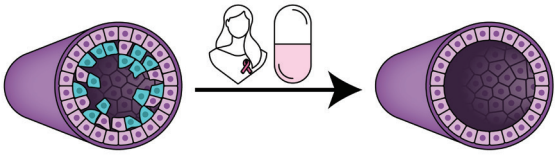
STOPPING BREAST CANCER BEFORE IT STARTS

Imagine a world where breast cancer can be stopped before it even begins - where people at high-risk of developing this devastating disease have options beyond invasive surgeries or a lifetime of uncertainty and emotional turmoil. For millions of women, especially BRCA1/2 mutation carriers who face heightened risk and often endure painful preventive measures, such a development cannot come soon enough.

Professor Sarit Larisch's lab at the University of Haifa is developing a molecule that is on track to become the world's first drug able to reverse early-stage cancer (premalignant) back to a normal state, representing a paradigm shift in cancer treatment and prevention.



The Ashkenazi Jewish community are around 10-times more likely to be BRCA-mutation carriers than the rest of the population, and so are encouraged to be genetically screened for the mutation. Women who are BRCA-mutation carriers will require regular mammographs, and at the first indication of changes in the breast – the pre-cancer stage – this drug could be used to reverse those changes back to healthy cells.

In time, it may be possible that the drug could even be used as a preventative measure for women found to be BRCA-mutation carriers who do not have any pre-cancerous signs. In the high-profile case of **Angelina Jolie**, who discovered she was a BRCA carrier and so decided to have a double mastectomy and her ovaries removed as a preventative measure, if such a drug had been available for her she could have avoided such drastic and invasive overtreatment.

2.3
million

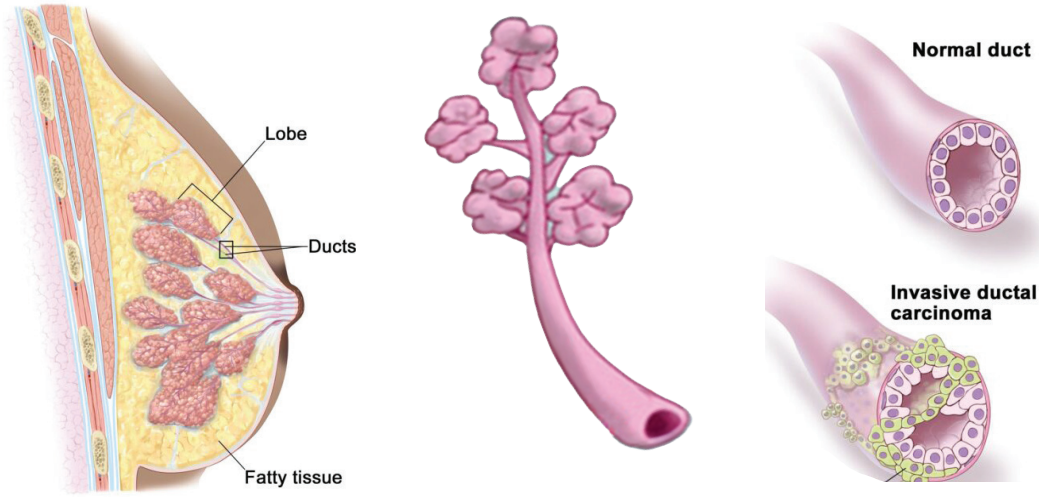
women were diagnosed with breast cancer in 2022

Breast cancer is notoriously complex, with a range of treatments that can have varying efficacy for different people. Aside from BRCA-mutation carriers, all women at the age of 50 will have a mammogram, catching many early-stage pre-cancers.

While early detection is essential for survival, current treatments fall short of addressing pre-malignant tumours - the earliest and most preventable stages of the disease. This leaves high-risk individuals vulnerable and underscores the urgency for breakthrough solutions. Currently, women diagnosed with pre-cancer lesions either undergo surgeries or are frequently monitored. Both approaches are not optimal and can result in breast cancer progression.

Professor Larisch's lab is leading a transformative effort to change this narrative. They have identified innovative small molecules that target both early-stage (pre-malignant) and established (malignant) breast cancer cells. Remarkably, these compounds not only eliminate malignant cells while sparing normal ones but also have been shown to reverse early-stage cancer cells back to their normal state, halting life-risking progression before it starts.

BREAST CANCER PROGRESSION

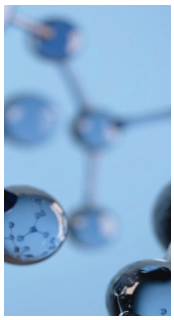


PREMALIGNAT STAGES

PROFESSOR LARISCH AND ARTS

Professor Sarit Larisch is the Head of the Cell Death & Cancer Research Laboratory in the Department of Human Biology. As a post-doc she discovered a novel protein, which she termed ARTS.

Further investigation into ARTS revealed it plays an important role in allowing the expected death of healthy cells at the right time, so they can be replaced by new healthy cells. The absence of ARTS causes cells to 'out-stay their welcome', and live beyond their expected life, which can lead to them turning 'immortal' cancerous cells.



LOSS OF ARTS PROTEIN

Normal breast **Breast cancer**

ARTS

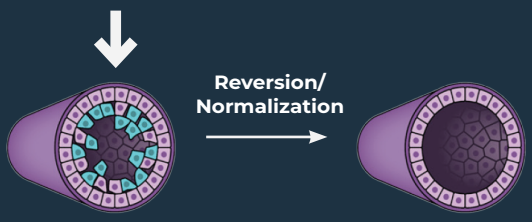
- **The ARTS protein is found in every cell of our body.**
- **ARTS is critical for protecting our cells from turning into cancer cells.**
- **Cells that have lost ARTS can become cancerous.**
- **Loss of ARTS alone in normal breast cells is sufficient to turn them into breast cancer cells.**

THE BREAKTHROUGH

After discovering that reinserting ARTS back into cancerous tumours reversed them back to healthy cells, a significant breakthrough came when the lab identified novel molecules that mimic the role of ARTS in the cell.

Many research laboratories work on late stages of breast cancer. Professor Larisch's lab focuses on the **pre-cancer stages**, that very few in the world work on, if any. Why? Because they have found that **this stage is reversible.**

ARTS SMALL MOLECULE MIMETICS



Pre-cancer cells Early Breast cancer **Normal breast**

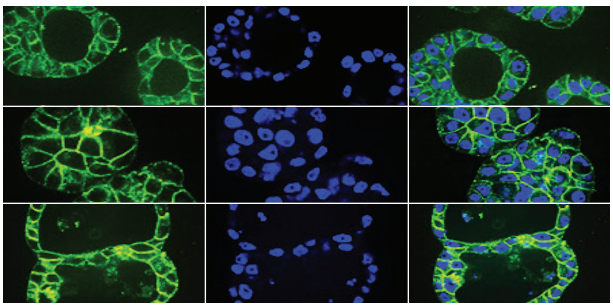
THE FINAL STEPS, AND HOW YOU CAN HELP

The focus for Professor Larisch's lab now is to accelerate the development of the molecule to a drug, through the final pre-clinical stages, which will prepare it for clinical trials.

To date, all of the research has been on breast cancer, but as ARTS is present in all cells, it is expected this molecule could cause similar reversion of premalignant tumours in other cancers.

HIV/AIDS and Hepatitis C used to be lethal diseases. Today, carriers are treated with drugs to manage their diseases and live to a normal life expectancy. The University of Haifa aims to add breast cancer and other cancers to that list.

The lab's groundbreaking approach could revolutionize breast cancer care, offering hope and the potential to change the lives of countless patients while creating a model for tackling other types of cancer.



Professor Sarit Larisch is Head of Cell Death and Cancer Research Laboratory at the University of Haifa. She is also Visiting Professor at the Rockefeller University in New York. Her work has been recognised with numerous awards and has been funded through a number of competitive grants from both national and international agencies. Her lab has published in many high-ranking scientific journals, and Professor Larisch has registered eleven patents and patent applications

» **To find out more about supporting Professor Larisch's work, please contact Marcus Rees-Roberts, Executive Director of the University of Haifa UK at: marcus@haifa-univ.org.uk or on +44 (0)7795 103066**

With your support, we can turn this vision into reality, driving a game-changing shift in cancer prevention and treatment and tackling the early changes in the breast – before cancer takes hold.

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