

Breastfeeding reduces the risk of breast cancer: A call for action in high-income countries with low rates of breastfeeding

Dr. Britta Stordal

Associate Professor in Cancer Research

Deputy Dean Research and Knowledge Exchange

Middlesex University London

b.stordal@mdx.ac.uk

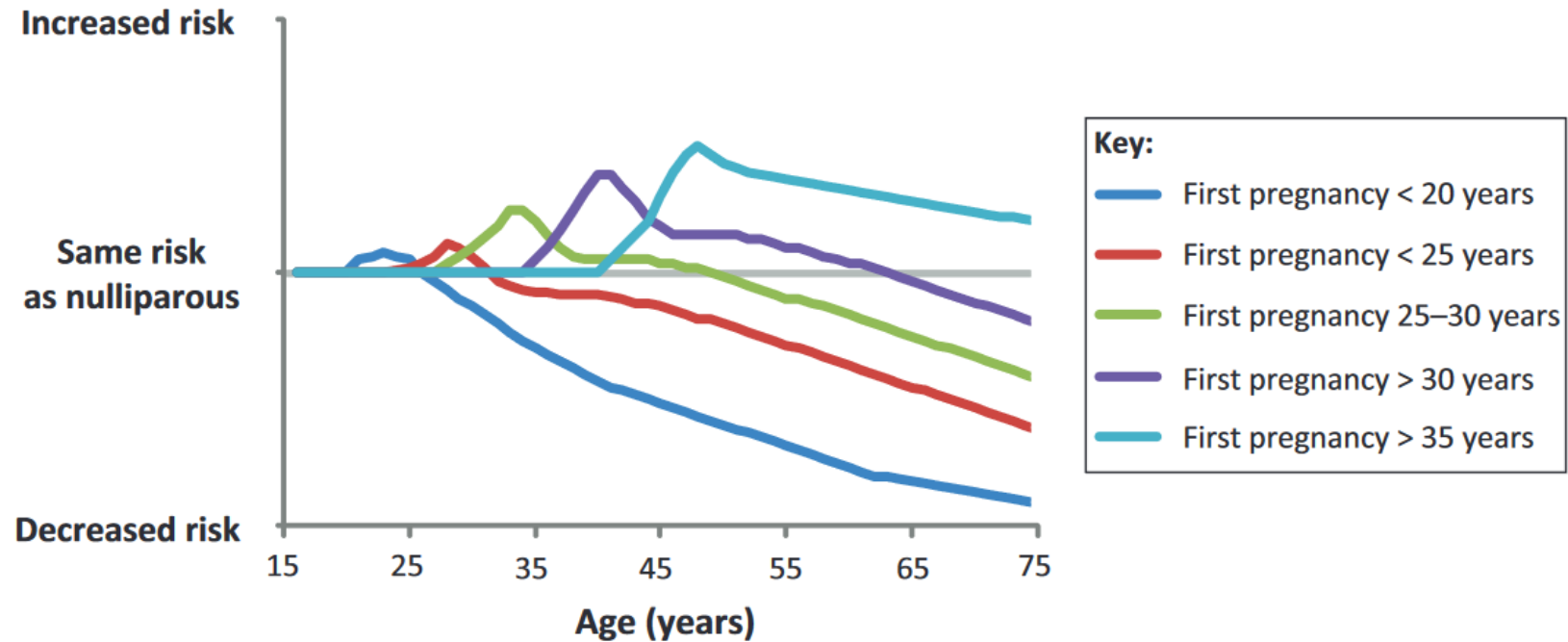


Low Rates of Breastfeeding

- The UK has low rates of breastfeeding, 81% of babies are ever-breastfed.
- Breastfeeding is less common in younger mothers and in more deprived areas
- Mothers in the UK are more likely to breastfeed if they themselves were breastfed and most of their friends breastfeed.
- There is a lack of experience in the UK population, today's grandmothers have less experience with breastfeeding (62%) than their daughters.



Pregnancy and Breast Cancer Risk



- Women in the UK are having children later in life which increases their breast cancer risk.



Breastfeeding and Breast Cancer Risk

Articles

Breast cancer and breastfeeding: collaborative reanalysis of individual data from 47 epidemiological studies in 30 countries, including 50 302 women with breast cancer and 96 973 women without the disease

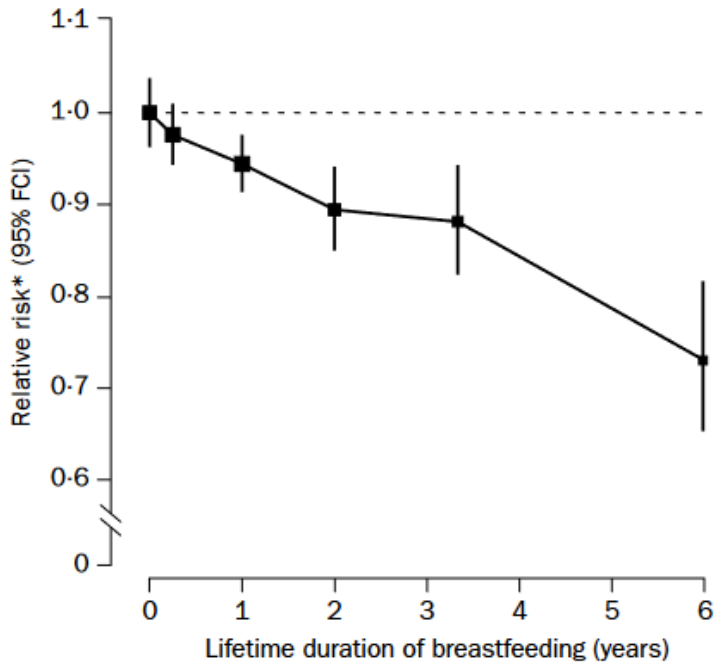


Figure 3: **Relative risk of breast cancer in parous women in relation to lifetime duration of breastfeeding**

*Calculated as floating absolute risk (FAR), and stratified by study, age, parity, age at first birth, and menopausal status.

- The risk of breast cancer is reduced by 4.3% for every 12 months of breastfeeding
- An estimated 4.7% of breast cancer cases in the UK are caused by not breastfeeding.
- 2585 cases per year or 7 cases a day.



Mechanism of Reduced Risk?

The protective effects of an early full-term pregnancy and breastfeeding have been consistently seen in multiple countries and ethnic groups

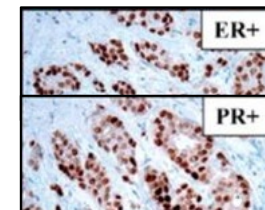
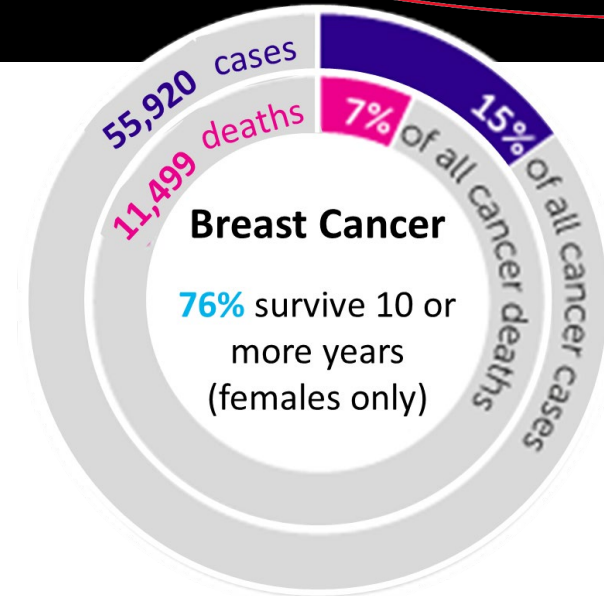


This suggests that the protection results from biological changes in the breast rather than environmental or socioeconomic factors



Types of Breast Cancer

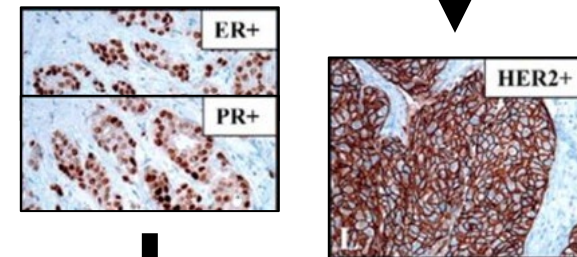
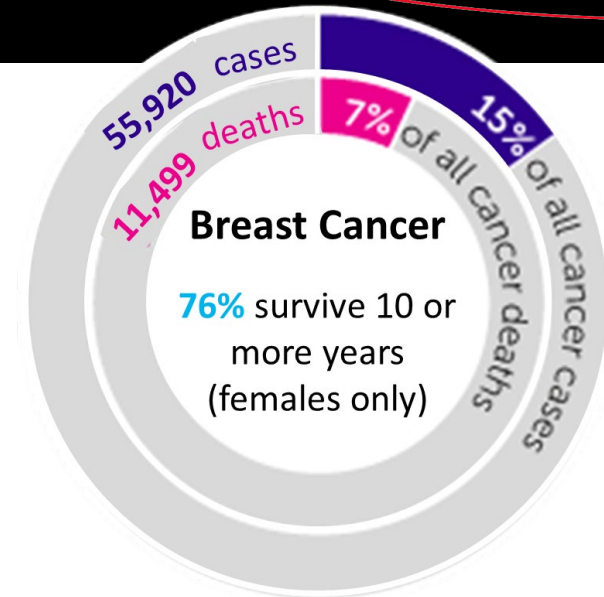
- Hormone-receptor positive is the most common type of breast cancer (70% of cases).
- Hormone receptors become activated when hormones bind to them. This causes expression of specific genes, which can lead to the stimulation of cell growth.
- When detected early and treated with endocrine therapy, 99% of women survive 5 or more years.



Endocrine Therapy

Types of Breast Cancer

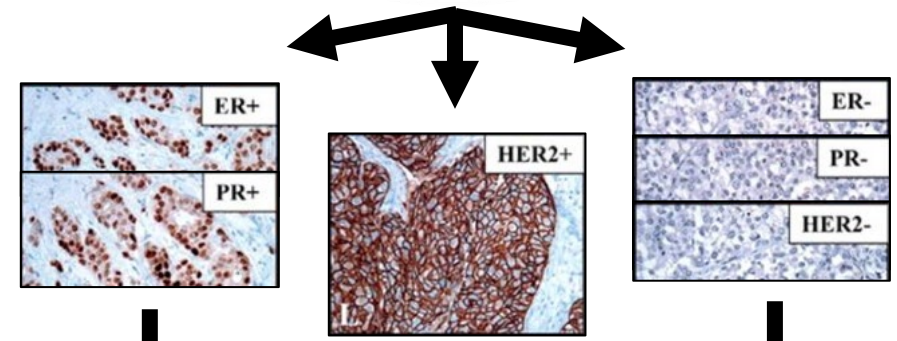
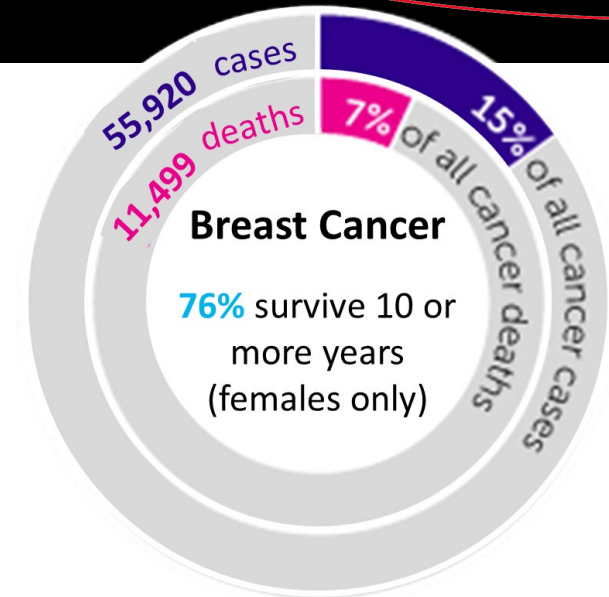
- HER2 positive breast cancers account for 15–20% of cases.
- HER2 is a member of the human epidermal growth factor receptor family, and is an oncogene.
- When detected early and treated with a combination of chemotherapy and HER2 inhibitors, 94% of women survive 5 or more years.



Endocrine Therapy Herceptin

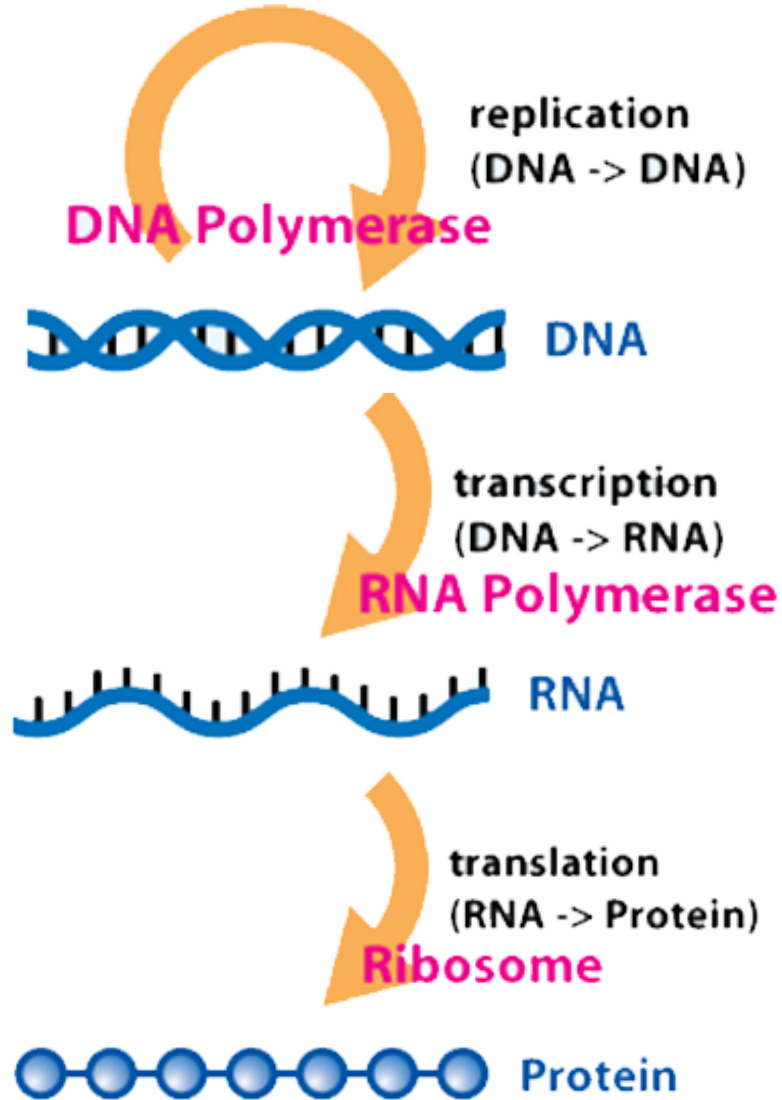
Types of Breast Cancer

- Breast cancers that do not have hormone receptors or HER2 are Triple Negative.
- The cause of these cancers can be unknown but tumours from BRCA mutation carriers are typically within this subtype.
- When detected early and treated with chemotherapy only 85% of women survive 5 or more years.



Endocrine Therapy Herceptin Parp Inhibitors

Central Dogma Molecular Biology



Fertilised
Egg



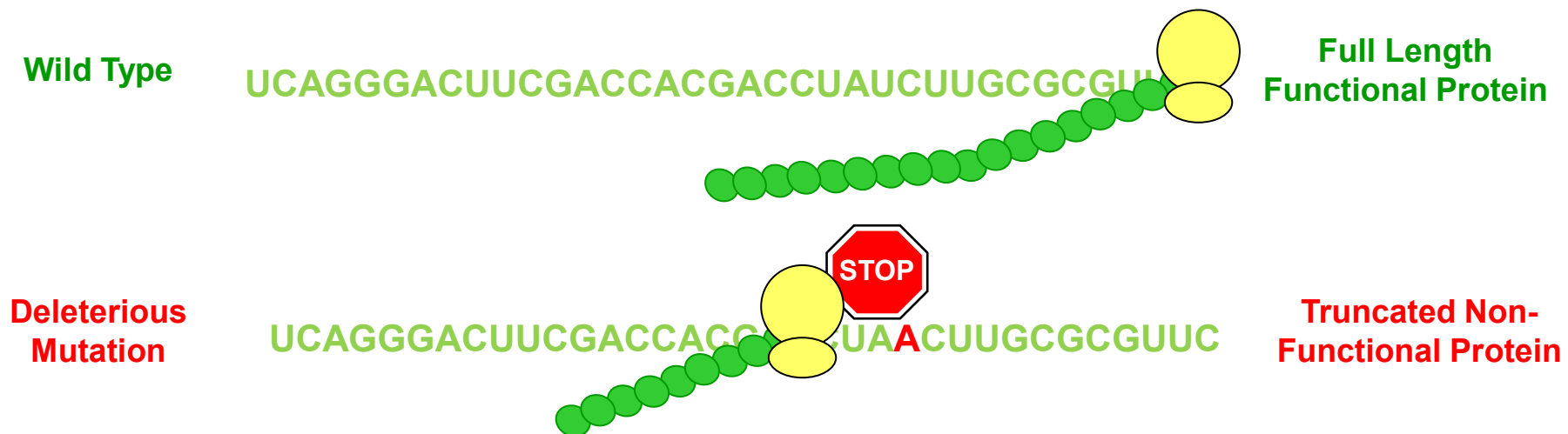
Nerve Cells



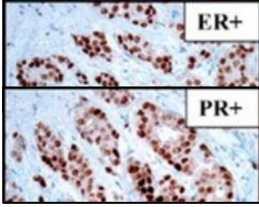
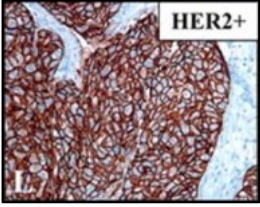
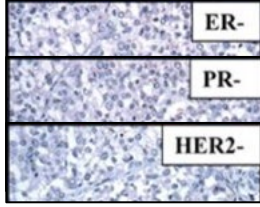



Muscle Cells

What is BRCA1?

- DNA in every cell of the body is constantly being damaged from external stimuli, and then repaired.
- BRCA1 is an important DNA repair protein and tumour suppressor.
- Without BRCA1 mistakes can accumulate and this can trigger carcinogenesis



Types of Breast Cancer

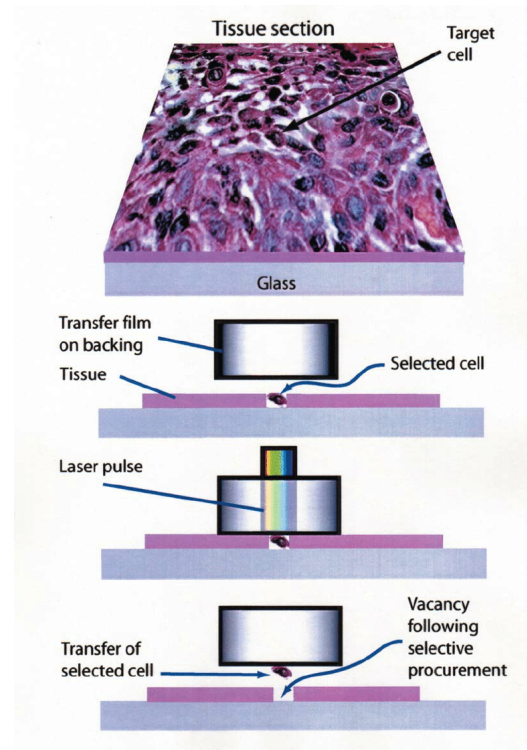
				
	<p><25 first pregnancy 18-40% ↓</p> <p>1 or more pregnancy 29-35% ↓</p>	<p>No clear consensus</p>	<p>1 or more pregnancy 30% ↓</p>	<p><21 first pregnancy BRCA1 9% ↓ BRCA2 17% ↓</p>
	<p>No further reduction in risk (Meta Analysis)</p>	<p>No clear consensus</p>	<p>20% ↓</p>	<p>BRCA1 22-50% ↓</p> <p>BRCA2 No further reduction in risk</p>

Normal Breast Tissue

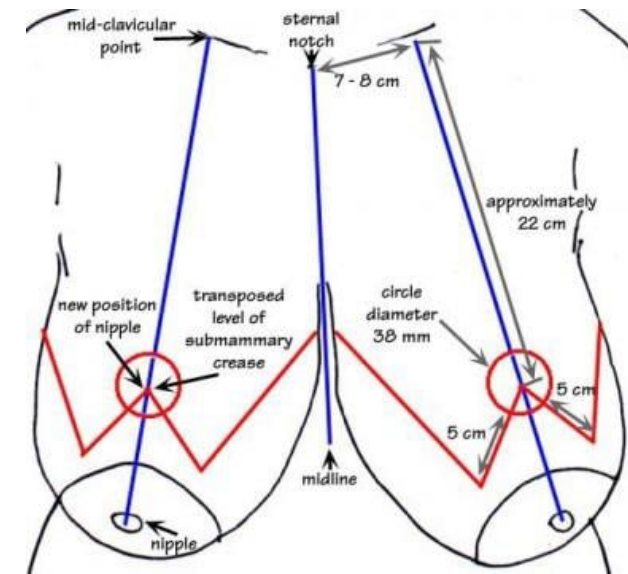
Breast Core Needle Biopsies



Microdissection

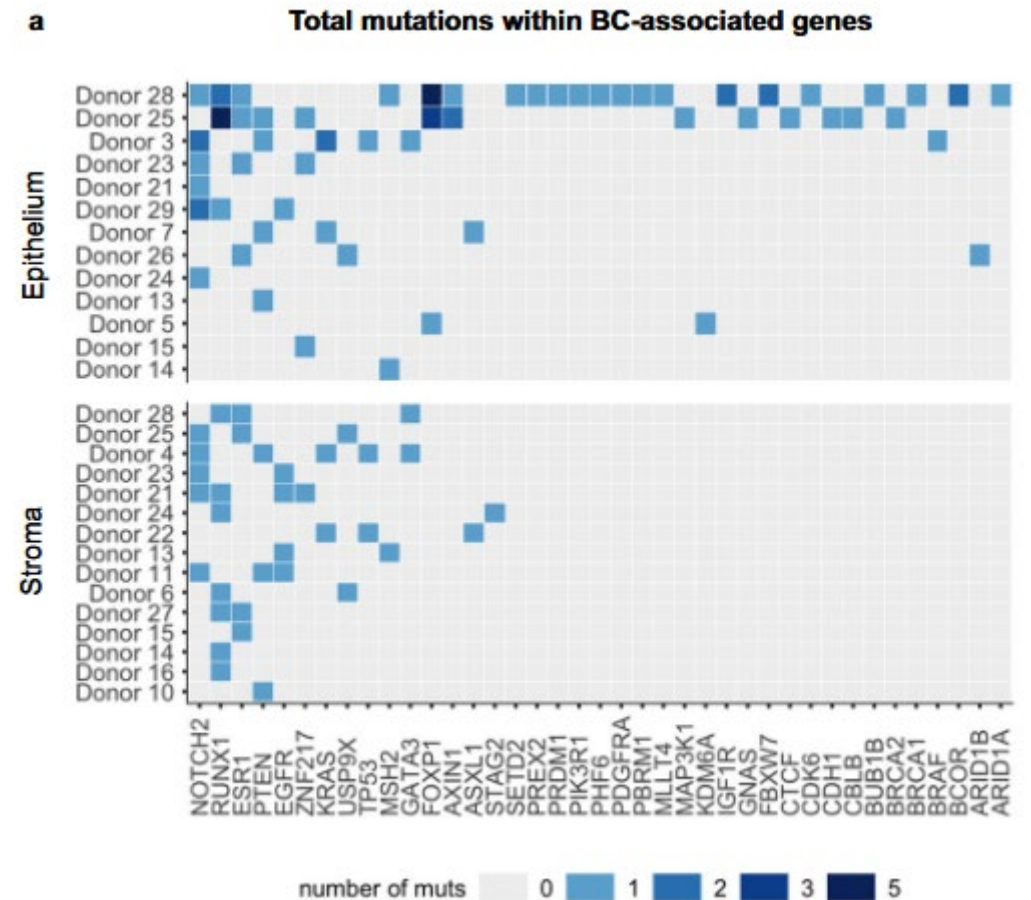


Reduction Mammoplasty

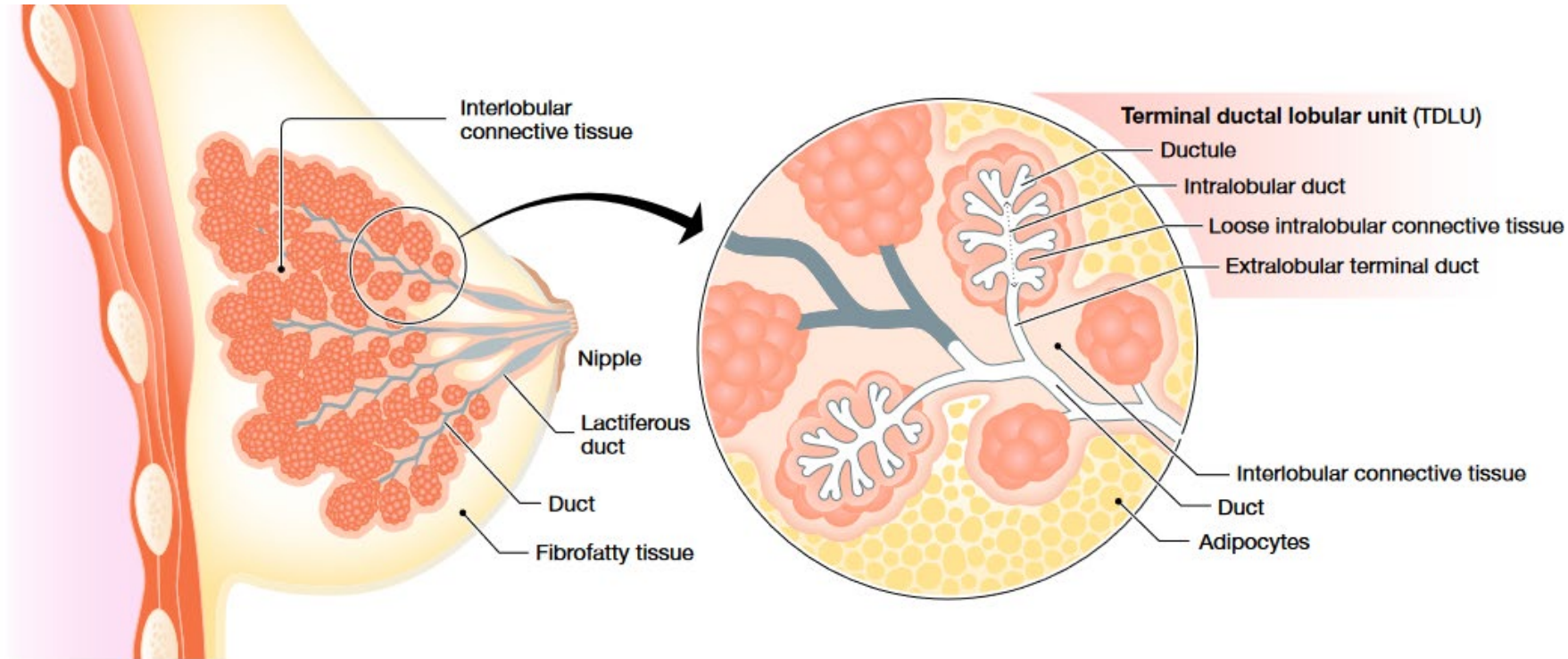


DNA Mutational Studies

- A study has looked at DNA mutational load between human parous and non parous breast tissue
- No studies to date looking at mutational load breastfeeding vs non-breastfeeding in parous breast tissue.

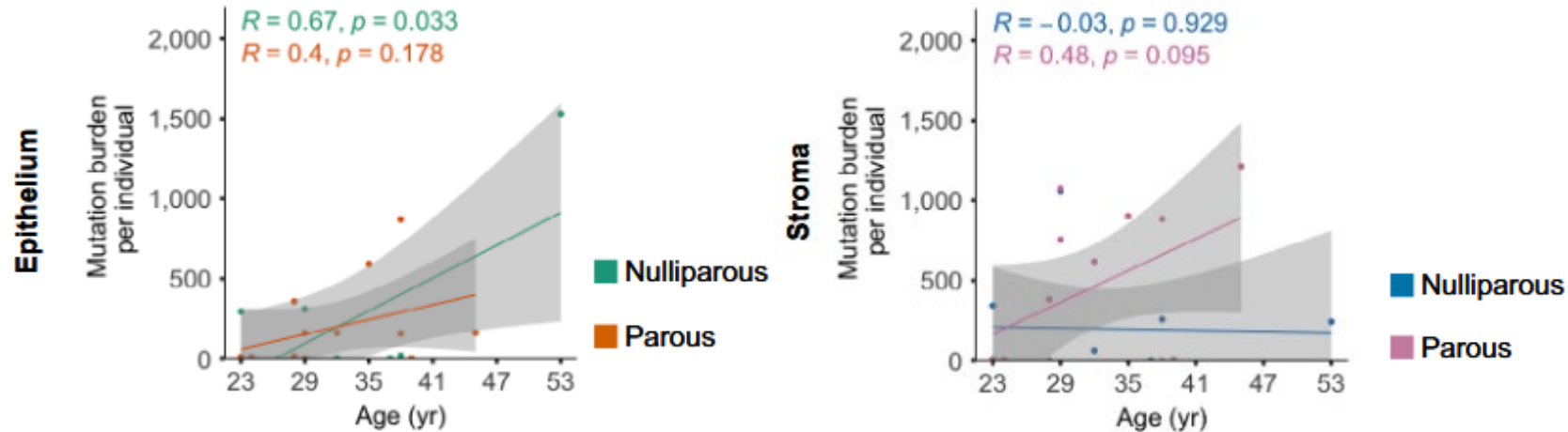


Site of Origin



Terminal ductal lobuloalveolar units are regarded as the site of origin for the majority of human breast cancers

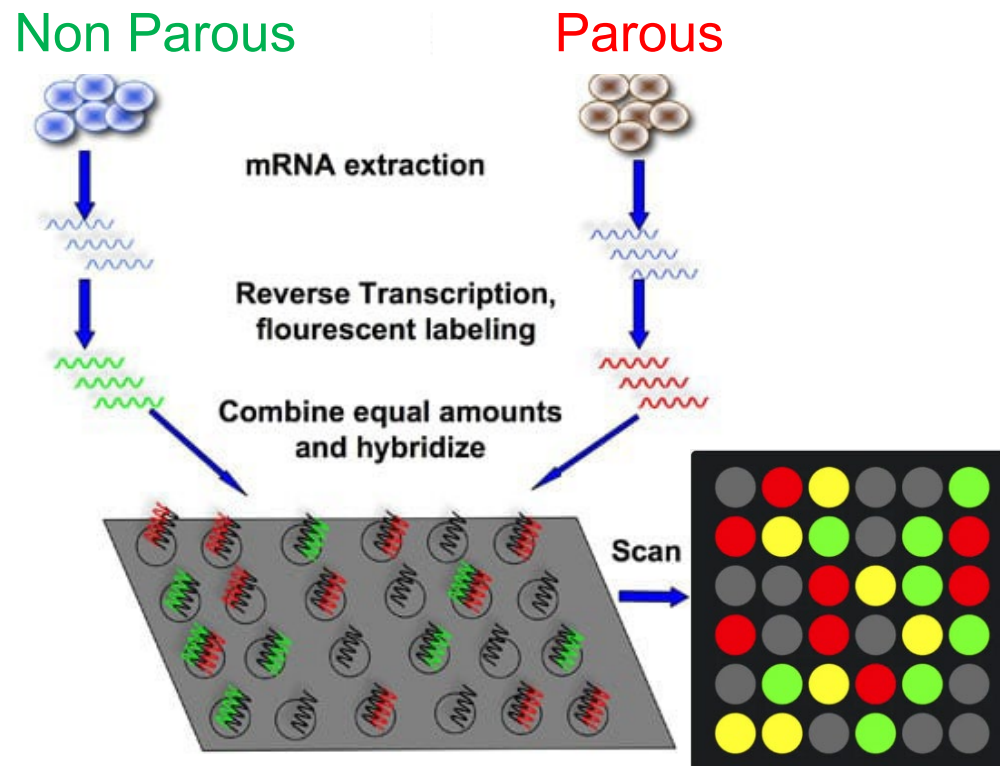
DNA Mutational Studies



- The fast proliferation and differentiation characteristic of mammary tissue during pregnancy induces expansion of pre-existing clones, rather than the onset of new mutations.
- Caveats to this study – small sample size $n = 26$
- Effect of Age is measured by looking at older and younger participants, individuals are not followed longitudinally

Gene Expression Studies

- Four large studies have looked at gene expression between human healthy parous and non parous breast tissue
- No studies to date looking at breastfeeding vs non-breastfeeding in parous breast tissue.



- Gene NOT active in either parous or non-parous breast tissue
- Gene IS active in parous and non-parous breast tissue
- Gene active in non-parous breast tissue only - interesting!
- Gene active in parous breast tissue only – interesting!

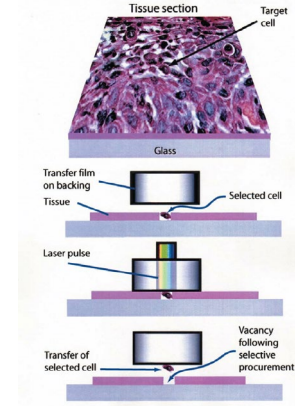
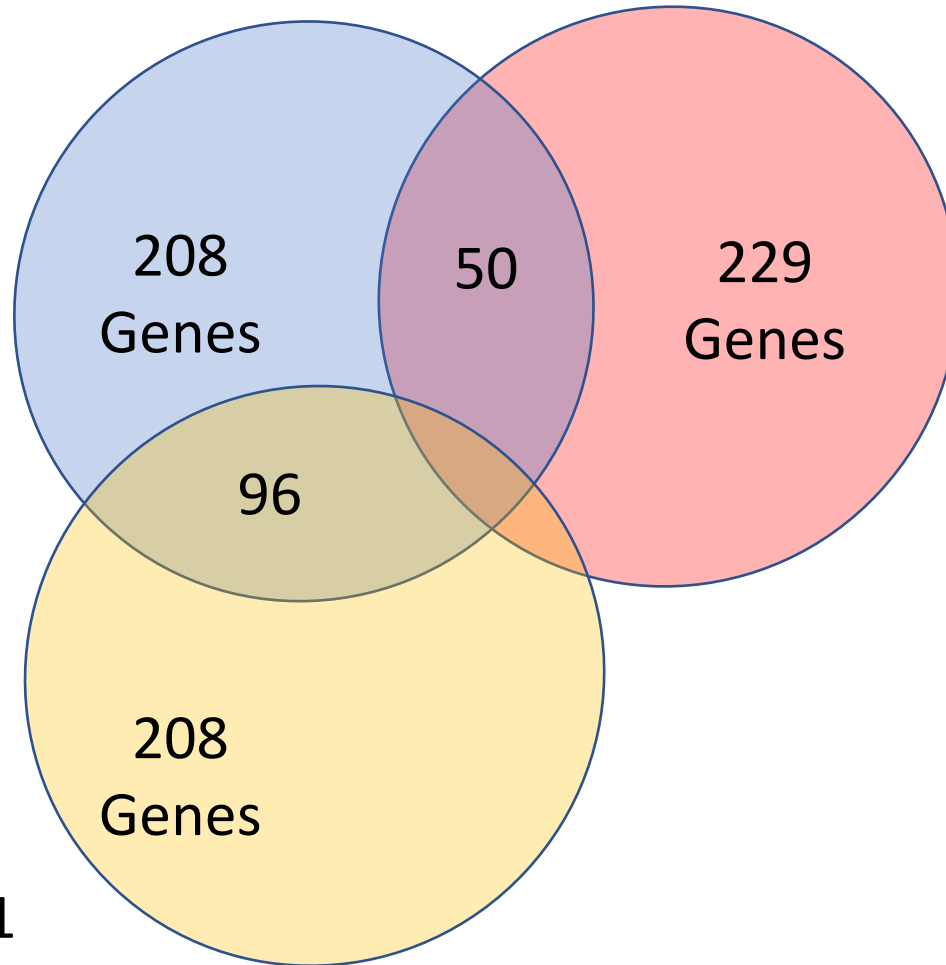
Gene Expression Studies



Peri 2012
Sweden

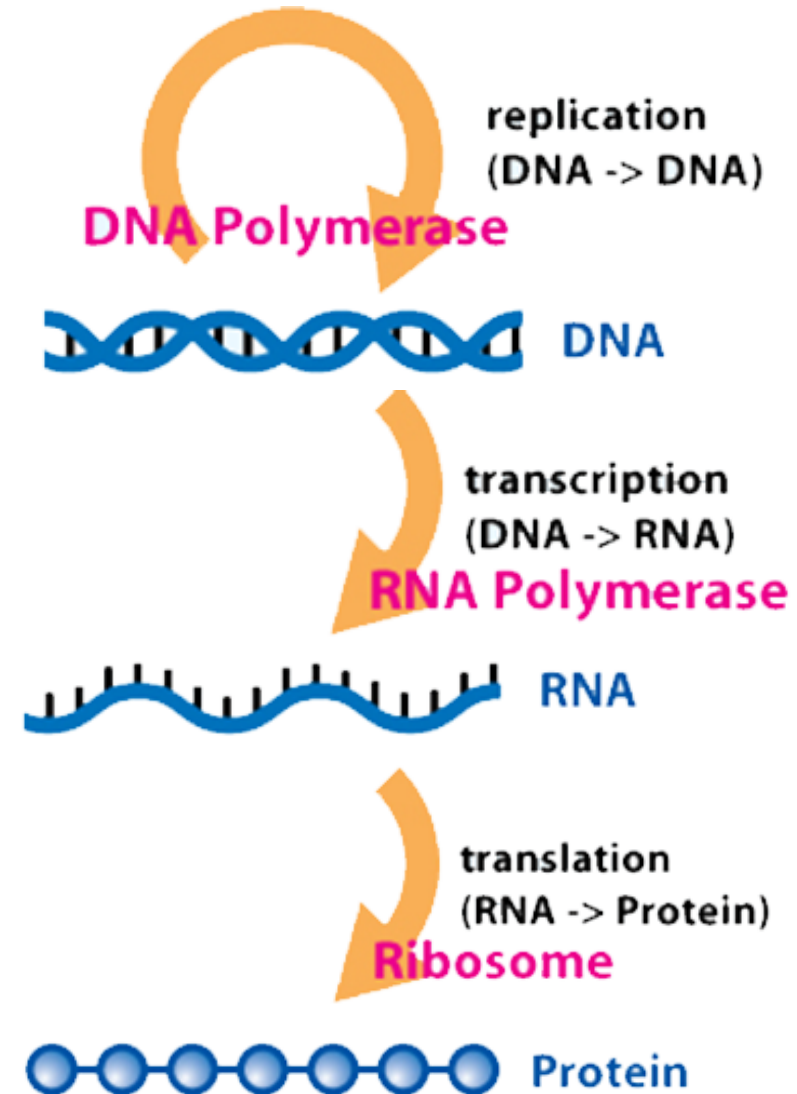
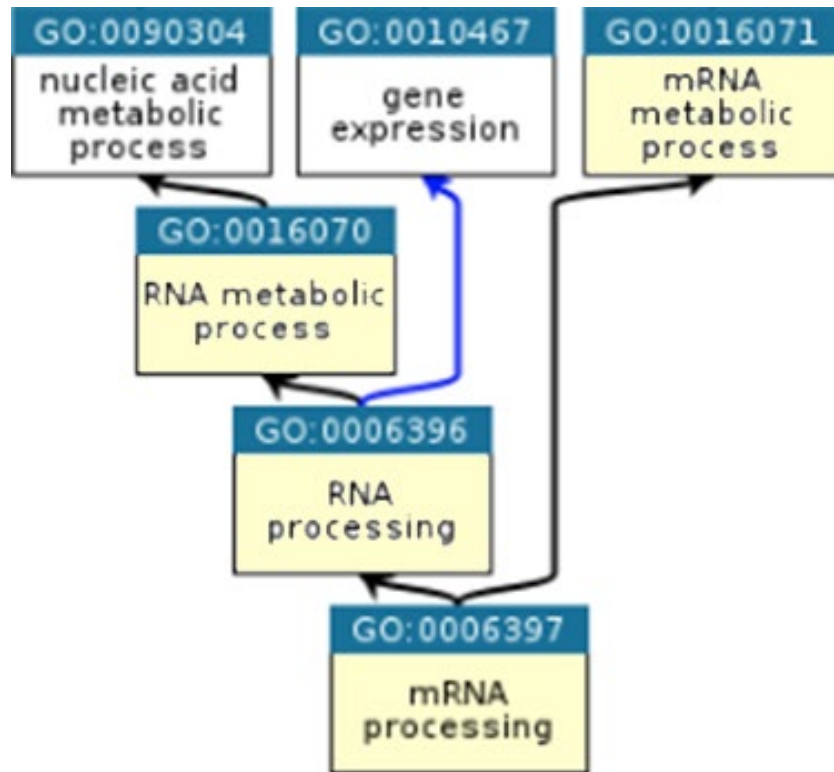


Belitskaya-Levy 2011
Sweden



Russo 2008
USA

mRNA Processing



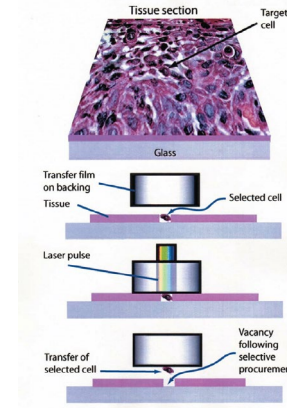
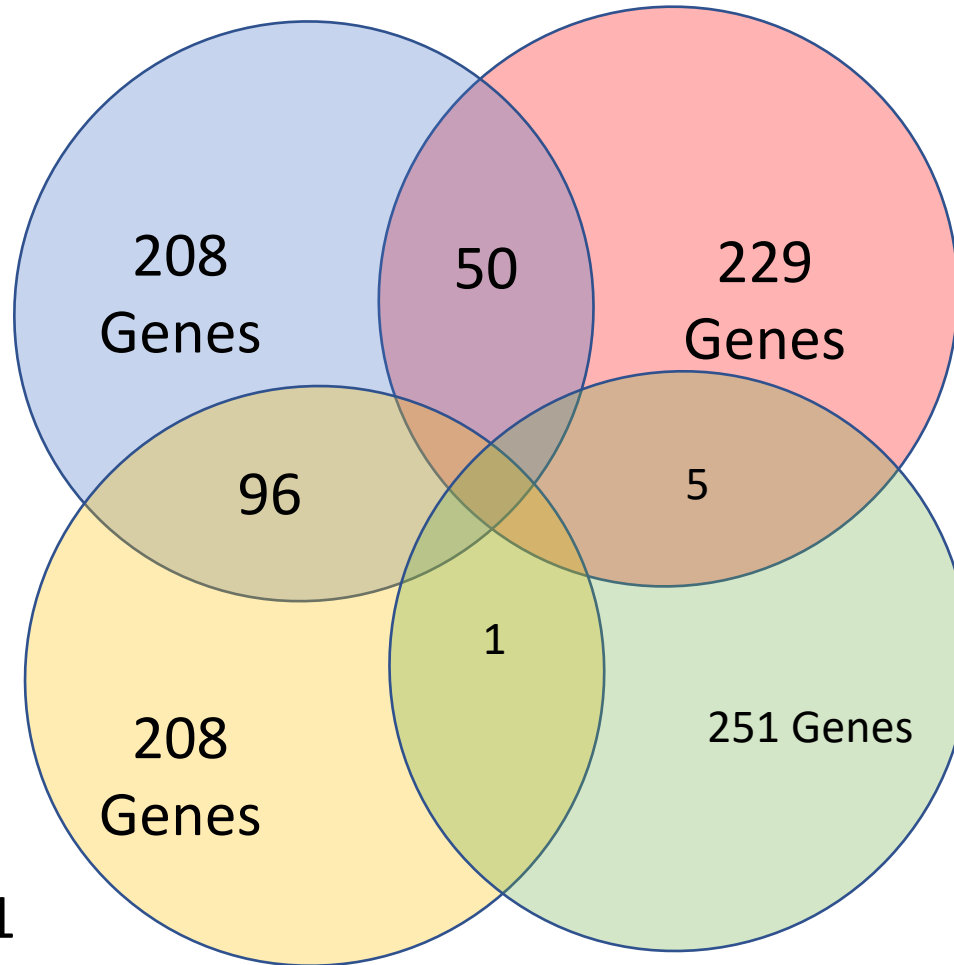
Gene Expression Studies



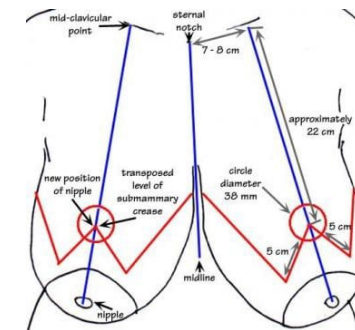
Peri 2012
Sweden



Belitskaya-Levy 2011
Sweden

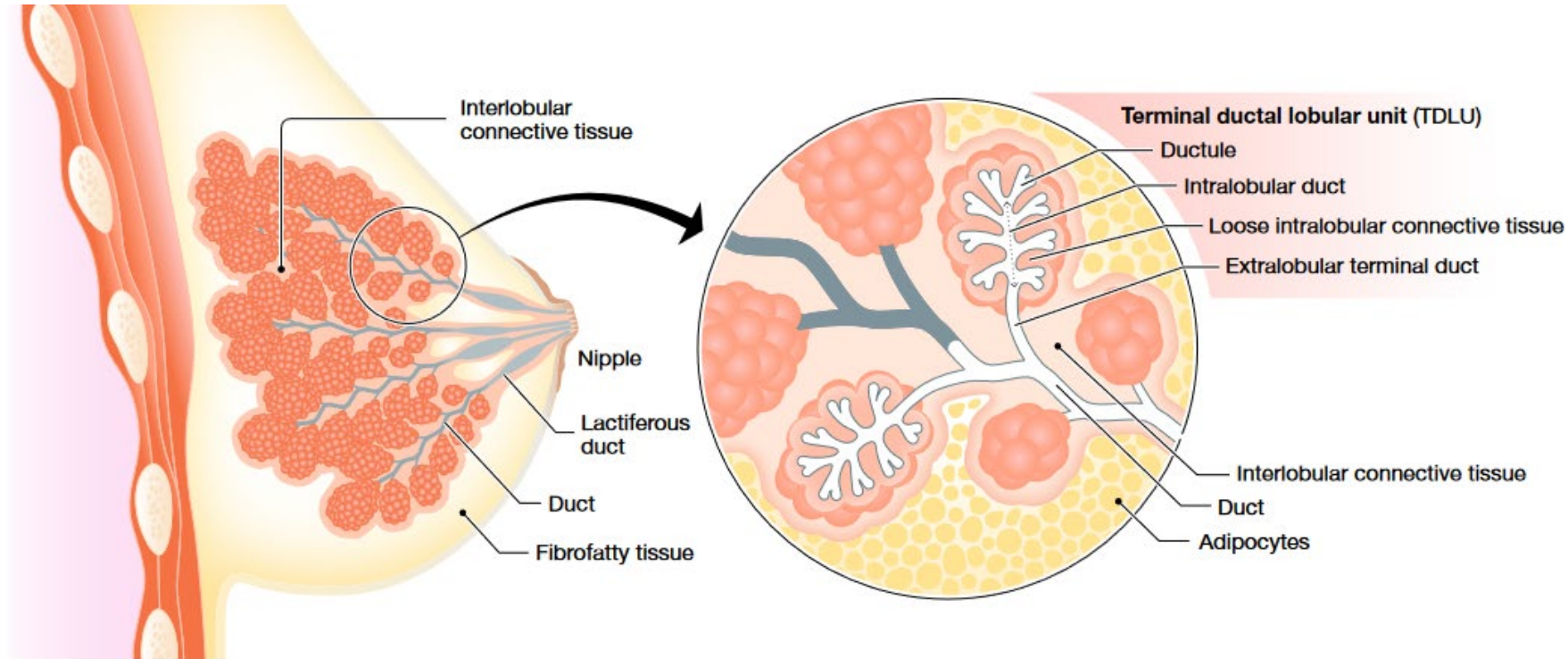


Russo 2008
USA



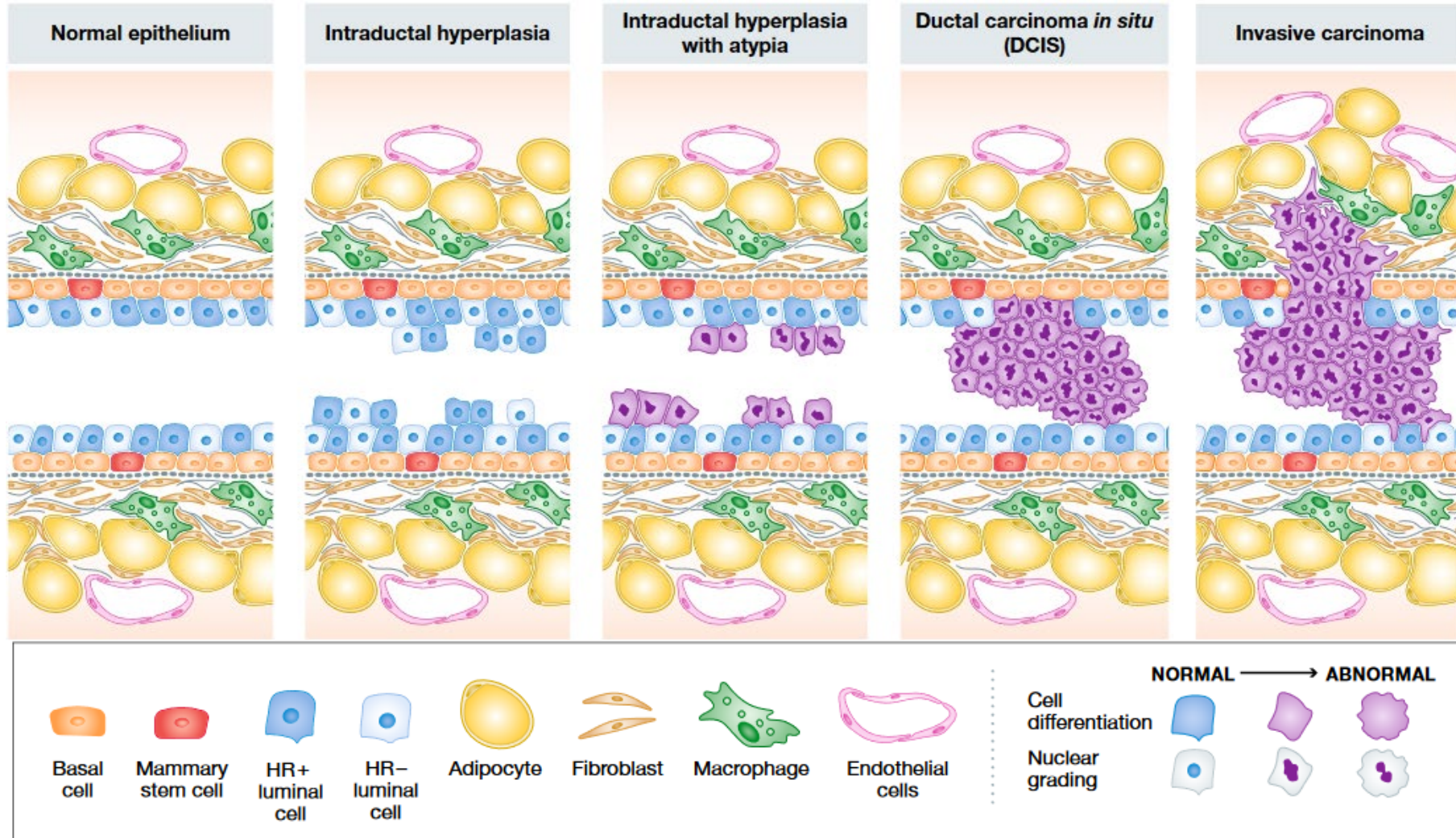
Rotunno 2014
USA

Site of Origin

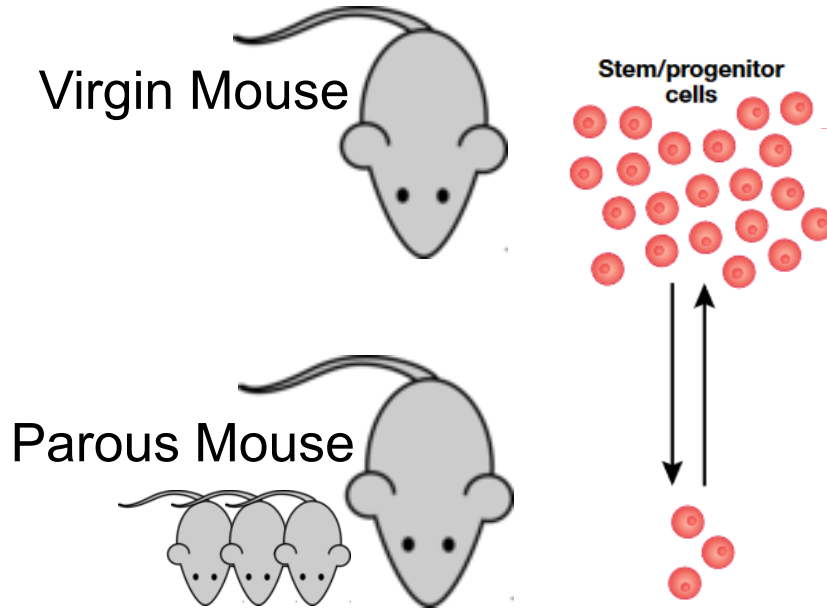


Terminal ductal lobuloalveolar units are regarded as the site of origin for the majority of human breast cancers

Site of Origin

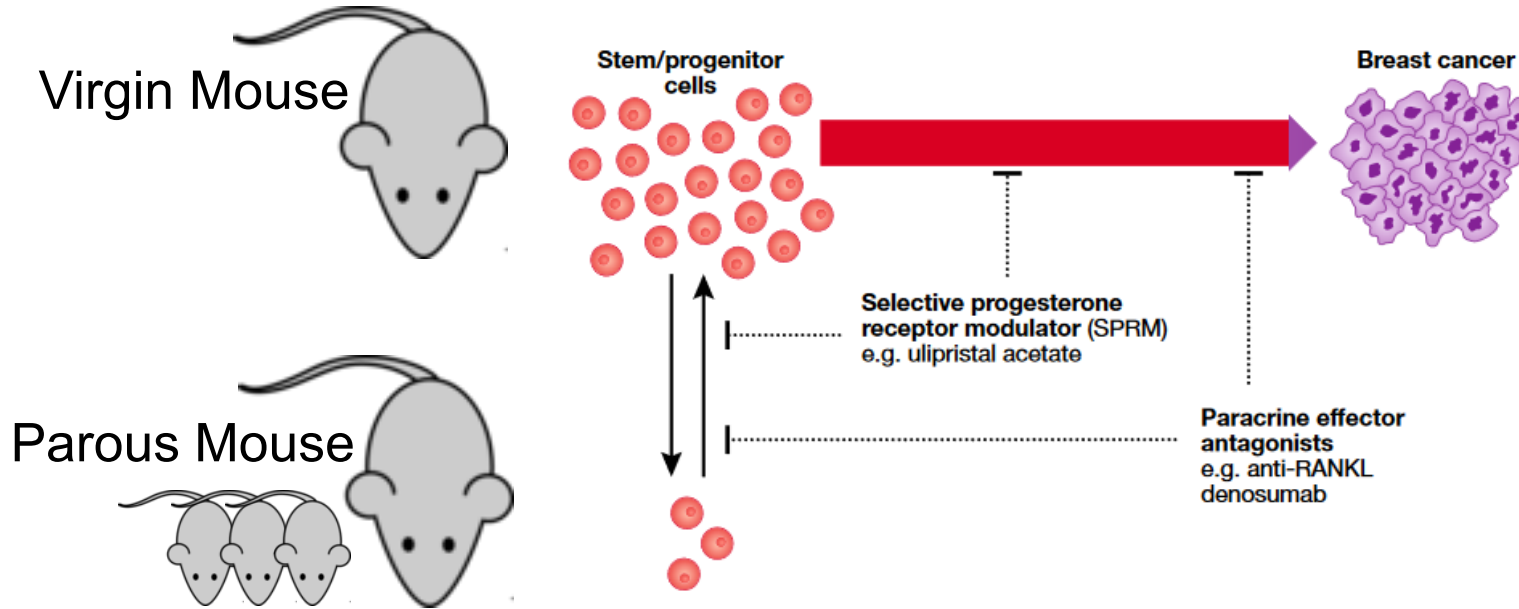


Mammary-Epithelial Stem Cells



An early pregnancy causes a persistent decrease in the number of functional mammary-epithelial stem cells.

A Cancer Prevention Strategy?



The maintenance of stem cells relies on regulation through gene expression, including chromatin modification, transcription factors, microRNAs and regulation through alternative RNA splicing



**CANCER
PREVENTION
CONCORDAT**



**Middlesex
University
London**

Cancer Prevention Concordat

Dr. Britta Stordal

Associate Professor in Cancer Research

Deputy Dean Research and Knowledge Exchange

Middlesex University London

b.stordal@mdx.ac.uk



Higher Education Sector and Cancer



In the Higher Education sector in the UK in 2023/24 there were 2,904,425 students and 452,400 staff members ~3.35 million people.

Nearly 1 in 2 people in the UK will be diagnosed with cancer in their lifetimes.
~1.5 million people from the higher education sector will develop cancer.

~38% of cancers are preventable - Lung cancer, bowel cancer, melanoma skin cancer, and breast cancer together account for almost two-thirds of all preventable cancer cases in the UK.

~570,000 cases from the HE Sector.



Cancer is a Preventable Disease



4 IN 10 CANCERS CAN BE PREVENTED

These are proven ways to reduce the risk of cancer. Larger circles indicate greater impact on cancer risk.



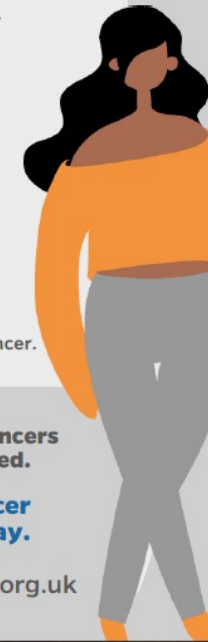
Let's beat cancer sooner
cruk.org/health



FIVE TOP TIPS Reduce your risk of breast cancer



- 1 Drink less alcohol**
 It's best not to drink. If you drink, do it in moderation. Do not go beyond the UK government guidelines of 14 units of alcohol per week.
- 2 Get active**
 By being physically active you can reduce your risk of breast cancer by around 20%.
- 3 Maintain a healthy weight**
 Maintaining a healthy weight is a key part of reducing your risk of breast cancer.
- 4 Eat more fruit and veg**
 By making good food choices you can reduce your risk of breast cancer.
- 5 Be aware of harmful chemicals**
 Many chemicals in everyday products and the environment may affect your risk of breast cancer.



SCAN ME



At least 30% of breast cancers cases could be prevented.

Take our breast cancer prevention quiz today.

or visit breastcanceruk.org.uk

Cancer Prevention Concordat



The Cancer Prevention Concordat aims to reduce people's exposure to cancer risk factors by:-

- Raising awareness of cancer risk factors that individuals can change
- Changing institutional policy to reduce cancer risk factors and promote healthy lifestyles

The Cancer Prevention Concordat will cover the following risk factors:-

- Smoking, Alcohol, Obesity, Red and Processed Meat, UV Exposure, HPV and other STIs
- As well as the following protective factors:-
- Breastfeeding, Exercise, Fruit and Vegetables

Lack of Breastfeeding

- Provide a dedicated breastfeeding room on campus where infants can be fed as well as milk can be expressed and refrigerated.
- Breastfeeding support available through links with university midwifery team (if programme taught) or International Board-Certified Lactation Consultants or Health Visitors.
- Provide information about breastfeeding and reduction of cancer risk
- Update and raise awareness of children on campus policy to promote breastfeeding



Next Steps

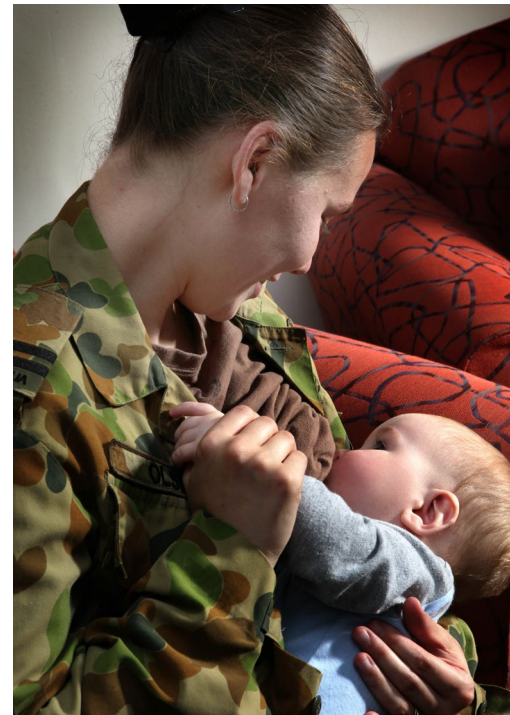
- Work with Universities:-
 - To develop further ideas for actions on reducing cancer risk factors
 - To become the first signatories to the new Cancer Prevention Concordat
 - To form a review board from member universities
- Work with charities and other organisations:-
 - To promote the Cancer Prevention Concordat
 - To provide high-quality cancer prevention information and support to the University Sector

Conclusions

- The risk of breast cancer is reduced by 4.3% for every 12 months of breastfeeding
- Breastfeeding reduces the risk of Triple-Negative Breast Cancer (20%) and in carriers of BRCA1 mutations (22-55%).
- The mechanisms of reduced risk as a result of pregnancy are related to changes in RNA processing
- Women with a family history of breast cancer should particularly be supported to breastfeed as a way of reducing their risk.



Thanks to



Breast
Cancer 

