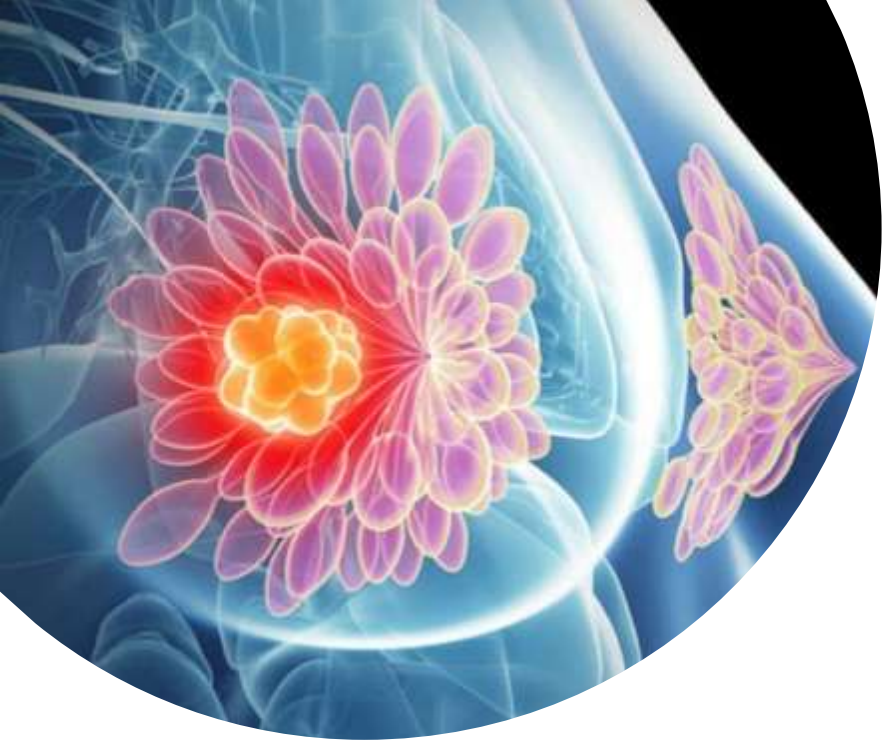


Tumour ‘organoids’ – the future of cancer research?

Dr Emma Nolan

Group Leader, Breast Cancer Research Laboratory
Auckland Cancer Society Research Centre
University of Auckland

emma.nolan@auckland.ac.nz

My journey as a cancer biologist

Bachelor of Science (2008-2011)
University of Otago

PhD (2012-2016)
University of Melbourne, Australia

Postdoc (2017-2022)
Francis Crick Institute, London, UK

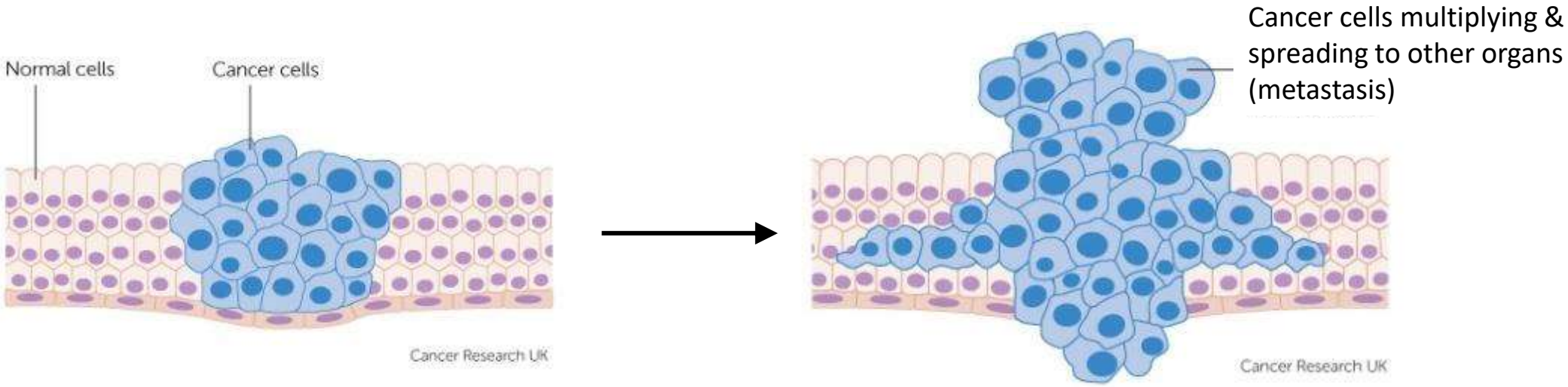
Laboratory Head (2022-current)
University of Auckland

The Walter & Eliza Hall Institute, Melbourne

WEHI
brighter together

What is Cancer?

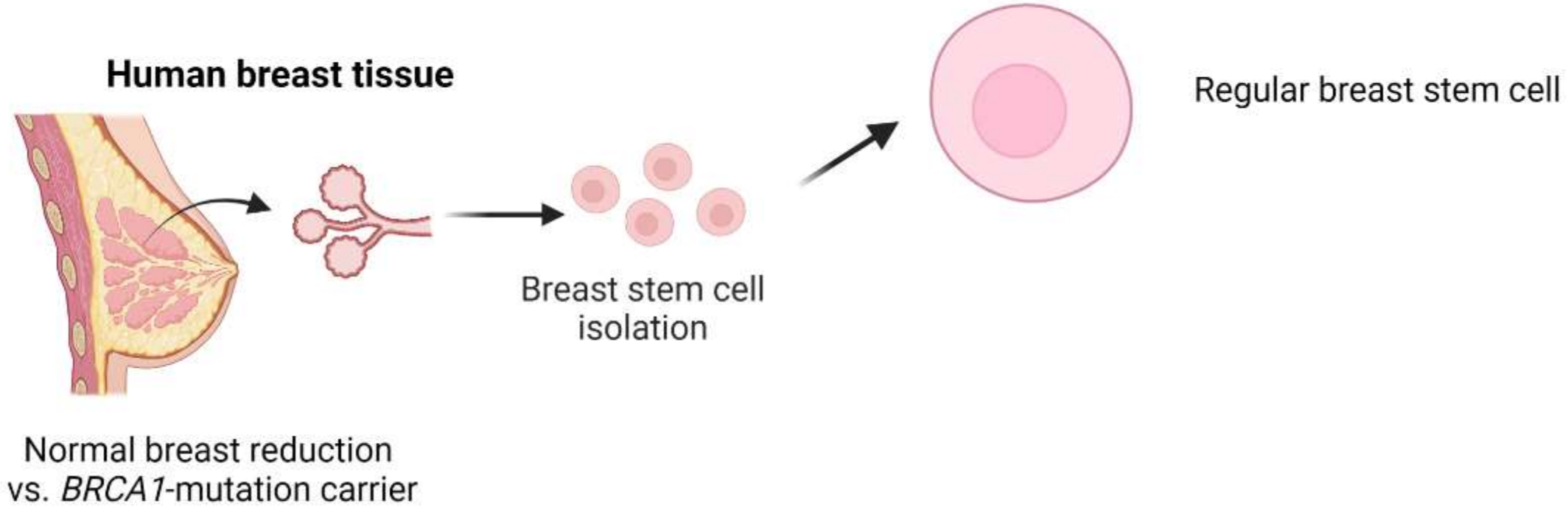
- Cancer is when abnormal cells divide in an uncontrolled way
- Some cancers may eventually spread into other tissues (metastatic disease)



My PhD research – preventing breast cancer in high-risk women

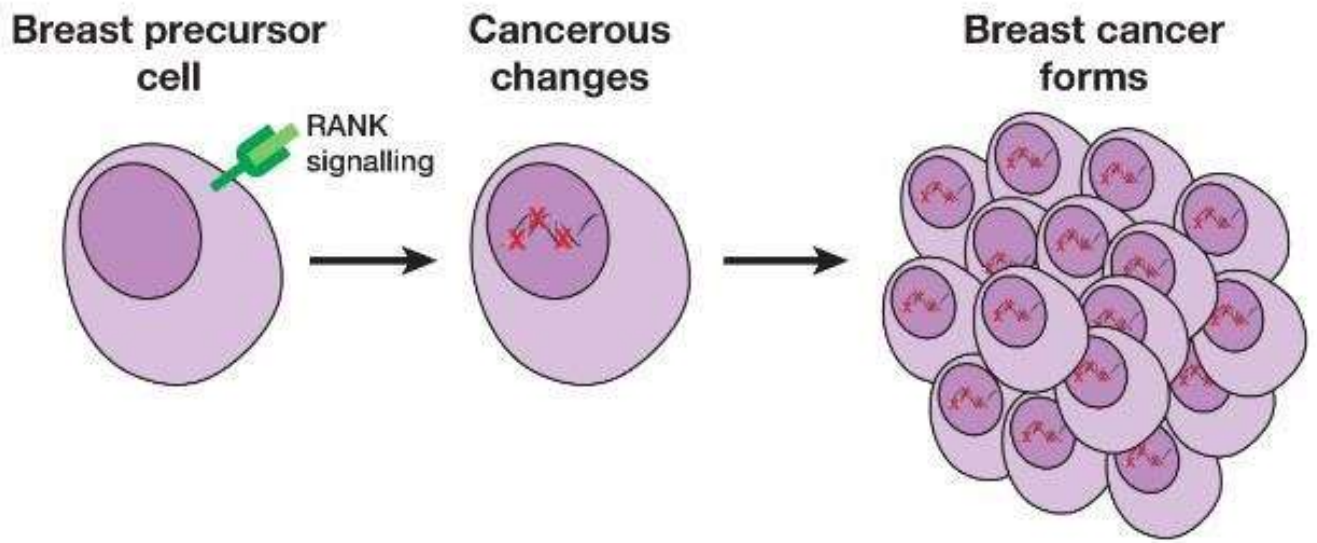
- Women who inherit a **BRCA1 mutation** have a ~65% lifetime risk of developing breast cancer
- Tumours are often early-onset aggressive tumours with a poor survival
- Current options for **prevention**:
    1. Breast removal surgery (double mastectomy)
    2. Regular mammograms/ultrasounds
    3. Prevention drug?

My PhD research – preventing cancer in high-risk women



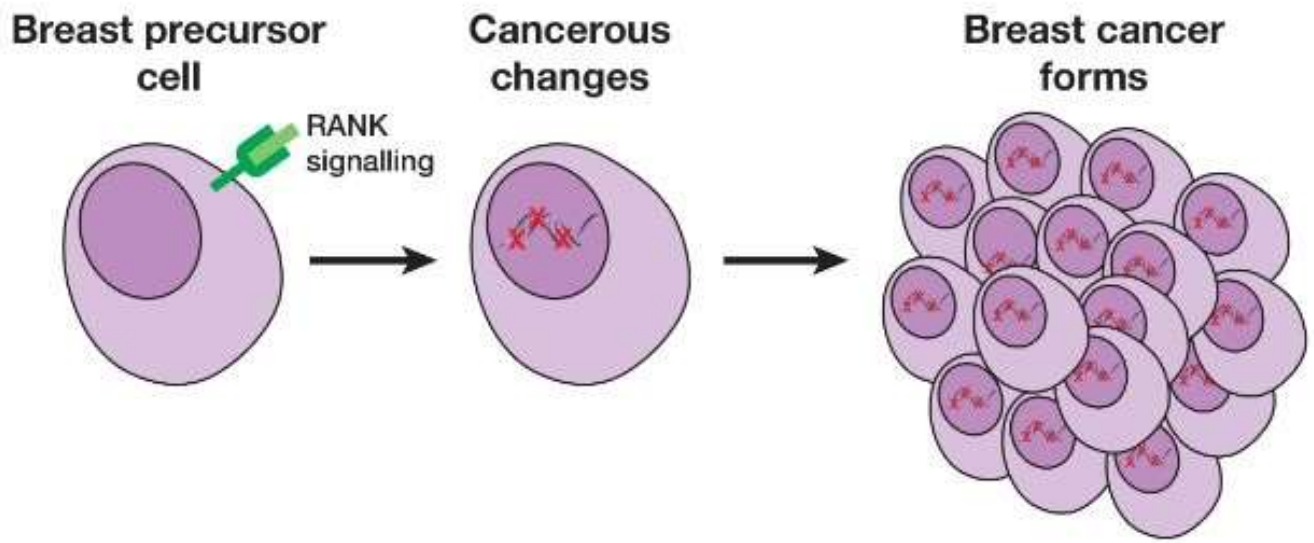
My PhD research – preventing cancer in high-risk women

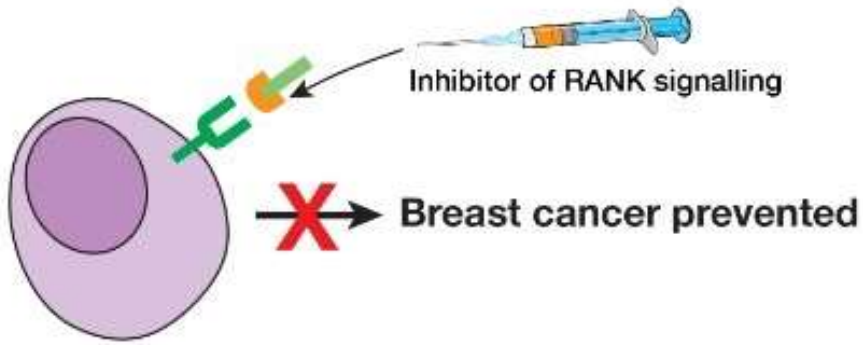
Breast tissue from BRCA1 mutation carriers



Denosumab as a breast cancer prevention drug?

Breast tissue from BRCA1 mutation carriers





International Phase III Breast Cancer Prevention clinical trial

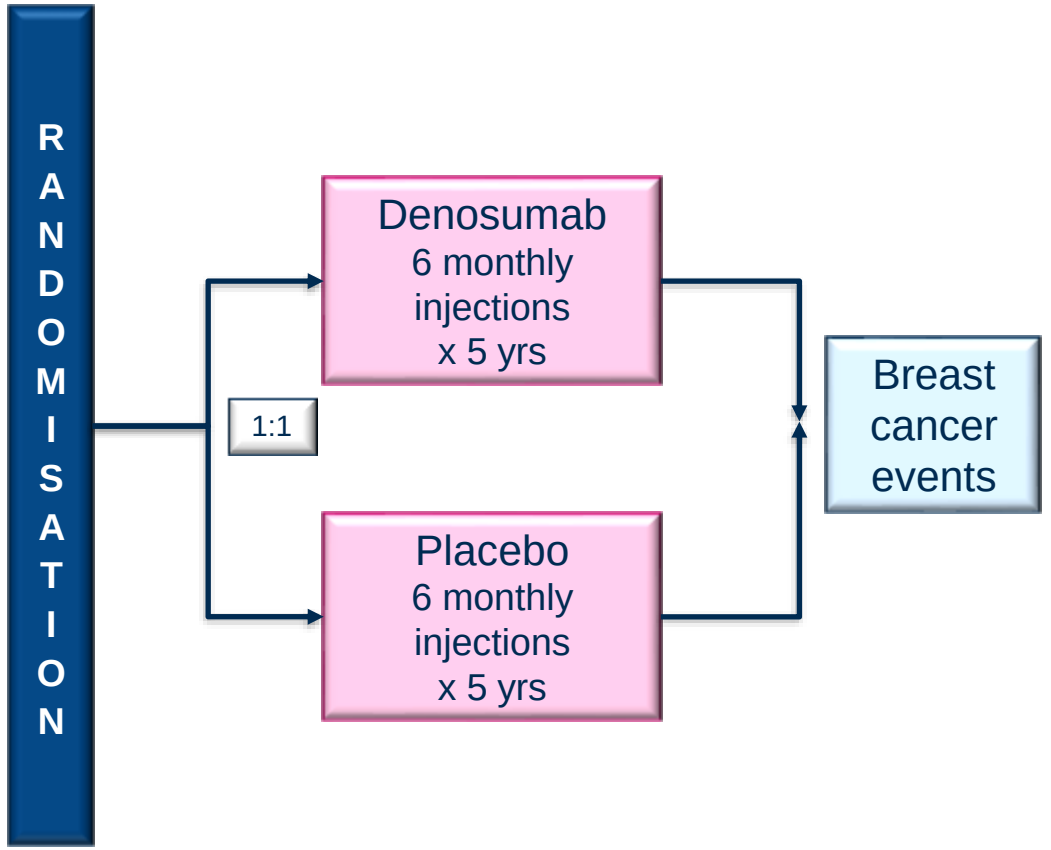
BRCA-P Trial Design

Phase III, double-blind, prospective, randomised interventional prevention trial

PATIENT POPULATION

BRCA1 germline mutation

n = 2,9184



Austria (Singer)
Australia (Lindeman)
Germany (Schmutzler)
Israel (Paluch-Shimon)
Spain (Vidal)
UK (Evans)
USA (Garber)

NEW ZEALAND

'Holy grail' of breast cancer prevention: Kiwi helps discovers drug that could counter faulty gene

21 Jun, 2016 05:00 AM

6 minutes to read

Researchers, including Kiwi PhD student Emma Nolan, at the Walter and Eliza Hall Institute in Melbourne have discovered that an existing medication might prevent breast cancer in women carrying a faulty gene

By **Jamie Morton**
Science Reporter

New Zealand Herald
21st June 2016

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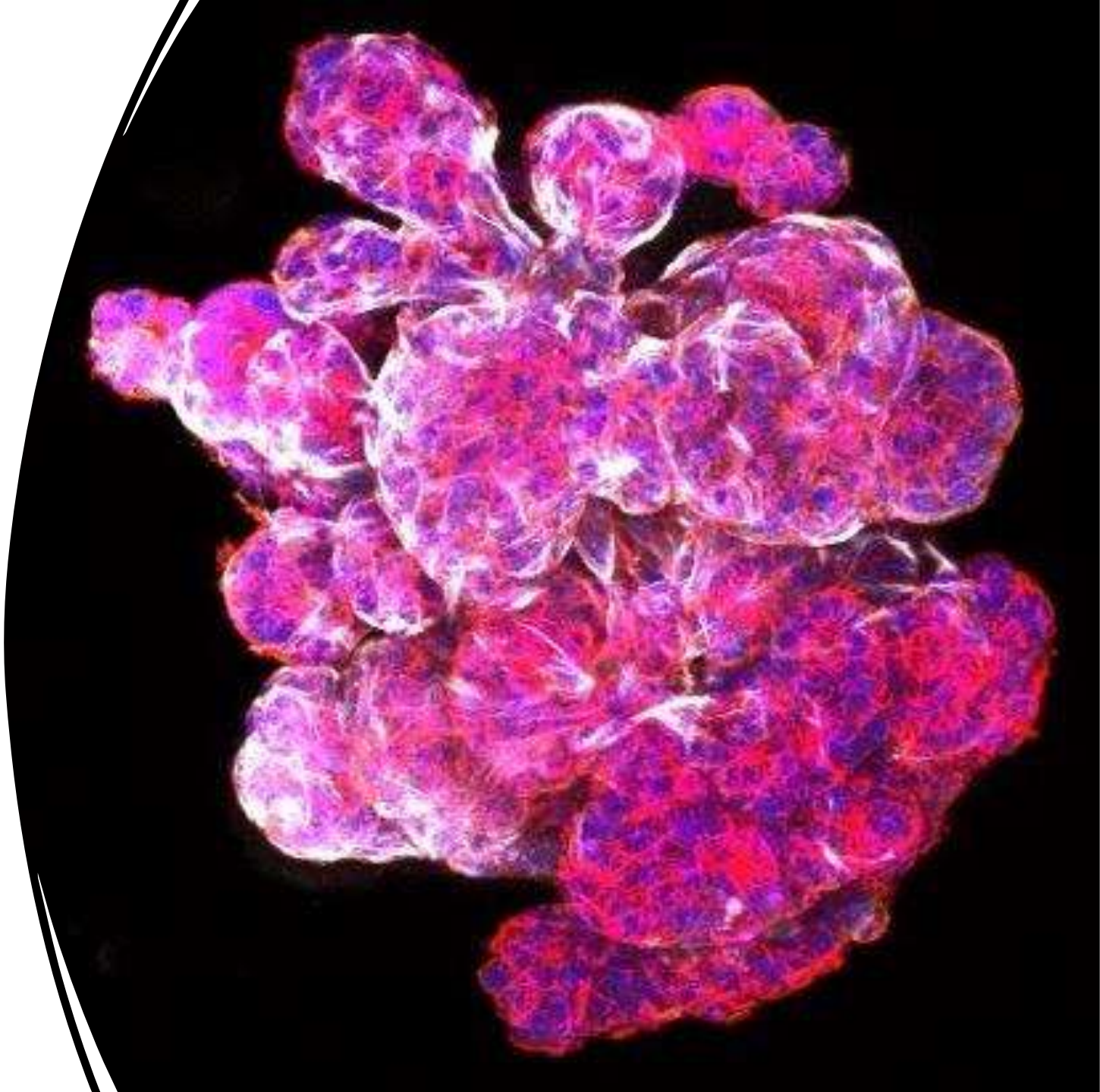
Auckland Medical Research Foundation
est. 1955

Supported by the AMRF Douglas Goodfellow Repatriation Fellowship

Tumour Organoids

‘Mini tumours in a dish’

Creating a new
patient-relevant model
for cancer research in NZ



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Research Foundation
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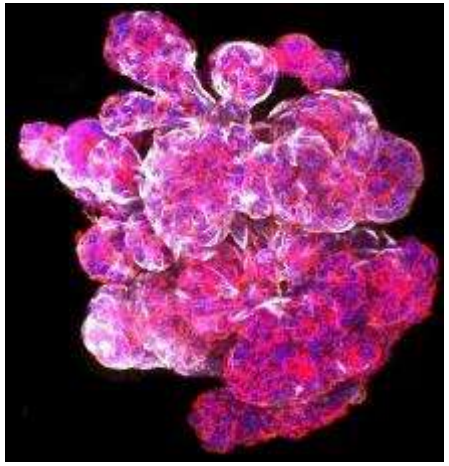
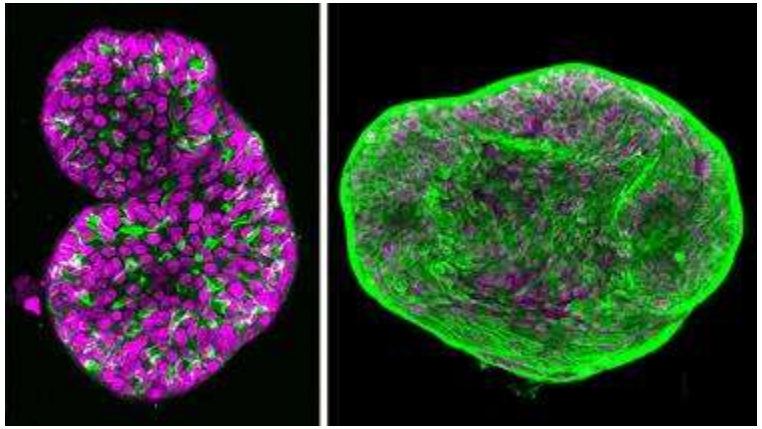
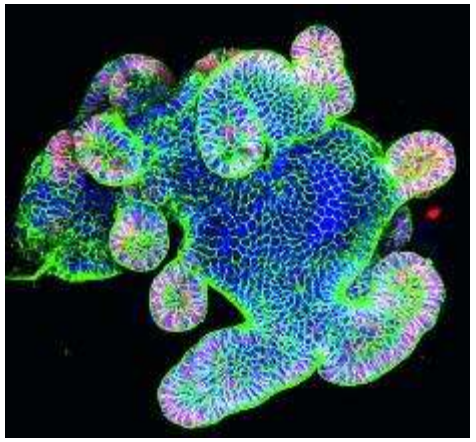
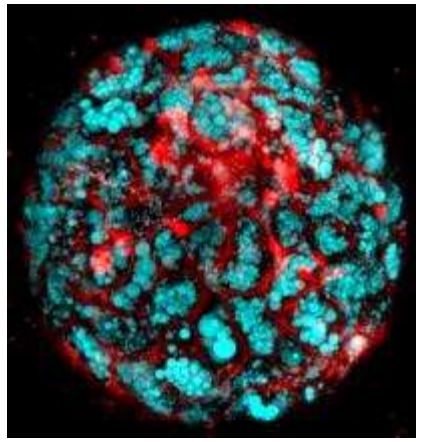
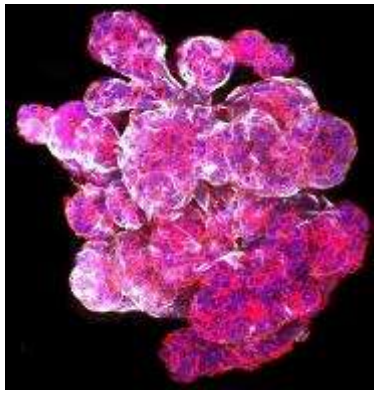
A new tool for cancer research in NZ

- **Organoids = ‘mini tumours in a dish’.**
- Tiny three-dimensional structures grown from tumours donated by cancer patients
- Behave just like the donor patient’s tumour - they look, grow and respond to drugs the same way

Organoids - ‘mini tumours in a dish’

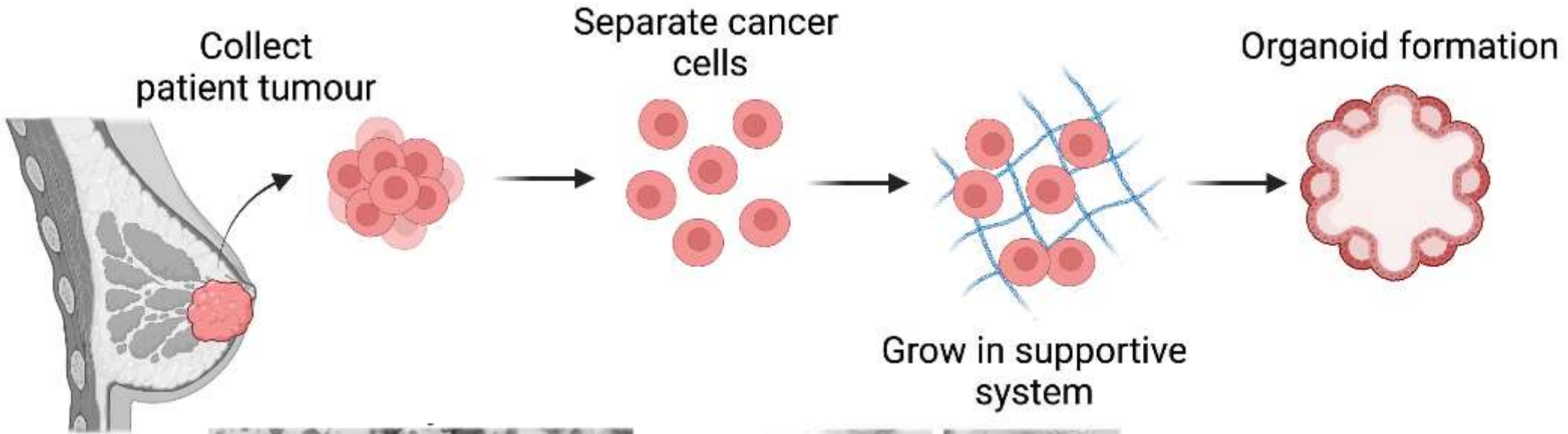


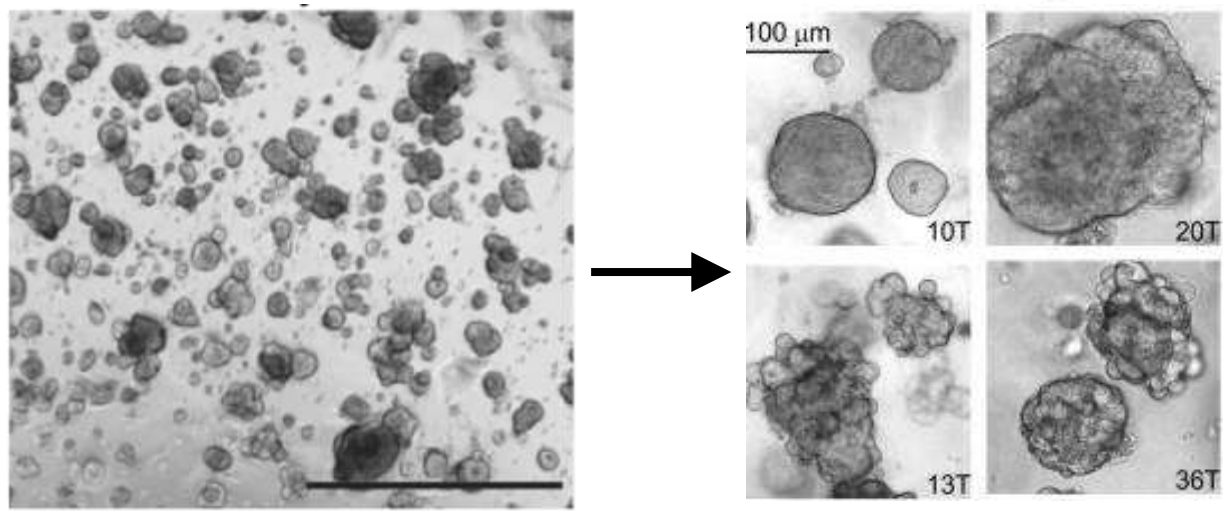
- Establishing human breast cancer ‘organoids’ using tumours donated by NZ cancer patients

- Goal = create a collection of organoids that is representative of breast cancer in New Zealand

↘ A new tool to support scientific discovery in NZ

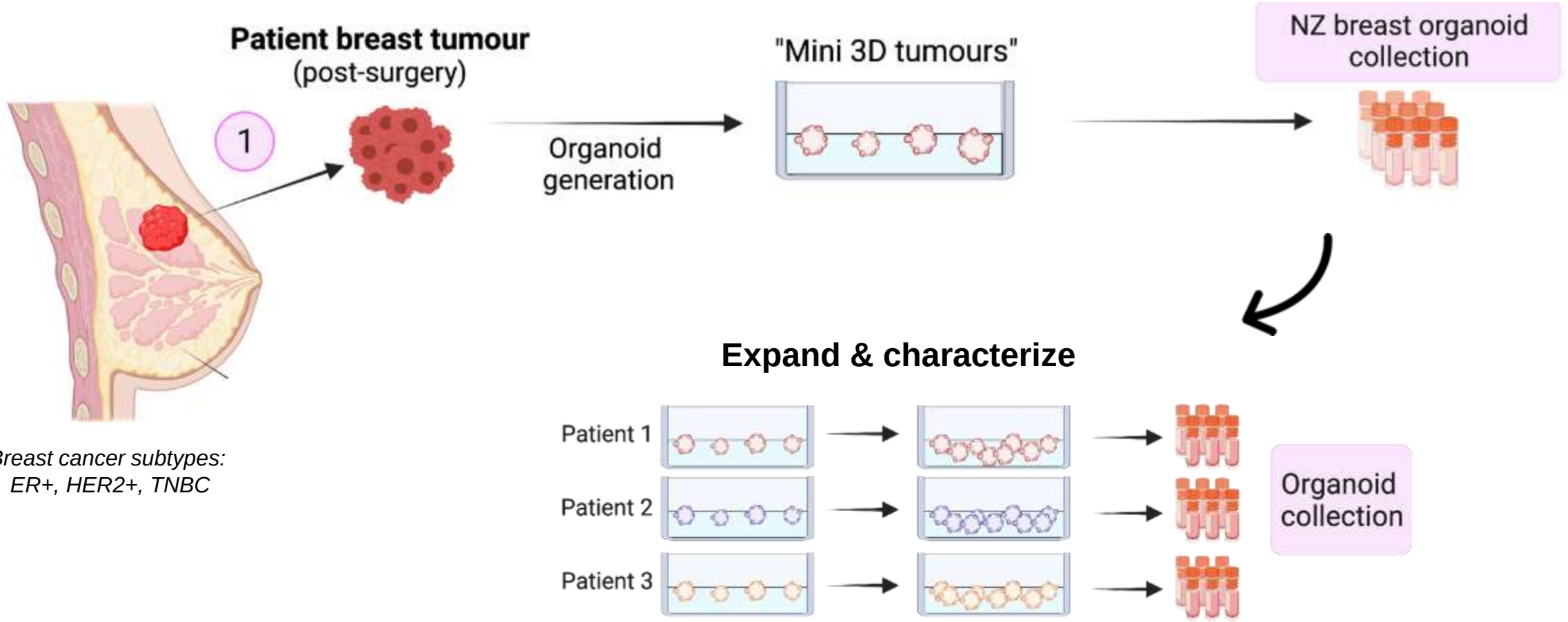
Organoids - ‘mini tumours in a dish’





My research plan

Aim 1 = create a collection of organoids that represents breast cancer in NZ

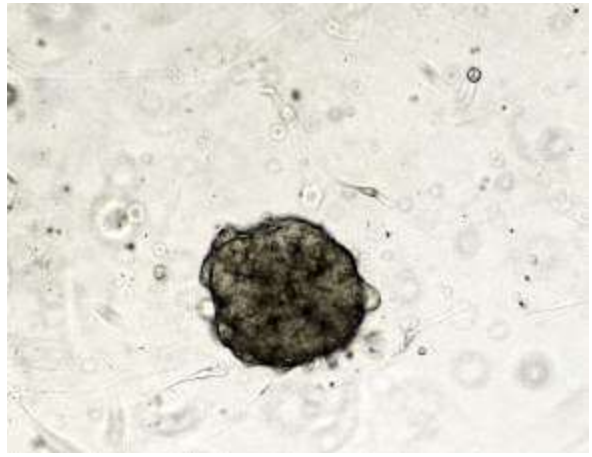


Breast cancer subtypes:
ER+, HER2+, TNBC

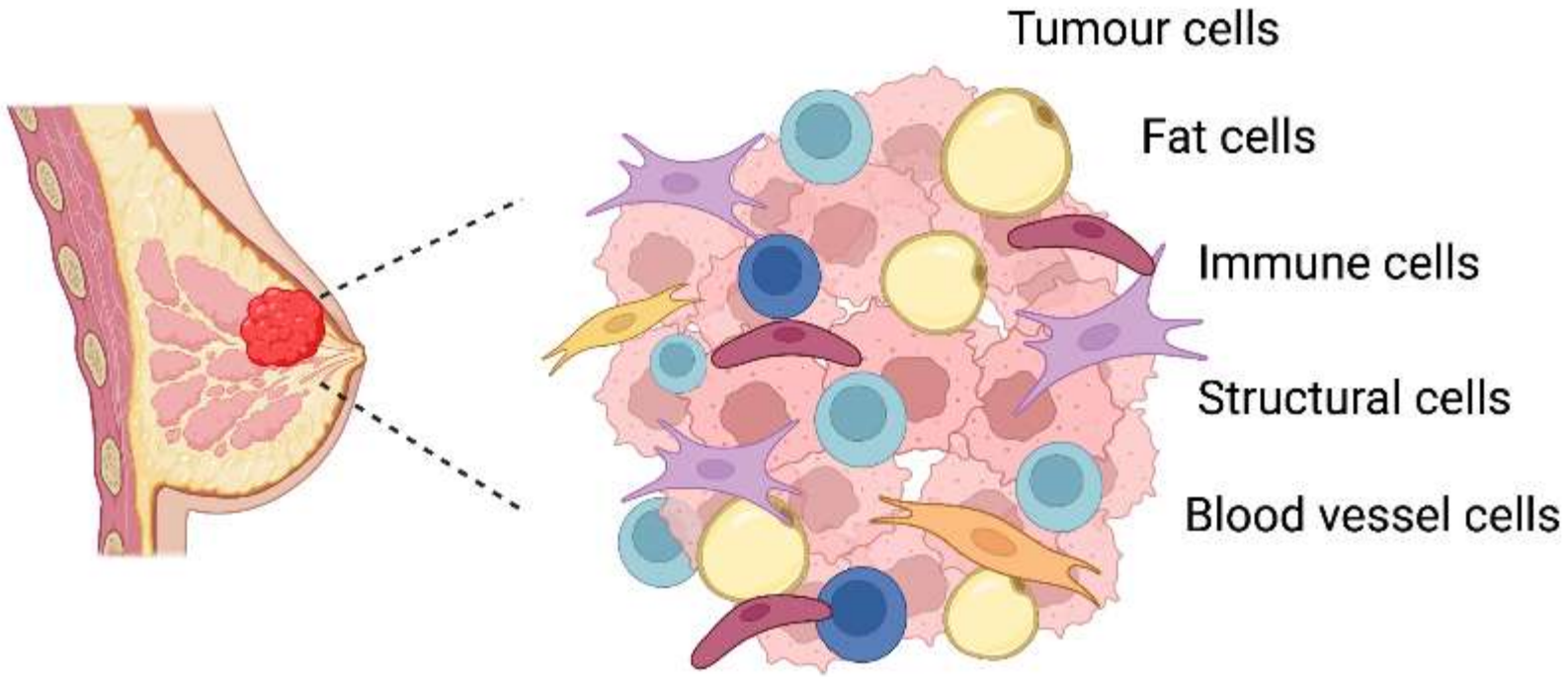
My research plan

Aim 1 = create a collection of organoids that represents breast cancer in NZ

	Hormone receptor status	HER2 status	Tumour Type, Grade	Patient age	Ethnicity
Patient 1	ER+ PR+ (strong)	HER2 neg	Grade 2 Ductal	54	Samoan
Patient 2	ER+ PR+ (moderate)	HER2 low	Grade 2 Ductal	60	NZ/Māori
Patient 3	ER+ PR+ (strong)	HER2 neg	Grade 1 Ductal	47	Chinese
Patient 4	ER+ PR+ (strong)	HER2 neg	Grade 1 Ductal	68	Samoan
Patient 5	ER- PR- (TNBC)	HER2 neg	Grade 3 Ductal	79	NZ/Euro

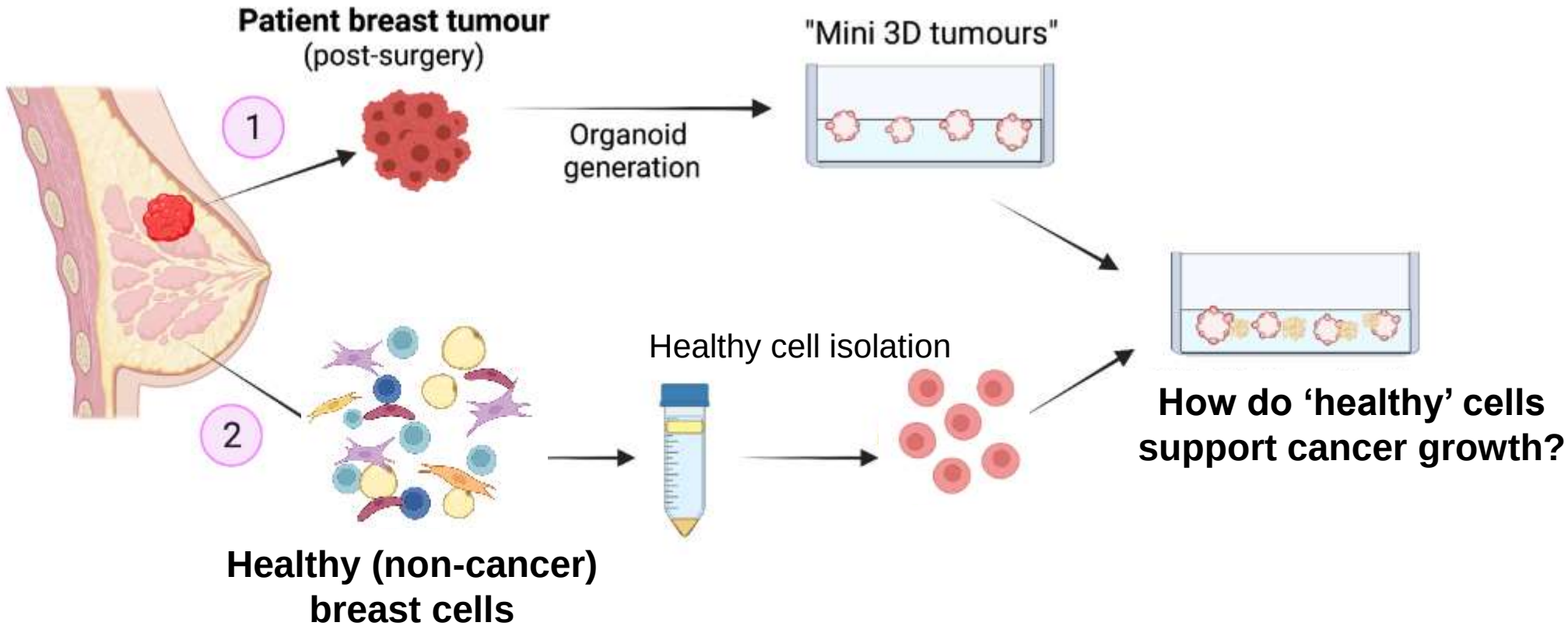


Aim 2: Use organoids to study the tumour ‘ecosystem’



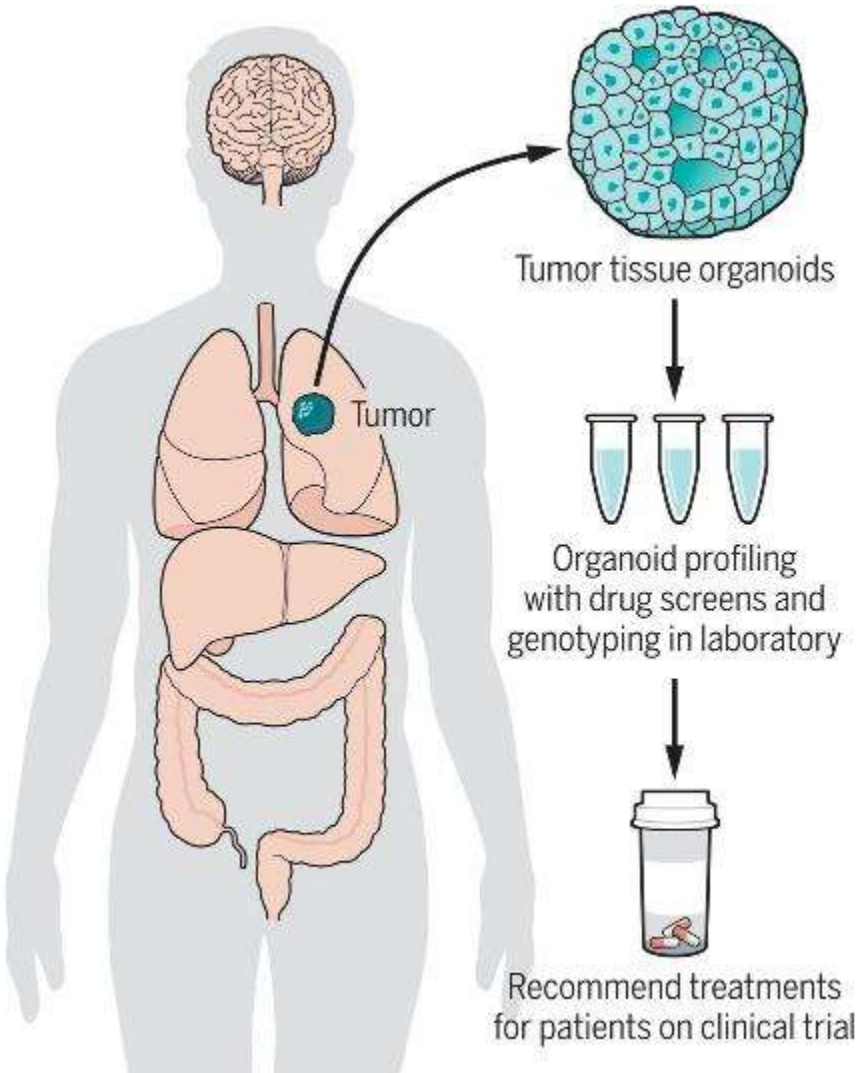
Tumour = Cancer cells + Normal cells

Aim 2: Use organoids to study the tumour ‘ecosystem’



Goal = to understand breast cancer better & find new treatments

Aim 2: To explore organoids for ‘personalized medicine’



Customised cancer therapy?

Thank you for listening!

Francis Crick Institute, London

Walter & Eliza Hall, Melbourne

University of Auckland

Auckland Medical Research Foundation
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Waitematā District Health Board
Best Care for Everyone

The Kelliher Charitable Trust

A R T B

Dr Reena Ramsaroop

Auckland Cancer Society Research Centre

THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

MAURICE WILKINS CENTRE
FOR MOLECULAR BIODISCOVERY

If you have any questions, please feel free to contact me at:
emma.nolan@auckland.ac.nz; +6421490013