The Science of Healing: Cutting Edge Cancer Biology Research

Keighley Reisenauer
Present Your PhD
Understanding healing requires understanding the disease.
The target: Triple Negative Breast Cancer

Women diagnosed with Breast Cancer

Women diagnosed with Triple Negative Breast Cancer
To help these patients, scientists have to overcome two major hurdles:

- Metastasis
- Chemoresistance

- EMT
- Cancer stem-like cells
Metastatic Cascade

Metastasis kills 50% of chemo non-responsive patients
How does metastasis contribute to chemotherapy resistance?
Chemoresistance and metastasis are driven by two related cell types
Tumors are not comprised of one type of cell
Cancer stem-like cells are responsible for resistance
Cancer stem like cells are like weeds

Cancer stem cells

Healthy body

“Surgery”

“Chemo”

GOAL
Why are they called “stem-like”?
Where do these cells come from?

The Epithelial-Mesenchymal Transition Generates Cells with Properties of Stem Cells

Control  Turn on EMT (3 ways)
A lot of moving parts makes cancer hard to target
Let’s check in... Questions?
Where to next?

How did I get to studying cancer?

How do we study these cells?

Let’s test your cell knowledge!
How do we study these cells?

Using breast cancer cell lines...
...and models of EMT

HMLE

HMLE + Twist
What is Twist? Why does it matter?
What kind of experiments do you do with these cells?
What kind of experiments do you do with these cells?

Testing differential sensitivity
Mammosphere and migration assays test intrinsic EMT properties

**Mammosphere Formation**

- MDA-MB-231 cells
- 0.1 μM Opa
- 72 hours
- Non-adherent plate
- 10 days

Count spheres ≥50μm

Plate 7000 cells in each side of the IBIDI insert or 200,000 cells for scratch assay

**Migration**

- T₀ | 0 hrs
- T₁ | 2 hrs
- T₂ | 4 hrs
- T₃ | 6 hrs
- T₄ | 9 hrs

Remove inserts or use a pipet tip to create a scratch
How do we test biological relevance?

- **DAY 0**: Cell injection
  - Cell lines of interest
  - NOD/scid mouse

- **WEEKS 4-6**
  - Evaluate mice for tumor formation

- **WEEKS 9-10**
  - Treatment
  - Cell and tissue analysis

- **END POINT**: Collect tumor and organs
How did I get to studying cancer?
Let's play
Let's nail down some background info

Epithelial → Mesenchymal

Mesenchymal:
- Long and thin (spindle-like)
- Spread out

Epithelial:
- Rounded square cobblestone-like
epithelial  
HUMAN MAMMARY EPITHELIAL CELL WITH RAS ONCOGENE

mesenchymal  
MDA-MB-231 TRIPLE NEGATIVE BREAST CANCER CELL
Epithelial or mesenchymal?

- **Mesenchymal**
  - Long and thin (spindle-like)
  - Spread out

- **Epithelial**
  - Rounded square
  - Cobblestone-like
Epithelial or mesenchymal?

**Mesenchymal**
- Long and thin (spindle-like)
- Spread out

**Epithelial**
- Rounded square cobblestone-like
Cancer cell or not?

Cancer

Not
Thank you! Questions?

Find me/get in touch here:

@scientifieghley
@sciencekeighley
sites.baylor.edu/kreisenauer

or @presentyourphd