Could You Cure Cancer?

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Some questions on cancer:

- What is cancer?
- How does in situ become invasive cancer?
- How does invasive cancer metastasise (spread via vessels) and then grow?
- When treated, why do some cancer cells die and others survive?
- Are there cancer stem cells? How are they reactivated?
What is cancer?

- Uncontrolled growth of cells
- “Wound that never heals”
- Invasion and metastasis
- “Soil and seed” hypothesis
- “War on cancer” – problem solved?
- US cancer mortality:

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<th>1950</th>
<th>2001</th>
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<td>193.9/100,000</td>
<td>194.4/100,000</td>
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What is cancer?
Aberrations of cell pathways

Apoptosis
Proliferation
Angiogenesis

IGF1 signalling
PI3 Kinase
Akt
mTOR
PTEN

HER signalling
src
p110
p85
GRP
SOS
RAS
RAF
MEK1/2
MAP Kinase

CYTOPLASM

NUCLEUS

cdk2
Cycline
p27
P
p27 degradation

Diersa V. Bull Cancer 2007
Breast cancer in the UK

- 1 in 8 women
- 46,000 women, 400 men p.a.
- 4,600 women diagnosed with DCIS p.a.
- 4,000 women per month
- 135 women per day
- 12,000 women, 80 men die from breast cancer each year, over 1 per hour

- 550,000 people alive today in the UK following a breast cancer diagnosis
Breast cancer subtyping

- Luminal ER+/PR+
- HER2+
- Triple Negative Breast Cancer (TNBC): ER-/PR-/HER2-
Treatments for (breast) cancer:

- Surgery
- Radiotherapy
- Endocrine therapy
- Chemotherapy
  - adjuvant
  - neoadjuvant
- Biological therapy
Estrogen receptor (ER) is the target of endocrine treatment and is expressed in ~70-80% of breast cancers.

Upto 30% develop drug resistance which accounts for many deaths.
Why give neoadjuvant therapy?

- Patient’s perspective:
  - test individual in vivo efficacy of drugs,
  - improve surgical options,
  - identify patients with long term survival
- Complete pathology response (2% - 80%)
- Depends on subtype (TNBC; HER2+)
- Depends on drugs used
- What about residual disease?
What about residual cancer?

- Nests of cancer cells, reflecting heterogeneity:
- Are we looking at an evolutionary tree:
- Cancer stem cells?
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Questions we need to address

-------------------------------------------could YOU cure cancer?