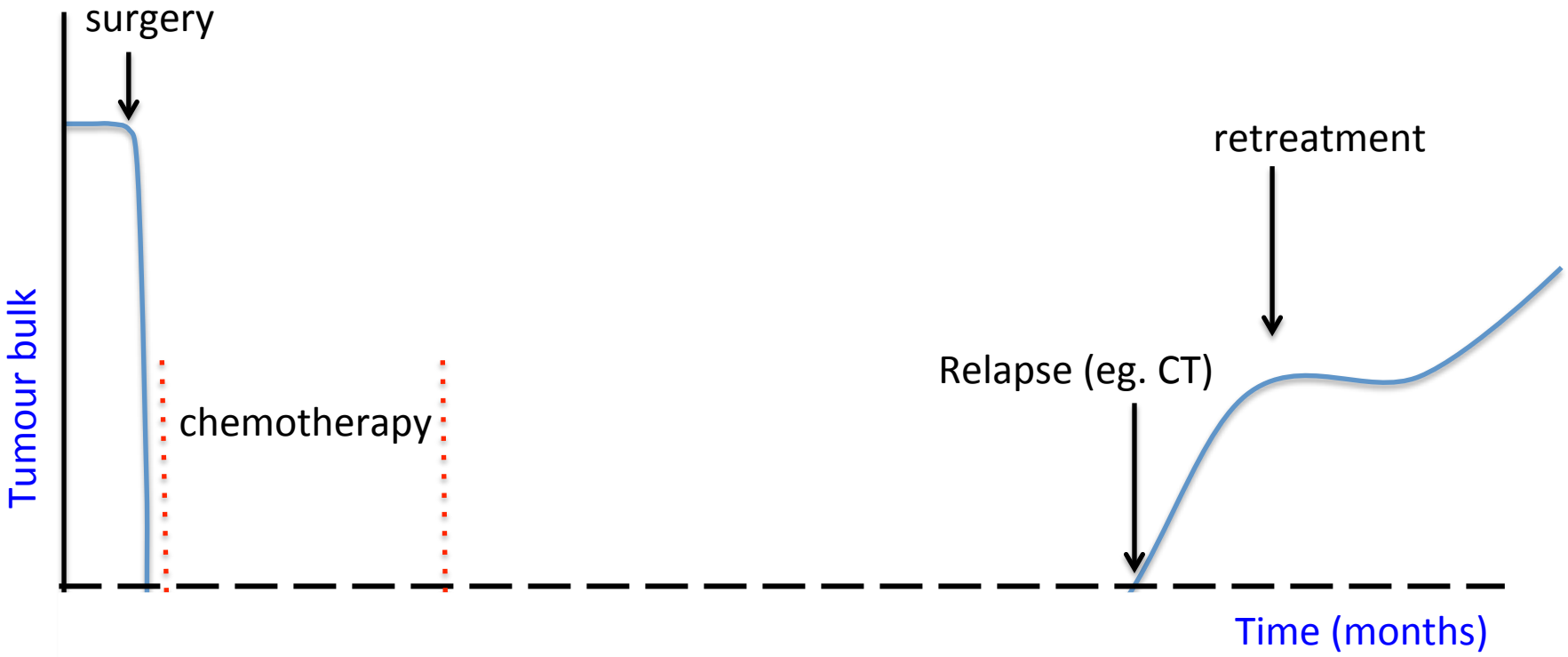
Otago Spotlight Series
Cancer Research

Healthier Lives National Science Challenge:

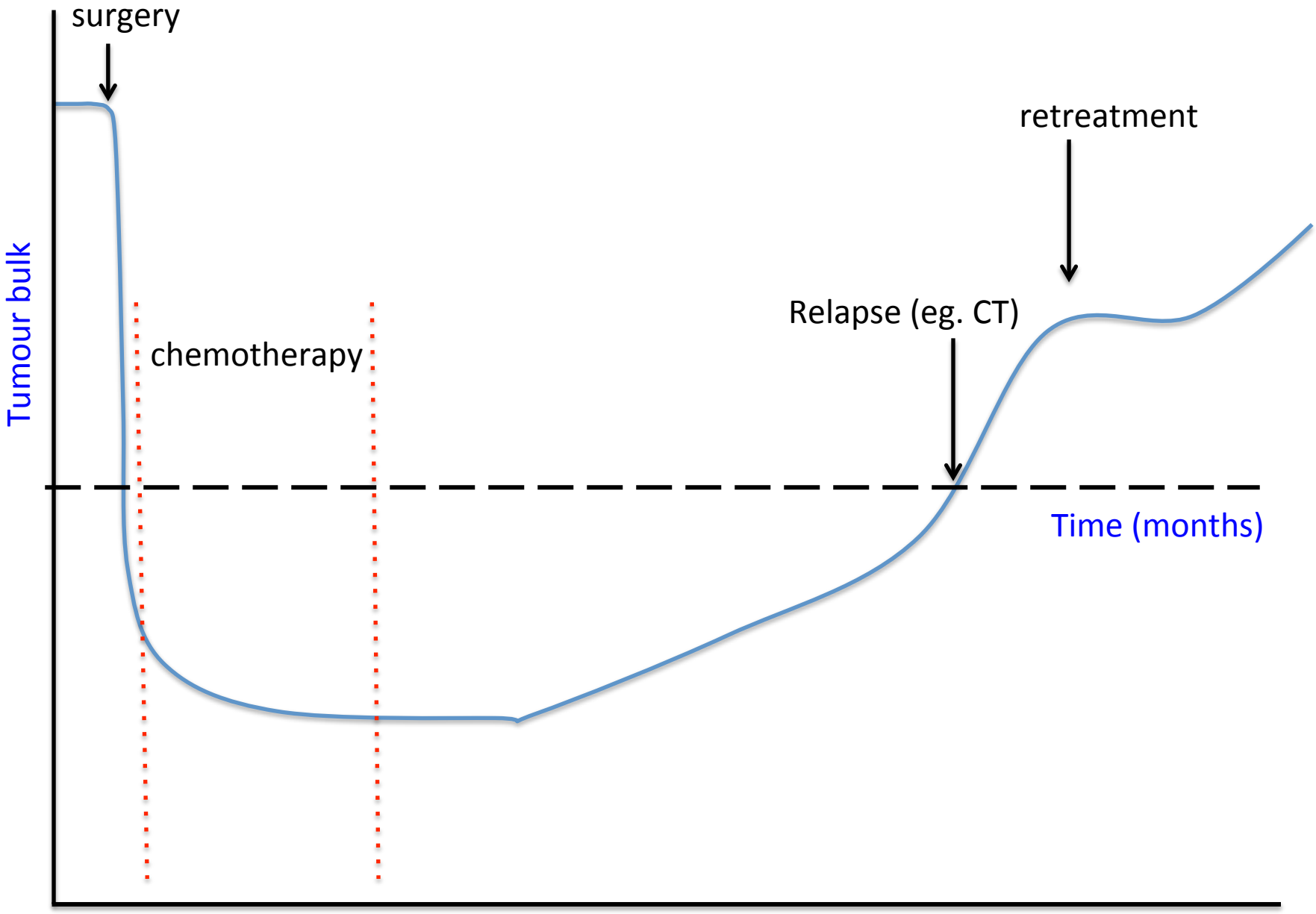
Rapid response to cancer progression

Parry Guilford
Cancer Genetics Laboratory

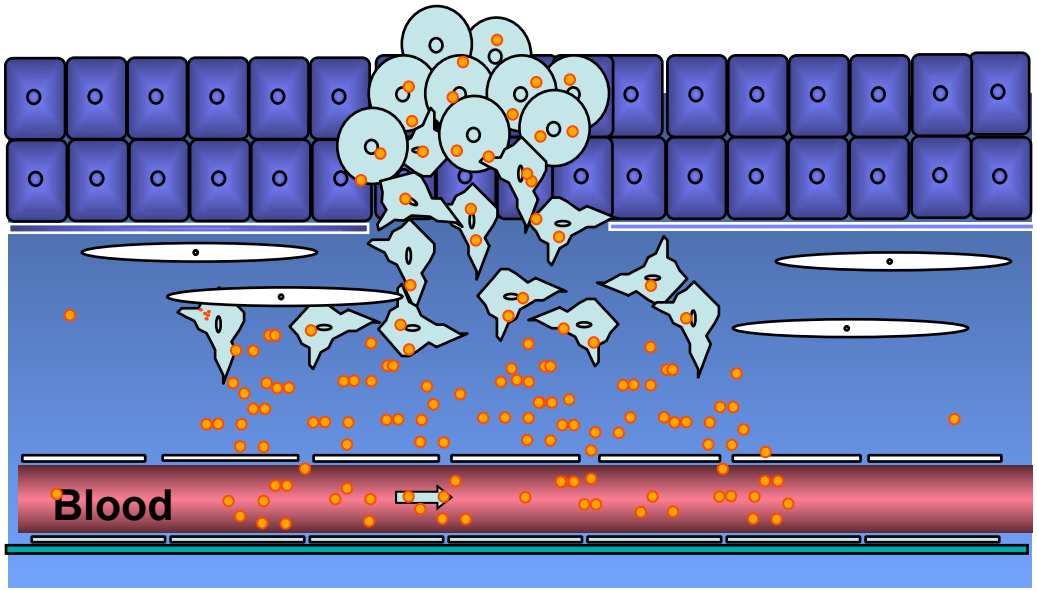
Detection of Cancer Progression



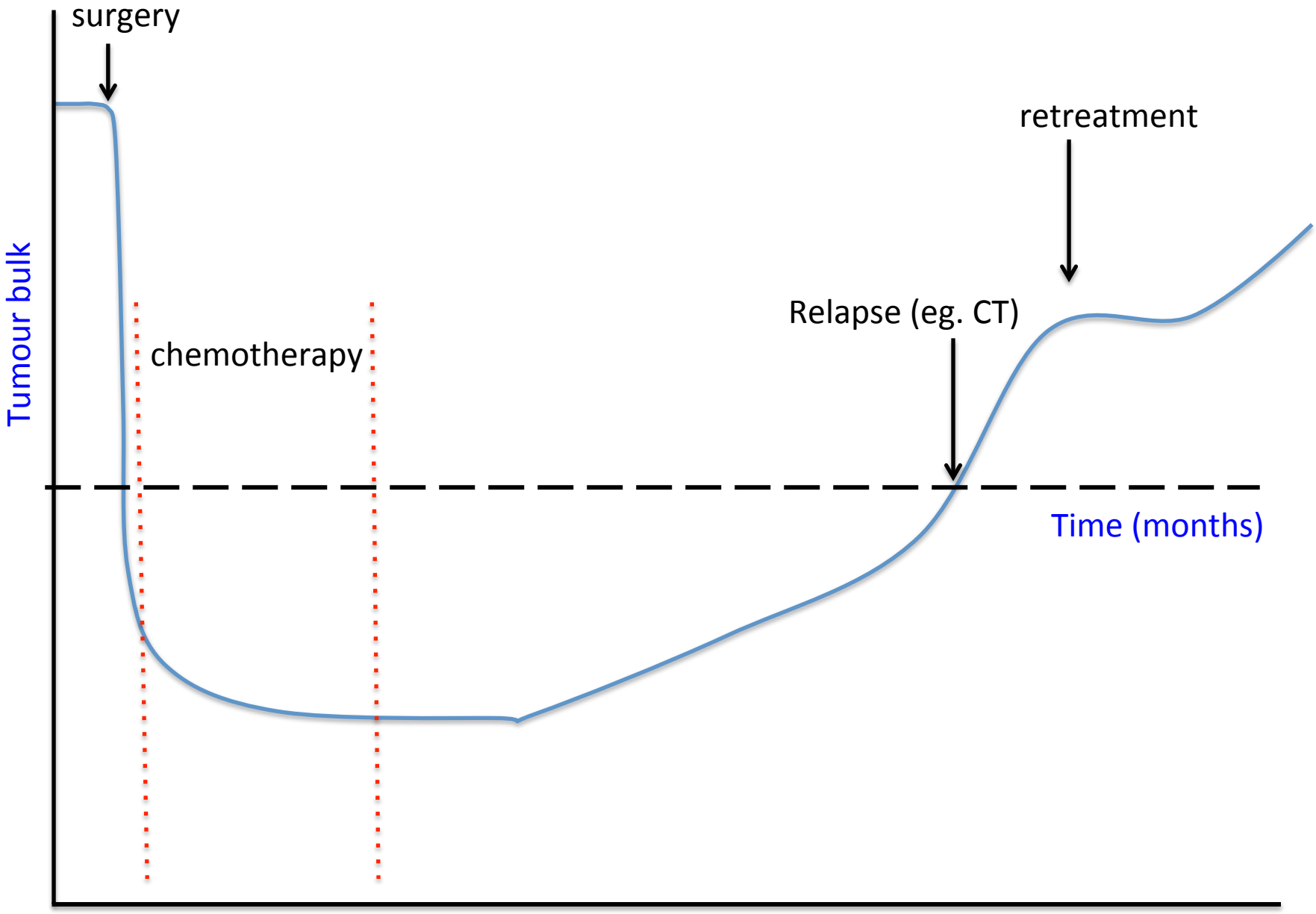
- Blood protein markers (eg. CEA)
- X-Ray
- Computerised tomography (CT) scans
- PET scans

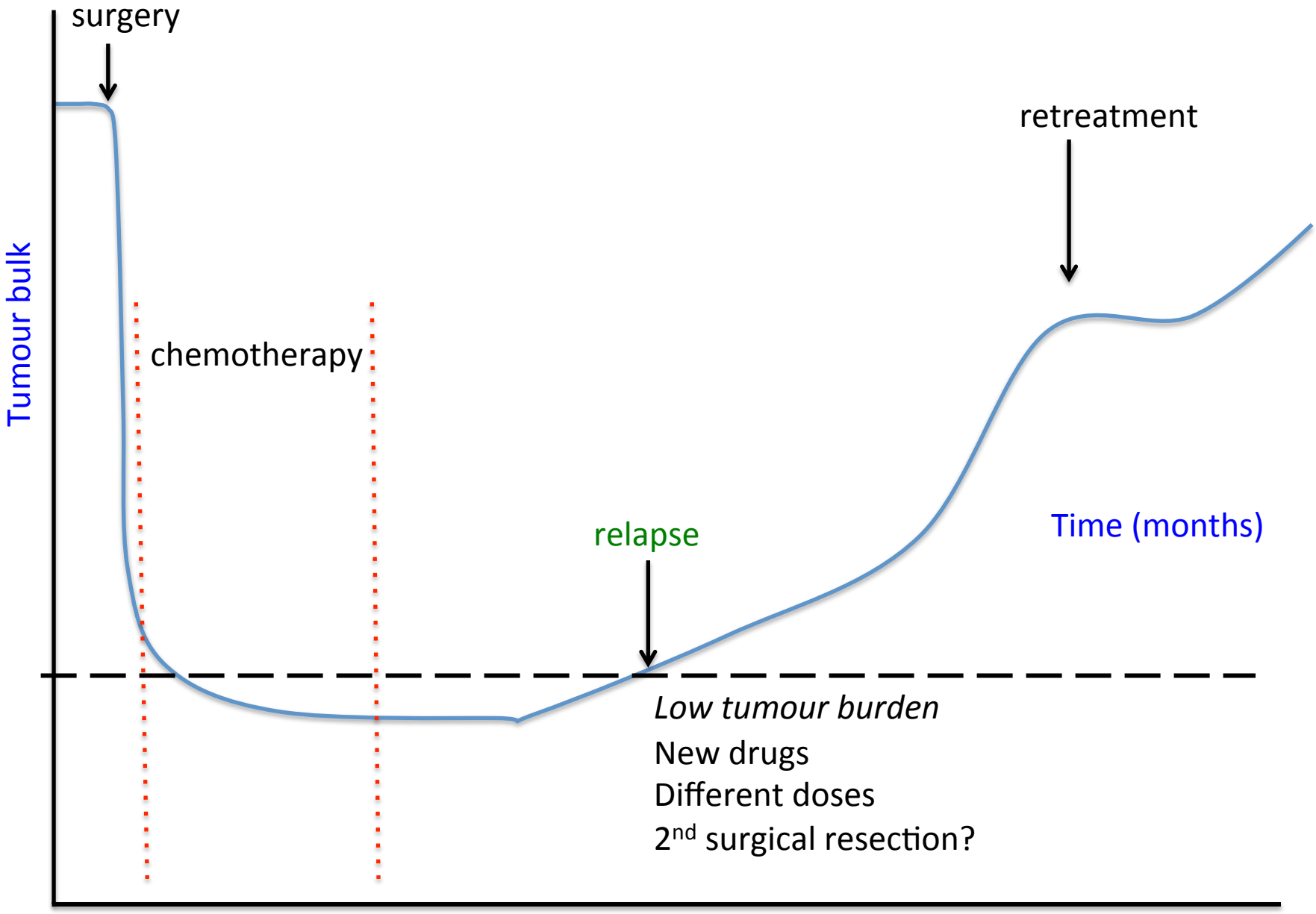

surgery
retreatment
Relapse (eg. CT)
chemotherapy
Tumour bulk
Time (months)

Circulating tumour DNA (‘liquid biopsies’)



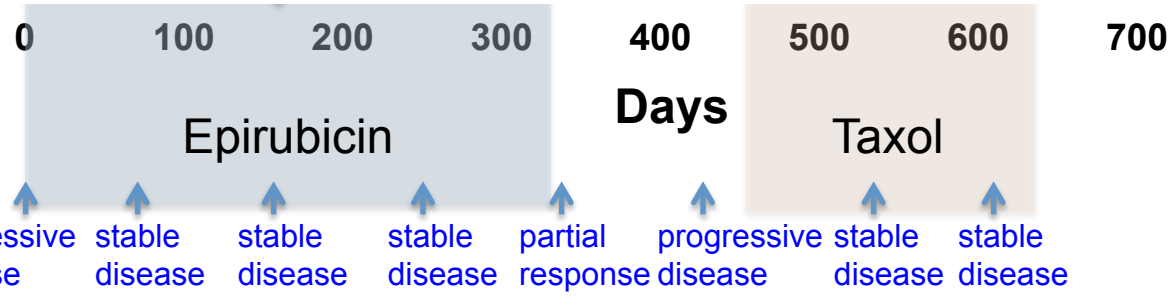
- Release of tumour DNA into bloodstream
- Detected by searching for mutated cancer genes in plasma
- Earlier detection of relapse
- Information on the tumour’s clonal development


surgery
retreatment
Relapse (eg. CT)
chemotherapy
Tumour bulk
Time (months)


surgery
retreatment
Tumour bulk
chemotherapy
relapse
Time (months)
Low tumour burden
New drugs
Different doses
2nd surgical resection?

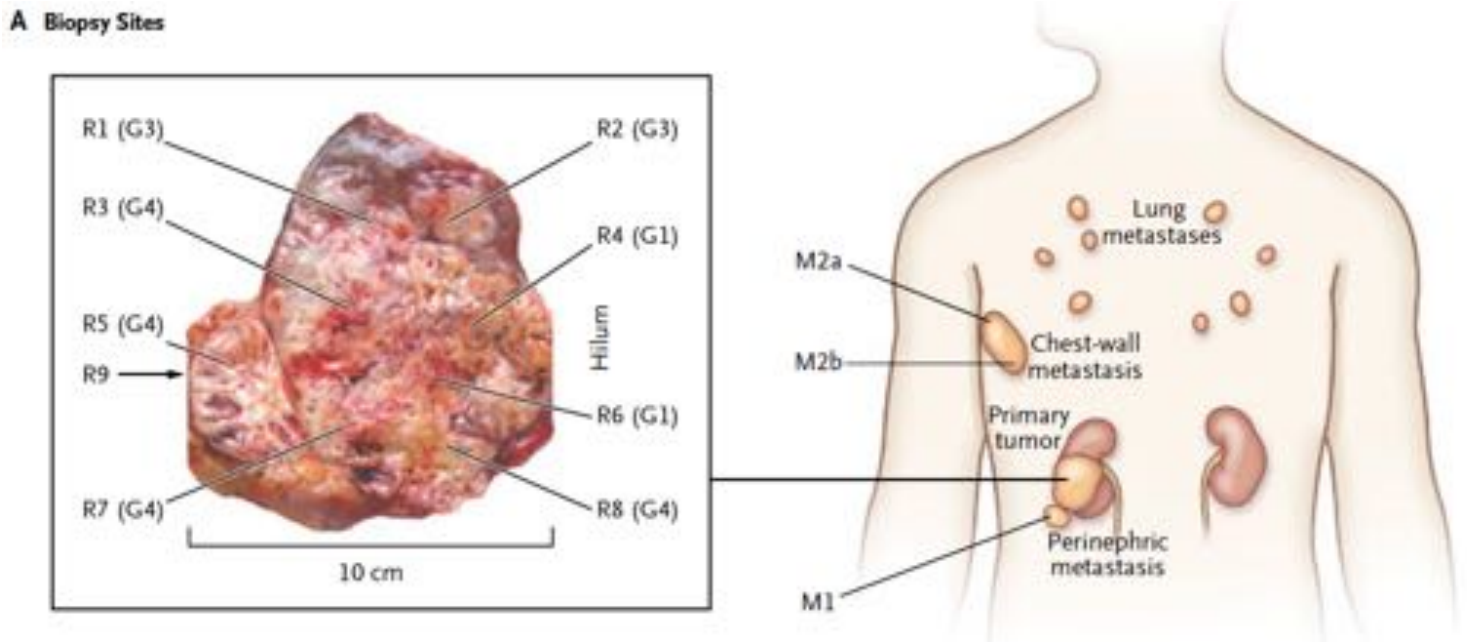
Early measure of treatment response or relapse

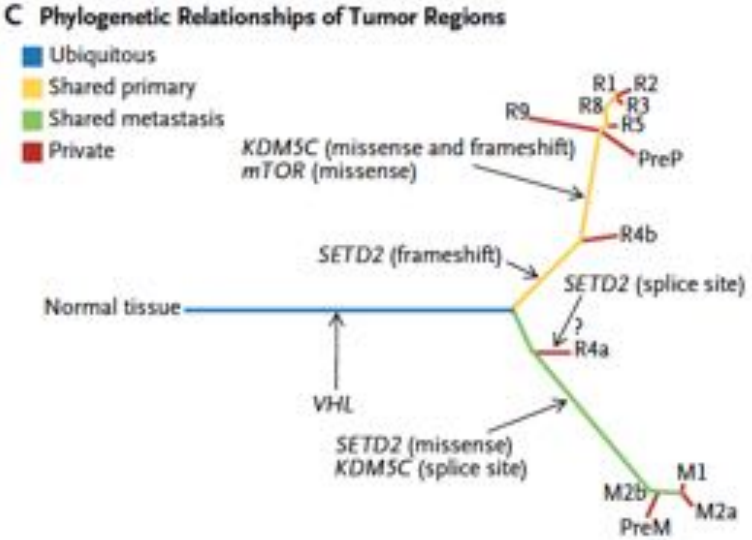
70yr old woman
ER+/HER2 – breast cancer
with bone and liver metastases



Dawson et al (2013) NEJM

Tumour Heterogeneity





Gerlinger et al (2012) NEJM 366, 883-892

Healthier Lives ctDNA project

Colorectal cancer and melanoma

- Detect relapse of stage 3-4 disease early
  - -change treatment when tumour burden is small
  - -stop futile treatment
  - -identify treatment induced changes in tumour type (heterogeneity)

- Reduce complex chemotherapy in elderly/unwell patients who are responding well to simpler treatments

ctDNA project (2)

- Increase intensity of patient surveillance
- Reduce reliance on CT scans ($/compliance)
- Migrate surveillance away from hospitals towards communities