Cyclops Healthcare Network Grand Challenge Workshop

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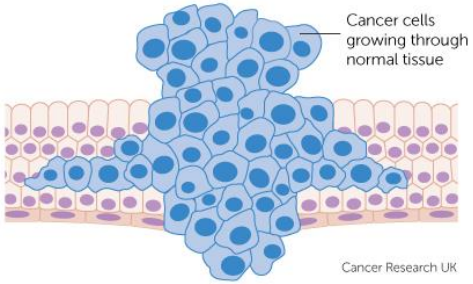
Cancer

- Background
- Current major developments
- Gaps & Opportunities

Cancer

1 in 2 of us will develop cancer

1 in 4 will die of it



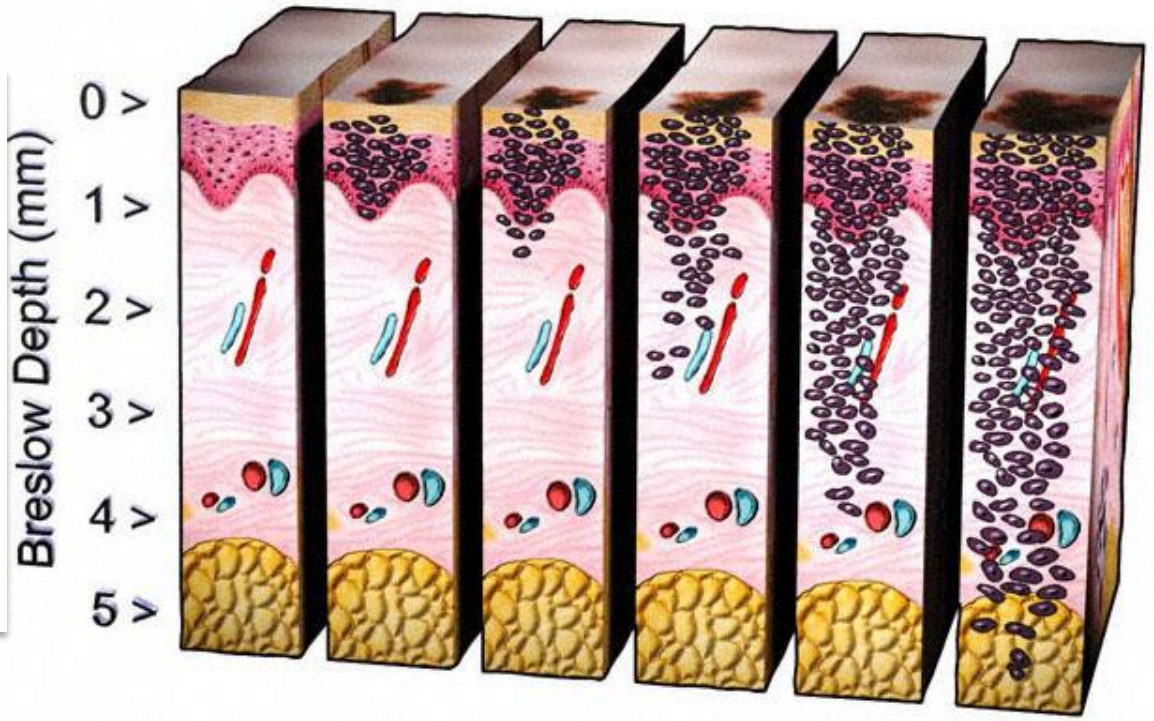
357,860 new cases in the UK ~1000/day

163,444 deaths in the UK ~ 450/day

29% of all deaths are cancer related

(CRUK)

Melanoma


Breslow Depth (mm)
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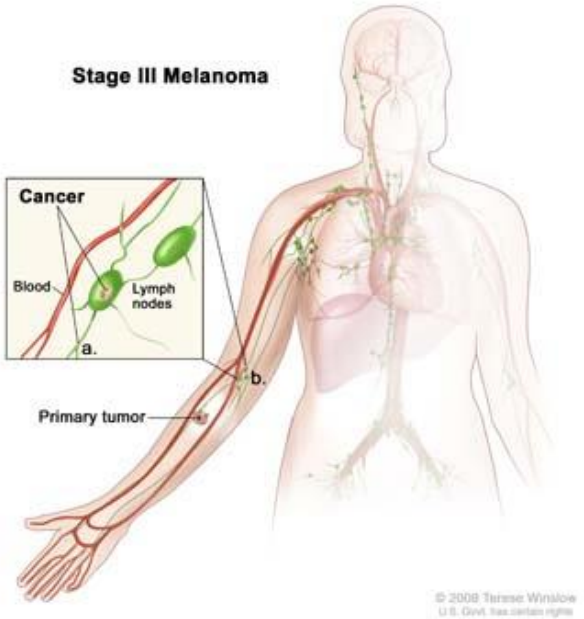
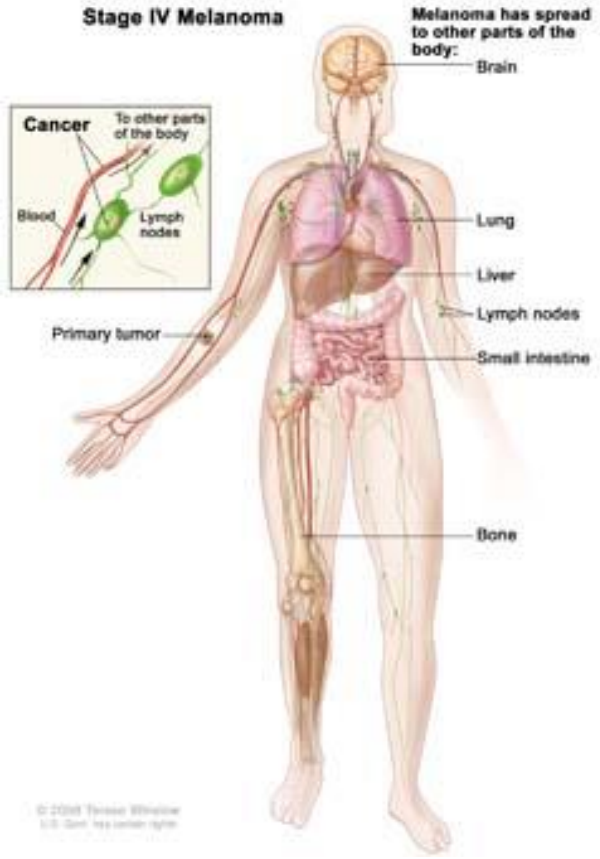
2001 Image by Med-Art ~ http://www.med-ars.it

Melanoma can spread

- lymphatic spread
  - Lymph nodes

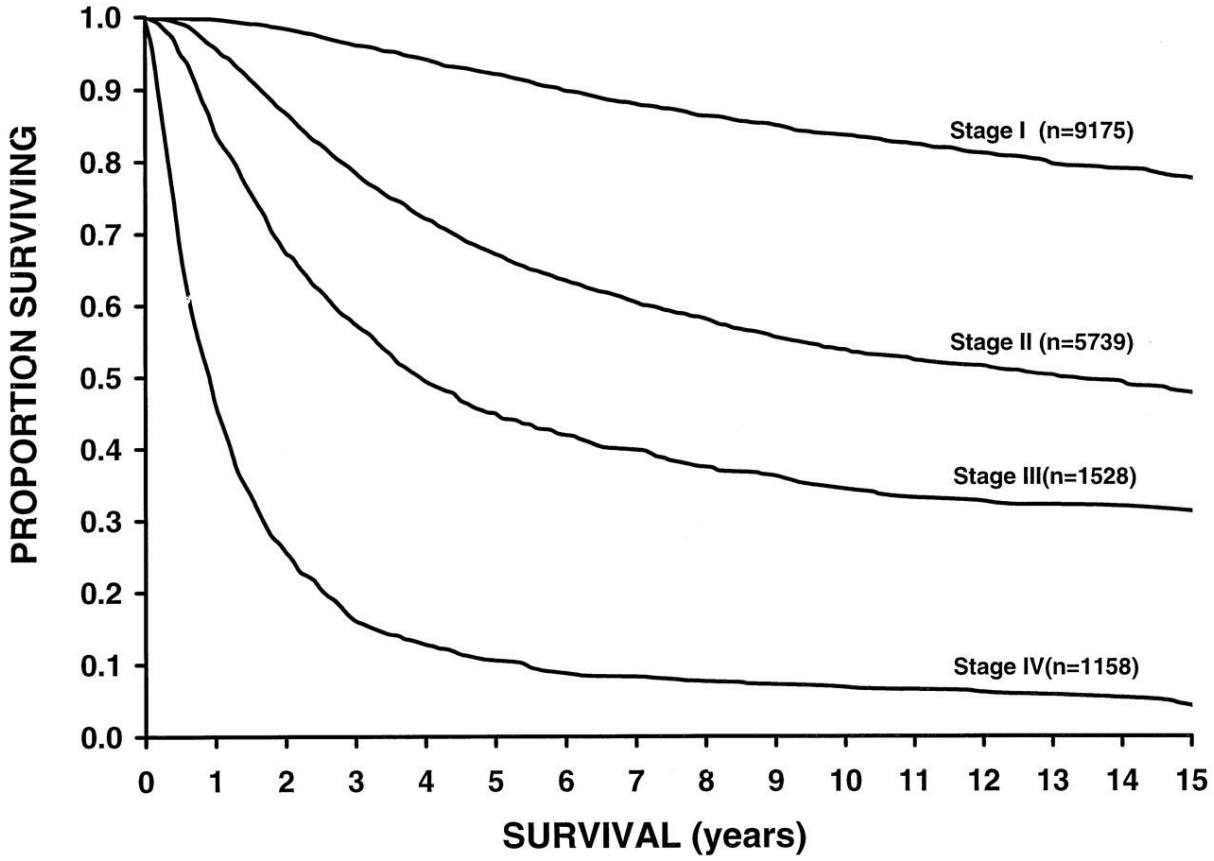
- Blood bourne spread
  - lung, liver, brain, skin





The University of Nottingham

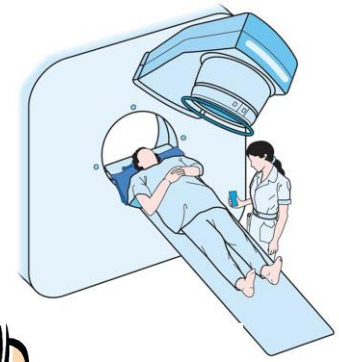
Survival from melanoma



Treatments

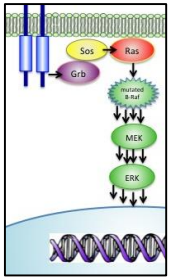
Surgery

Radiotherapy



Systemic Therapies

- Chemotherapies
- Targeted therapies

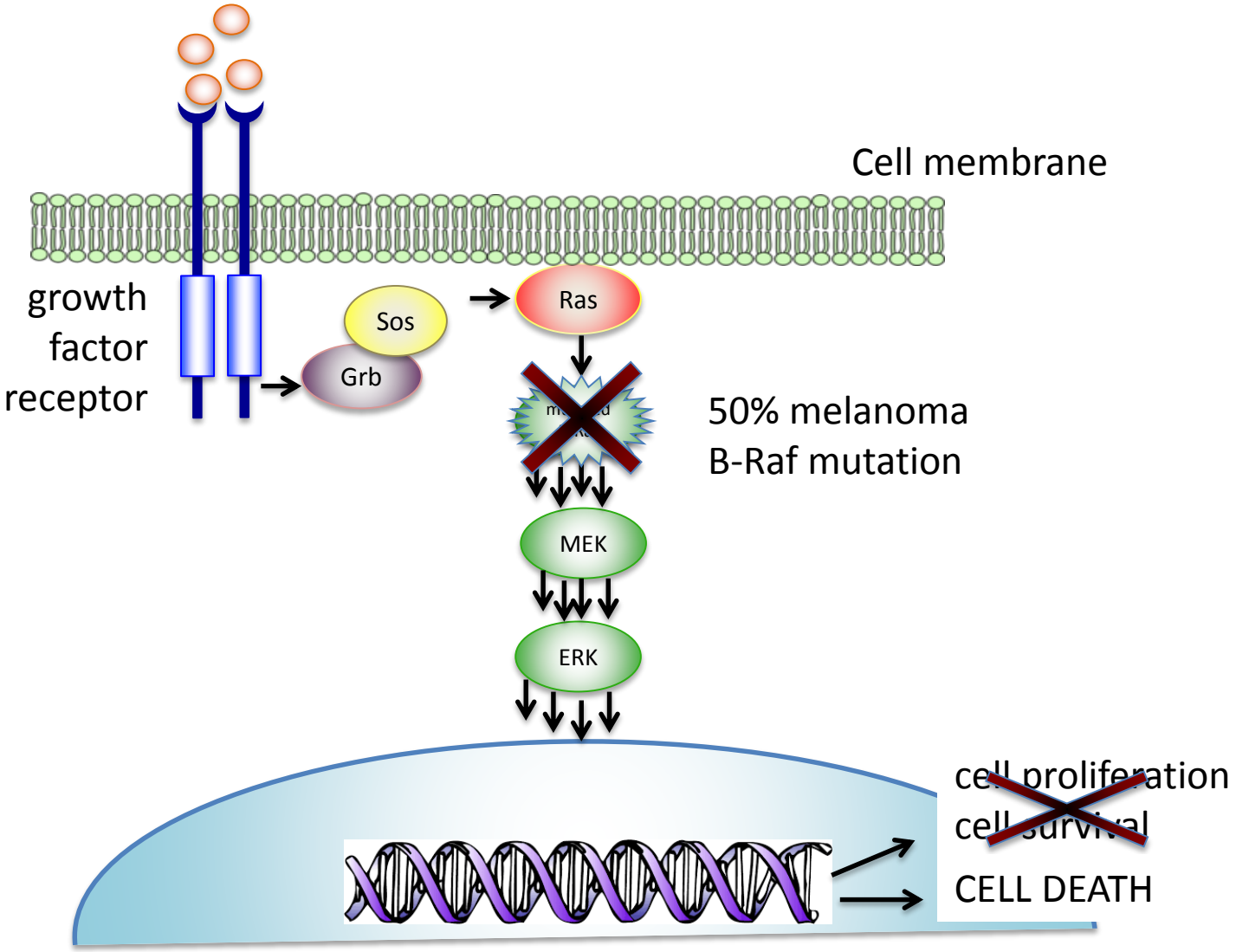


- Immunotherapies

breakthroughs

- Genomics
- Stereotactic/Image guided radiotherapy
- Targeted therapy
- Immunotherapy

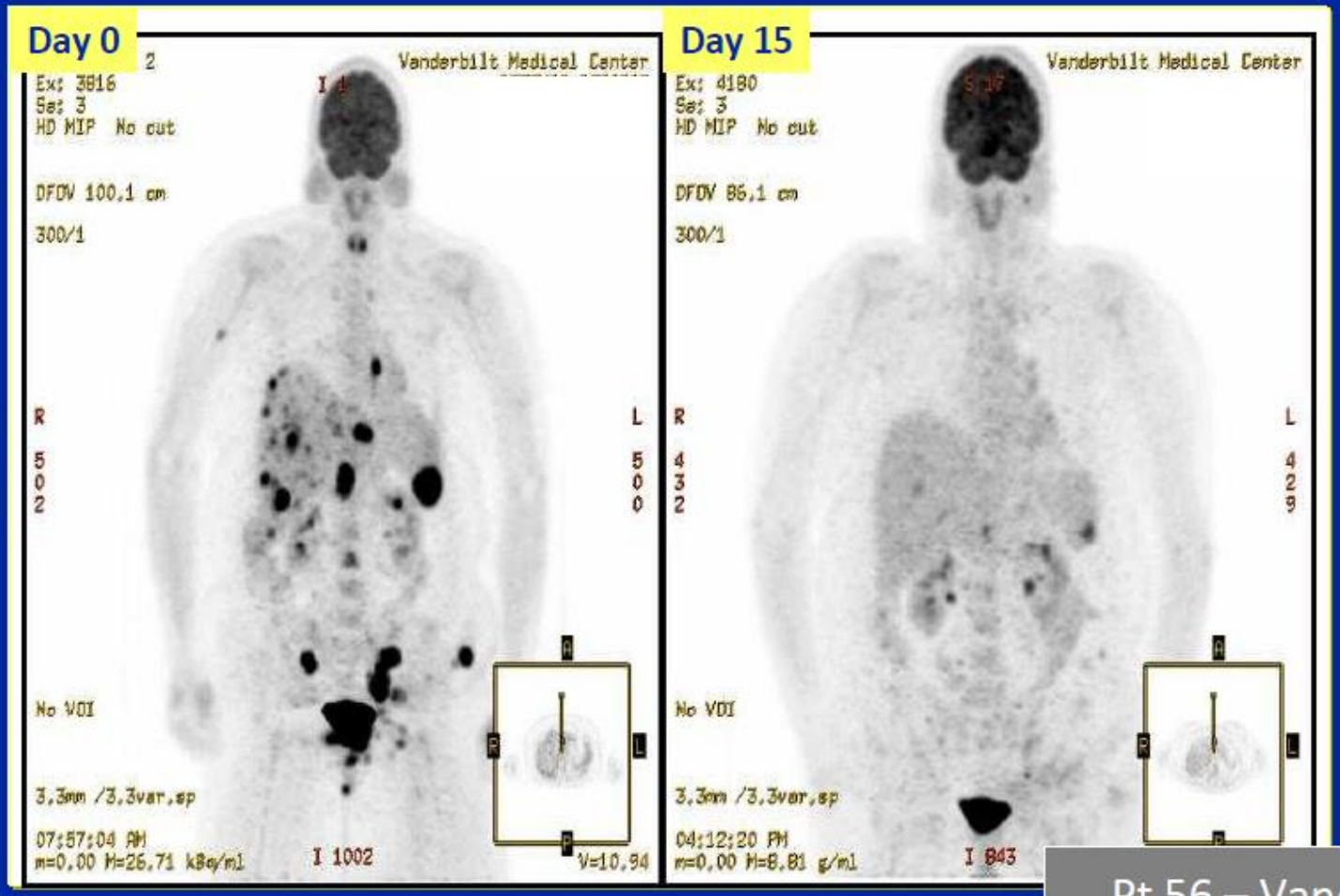
B-Raf signalling in melanoma



Patient # 69

Pre-treatment **Cycle 2** **Cycle 4**

BRAF^{V600E} melanoma patient PET scan at baseline and day +15 after PLX4032 treatment at 720 mg BID



Pt 56 – Vanderbilt

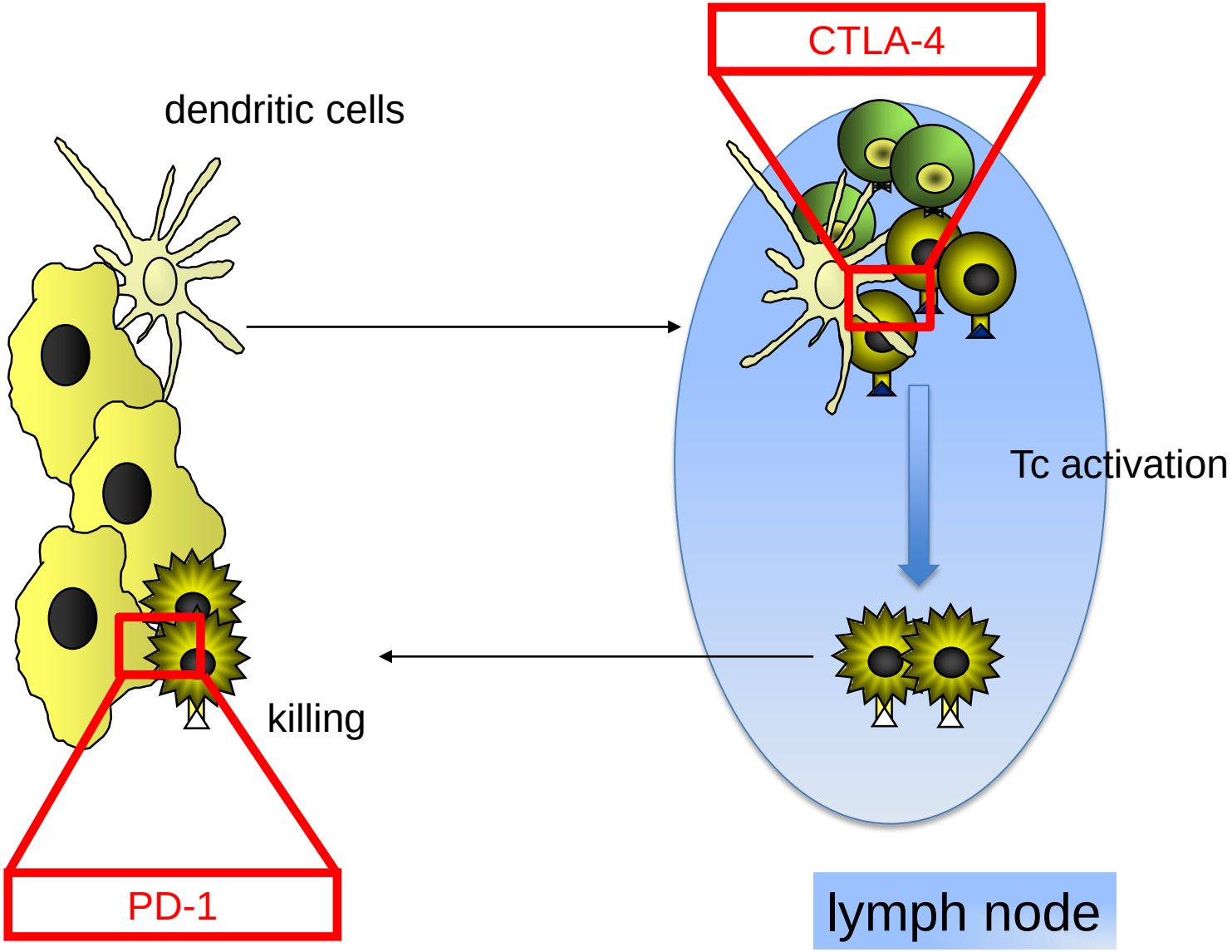
Cancer Immunotherapy

New anti-cancer immuno-therapies licensed

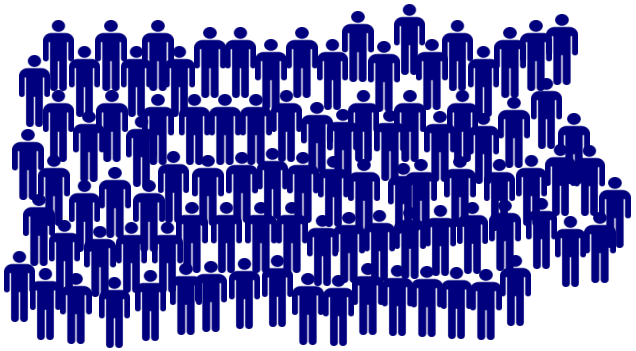
Many more in development

Long term remissions

‘take the brakes off the immune system’

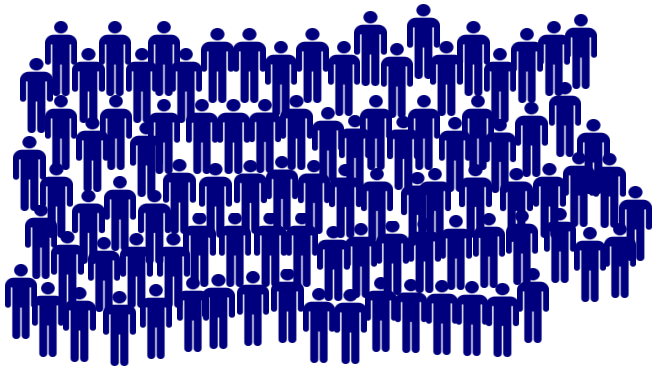


Checkpoint inhibitors in melanoma

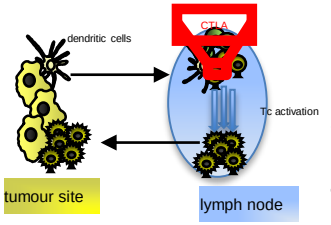


Chemotherapy

1 year ~ 30%
2 year ~ 10%
5 year ~ 4 %

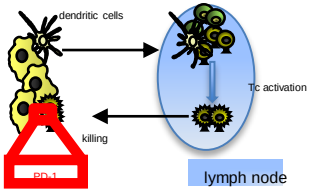


Ipilimumab

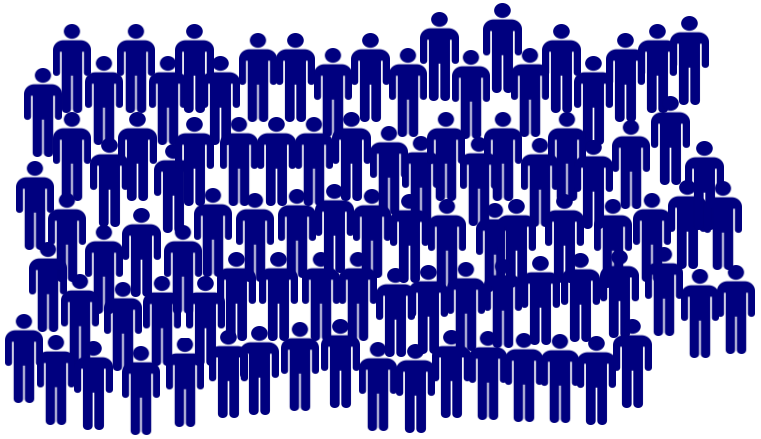


1 year ~ 50%
2 year ~ 25%
5 year ~20%

Anti-PD-1



Pembrolizumab



1 year survival ~ 70%

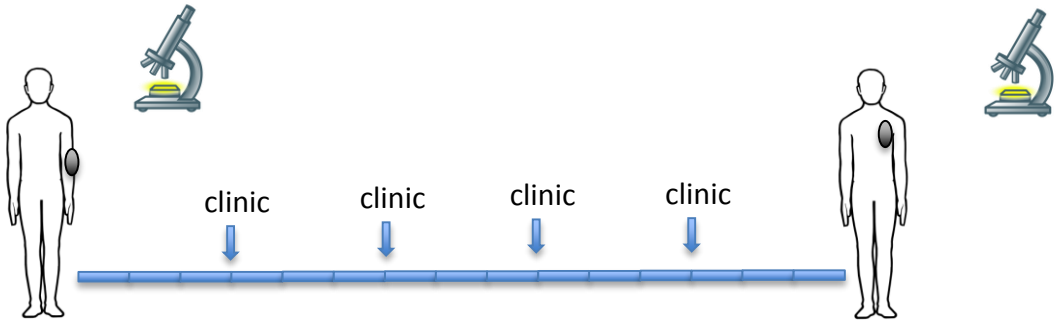
2 year survival ~ 50%

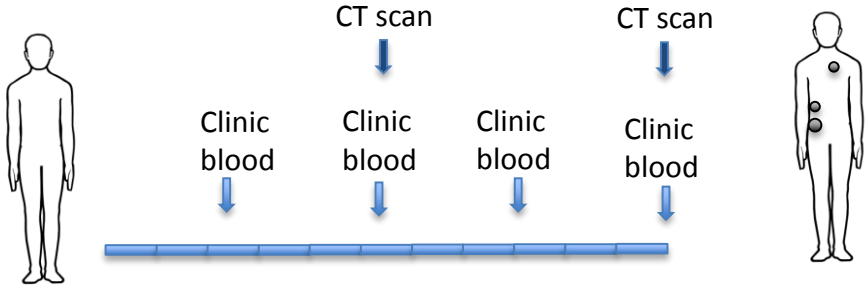
5 year survival ~? 40%

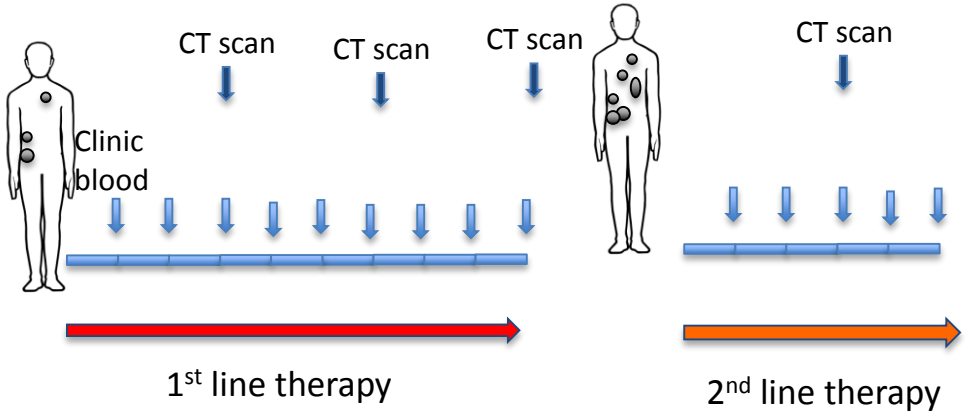
Closed loop systems

- directly in patient care
- research- cancer models

Closed loop systems in Cancer?



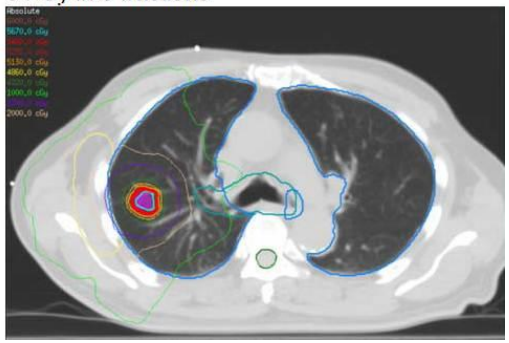




Current examples

SABR (stereotactic ablative radiotherapy)

54 Gy in 3 fractions



gaps

Collaborations

Measurements
(in real time)

Model Systems

measurements

Tumour
- biopsy
- imaging

Blood (or urine, saliva)
- tumour markers
- cell free DNA*

NEED New ways to measure ‘stuff’

ideas

PET Tracers

- zirconium labelled- anti- PDL-1 Ab
- IDO activity
- could we combine 5-10- xxx markers ?

Raman Spectroscopy-

-measuring biological levels of targeted agents with a pinprick blood test

Hypoxia tracers/ vascular targeting agents/ radiotherapy

New ways to measure..

Blue Skies

- Tracers that act as targets
- Injectable ‘switches’
- Smart Matrix