

Kunnen we kanker slim genoeg af zijn ?



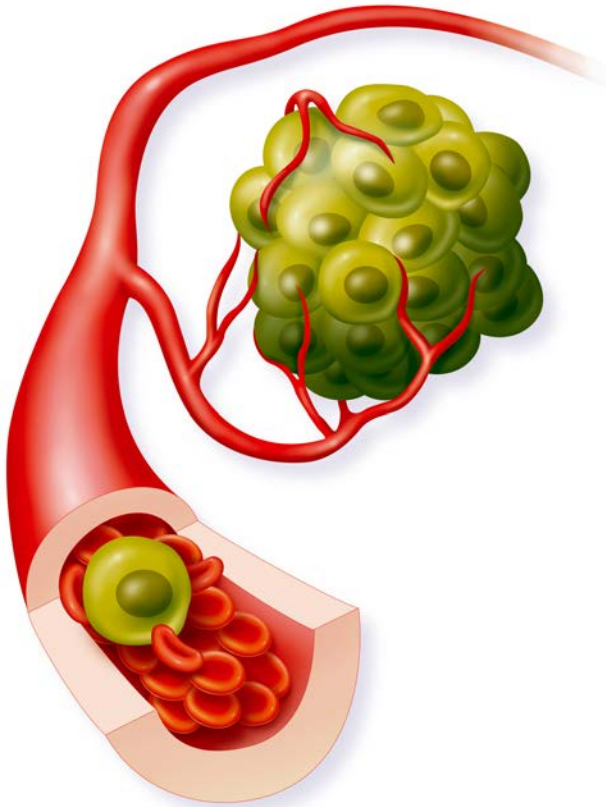
Johan Swinnen

Voorzitter Departement Oncologie KU Leuven

Vice-voorzitter LKI – Leuvens kankerinstituut

Voorzitter Fonds voor Innovatief Kankeronderzoek (FIKO)

Kanker



THE BURDEN OF CANCER

Cancer is a major public health and economic issue and its burden is set to spiral. With over 18 million cases in 2018, we can expect 29 million cases by 2040 due to the aging and growth of the population.

**En dan komt
kanker plots
dichtbij**



maart 2011 Barcelona



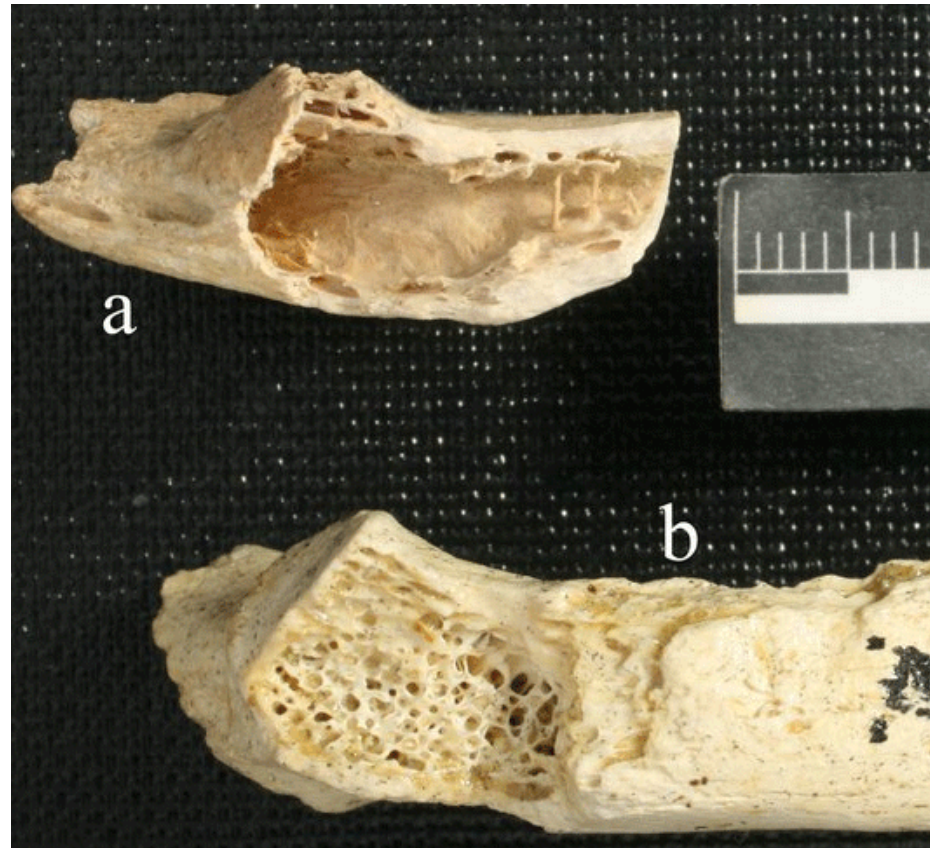
14 maart 2011

Pieter
Kanker
Hersentumor
Uitgezaaid
Slechte prognose

**“Als we onze Pieter over 5
jaar nog hebben, ga ik eens
echt iets zots doen”**

Kunnen we kanker slim genoeg af zijn?

Wat is kanker / hoe ontstaat kanker?



Neanderthalers
120.000 v C

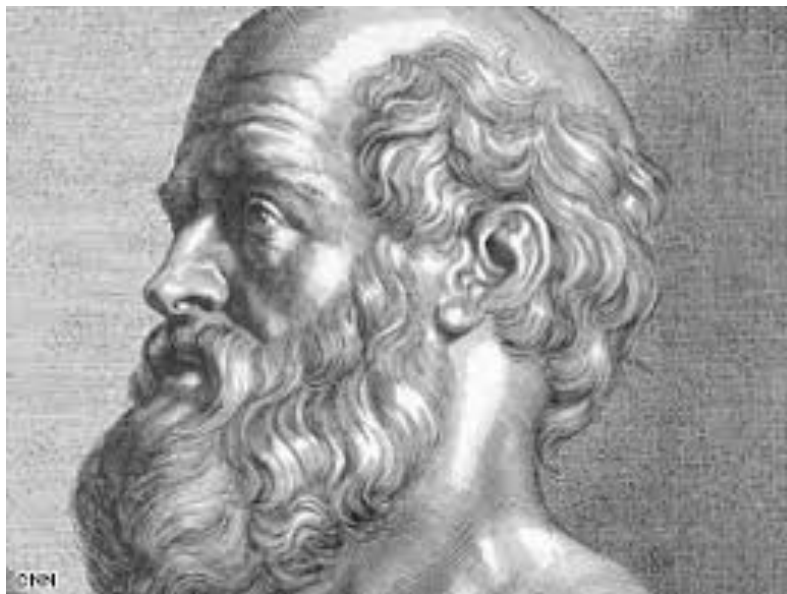


Egyptenaren
2.600 v C



Oude Grieken

2.600 v C



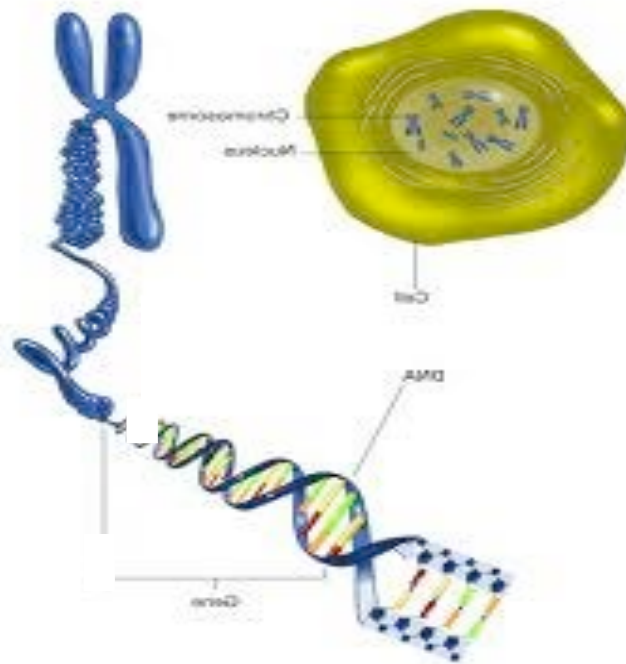
Hippocrates (400 v.C)
'lichaamsvochten'
'zwarte gal'
'carcinus'



Celsus
'cancer' → kanker



18de eeuw: microscoop
Lichaam bestaat uit cellen
Ook tumor bestaat uit cellen



19de – 20 ste eeuw
Chromosomen – DNA
DNA Sequencing → Mutaties

Wat is kanker?

Bevruchte eicel



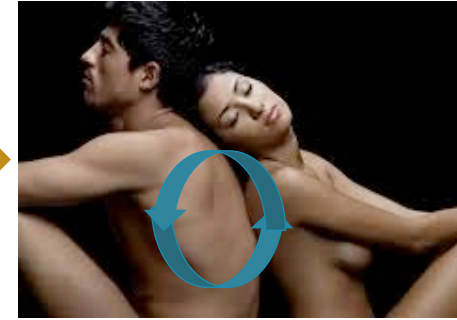
Embryo



Foetus

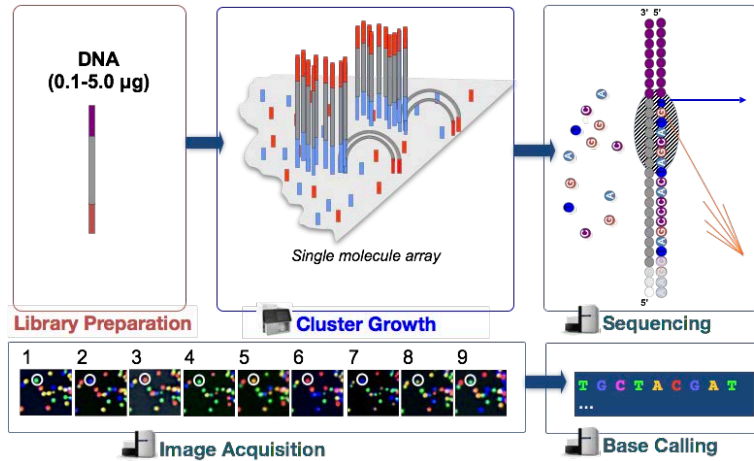


Lichaam

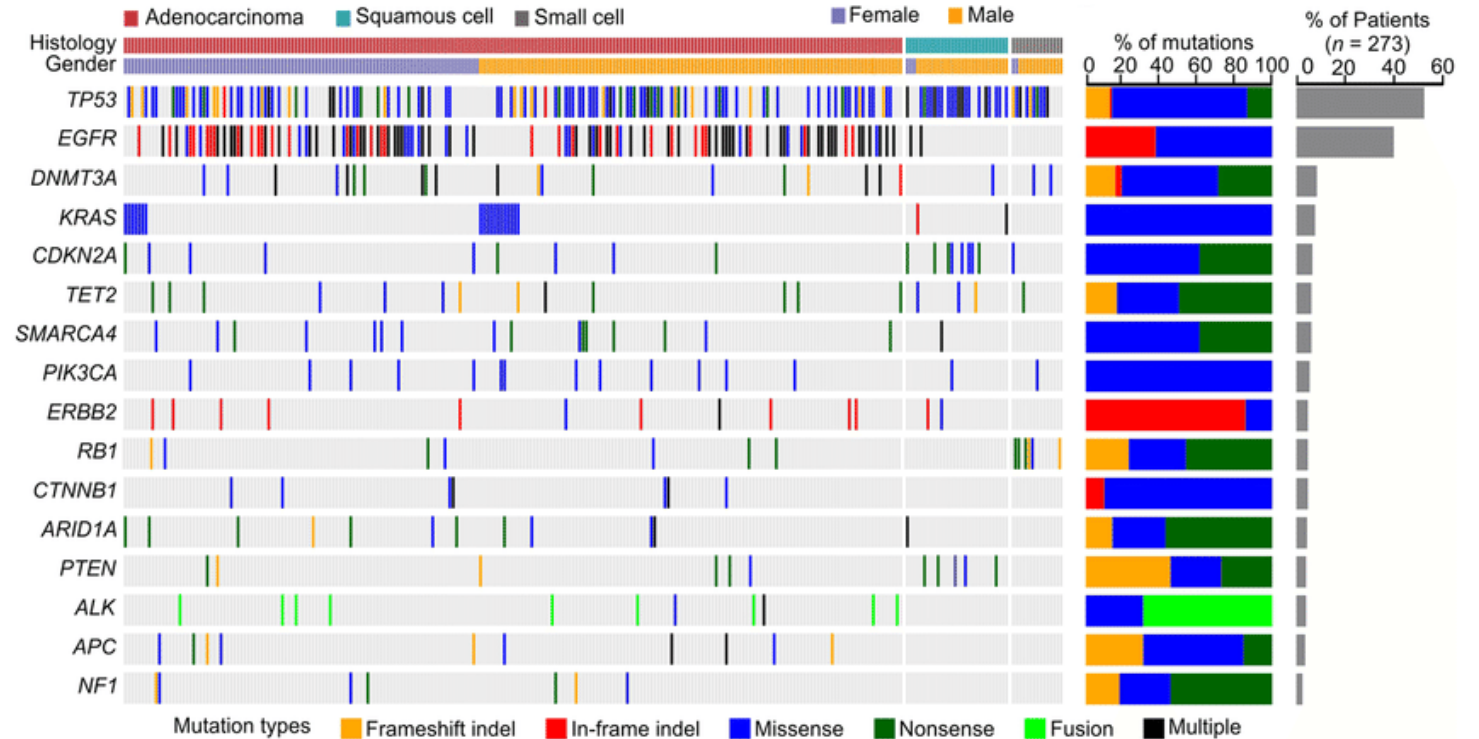


Genetisch landschap van tumoren

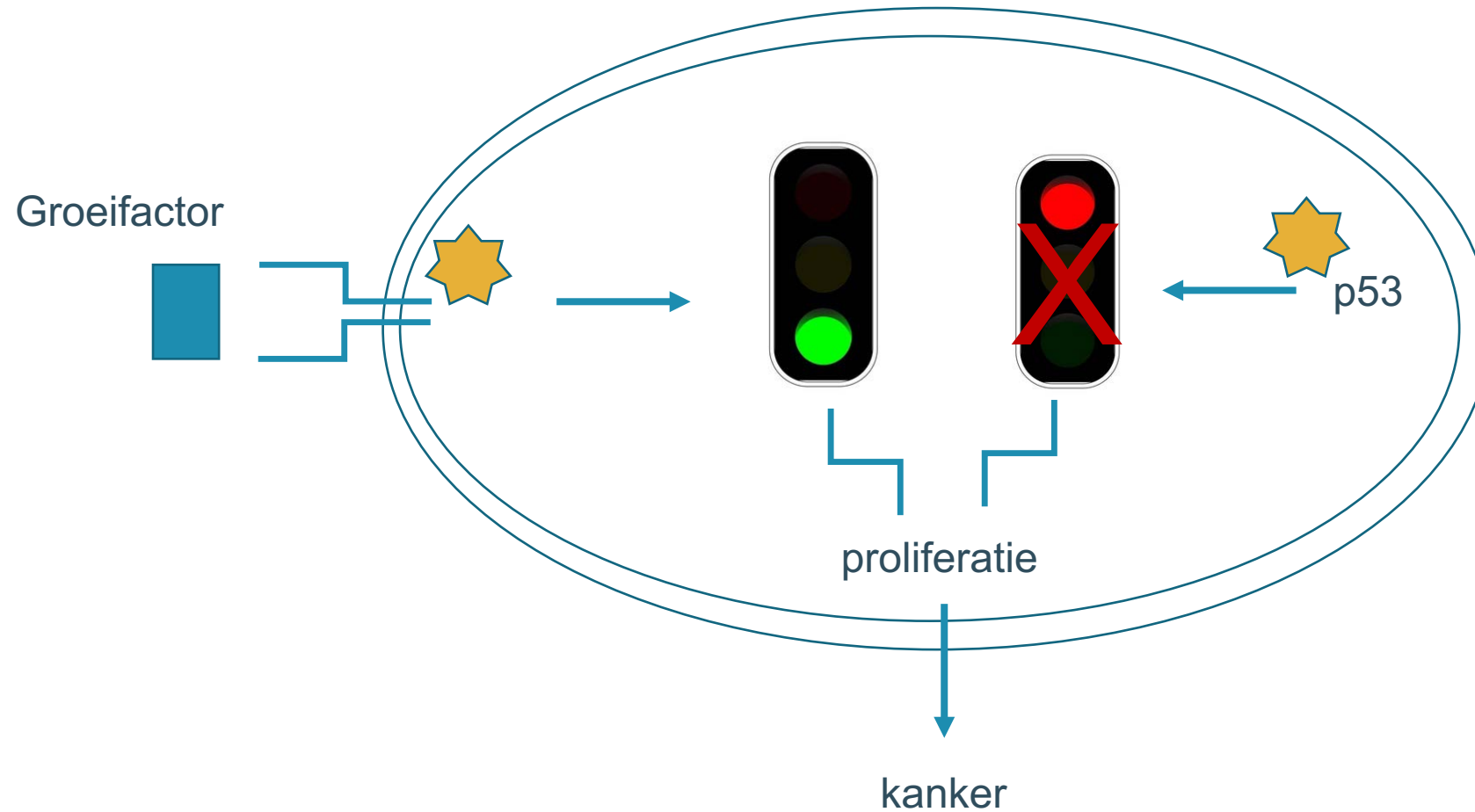
Next generation DNA sequencing



longkanker



Oncogenen en tumorsuppressoren



Evolutie in kankerbehandeling

Chirurgie



Radiotherapie



Chemotherapie



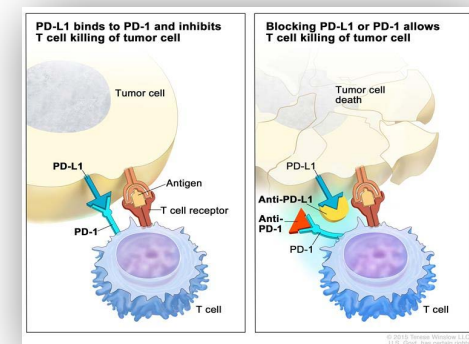
Hormonale therapie



Doelgerichte therapie

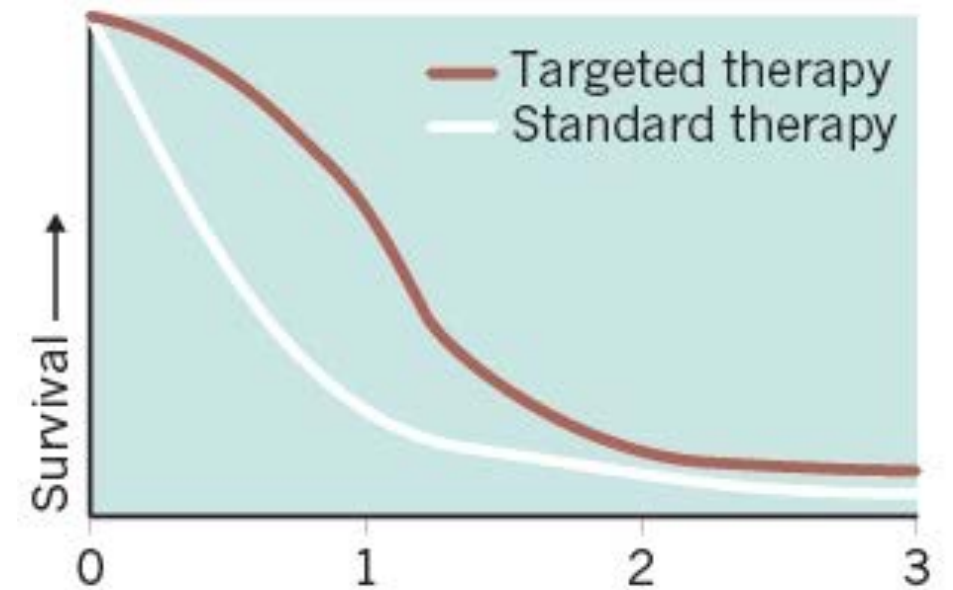
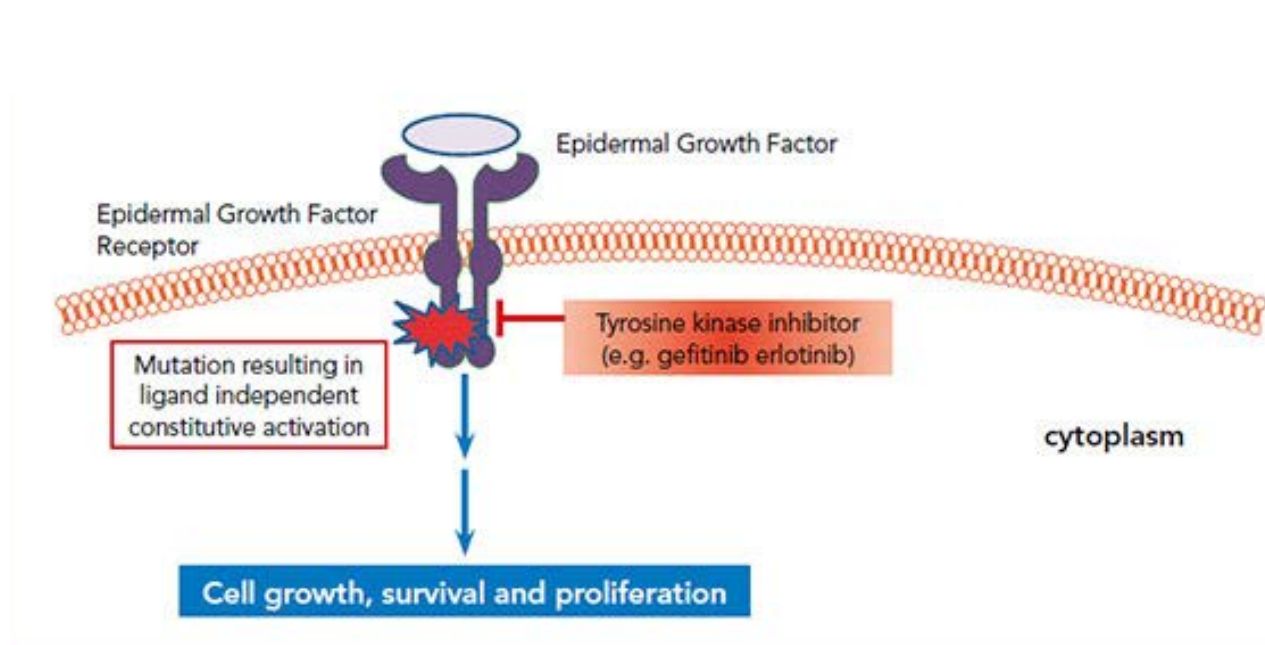


Immuuntherapie

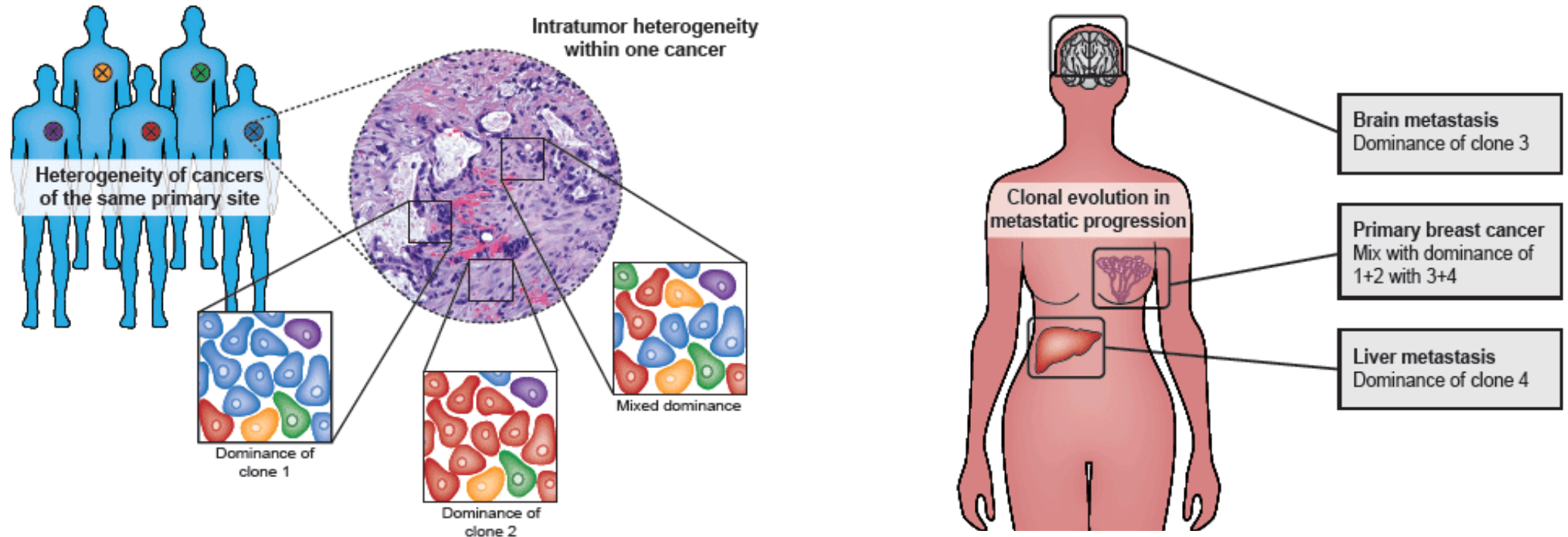


Doelgerichte therapie een revolutie met grote uitdagingen

b.v. EGFR



Kernprobleem: tumor heterogeneiteit / instabiliteit

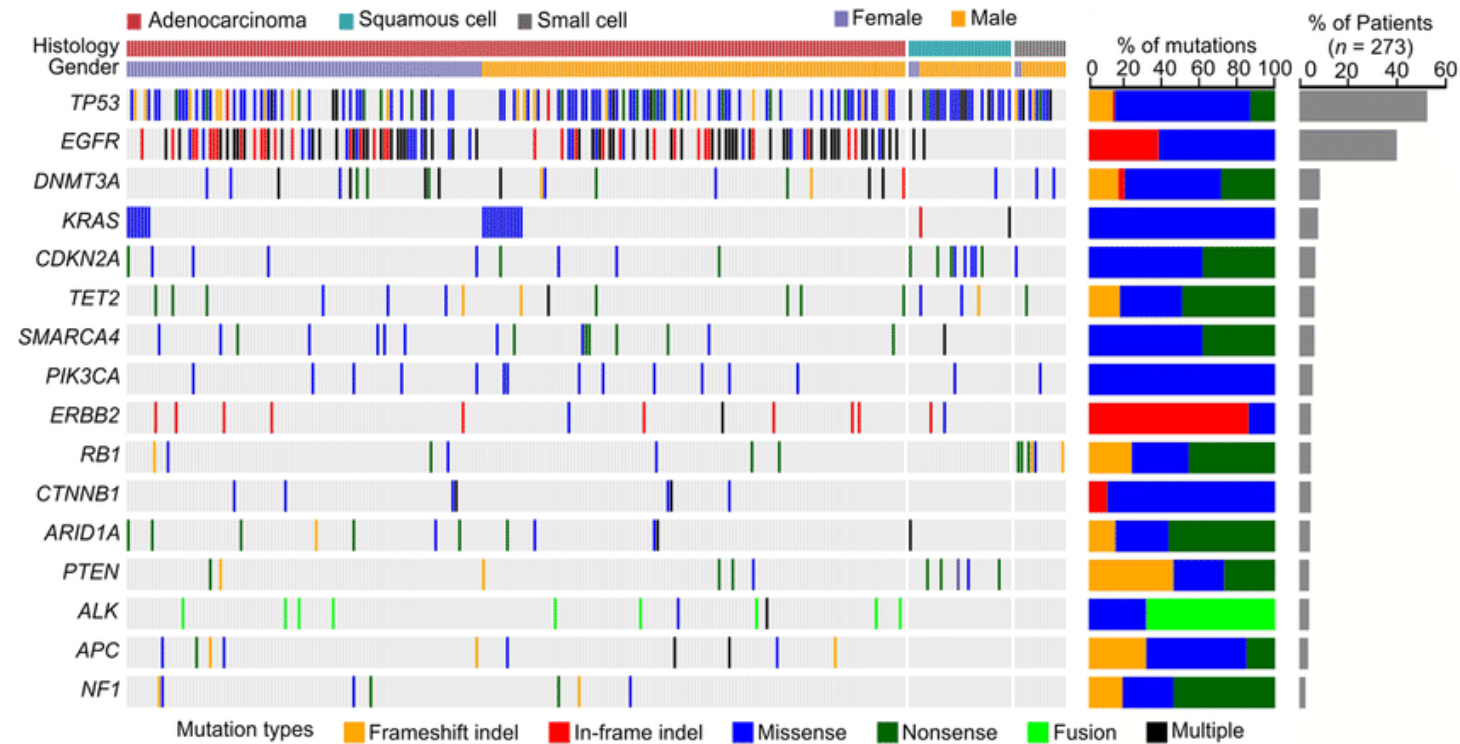


➤ bepaalt progressie en respons op therapie

Kernprobleem: tumor heterogeneiteit / instabiliteit

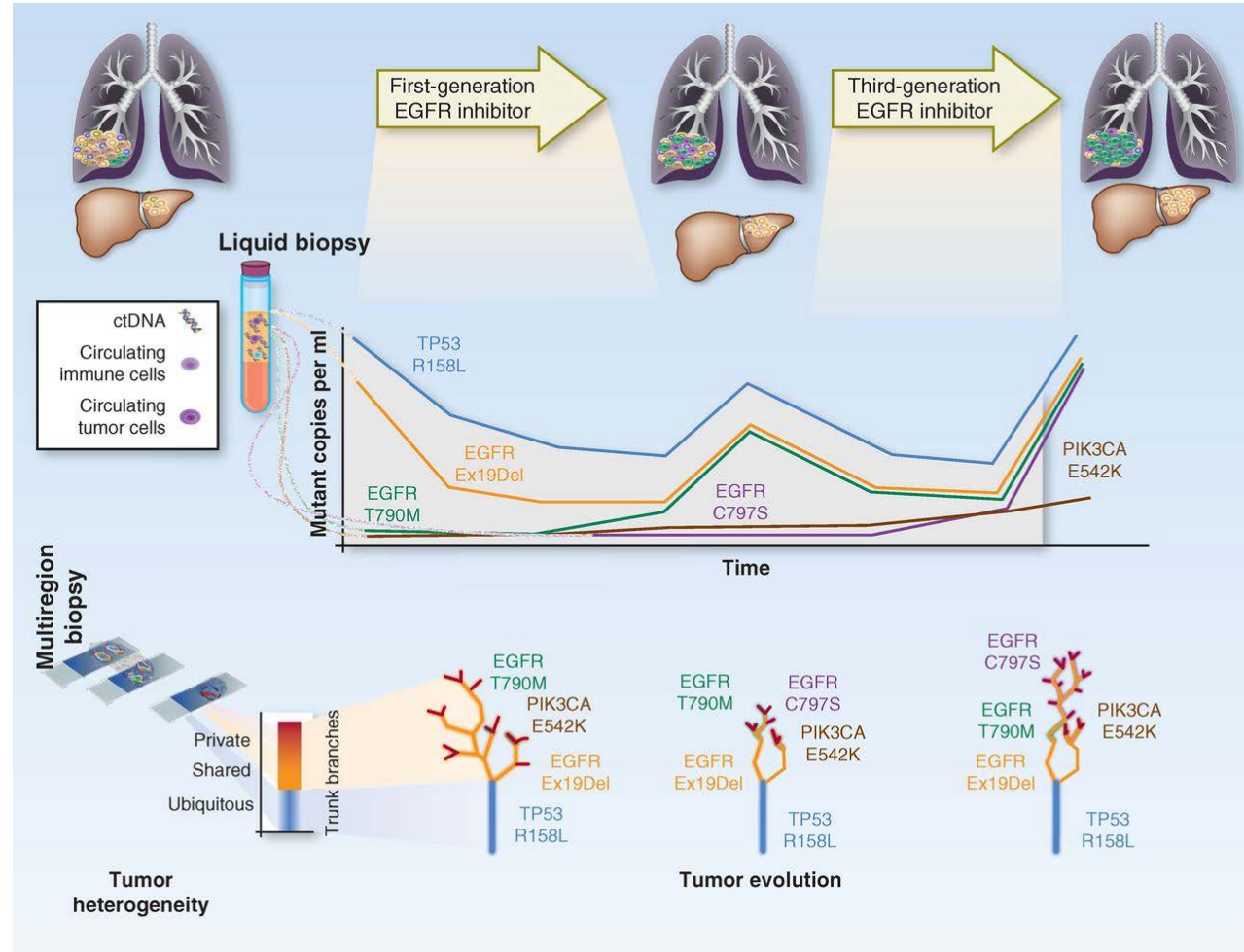
‘Elke patiënt / tumor is anders’

longkanker

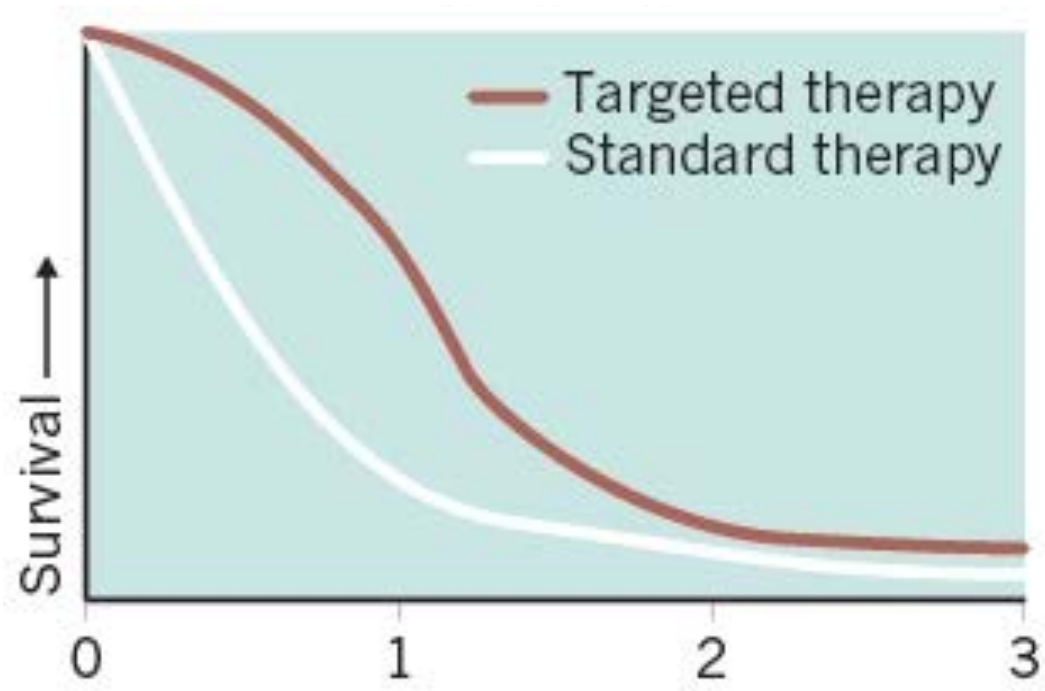


Kernprobleem: tumor heterogeneiteit / instabiliteit

Clonale
evolutie na
behandeling

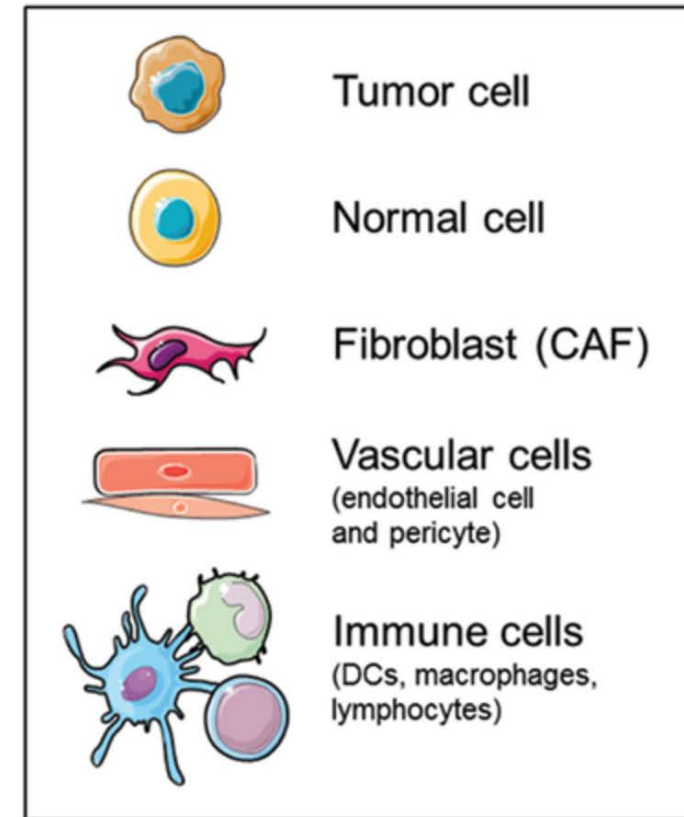
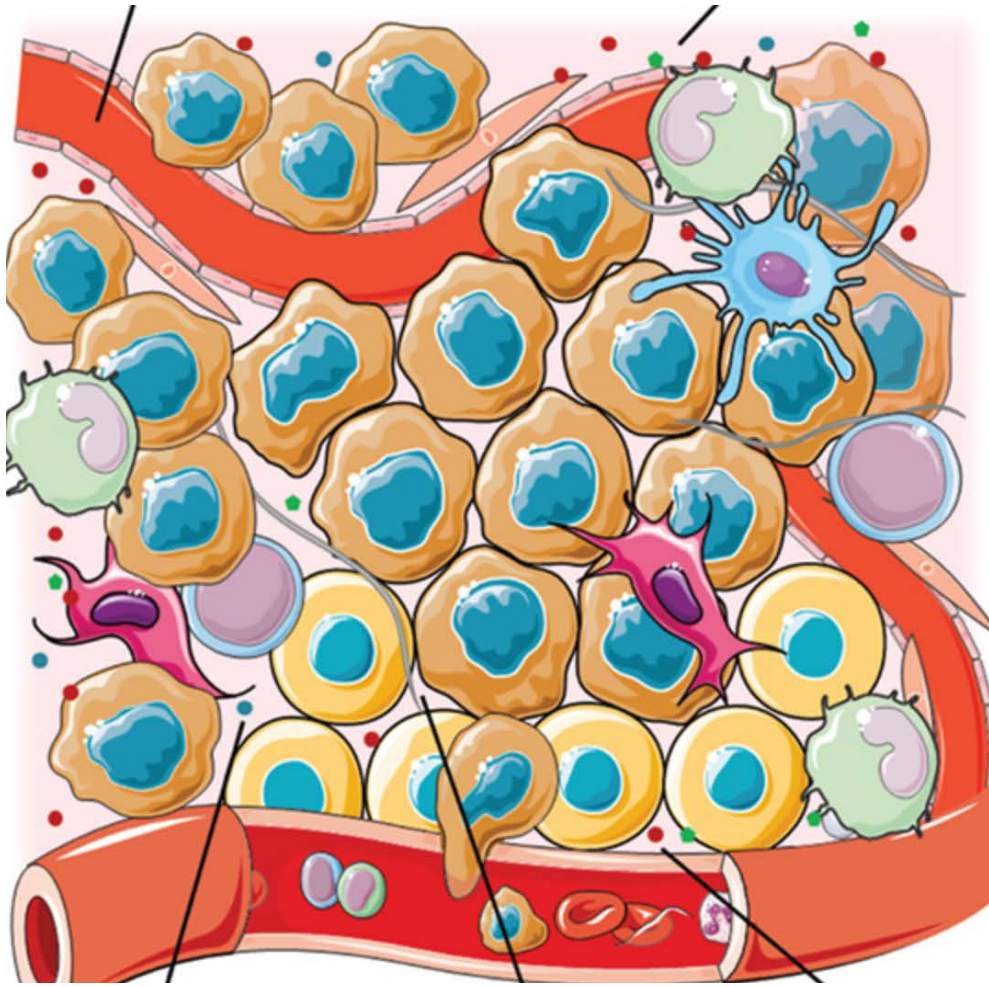


Uitdagingen ivm doelgerichte therapie

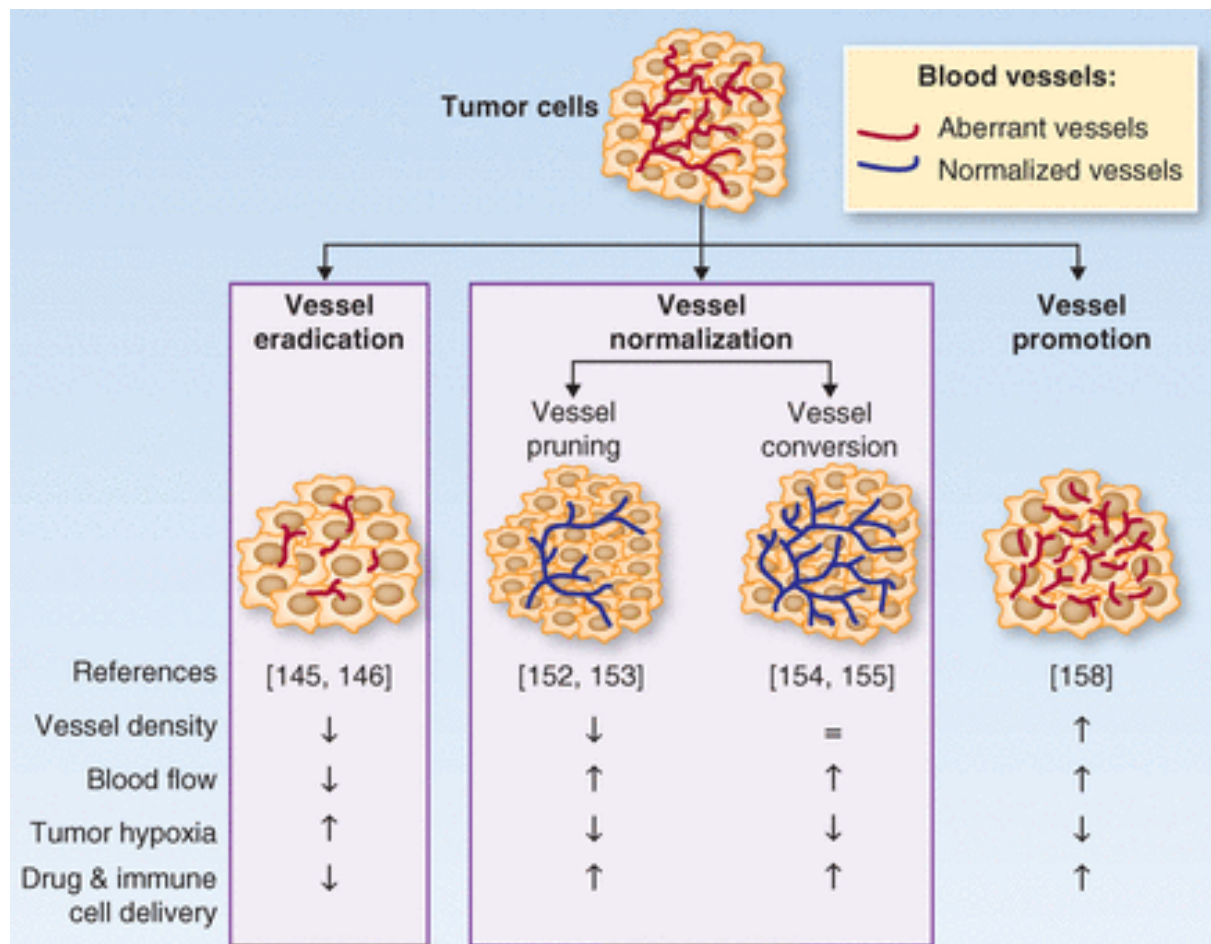


- Intrinsieke resistentie
→ selecteren
'gepersonaliseerd'
- Verworven resistentie
→ opvolgen en therapie aanpassen
- Nevenwerkingen
- 'Druggability'

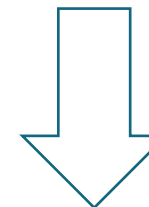
De tumor als een ecosysteem



Bloedvatvorming als doelwit

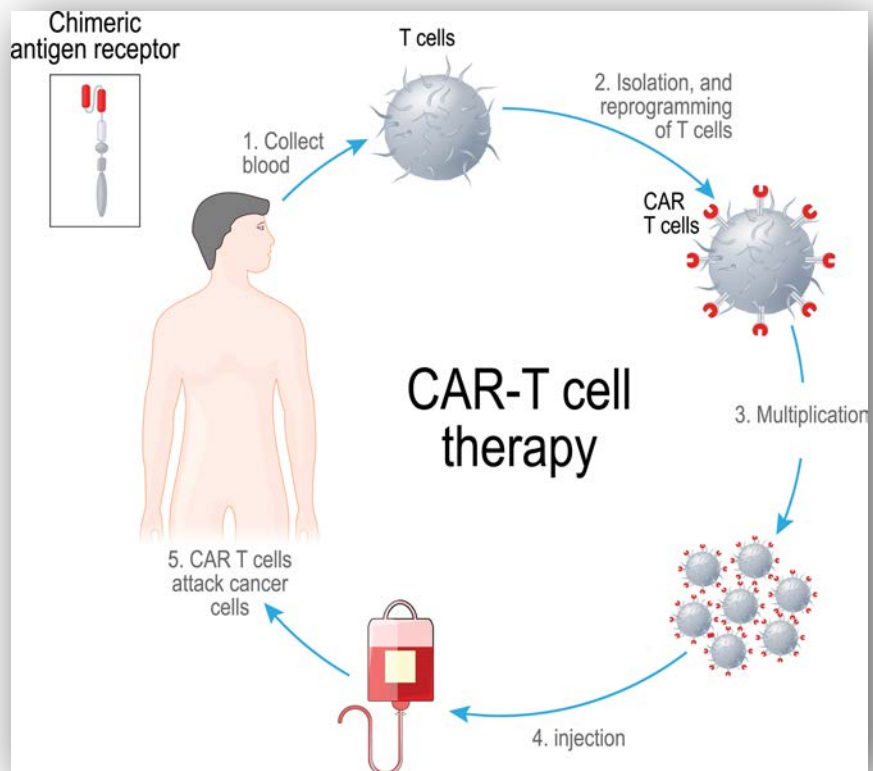


Anti-angiogenese

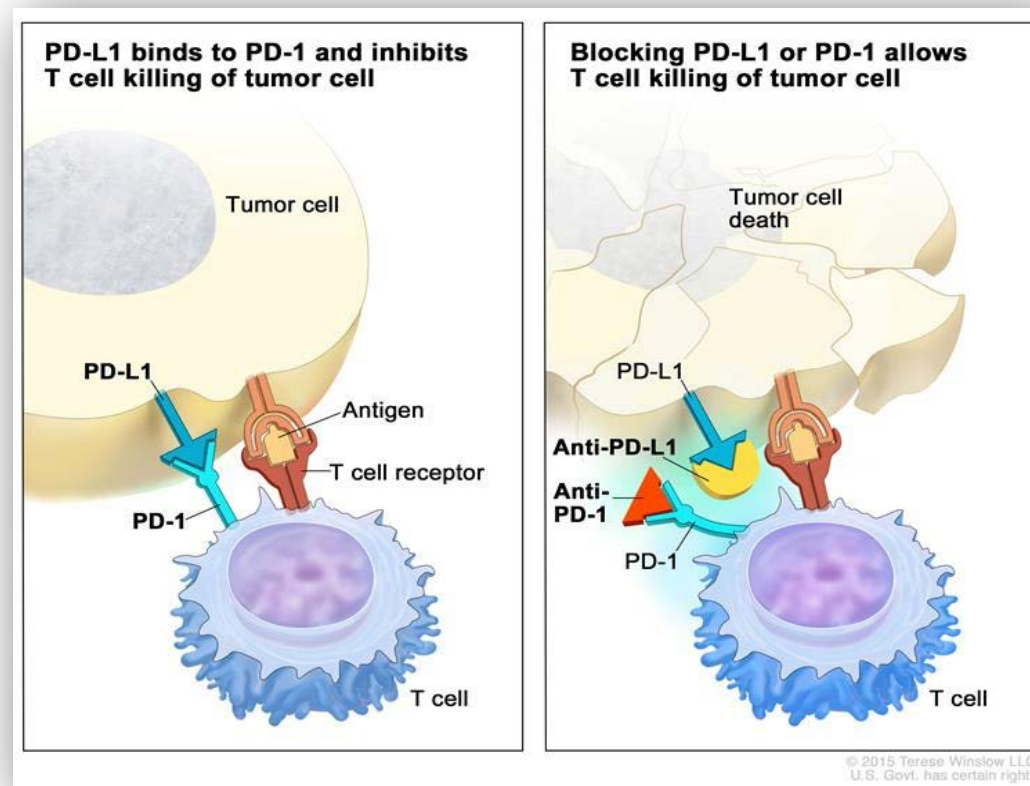


Normalisatie van bloedvaten

Immuuntherapie

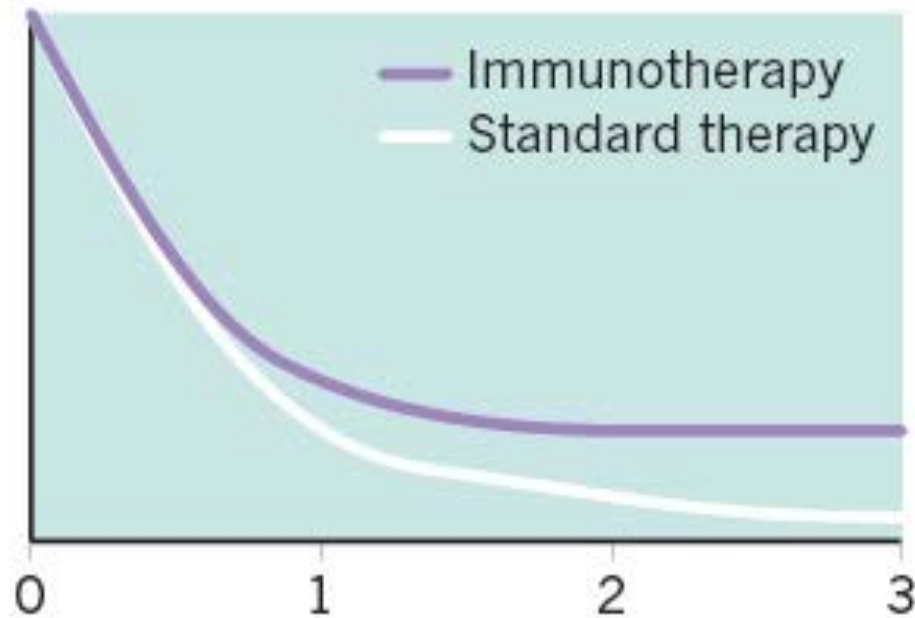


Recombinante geherprogrammeerde T-cellen



Checkpoint inhibitoren

Immuuntherapie



- Langdurige repons
- Bepaalde kankertypes
- Subset patiënten
 - selecteren
 - ‘gepersonaliseerd’
- Nevenwerkingen

Verbetering van immuuntherapie

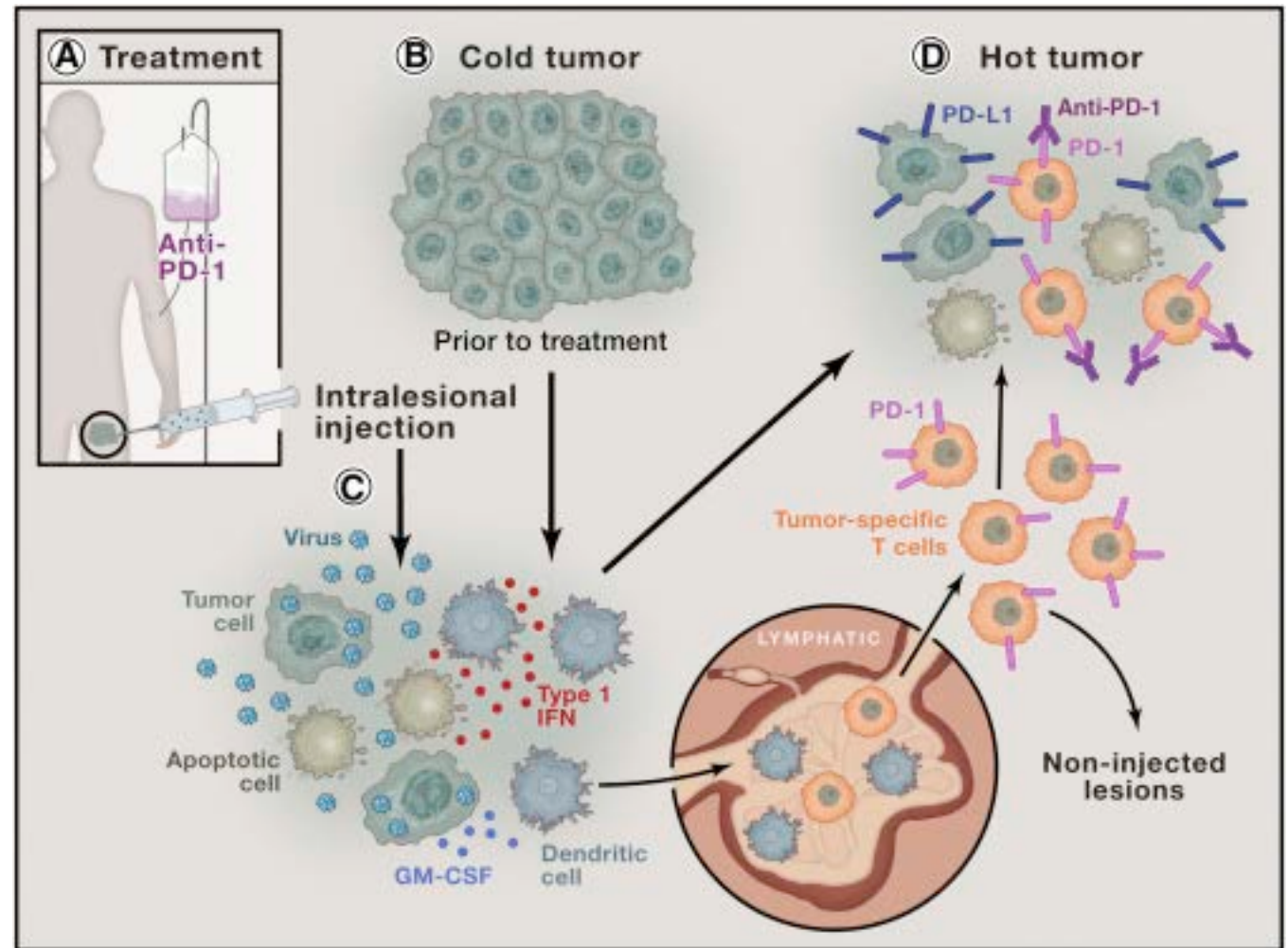
- Selectie van patiënten

Biomerkers:

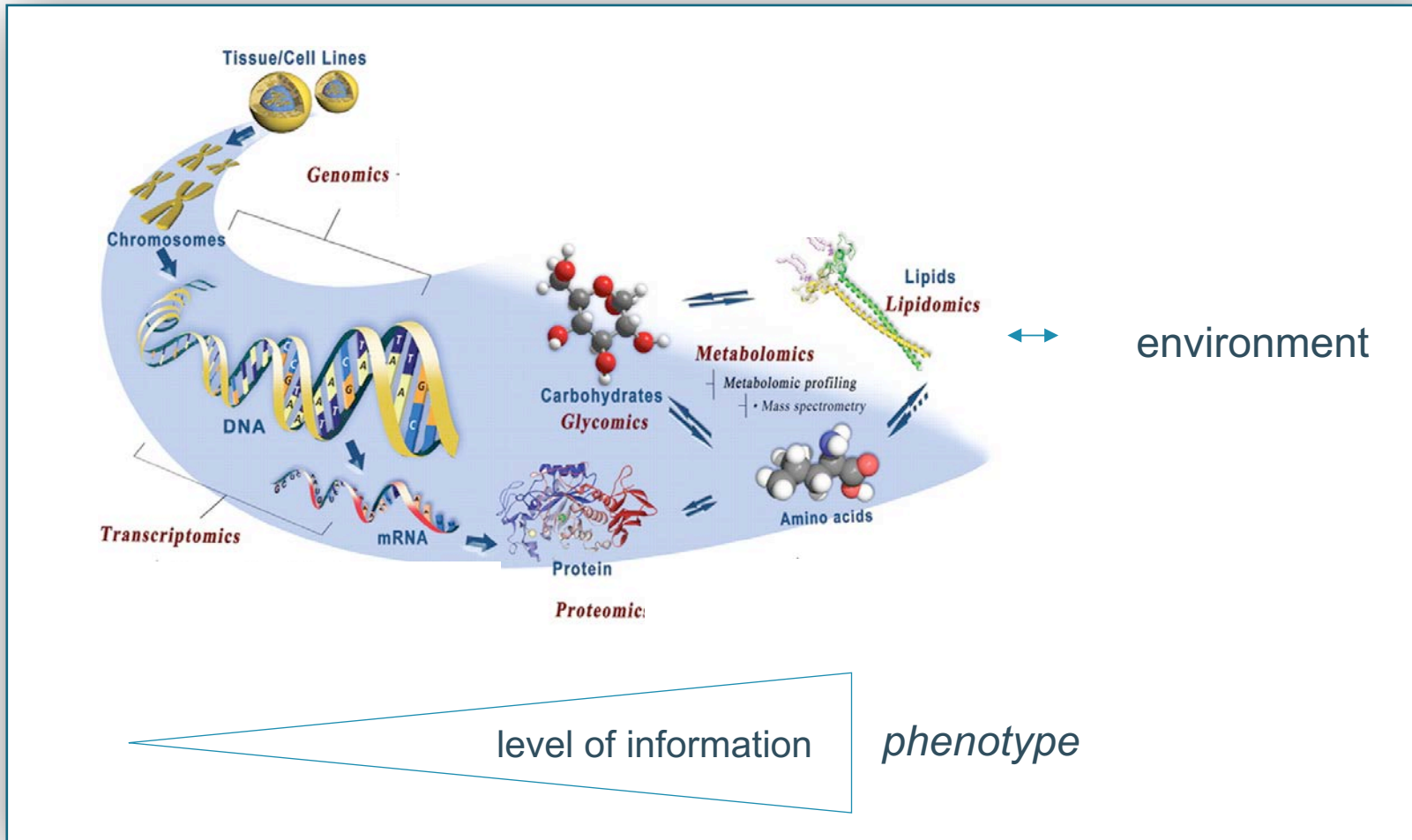
- 'mutational burden'
- immuuncel infiltratie

- Making 'cold' tumors 'hot'

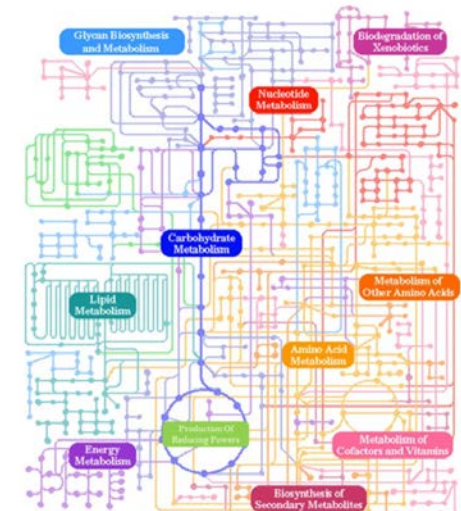
- oncolytische virussen
- combinatie-behandeling
- immuuncel-attractants



Een (kanker)cel is meer dan DNA ...



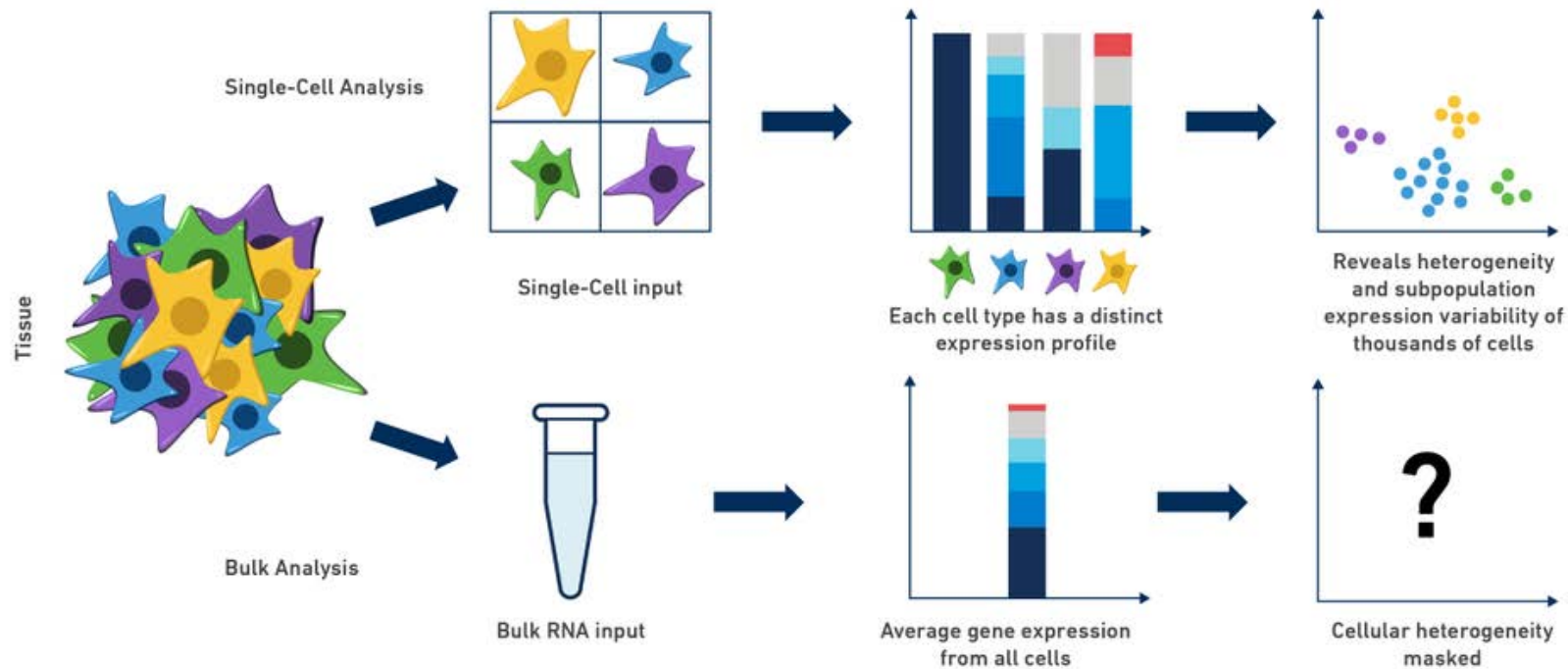
➤ (multi)omics



Bouwstoffen
Energie

➤ Nieuwe doelwitten

Single cell omics versus bulk analyse

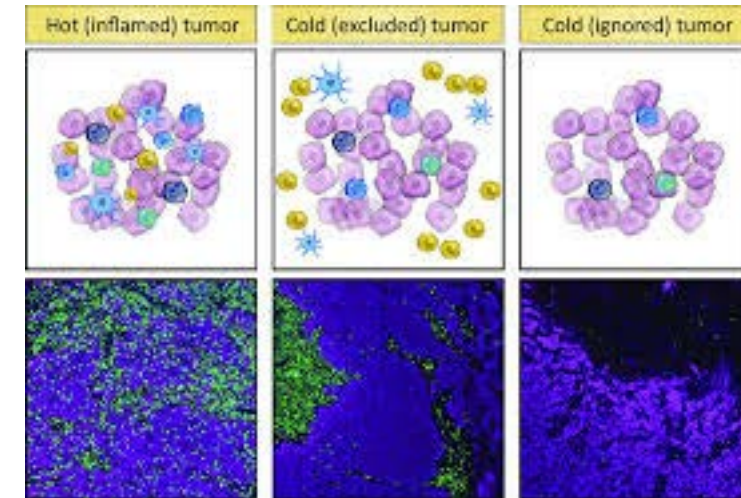
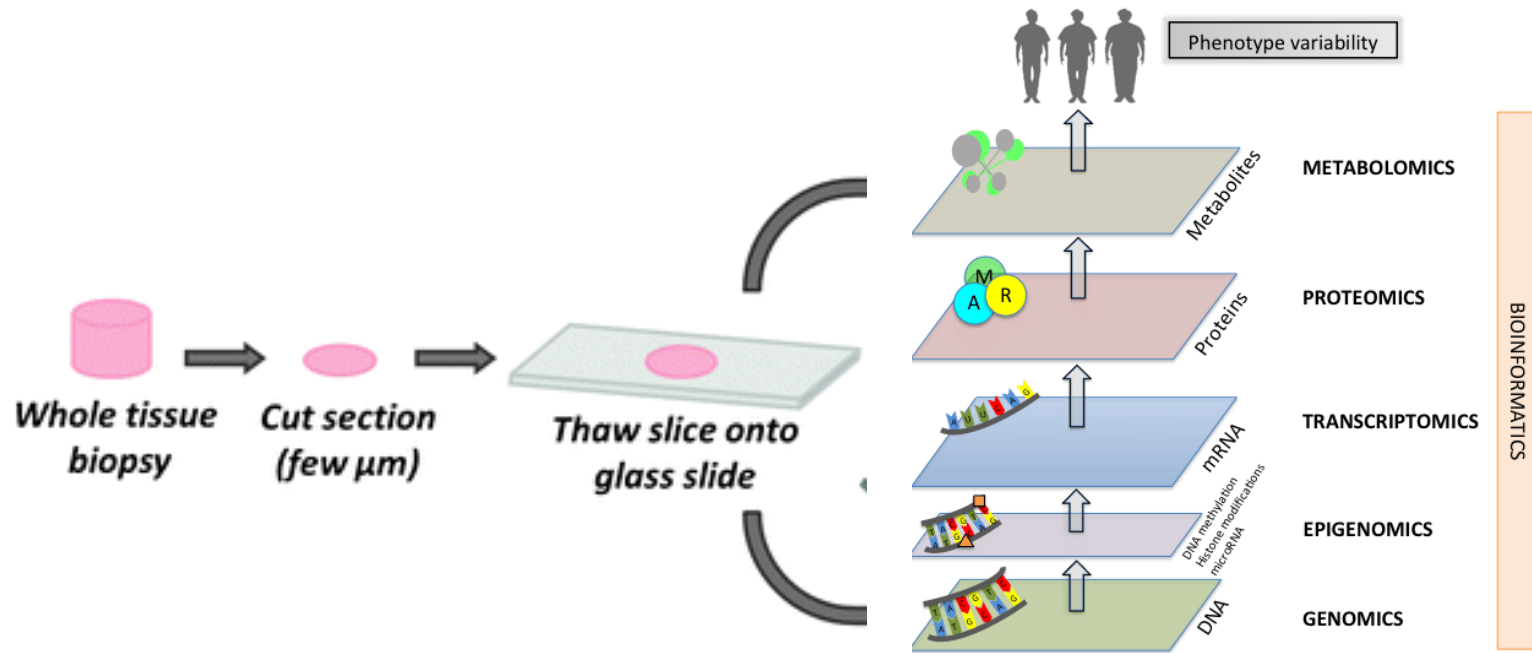


Uit welke verschillende cellen bestaat een tumor ?

Waarin verschillen die?

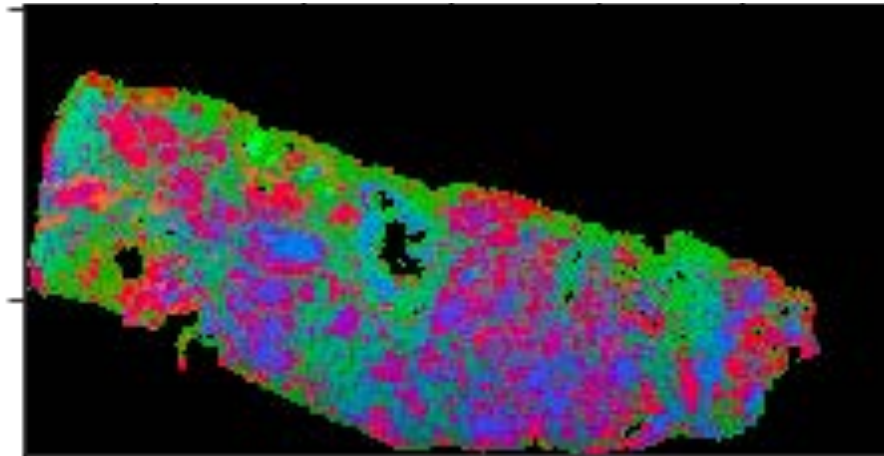
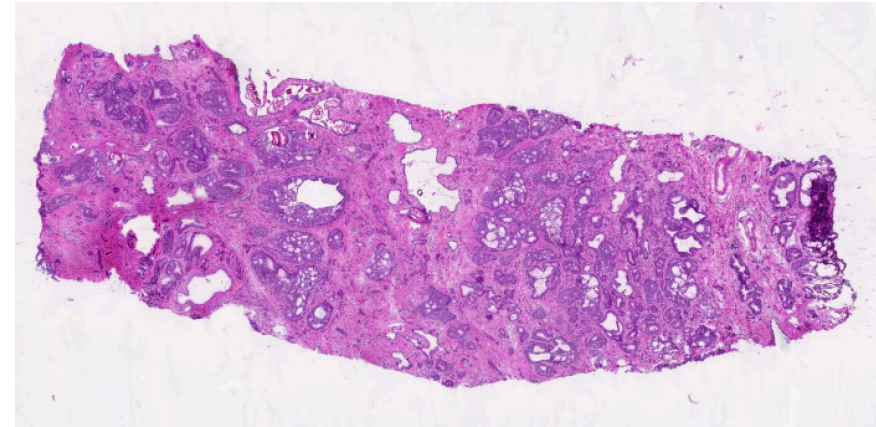
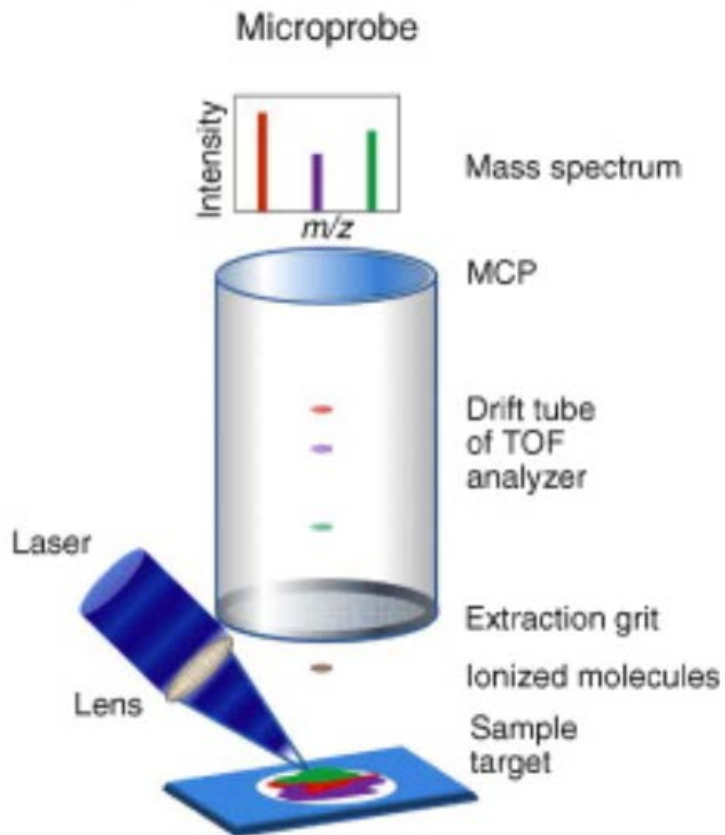
Hoe evolueert de samenstelling in functie van de tijd / in respons op therapie ?

Spatial Multi-omics



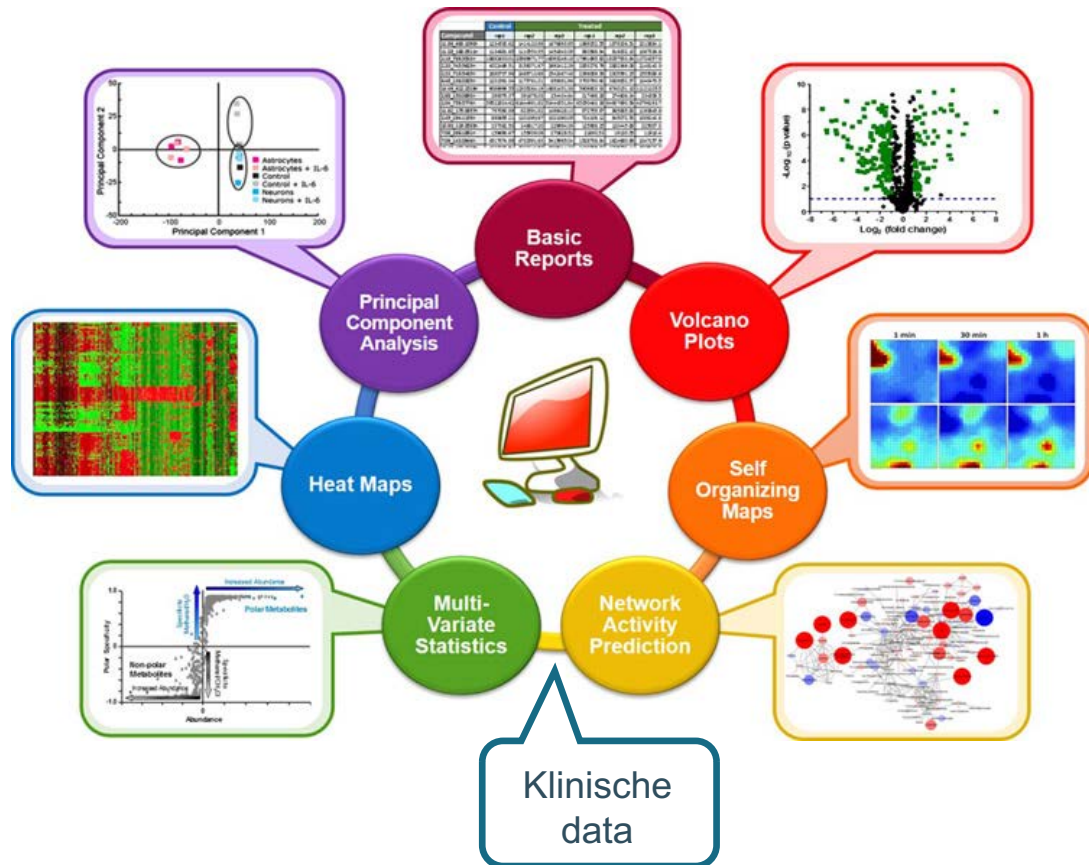
Waar in de tumor zitten welke cellen?
Bv. belang voor immuuntherapie

Spatial Multi-omics



Xander Spotbeen, Tina Smets (ESAT/Stadius), Etienne Waelkens, Johan Swinnen

Data-analyse



Bioinformatica
Artificiële intelligentie

- Biomerkers
- Doelwitten

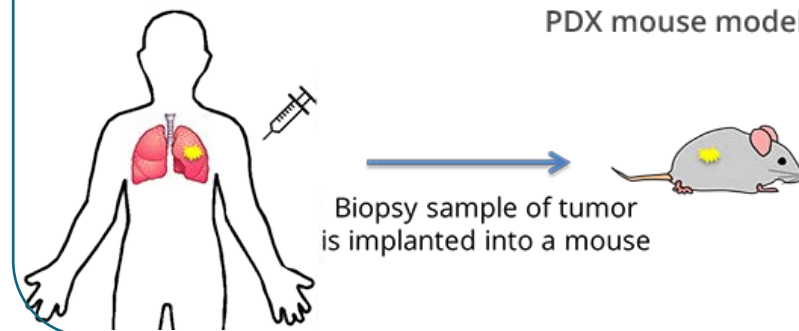
Preklinische modelsystemen

Tumor(cellen) bestuderen buiten de patiënt

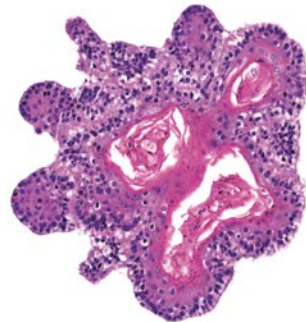
- Celculturen



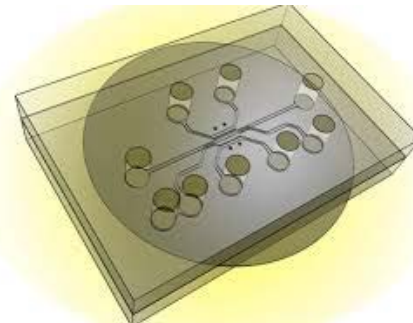
- Diermodellen



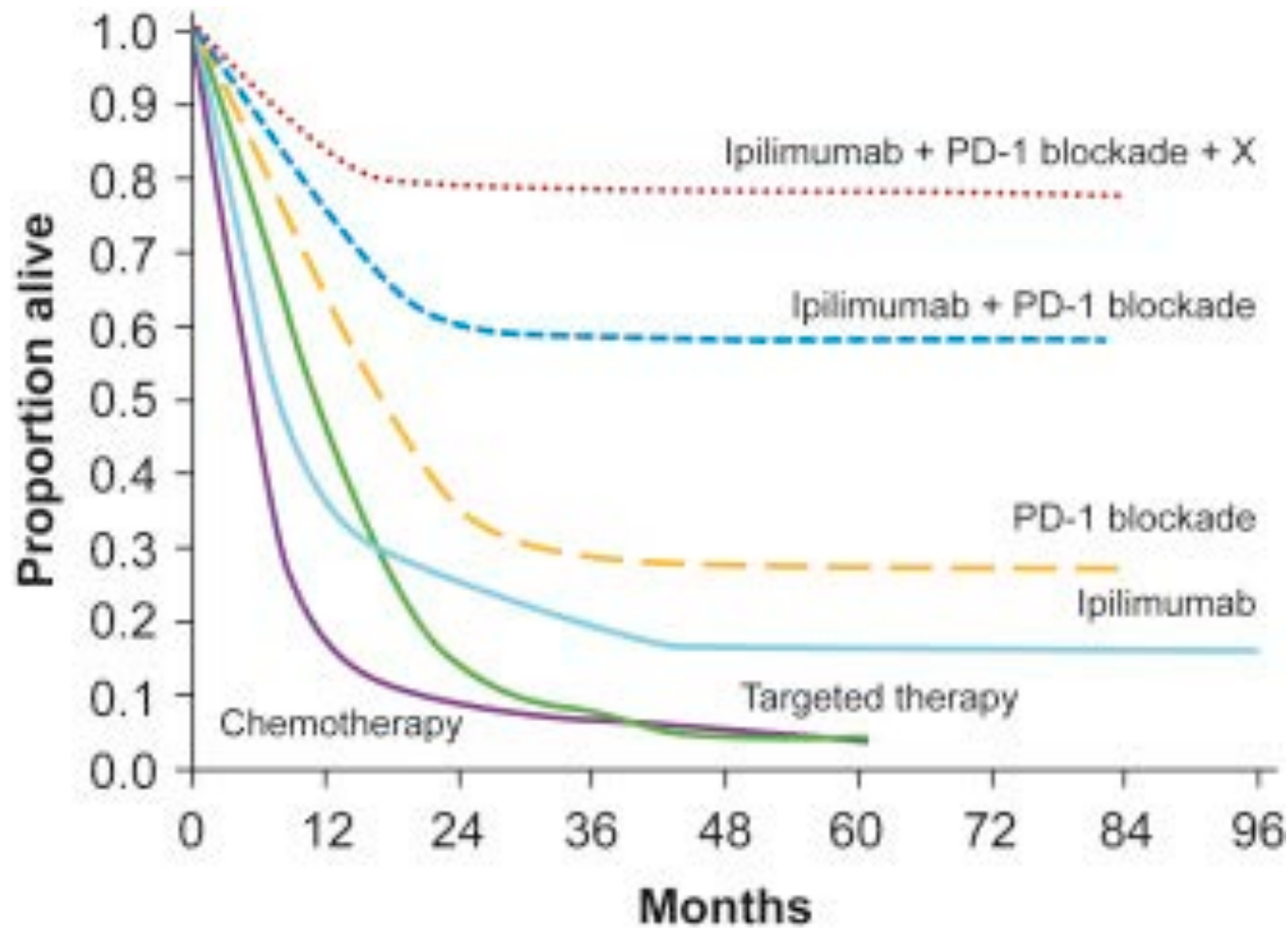
- 'Organoïden'



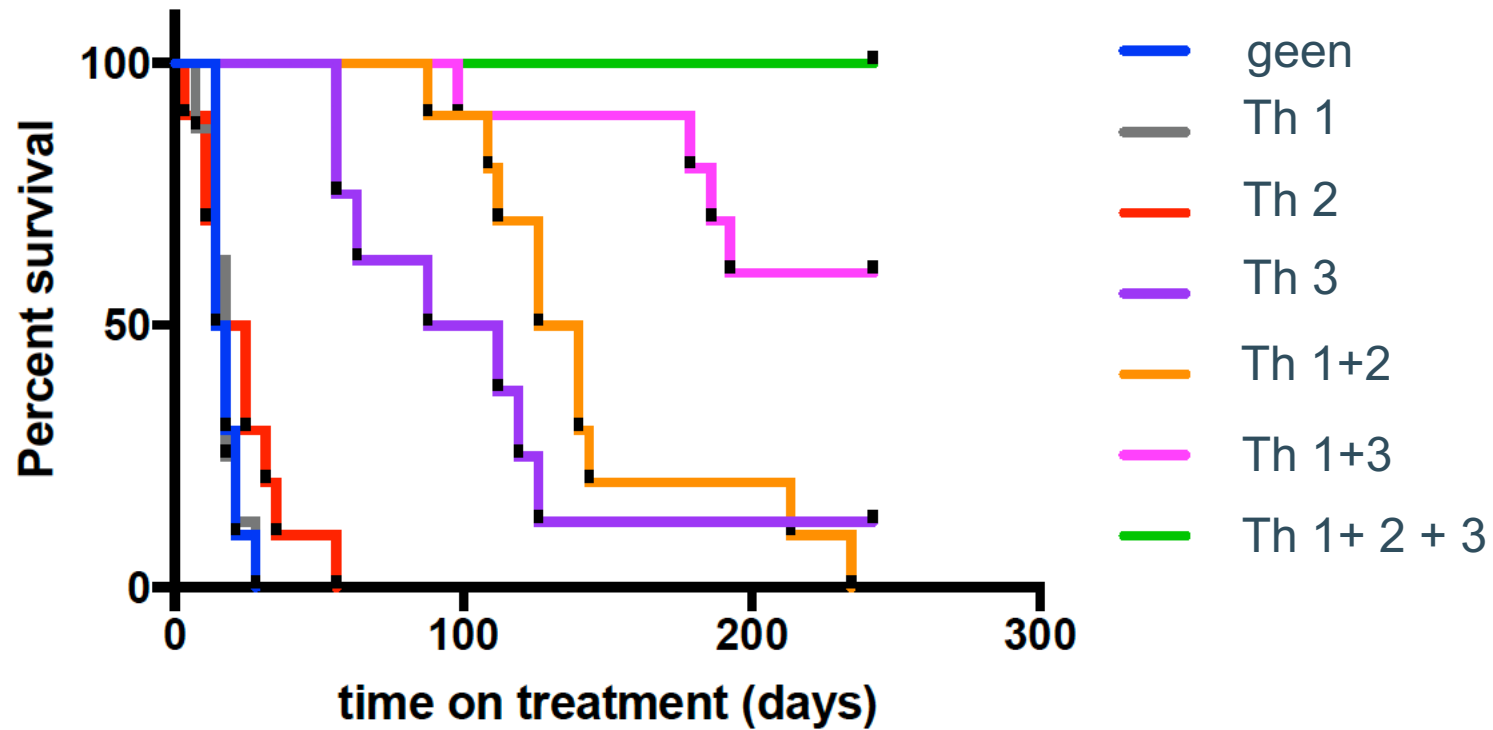
- 'Tumor-on-a-Chip'



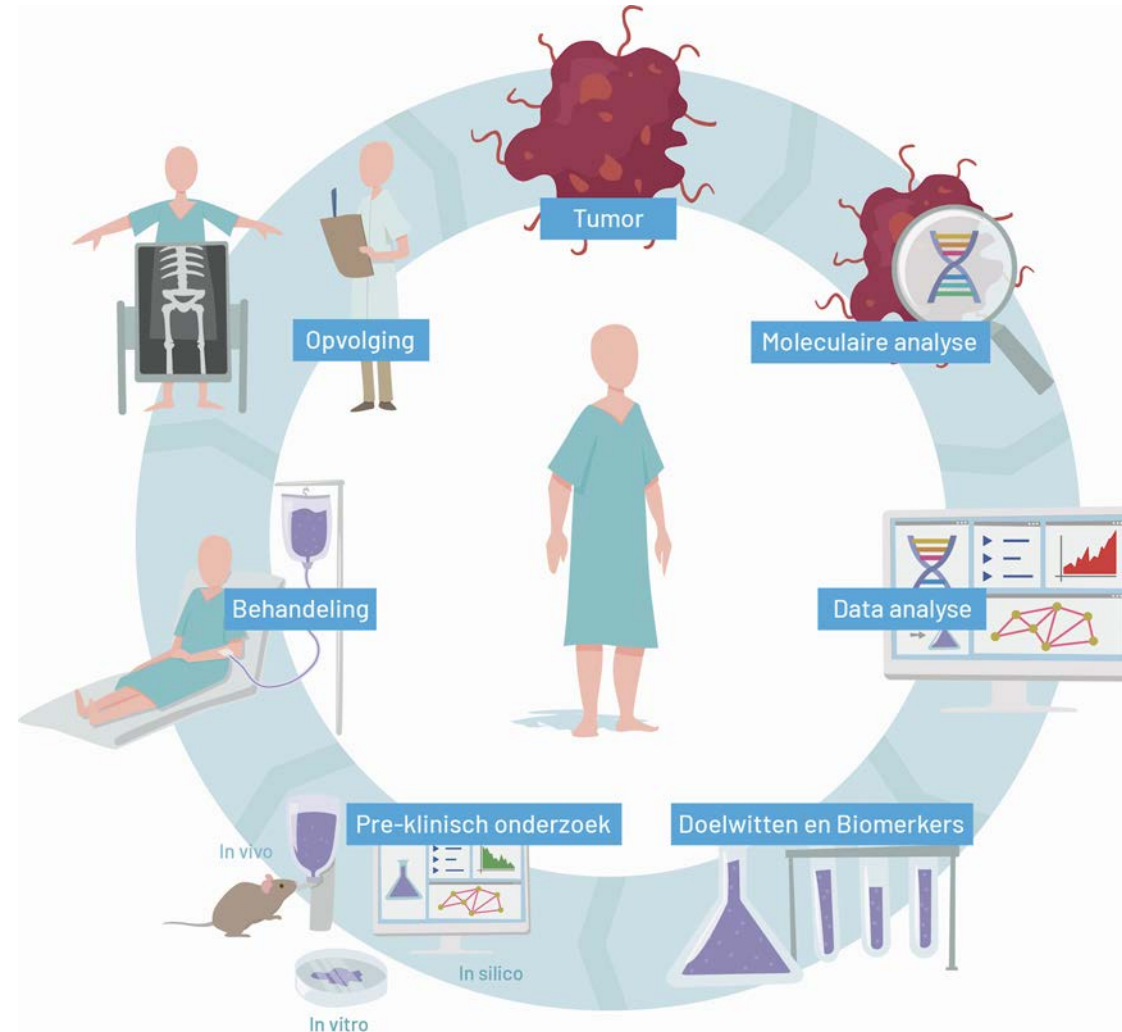
Nieuwe / slimme (combinatie)therapieën



Nieuwe / slimme (combinatie)therapieën



Onderzoekscyclus





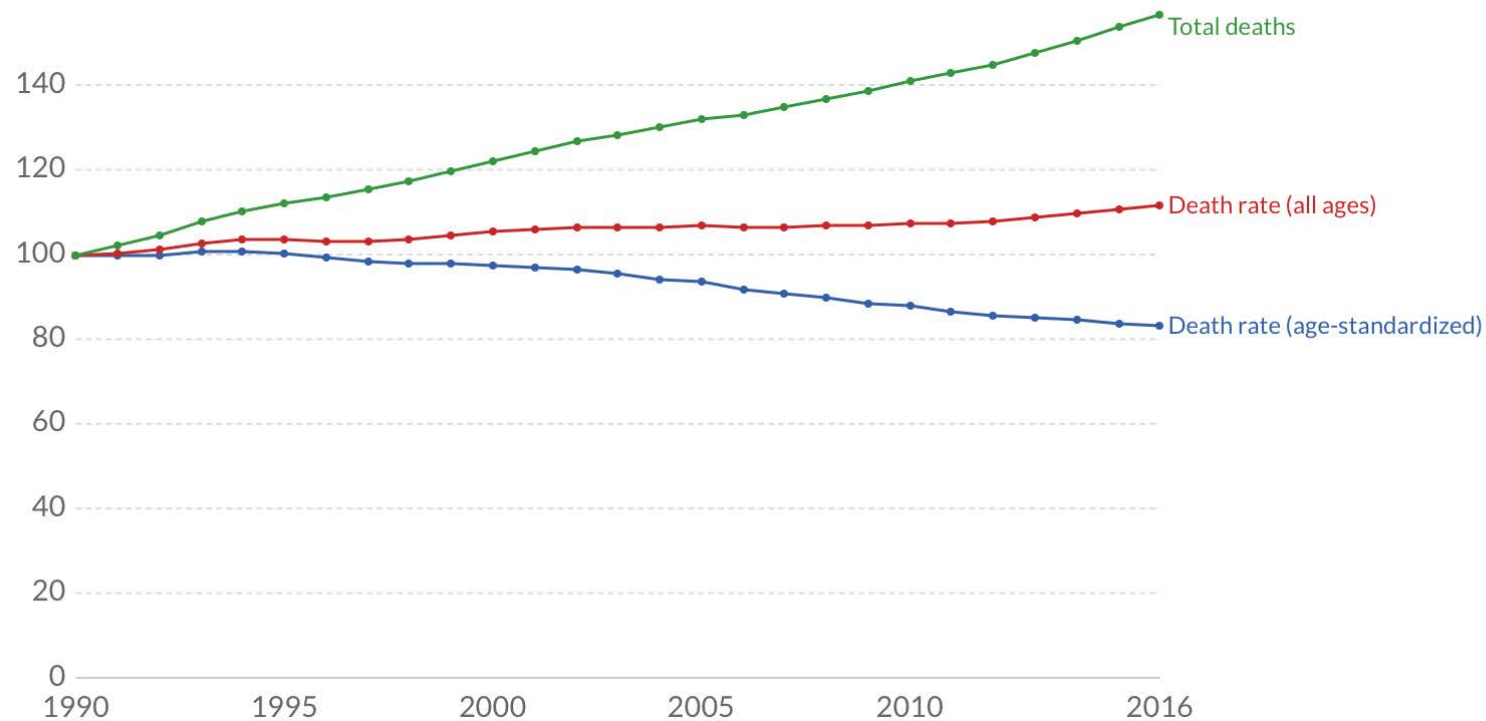


Vorderingen en uitdagingen

Cancer deaths, rate and age-standardized rate index, World

Our World
in Data

Index of absolute number of cancer deaths, the all ages death rate (measured as the number of deaths per 100,000) and age-standardized death rate (assuming a constant population age structure). Figures are indexed to the year 1990, where deaths and rates in 1990 are equal to 100.

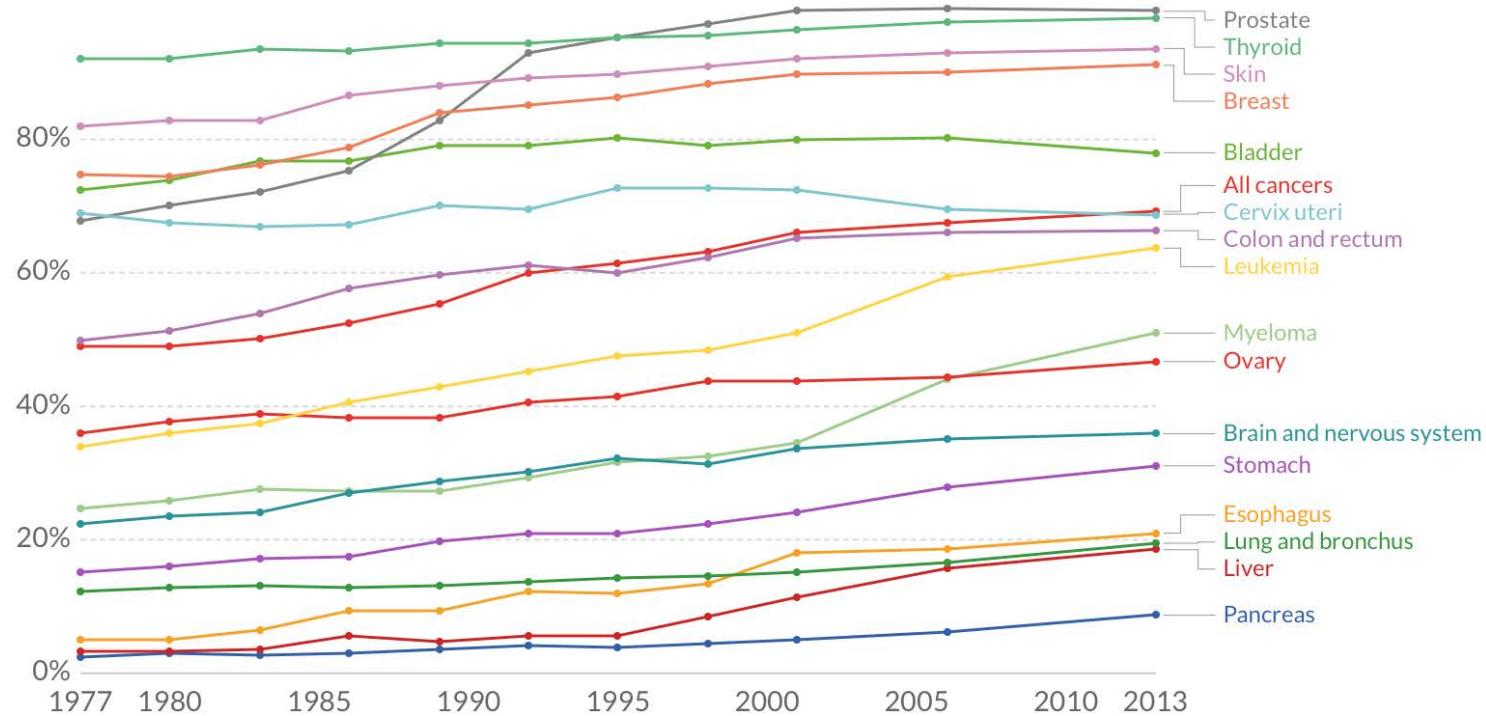


Vorderingen en uitdagingen

Five-year cancer survival rates in the USA, All races, total

Percentage of cancer patients surviving at least five years since diagnosis, by cancer type. This data is available to view by sex and race.

Our World
in Data



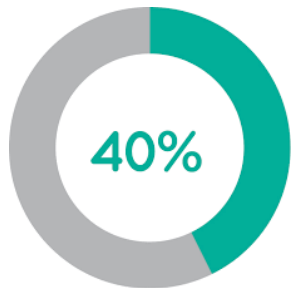
Source: National Cancer Institute

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Kunnen we kanker slim genoeg af zijn?

Waar op inzetten?

Preventie



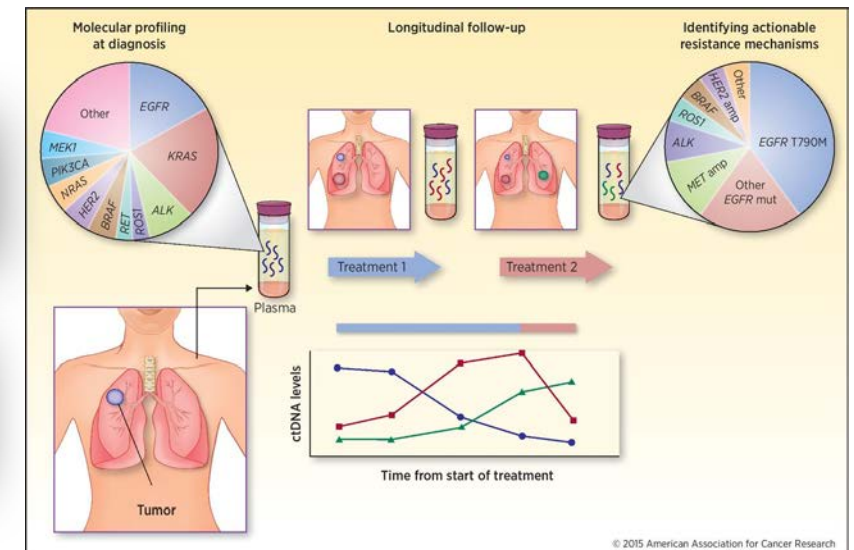
Vroege opsporing



Effectieve behandelingen



Opvolgen en bijsturen



De toekomst

Biomerkers

Opsporing, selectie, opvolging

Doelwitten

Meer selectief en effectief

Slimme combinaties

Moeilijk ontsnappen

Liquid biopsies/ biosensoren



e-health / m-health

Big Data



Slimme geneesmiddelen



Kanker vroeg
opsporen en
langdurig
onderdrukken

→ 'chronische
ziekte'

Leven met/na kanker



- Langdurige en dure behandeling
→ uitdaging maatschappij
- “rond de tumor leeft een mens”
- “Kanker heb je niet alleen”
- Achterblijvers
- De draad weer opnemen



**OUTWARD
BOUND**

De Kampenhoeve



**UZ
LEUVEN**

KU LEUVEN

**LKI
KANKERINSTITUUT**

**“Als we onze Pieter over 5
jaar nog hebben, ga ik eens
echt iets zots doen”**





29 augustus 2019











Beeldje**bij**beeldje.be