From Data to Decision

A knowledge engineering approach to individualise cancer therapy

Erik Roelofs

8 juli 2016

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Van Data tot Besluit

”Een Kennistechnologische aanpak voor geïndividualiseerde kankerbehandeling"

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"Data! Data! Data!"
he cried impatiently.
"I can't make bricks
without clay."
Sherlock Holmes
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MEDICAL
MEDICAL
Health Care
Doctor
Hospital
Pharmacist
Nurse
Dentist
First Aid
Surgeon
Emergency
MEDICAL
MEDICAL
MEDICAL
MEDICAL
Health Care
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Emergency

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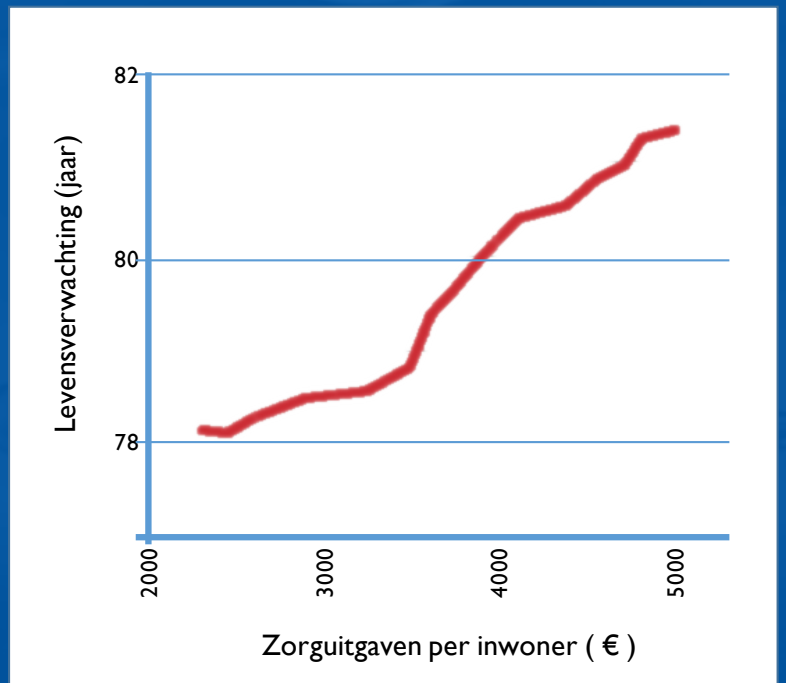
De *puzzel* in de oncologie…

- 105.000 kankerpatiënten (2015)
- 43.214 overleden (2014)
- Zorgkosten en leeftijd stijgen

€ 5000 per hoofd vd. bevolking



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Data, data, data, …

- Patiënt
  - Algemene gezondheid
  - Tumorlocatie, -grootte
  - Uitzaaiingen
  - Genen, DNA
- Behandeling
  - Radiotherapie, chirurgie, chemotherapie
  - Dosis, fracties (straling, chemo)
  - Marges (straling, snijden)
- Resultaten
  - Overleving
  - Kwaliteit van leven:
    (bijv. slikklachten, ademhalingsproblemen, mobiliteit, zelfredzaamheid, angst, etc.)

zie https://youtu.be/ZDJFOxpwqEA

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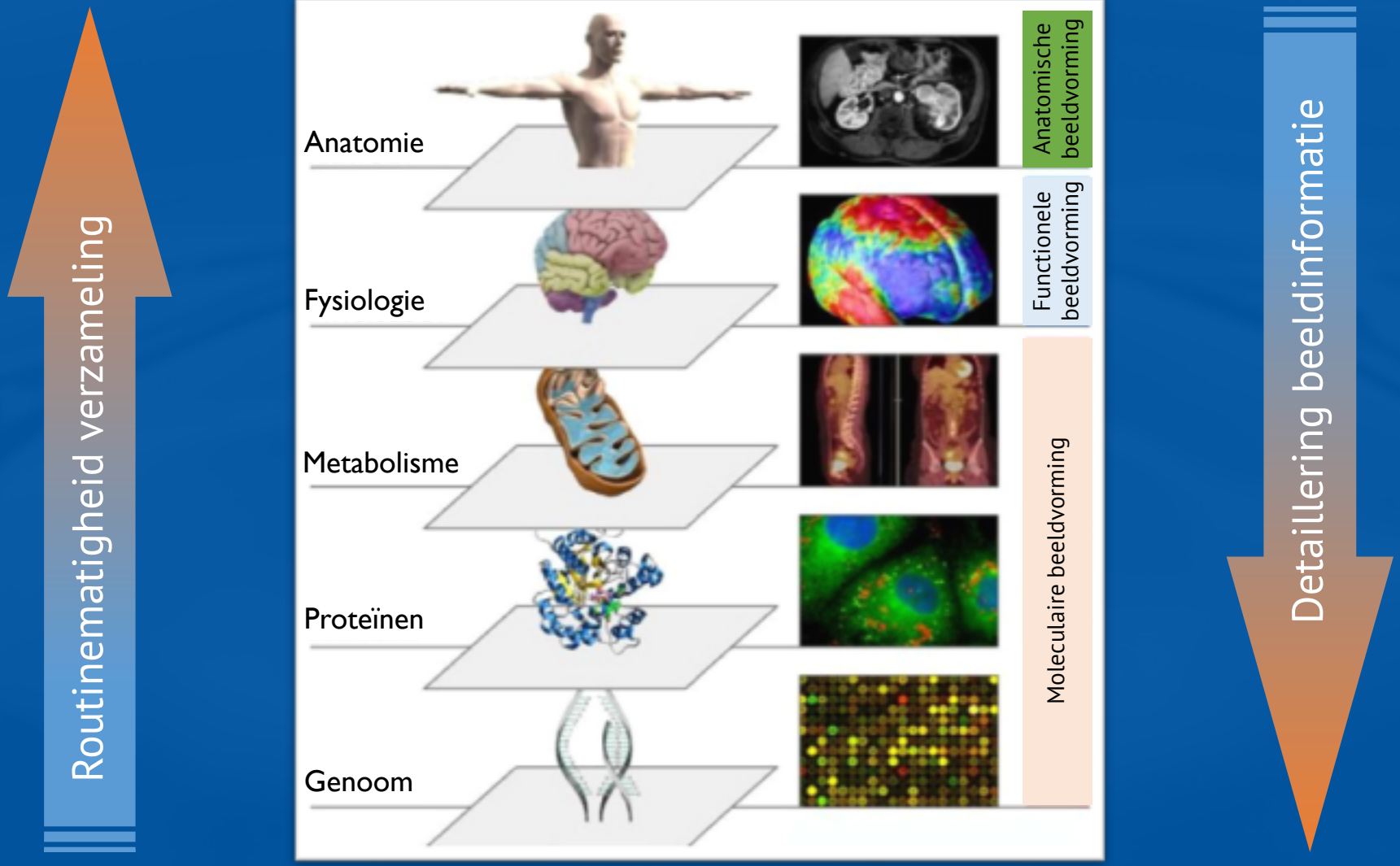
… en heel veel beelden!



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Big Data

- 2/3 petabytes in acad. ziekenhuis

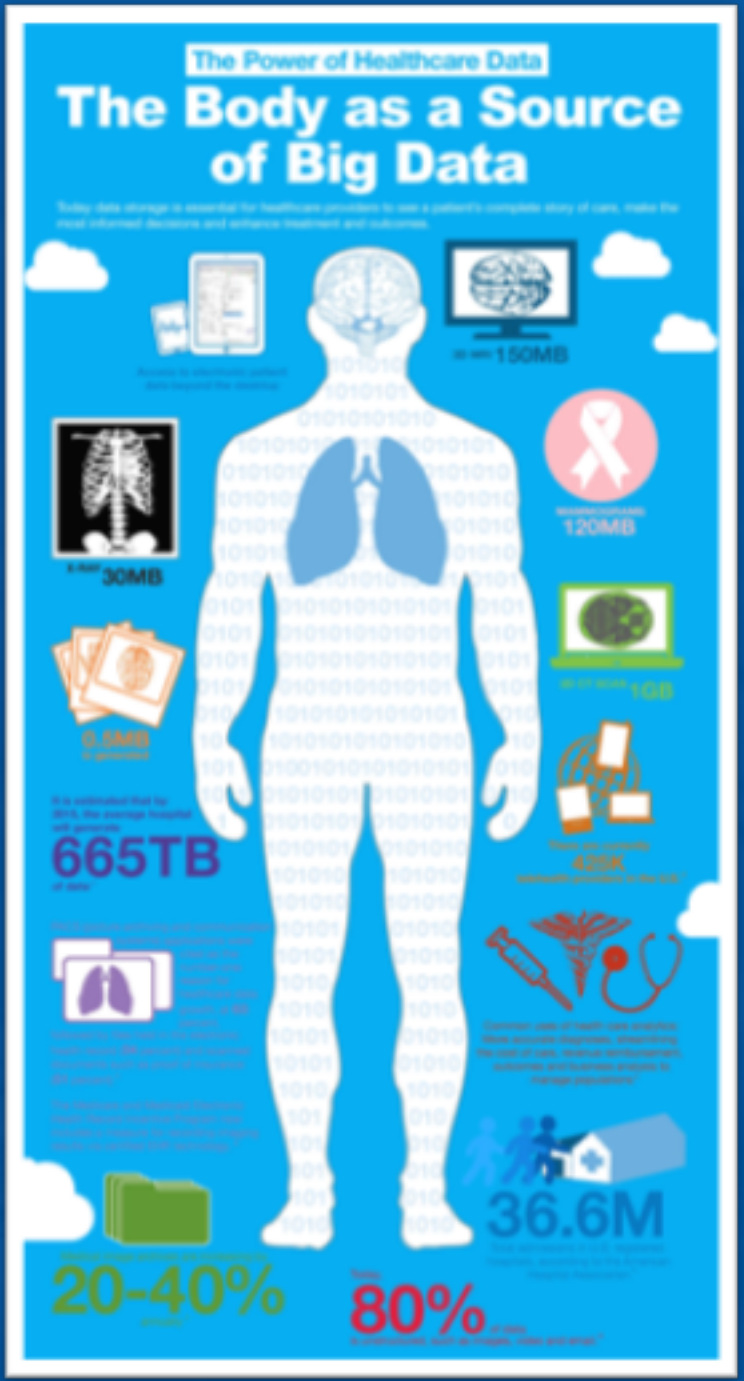
  1500 jaar muziek op mobiel tel.

- 80% beelden

  divers (CT, MR, US, 2D, 3D, 4D)

  ongestructureerd

- Groei 20-40% per jaar



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Problemen met medische data

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MEDICAL
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Doctor
Hospital

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Modelleren in Radiotherapie

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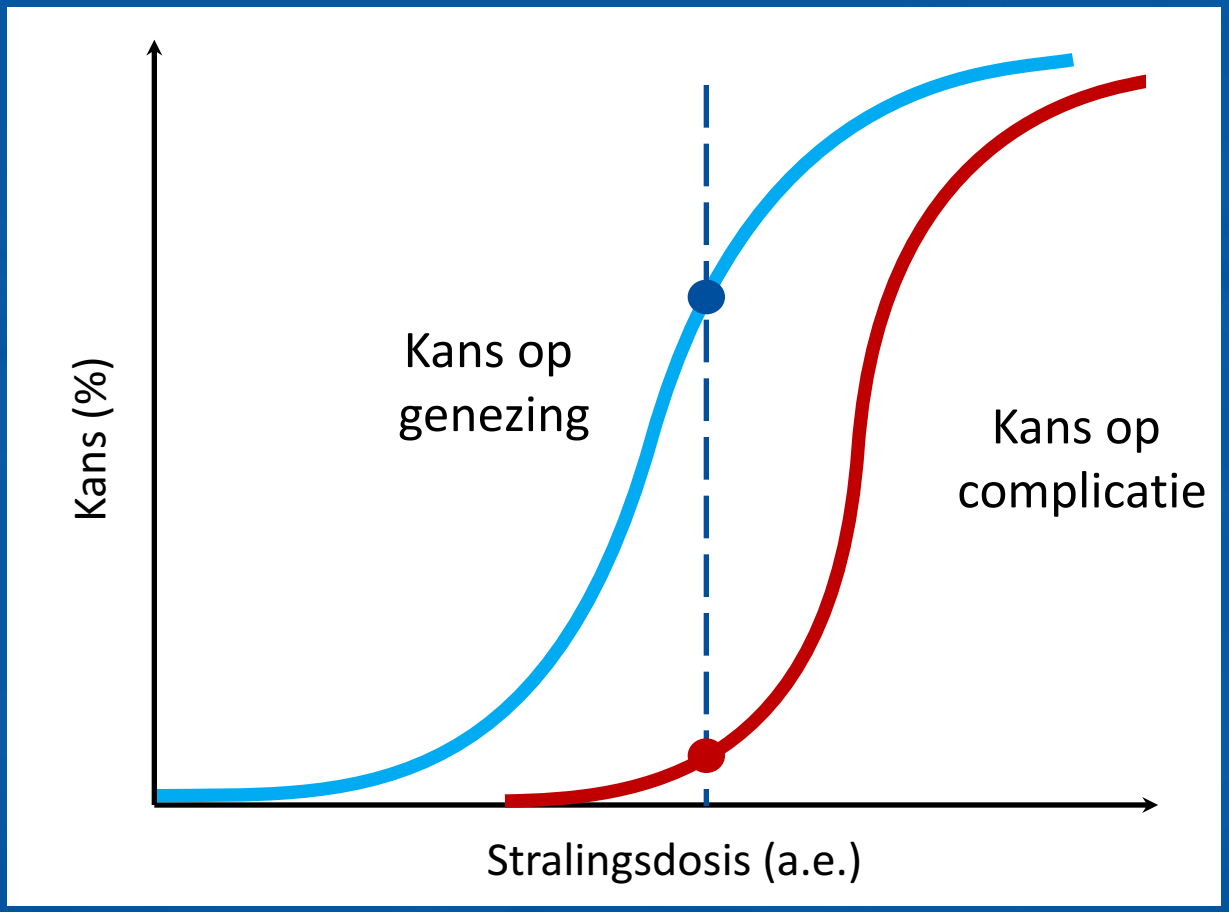
Risico's bij behandelen



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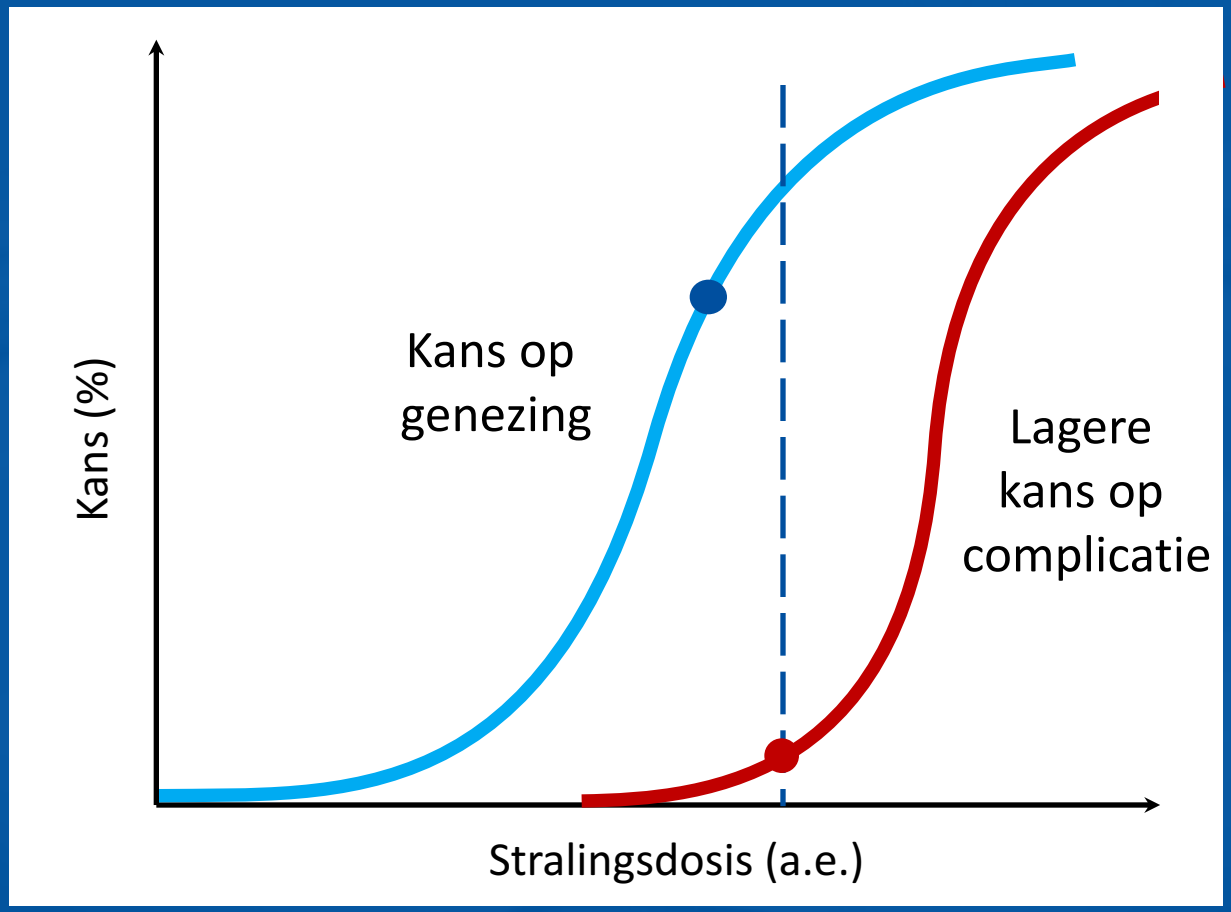
Risico's bij behandelen



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SIDE
EFFECTS
1
EURO
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Input
Hidden
Output
Risk score
low
medium
high
Survival
months after start radiotherapy
EQD2 [Gy]

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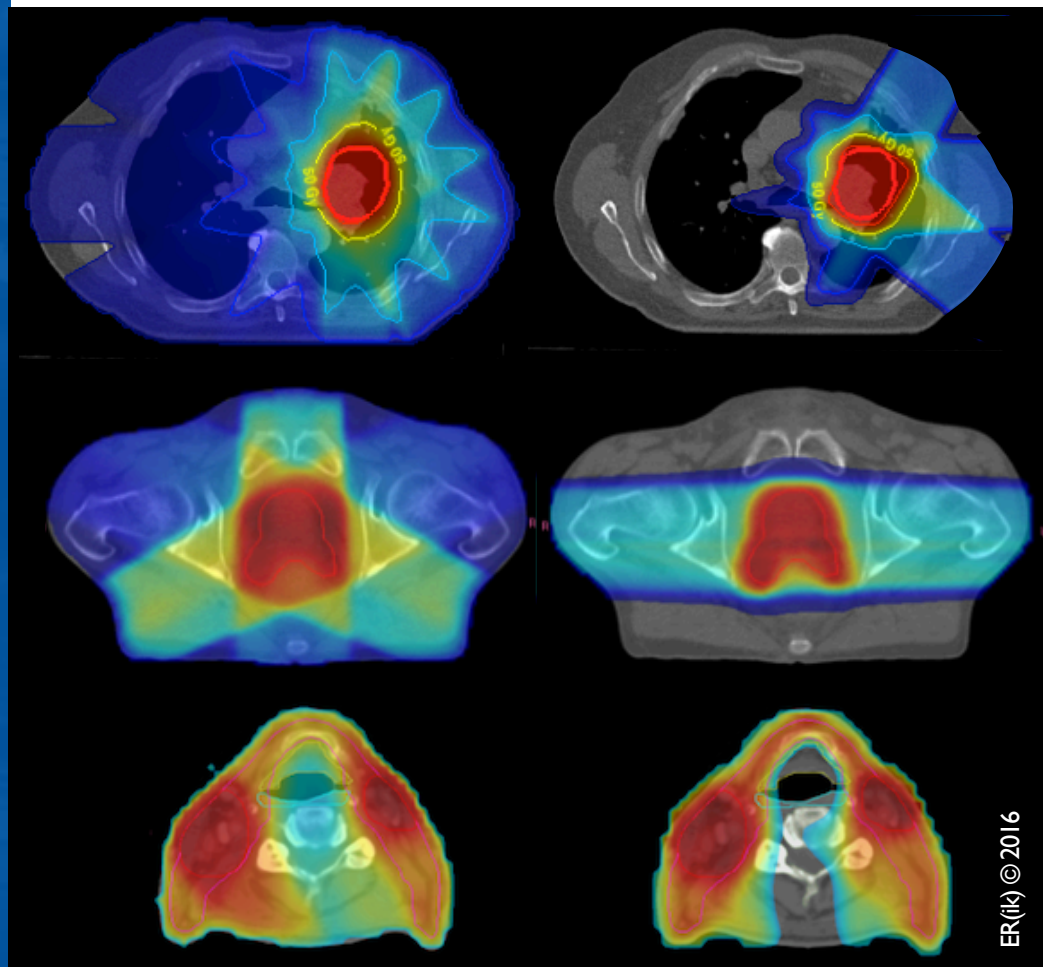
Protonentherapie

ROCOCO

Radiation
Oncology
Collaborative
Cooperation

Internationale vergelij-
king behandeling met
fotonen en protonen



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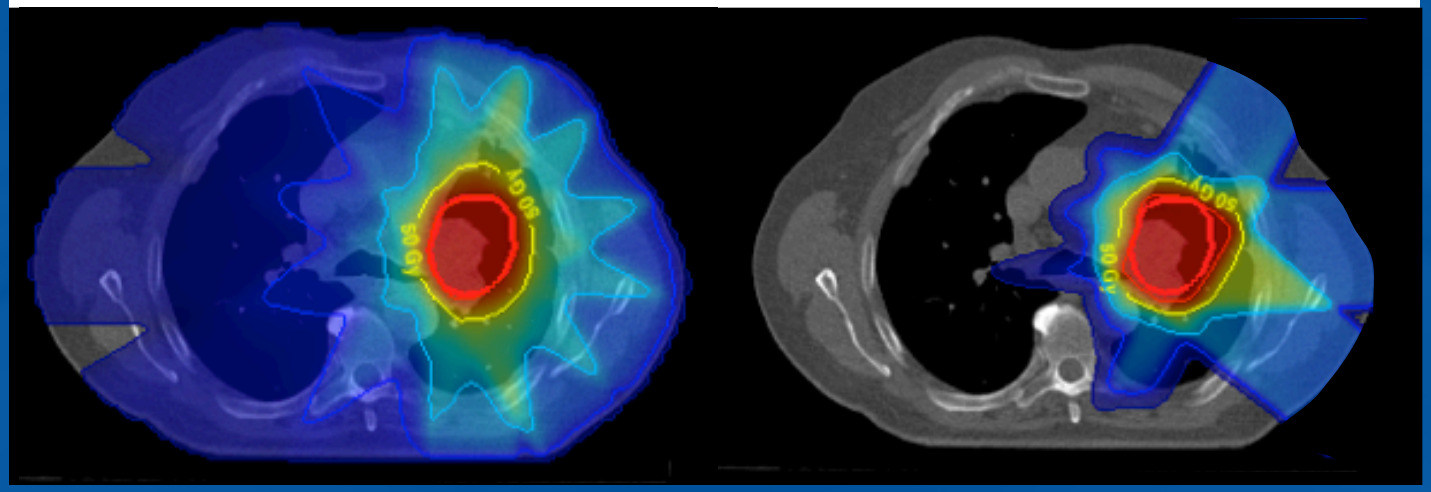
Protonentherapie

Fotonen	Protonen



Reguliere bestraling

- \- veel strooistraling
- \+ doorontwikkeld
- \+ goedkoop

Nieuwe technologie

- \+ spaart weefsel
- \- ‘nieuwe’ technologie
- \- ~3 à 4 keer duurder

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Van Data tot Besluit

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Johan Wolfgang von Goethe

Knowing is
not enough;
we must
apply.

Willing is
not enough;
we must
do.

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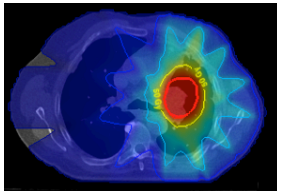
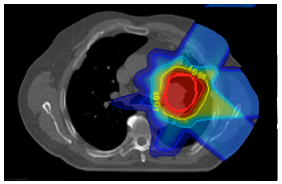
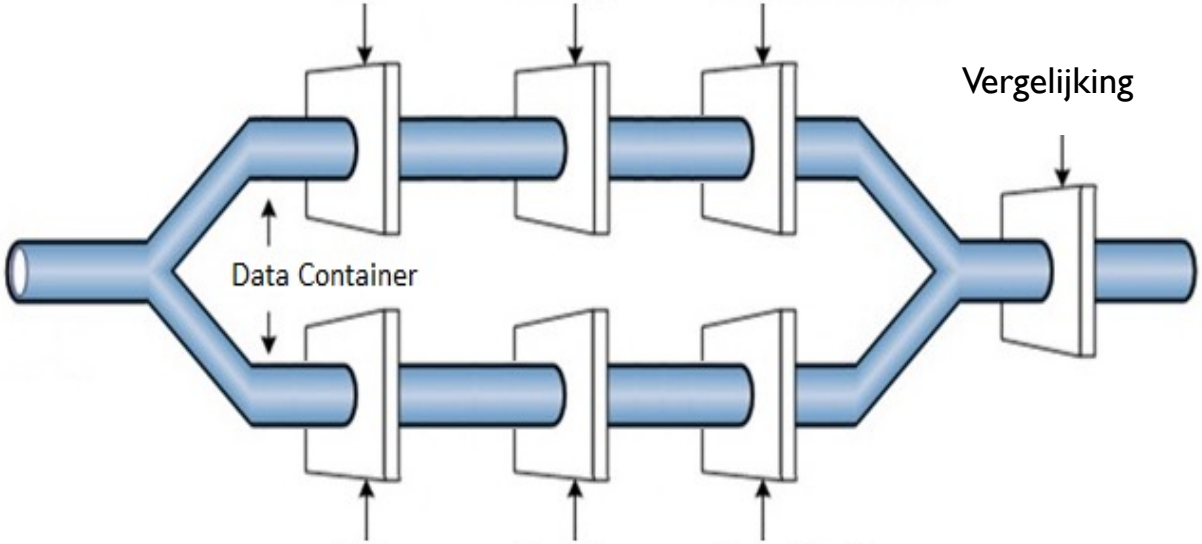
Protontherapie keuzehulp

Proton Decision Support (PRODECIS)

Invoer data







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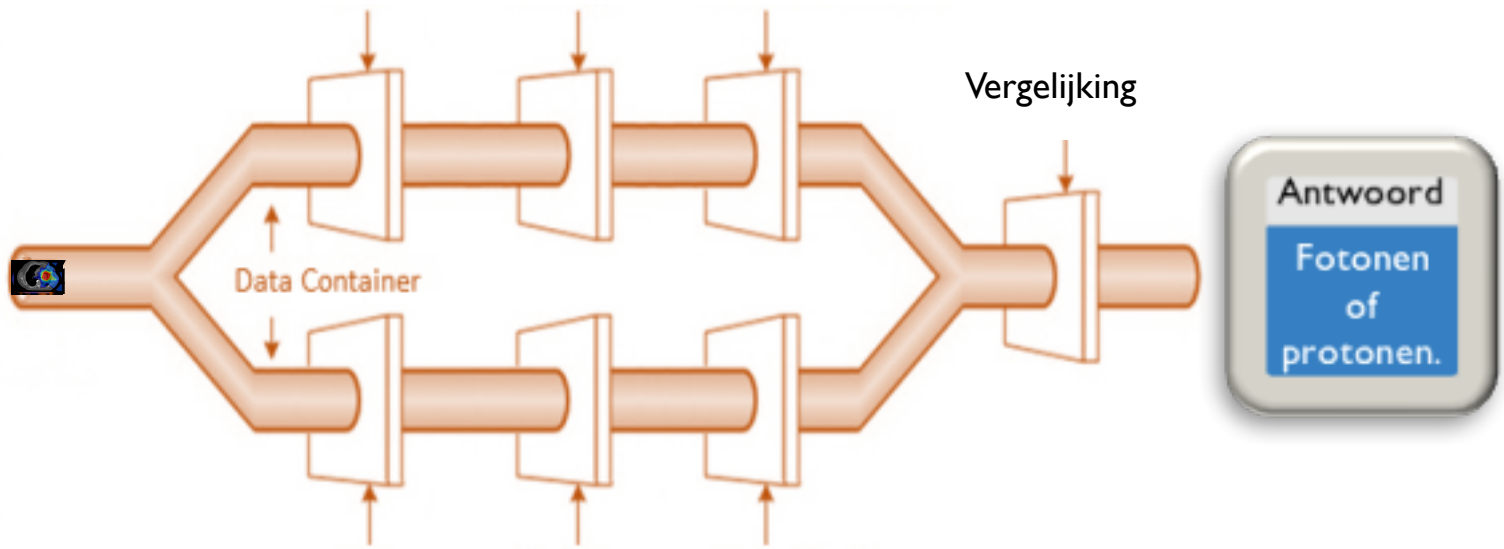
Protontherapie keuzehulp

Proton Decision Support (PRODECIS)

Invoer data



Dosis Complicaties Kosten

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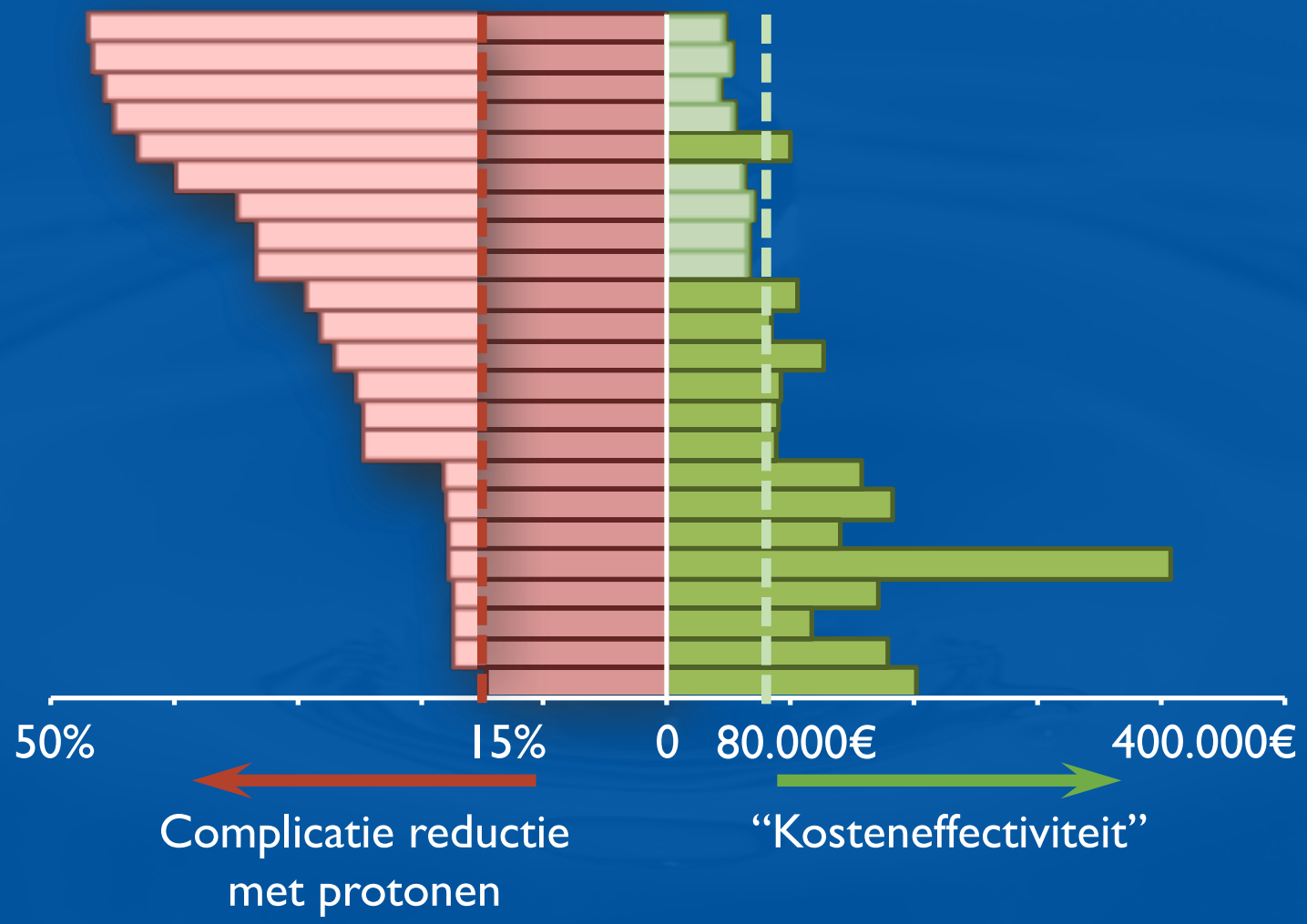
Protontherapie keuzehulp

Proton Decision Support (PRODECIS)



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Van prototype naar product

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Online decision support

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Wereldwijde samenwerking

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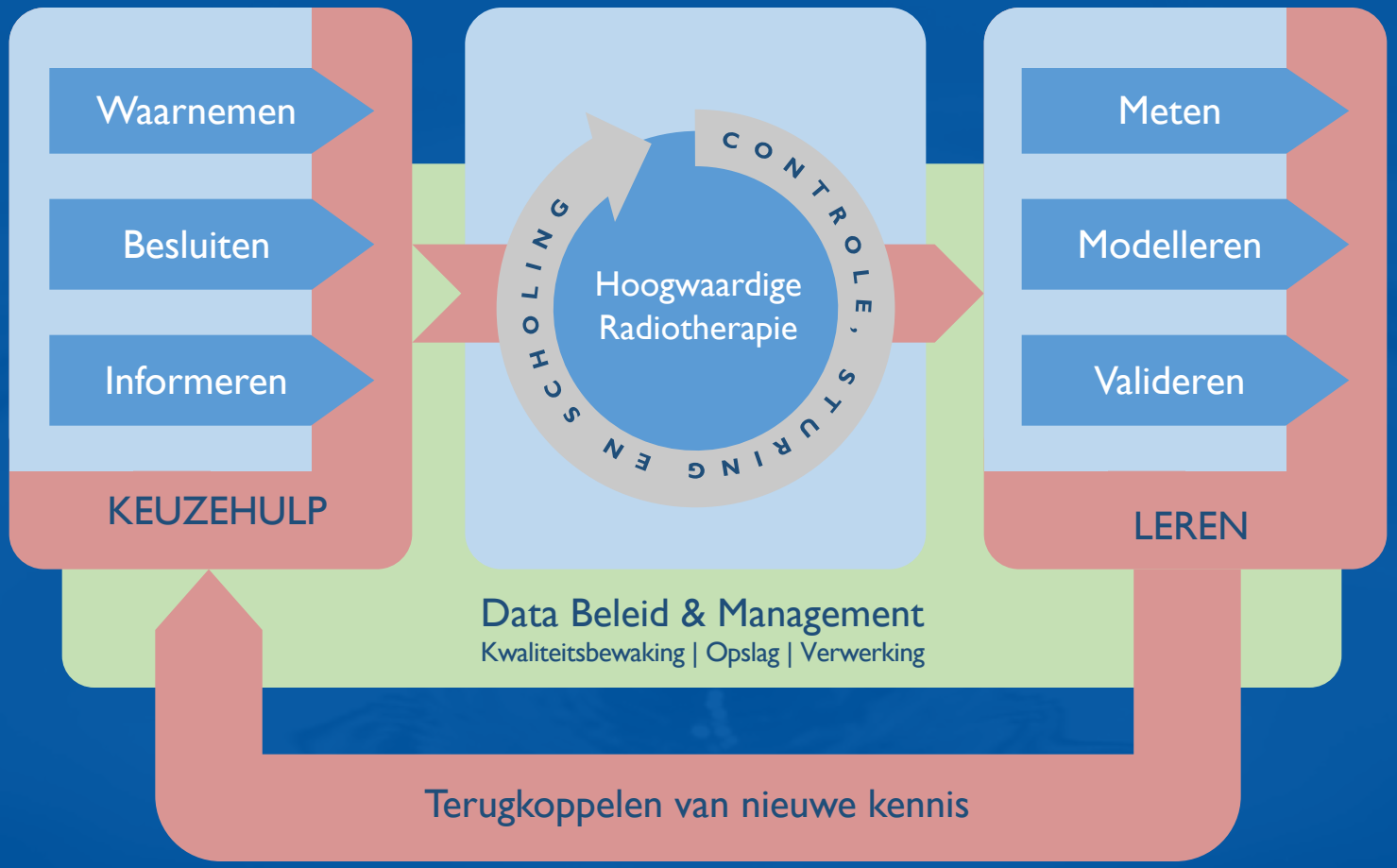
Rapid Learning Healthcare



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