




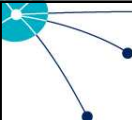
**HER2 positief mamma met  
solitaire /oligo hersenM+:  
SRS**

Katrien Erven, MD, PhD

Radiothereut- Oncoloog

Iridiumkankernetwerk

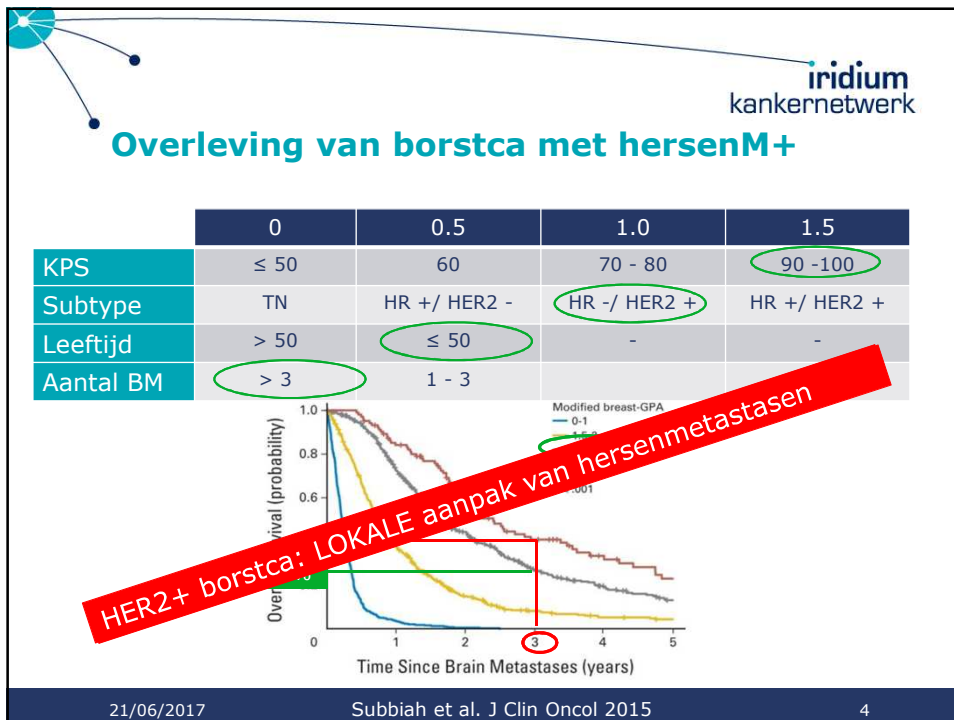
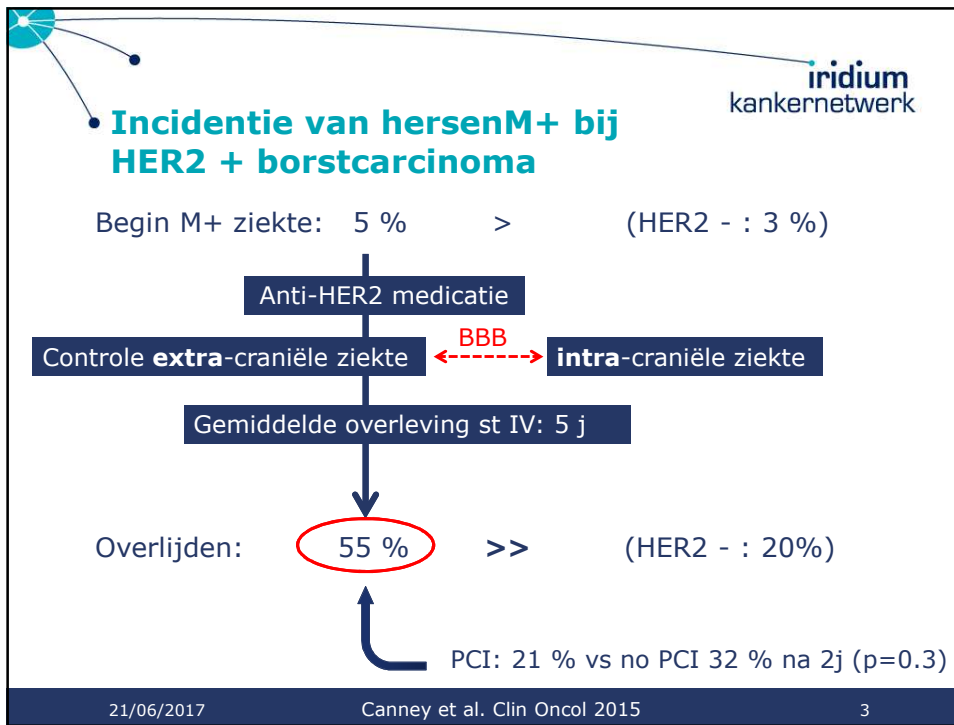
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**Agenda**

- HER2+ borstca met hersenM+
  - Incidentie
  - Prognostische factoren / overleving
- Radiochirurgie (SRS)
  - Kenmerken, resultaten
  - +/- WBRT
  - Tolerantie
  - vs Heelkunde
  - + anti-HER2 medicatie
  - Workflow

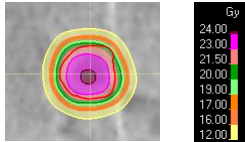
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## • Stereotactische radiochirurgie (SRS): kenmerken

- **Hoge bestralingsdosis**
  - 1 fractie: 'radiochirurgie (SRS)'
    - $\geq 20$  Gy
    - Ifv volume (max diameter):  $> 2$  cm: 18 Gy,  $> 3$ cm: 15 Gy
    - Ifv lokalisatie
  - 2-5 fracties: 'gefractioneerde stereotactische bestraling (fSRT)'
- **Steile dosisgradient**



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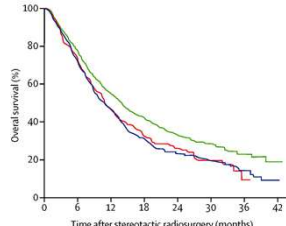
## • Welke hersenmetastasen komen in aanmerking voor SRS ?

- **Kleine** metastasen
  - Maximale diameter  $< 3$  cm
- **Beperkt aantal** metastasen
  - Maximaal 4: ~~ovv~~ ~~techniek~~ / ~~kloniek~~

Volume, KPS, controle extra-craniële ziekte

- 5 - 10

Group	Median overall survival, months (95% CI)	HR (95% CI)	p value
1 tumour	13.9 (12.0-15.6)	0.76 (0.66-0.88)	0.0004
2-4 tumours	10.8 (9.4-12.4)	Reference	
5-10 tumours	10.8 (9.1-12.7)	0.97 (0.81-1.18)	0.78



21/06/2017 Yamamoto et al. Lancet Oncol 2014 6

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## Resultaten van SRS

### Lokale controle (1j): 80-90 %

**Onafhankelijk van**

- Radioresistente / radiosensitieve tumor

**Afhankelijk van**

- Volume metastase (n)

$p < 0.001$

21/06/2017      Wolf et al. J of Neurosurg. 2017      7

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## Is WBRT nog aan de orde ?

1- 4 hersenM+: WBRT + SRS versus SRS  
 <math>< 3 / 3,5 \text{ cm}</math>  
 KPS  $\geq 70$

	Ayoma et al. <sup>1</sup>	Kocher et al. <sup>2</sup>
LC	89% vs 73% (1j)*	81% vs 69% (2j)*
DC	59% vs 36% (1j)*	67% vs 52% (2j)*
OS	39% vs 28% (1j)	10,7 m vs 10,9 m

\*p<0,05

21/06/2017 Ayoma et al. JAMA 2006; <sup>2</sup> Kocher et al. JCO 2011      8

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## Is WBRT nog aan de orde ?

1-4 hersenmetastasen: **WBRT + SRS** versus **SRS**  
 < 3 / 3,5 cm  
 KPS ≥ 70

	Brown <i>et al.</i>
Cognitieve achteruitgang na 3 m	92 % vs 64 % *
QOL	-12 vs -0.1 *

\*p<0,05

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Brown *et al.* JAMA 2016
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## SRS vs WBRT

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• Welke lokale behandeling kiezen:  
**resectie** of **SRS ?**

- Pathologische diagnose
- Snellere verbetering neurologische klachten

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• Welke lokale behandeling kiezen:  
**resectie** of **SRS ?**

- Pathologische diagnose
- Snellere verbetering neurologische klachten

- Minder invasief
- Kosteneffectief
- Ambulant
- Meerdere letsels tegelijk behandelen
- Geen onderbreking systemische therapie
- Lage morbiditeit / toxiciteit

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**Welke lokale behandeling kiezen:  
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- Pathologische diagnose
- Snellere verbetering neurologische klachten
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- Letsels > 2 à 3 cm
- Pathologie vereist
- Veel oedeem (midline shift > 1 cm)

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**Resectie + / - SRS tumorbed**

131 patienten  
1- 3 hersenM+

Volledige resectie van  $\geq 1$  hersenM+: Resectie vs Resectie + SRS

LC	45%	vs	72%	(1j)*
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\*p<0,05

21/06/2017 Rao et al. Neurosurg. 2016 14

## Hoe wordt SRS verdragen ?

- Acute toxiciteit: zeer beperkt !
  - Toename **peritumoraal oedeem** waardoor tijdelijk toename neurologische klachten, hoofdpijn, nausea, E-aanval.
    - R/ cortisone
- Late toxiciteit:
  - **Radionecrose** (radiografisch: < 10% - 30%, symptomatisch: < 4%)
    - Geassocieerd met tumordiameter
    - DD tumorprogressie
    - R/ cortisone, bevacizumab, chirurgische decompressie

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## Een voorbeeld van radionecrose

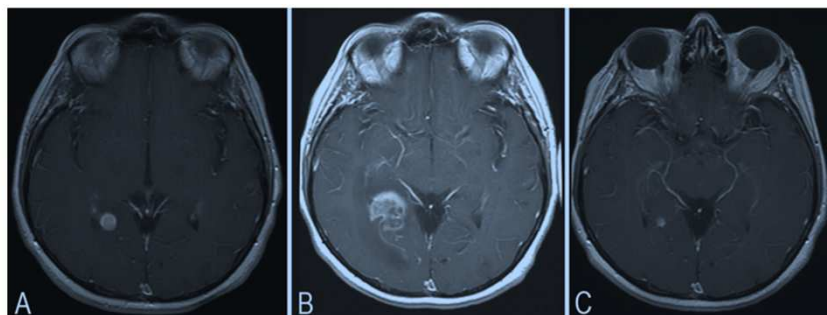


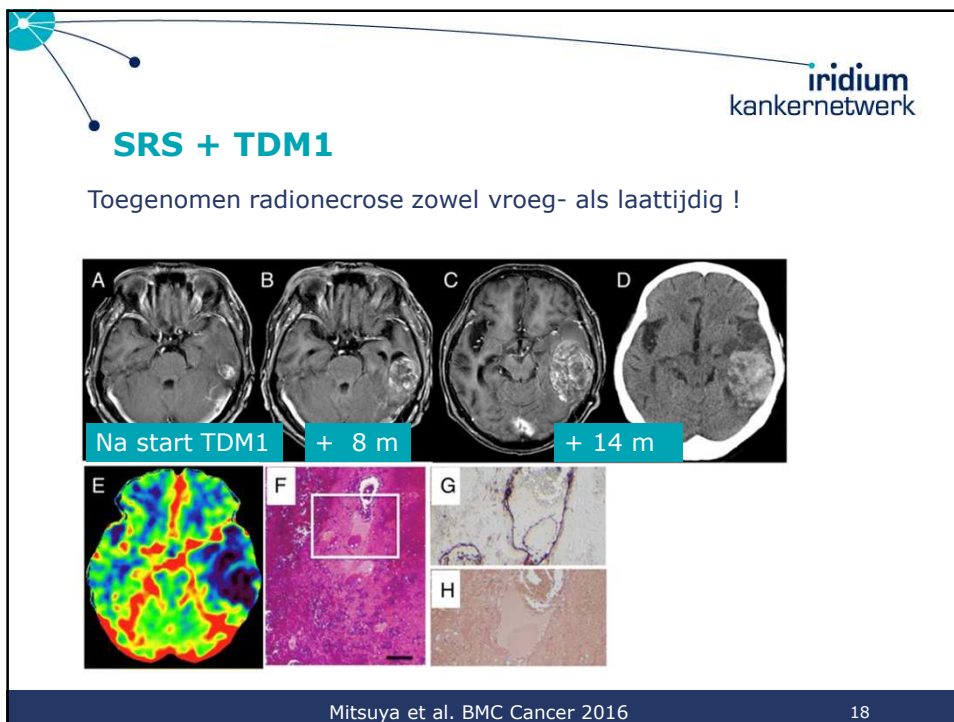
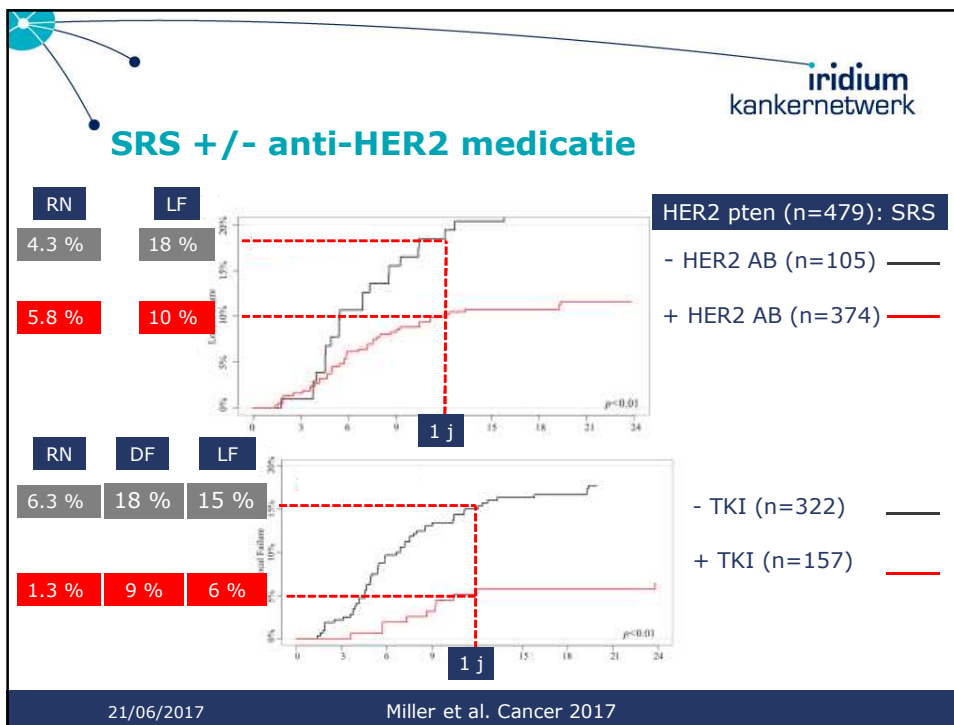
FIG. 1. **A:** Treatment-planning MR image showing the lesion treated with SRS on the day of GK treatment. **B:** MR image showing an initial increase in lesion size 6 months after GK surgery. **C:** MR image showing spontaneous resolution/reduction in size of the previously enlarging lesion 9 months after GK surgery.

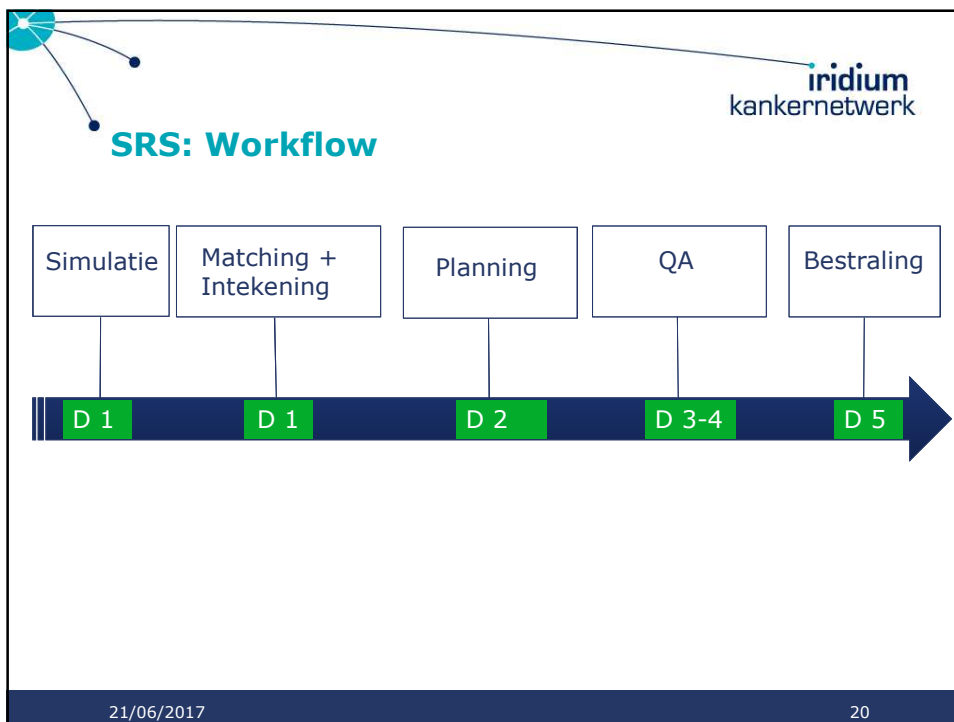
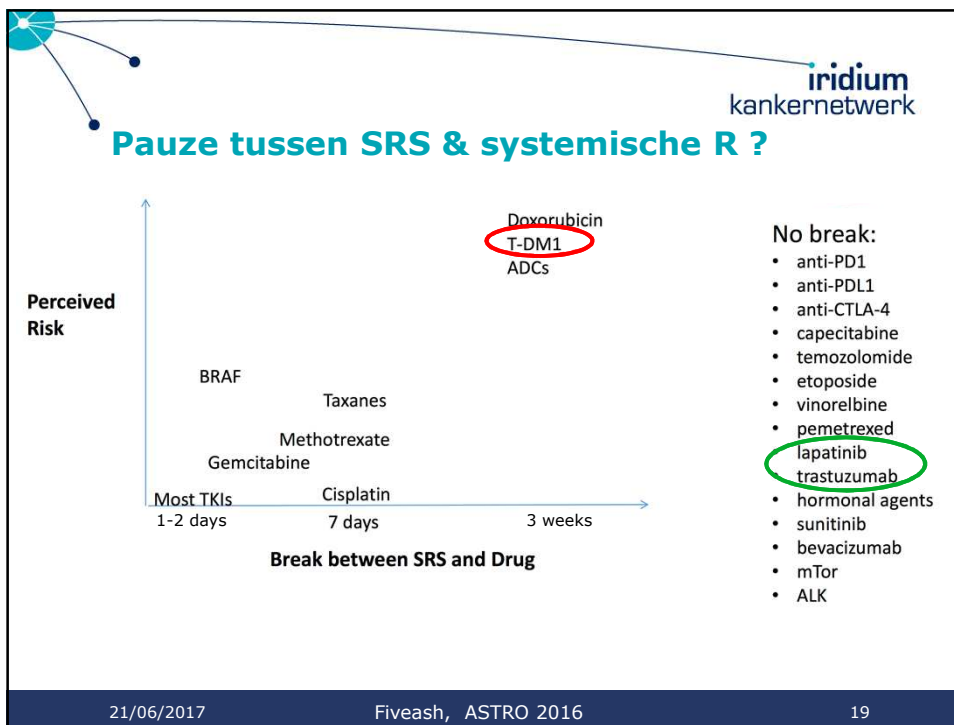
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Colaco et al. J Neurosurg 2016

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Simulatie

D 1

- Stereotaxiemasker
  - Dubbel
  - Bijtstokje
  - Open aangezicht
- CT met contrast
- MR neuronavigatie

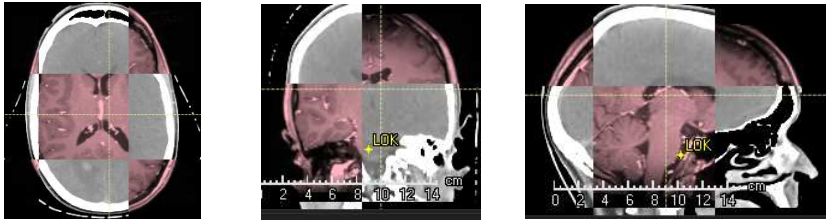



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Simulatie    Matching + Intekening

D 1    D 1



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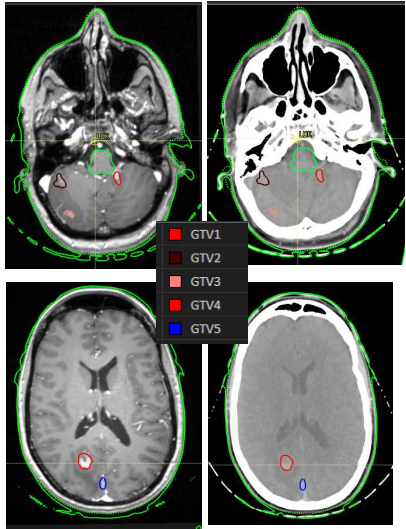
Simulatie

Matching + Intekening

D 1

➔

D 1



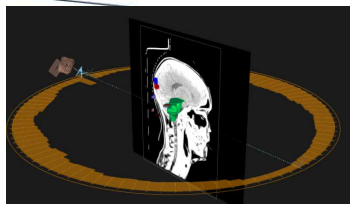
- BODY
- BOX
- Brainstem
- Chiasm
- Retina\_L
- Retina\_R
- GTV\_Total
- Brain
- NS\_O2\_Ring\_2
- Skin
- Lens\_L
- Lens\_R
- OpticNerve\_L
- OpticNerve\_R
- Cochlea\_R
- Cochlea\_L
- Pituitary
- Cornea\_L
- Cornea\_R
- LacrimalGland
- LacrimalGland
- OrbitaAnterior
- OrbitaAnterior
- NS\_Brain-GTV
- A\_Carotid\_R
- A\_Carotid\_L
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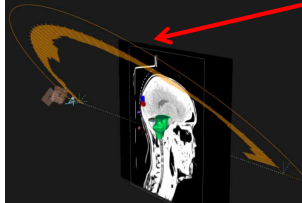
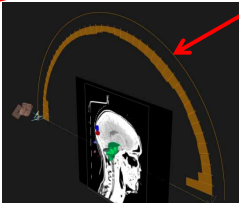
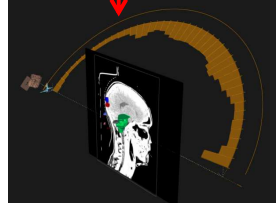
Simulatie

Matching + Intekening

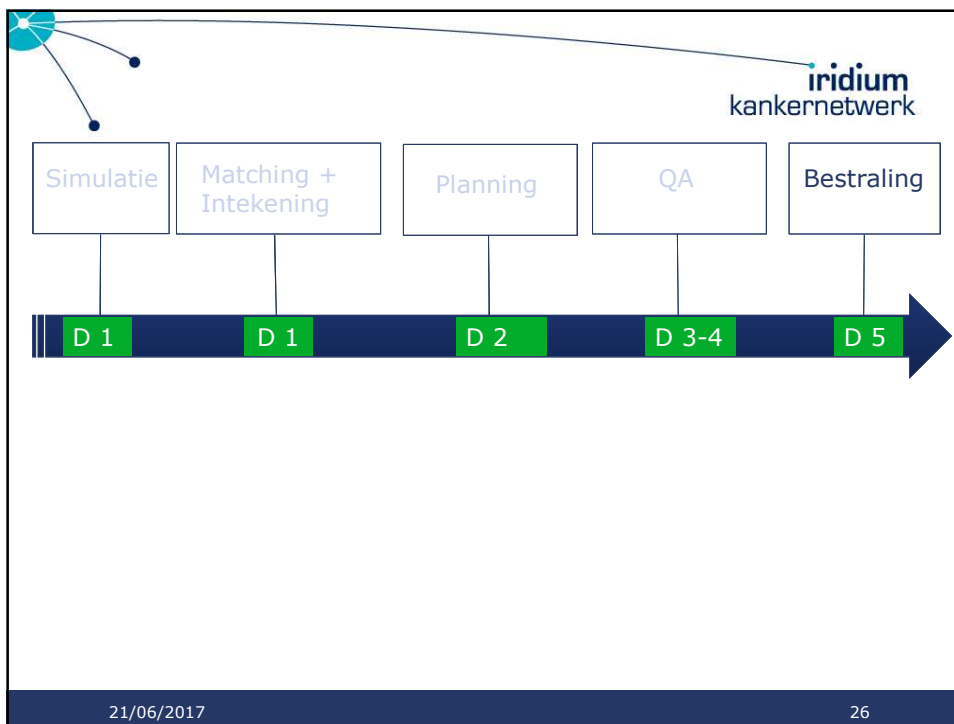
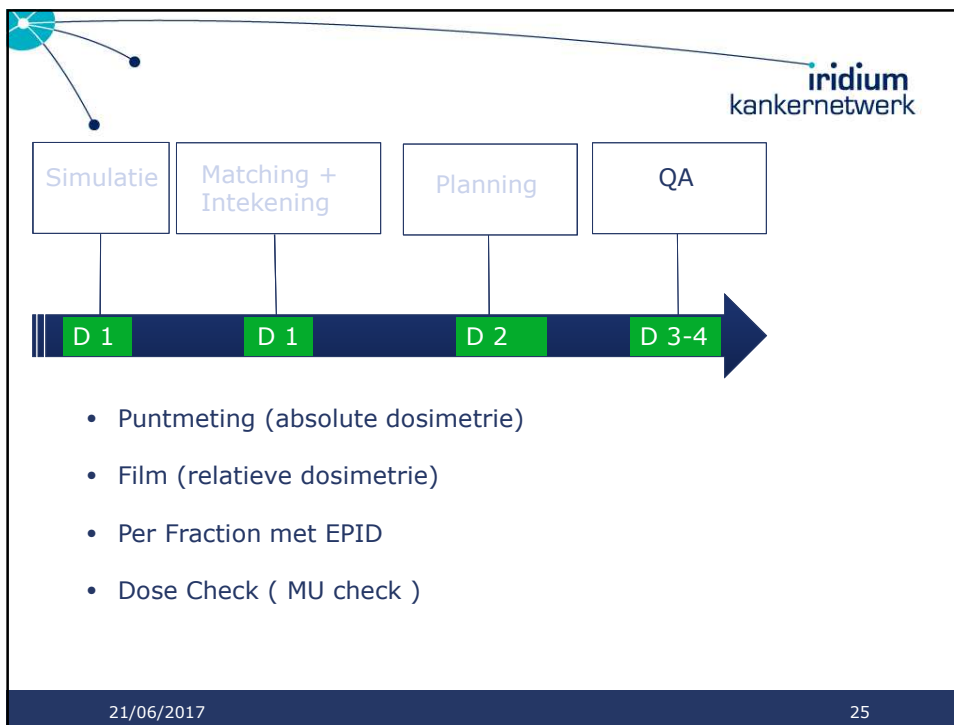
Planning



No.	Eye	Name	Energy [MV]	Gantry start angle [deg]	Gantry stop angle [deg]	Rotation	Coll. angle [deg]	Touch angle [deg Non-IEC]
1	👁	1ARC CCW TR0	6	179.9	180.1	Counterclockwise	45.0	0.0
2	👁	2ARC CW TR0	6	180.1	179.9	Clockwise	35.0	0.0
5	👁	5PART ARC TR315	6	180.1	0.0	Clockwise	335.0	315.0
3	👁	3PART ARC TR90	6	179.9	0.0	Counterclockwise	25.0	90.0
4	👁	4PART ARC TR45	6	179.9	0.0	Counterclockwise	345.0	45.0

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## Screening naar BM van HER2 + patienten ?

ASCO guidelines on HER2 + pts:

- 'routine surveillance with brain MRI **should** be considered in the setting of **any** neurological symptoms or signs of brain involvement'
- 'low threshold for performing brain imaging in the setting of any neurological symptoms or signs of brain involvement'

Toward the complete control of BM using surveillance screening and SRS

Identify tumors when they are small, **routine surveillance** brain imaging **should** be considered as part of the standard of care for lung, breast, and melanoma metastases.'

