



Evolutie in de radiotherapie

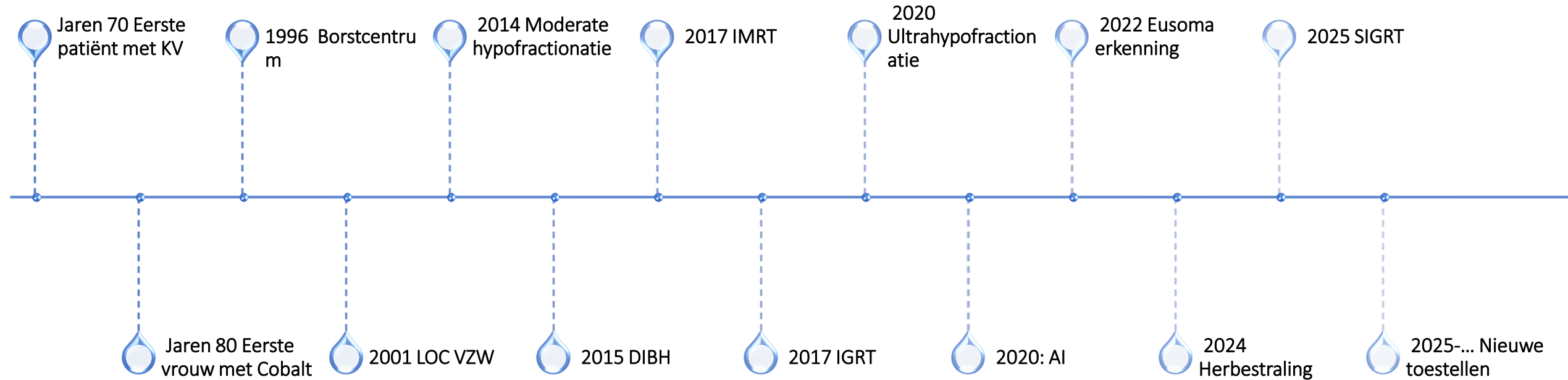
Dr. Anne-Sophie Van de Velde

Radiotherapeut Jessa

Inhoud

- Historie in Limburg
- Waarom radiotherapie ?
- Uitdagingen
- Oplossingen
 - Dosis/fractionatie schema's
 - Technische innovaties
- Radiotherapie van morgen in Limburg
- Ons team

Van verleden tot heden in Limburg



LOC vzw: Limburgs Oncologisch Centrum vzw

DIBH: Deep Inspiration Breath Hold

IMRT: Intensity Modulated Radiation Therapy

IGRT: Image Guided Radiation Therapy

AI: Artificial Intelligence

SIGRT: Surface Image Guided Radiation Therapy



Radiotherapie:

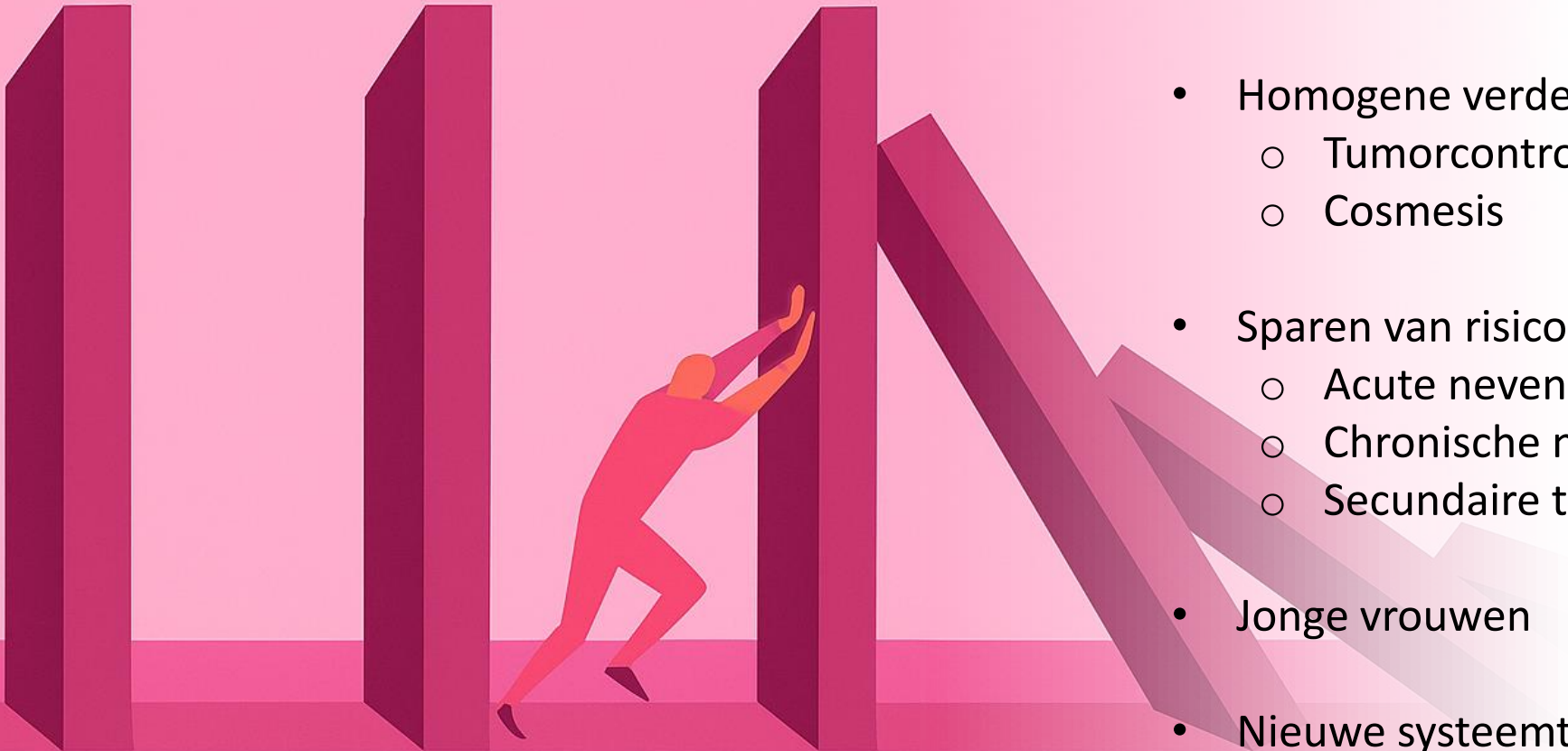
- **Radiotherapie** is een medische discipline waarbij gebruik gemaakt wordt van **ioniserende straling** als **therapie**
- **Ioniserende straling** beschadigt het DNA in de cel
- Bij voldoende schade kunnen cellen niet meer delen en sterven ze af
- **Repairmechanismen**: defect bij kankercellen -> fractionatie!
- **Doel**: streven naar zoveel mogelijk straling op de kankercellen en zo weinig mogelijk straling op gezonde cellen
- Radiotherapie is **teamwork**

Radiotherapie en borstkanker

- **Doel:**
- Residuele microscopische ziekte elimineren in de borst/thoraxwand/klierstreken
- **Resultaat:**
 - Lokaal recidief ↓
 - Borstkanker sterfte ↓
- **Na borstsparende heekunde**
 - Altijd radiotherapie bij invasieve tumoren
- **Na mastectomie**
 - Bij risico factoren:
 - Klier aantasting
 - Grote tumoren
 - Gradering
 - Lymfevatinvasie
 - R1/R2 resectie

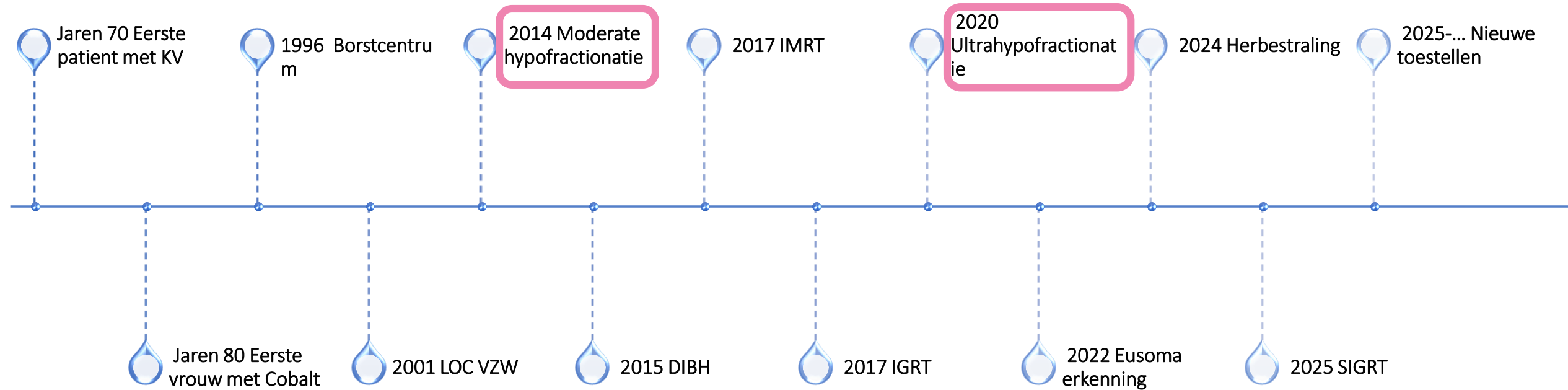


Uitdagingen in radiotherapie



- Homogene verdeling borst
 - Tumorcontrole
 - Cosmesis
- Sparen van risico organen
 - Acute nevenwerkingen
 - Chronische nevenwerkingen
 - Secundaire tumoren
- Jonge vrouwen
- Nieuwe systeemtherapieën -> toxiciteit
- Lange levensverwachting

Evolutie: Dosis/fractionatie



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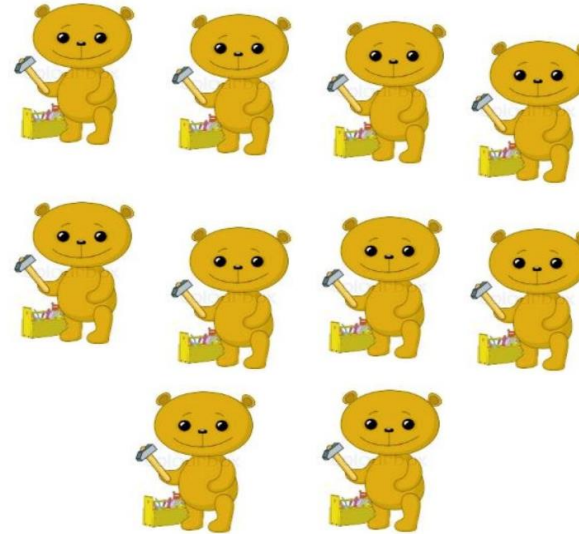
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Evolutie in dosis/fractionatie

Hypofractionated radiotherapy is the delivery of fewer and hence larger (>2 Gy) doses of radiotherapy for the same biological effect



1 X 10 Gy

10 x 1 Gy



2017: Moderate hypofractionation

The UK Standardisation of Breast Radiotherapy (START)
Trial B of radiotherapy hypofractionation for treatment of
early breast cancer: a randomised trial

Inclusion 1999-2001, 23 centres in UK
Tumour < 5 cm and N0-1a
(92% lumpectomy, 74% pN0, 64% T<2 cm,
72% Tam, 15% Tam+CT)

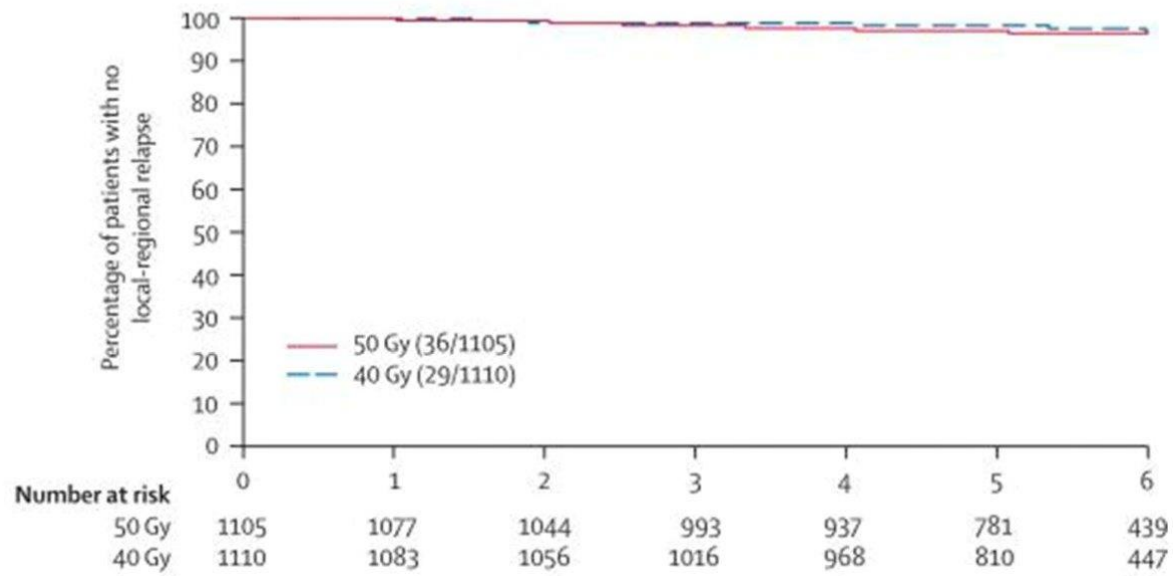
2215 pts 

- 40 Gy / 15 fractions, 2.67 Gy / fr
- 50 Gy / 25 fractions, 2.0 Gy / fr

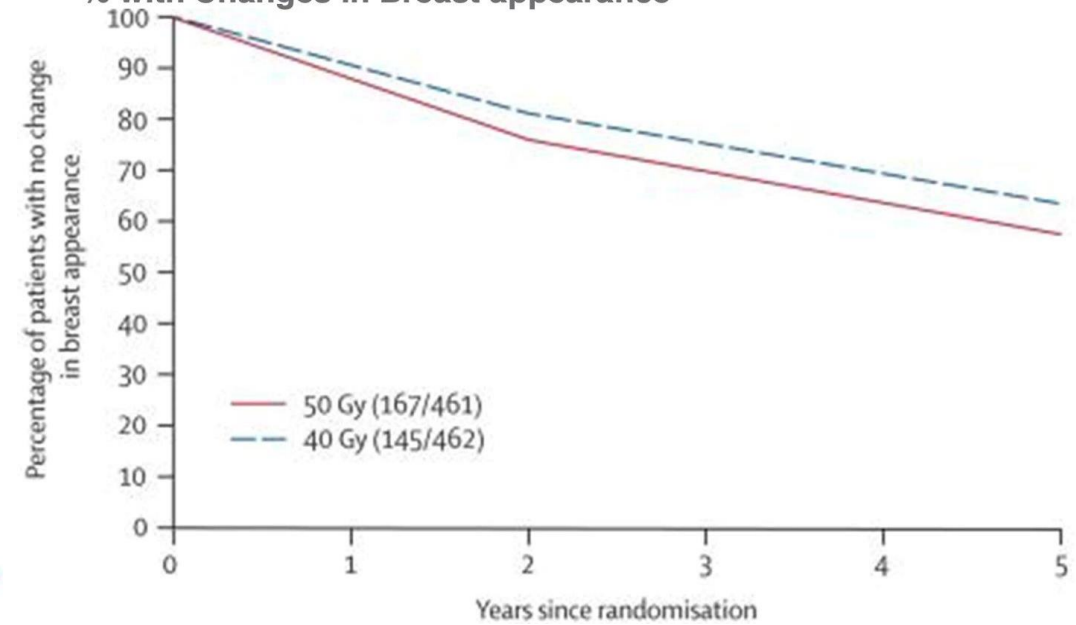
Endpoints: local control and morbidity
Median follow-up 6.0 years



A



% with Changes in Breast appearance



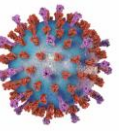
Trend minder nevenwerkingen ten voordelen van hypofractionatie

Minder krimpen van de borst

Minder fibrose van de borst

Minder zwellings

Minder veranderingen in huidskleur



2020: Ultra-hypofractionatie

Hypofractionated breast radiotherapy for 1 week versus 3 weeks (FAST-Forward): 5-year efficacy and late normal tissue effects results from a multicentre, non-inferiority, randomised, phase 3 trial



Adrian Murray Brunt, Joanne S Haviland*, Duncan A Wheatley, Mark A Sydenham, Abdulla Alhasso, David J Bloomfield, Charlie Chan, Mark Churn, Susan Cleator, Charlotte E Coles, Andrew Goodman, Adrian Harnett, Penelope Hopwood, Anna M Kirby, Cliona C Kirwan, Carolyn Morris, Zohal Nabi, Elinor Sawyer, Navita Somaiah, Liba Stones, Isabel Syndikus, Judith M Bliss†, John R Yarnold†, on behalf of the FAST-Forward Trial Management Group*



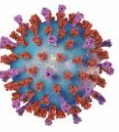
Summary

Background We aimed to identify a five-fraction schedule of adjuvant radiotherapy (radiation therapy) delivered in 1 week that is non-inferior in terms of local cancer control and is as safe as an international standard 15-fraction regimen after primary surgery for early breast cancer. Here, we present 5-year results of the FAST-Forward trial.

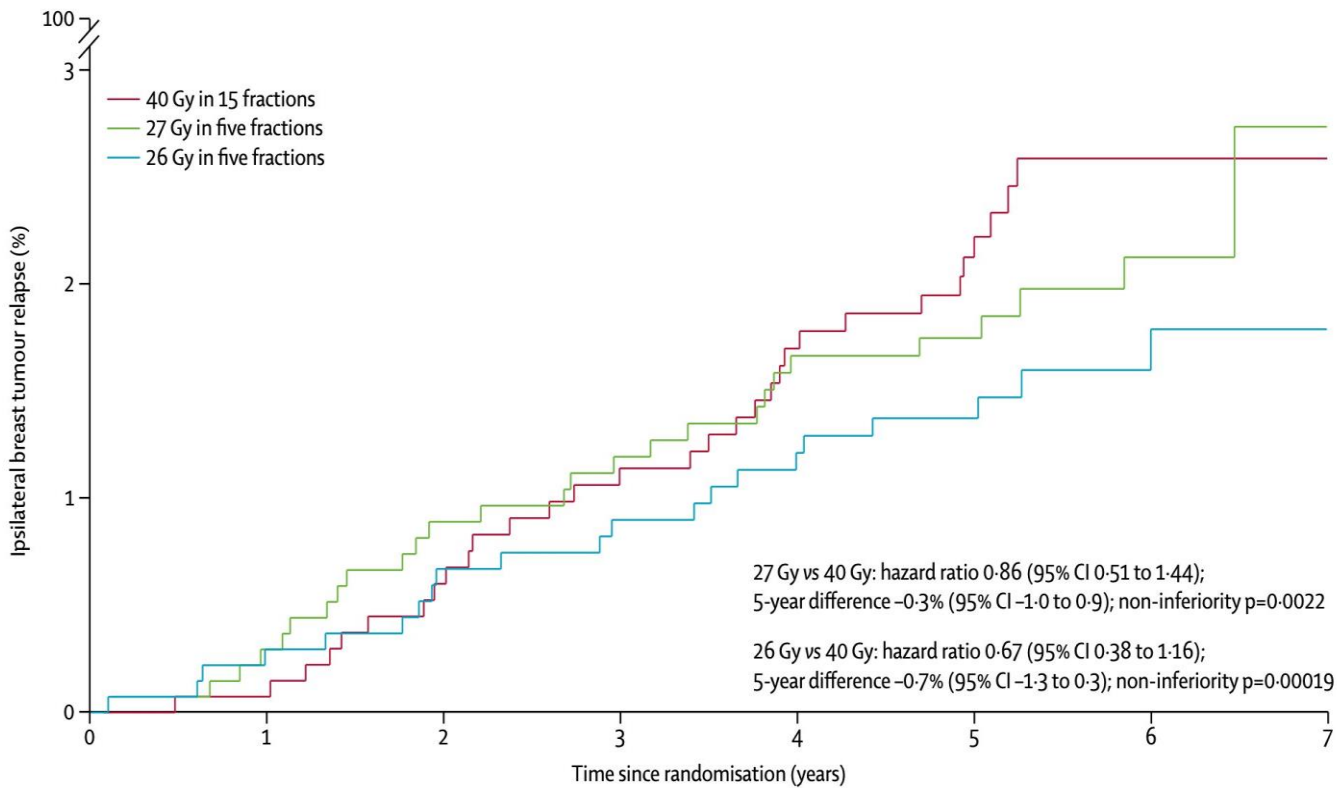
Lancet 2020; 395: 1613–26

Published **Online**

April 28, 2020



IBTR



Laattijdige nevenwerkingen

	Number of moderate or marked events/total number of assessments over follow-up	Odds ratio for schedule (95% CI)	p value for comparison with 40 Gy	p value for comparison between 27 Gy and 26 Gy	Odds ratio for years of follow-up (95% CI); p value
Any adverse event in the breast or chest wall*	..	..	..	..	0.98 (0.96-1.00); 0.055
40 Gy	651/6121 (10.6%)	1 (ref)	..	..	..
27 Gy	1004/6303 (15.9%)	1.55 (1.32-1.83)	<0.0001	..	..
26 Gy	774/6327 (12.2%)	1.12 (0.94-1.34)	0.20	0.0001	..
Breast distortion†	..	..	..	..	0.99 (0.95-1.02); 0.38
40 Gy	232/5724 (4.0%)	1 (ref)	..	..	..
27 Gy	363/5953 (6.1%)	1.51 (1.15-1.97)	0.0028	..	..
26 Gy	299/5945 (5.0%)	1.20 (0.91-1.60)	0.19	0.083	..
Breast shrinkage†	..	..	..	..	1.03 (1.00-1.06); 0.023
40 Gy	330/5728 (5.8%)	1 (ref)	..	..	..
27 Gy	503/5944 (8.5%)	1.50 (1.20-1.88)	0.0004	..	..
26 Gy	369/5943 (6.2%)	1.05 (0.82-1.33)	0.71	0.0018	..
Breast induration (tumour bed)†	..	..	..	..	1.00 (0.96-1.04); 0.95
40 Gy	185/5713 (3.2%)	1 (ref)	..	..	..
27 Gy	304/5948 (5.1%)	1.56 (1.19-2.05)	0.0013	..	..
26 Gy	236/5937 (4.0%)	1.19 (0.90-1.59)	0.23	0.047	..

Wie Wat?

Ultrahypofractionatie

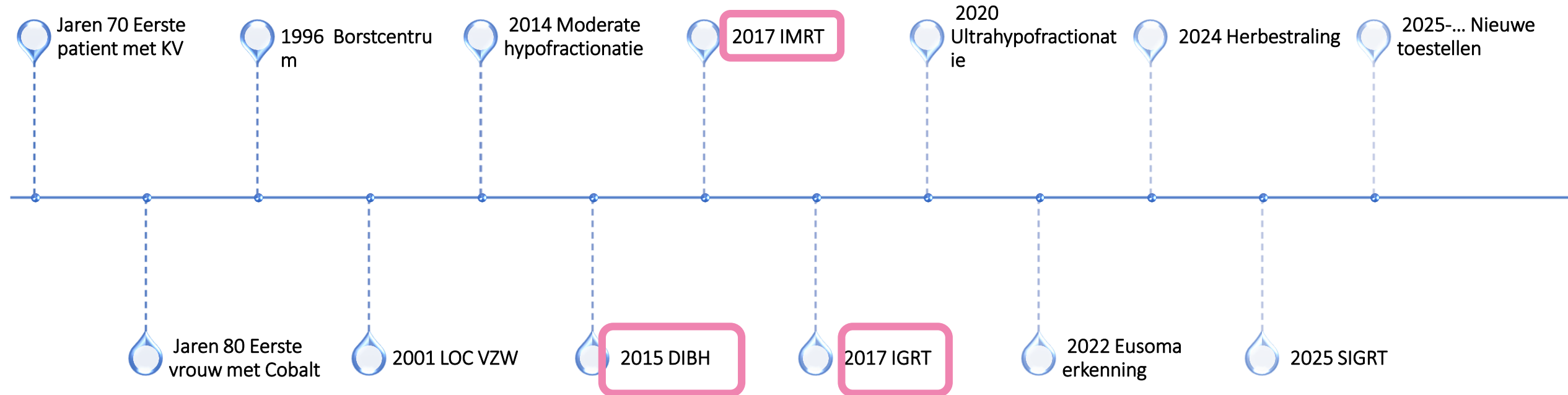
- Boven 50 jaar
- pT1 – pT3 pN0
- Geen klierstreken
- Geen expanders, prothesen of reconstructie
- Veilig genoeg (constraints behaald)

Moderate hypofractionatie

- Alle leeftijden
- pT0 – pT4 (cT4d) pN0-pN3
- Klierstreken
- Wel prothesen, expanders of reconstructies
- Indien FastForward niet veilig genoeg

	Dosis per fractie borst	Borst fracties	Dosis per fractie boost	Boost fracties	Totaal fracties
Normo fractionation 	2 Gy	25	2 Gy	8	33
Moderate hypofractionation	2.67 Gy	15	2.67 Gy	5	20
Ultra-hypofractionation	5.2 Gy	5	2 Gy	5	10

Evolutie in de technieken



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Doel

Technische innovaties in borstbestraling

Homogenere en nauwkeuriger
bestraling van de doelvolumes

Verbeterde overleving
Beter sparing van het omgevede
normale weefsel
Verminderde bijwerkingen

Deep inspiration
breath hold

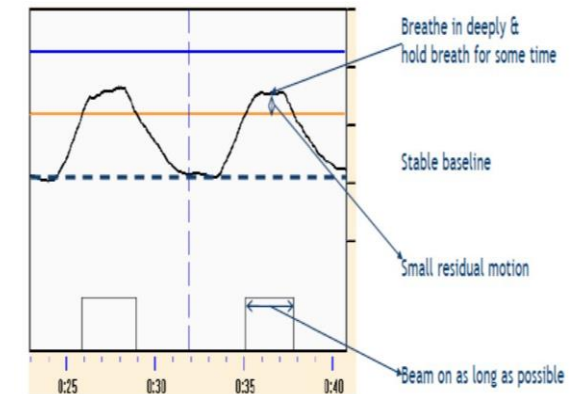
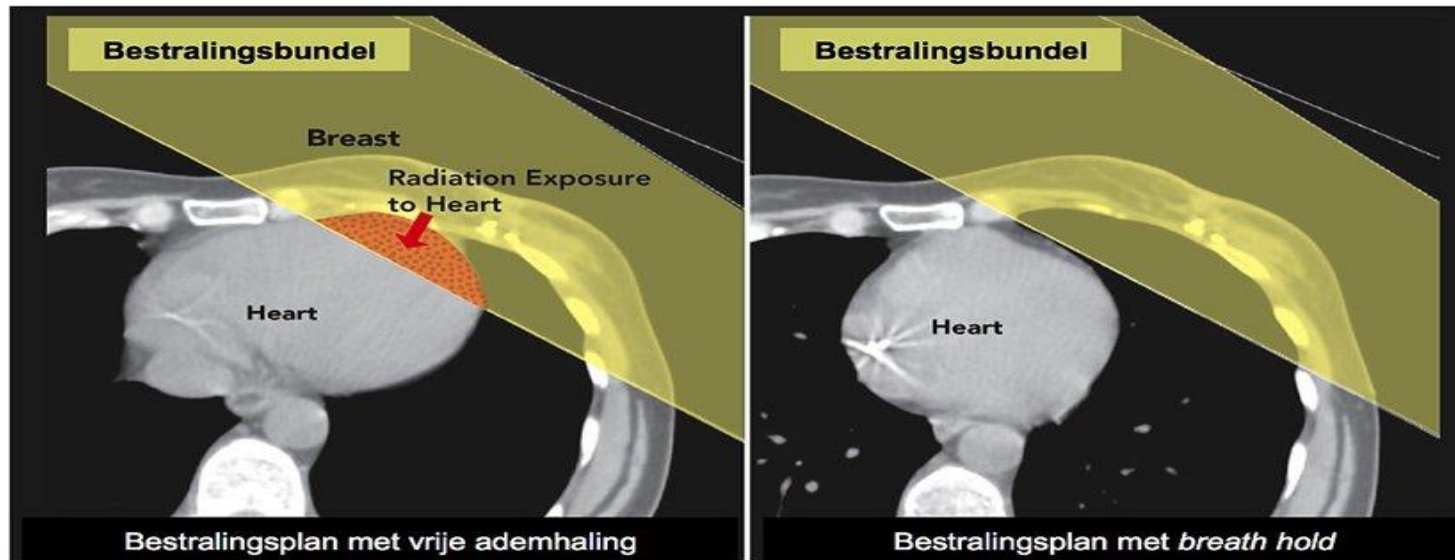
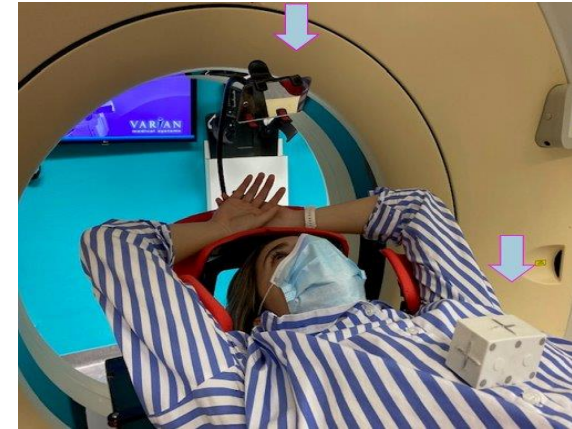
Intensity-Modulated
Radiation Therapy

Image-Guided
Radiation Therapy

2015: Deep Inspiration Breath Hold

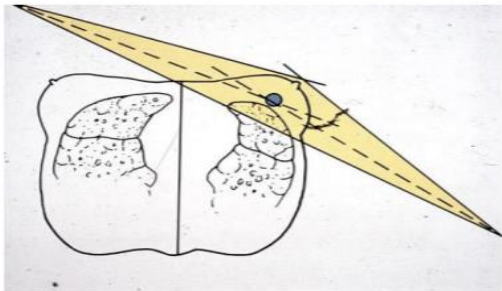
- Bestraling bij diepe inademing
 - Thoraxwand blijft stabiel
 - Longen zetten zich uit
 - Afstand tussen hart en wand vergroot

➔ **reductie in de dosis voor hart en de longen**

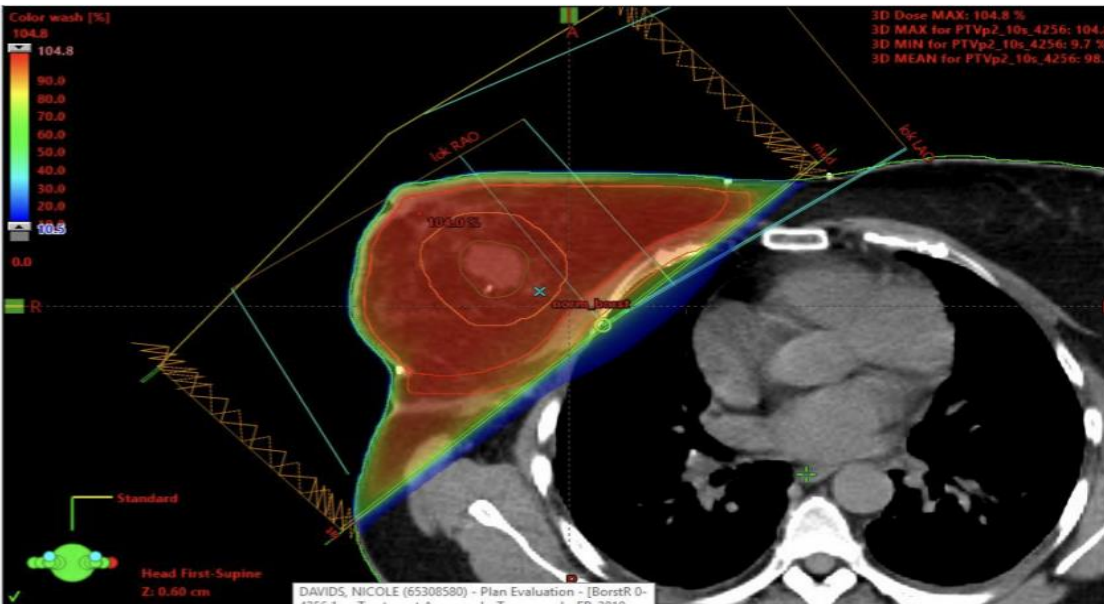
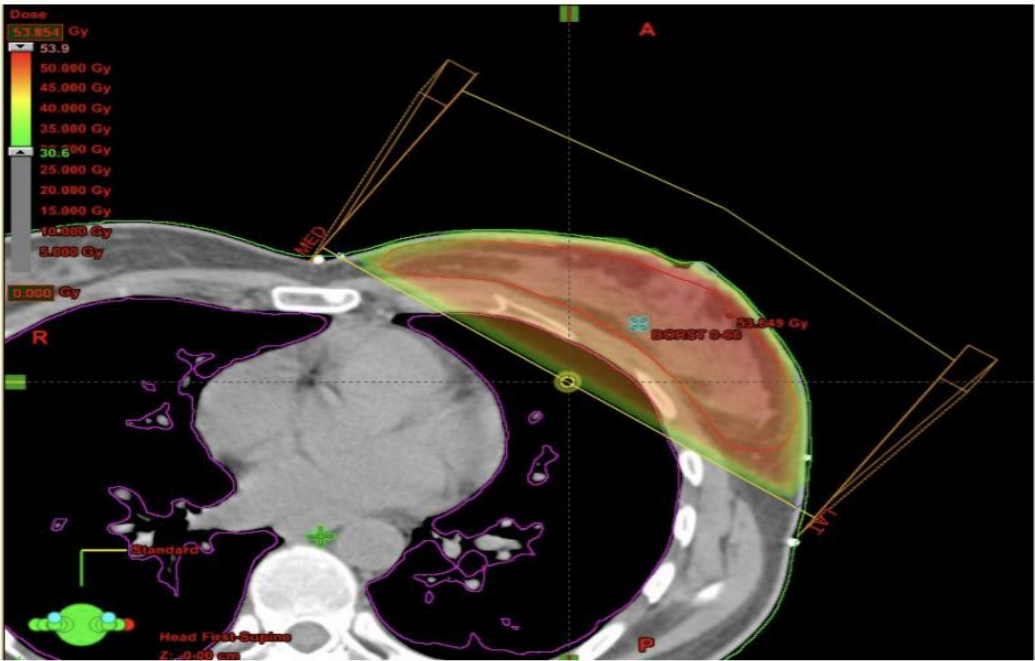
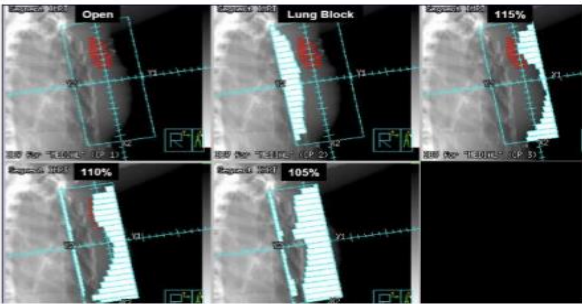


2017: Intensity Modulated Radiation Therapy

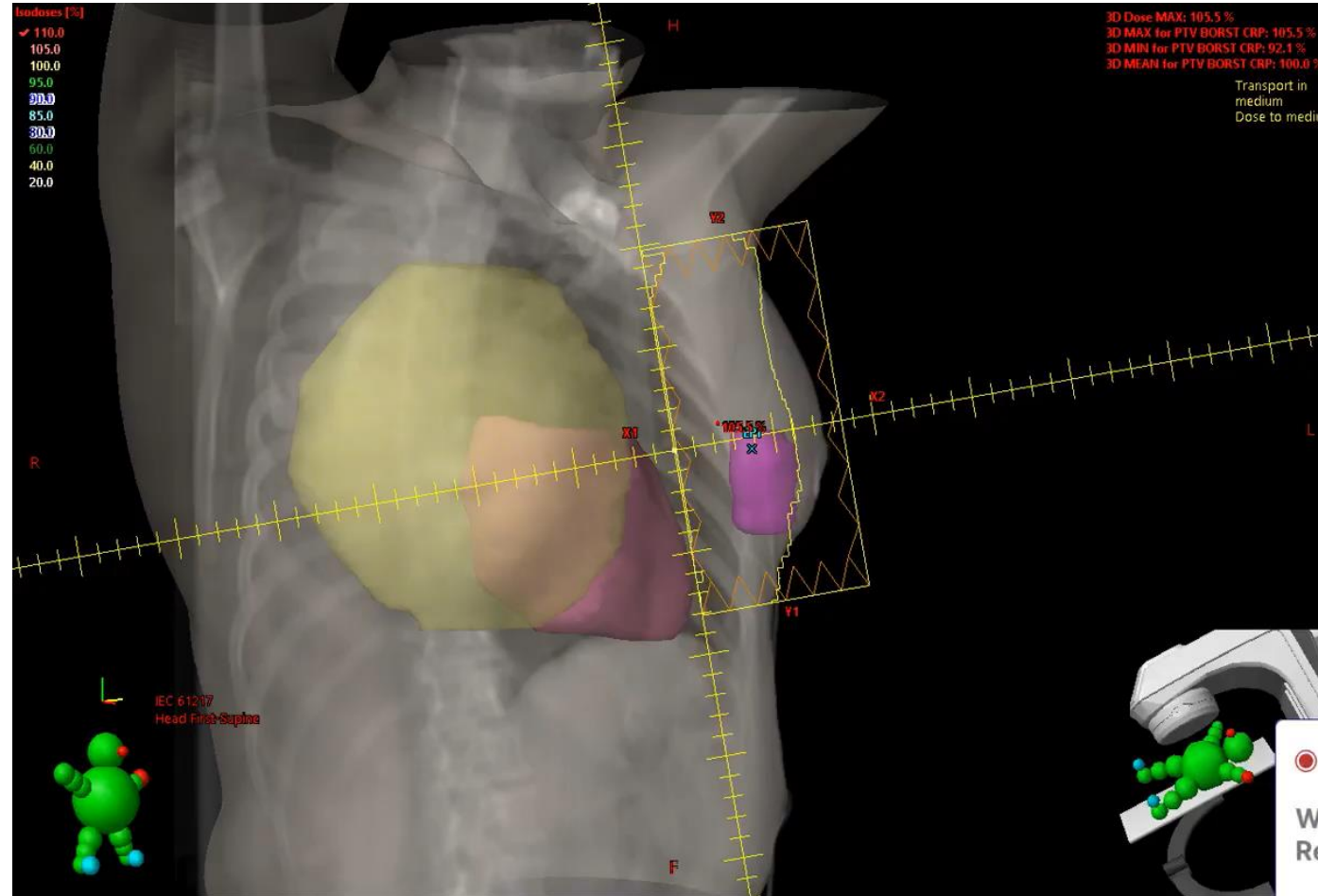
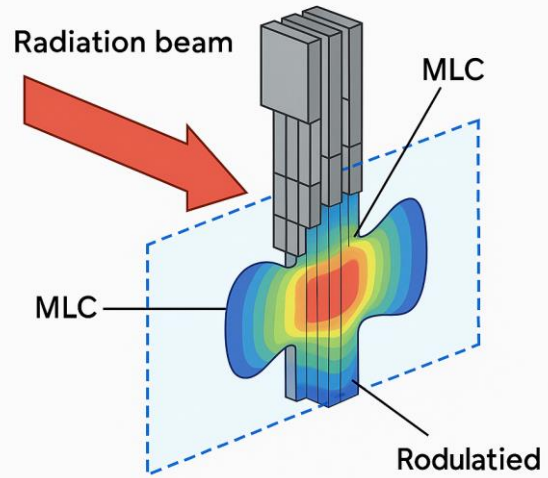
3D conformal



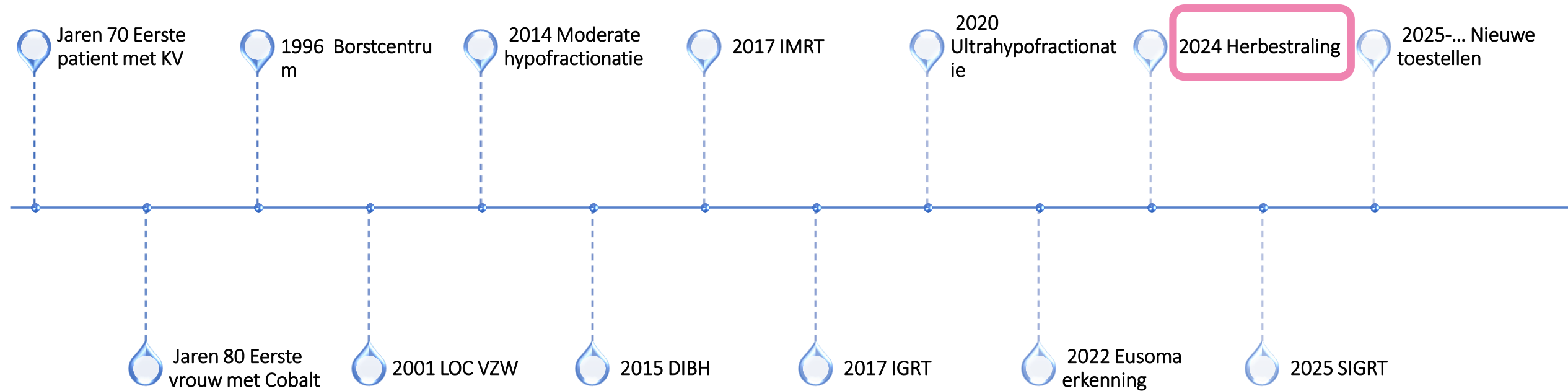
IMRT



IMRT



Evolutie: Borstkanker en herbestraling



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2024:

Repeat breast-conserving therapy in breast cancer

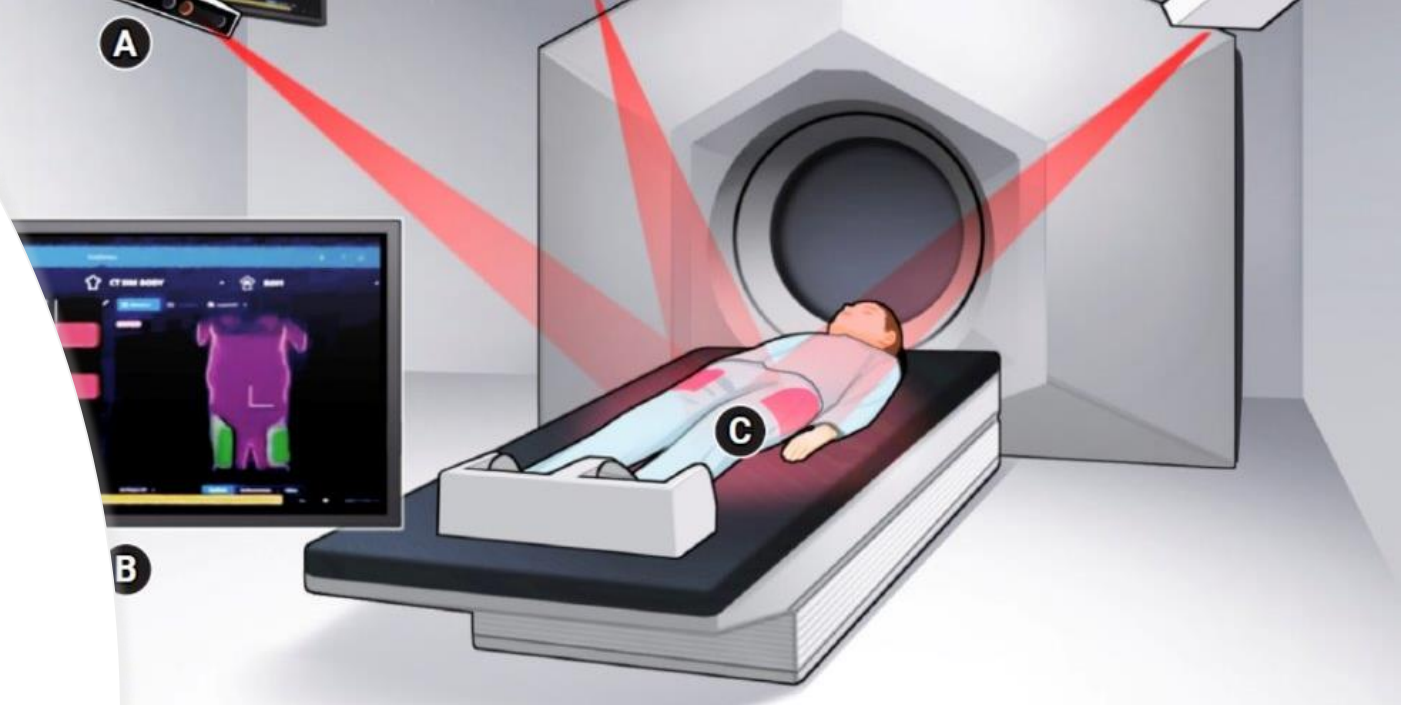
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C. Weltens, MD, PhD², P. Poortmans, MD, PhD^{7,8}

On behalf of the Belgian Breast Group of the *Belgian Society for Radiotherapy & Oncology* (BeSTRO)

MAAR een klein geselecteerde groep komt hiervoor in aanmerking !!!

Radiotherapie van morgen in Limburg

- Vervanging van de bestralingstoestellen
- Nieuwste technieken: SBRT, adaptieve radiotherapie, **surface scanning**...
- Doel = state-of-the-art radiotherapie aanbieden aan de Limburgse patiënt, in de nabije omgeving



Borstgroep radiotherapie LOC



Dr. Anne-Sophie
Van de Velde



Dr. Katleen
Verboven



Dr. Emilie
Dubaere



Dr. Leen Noé



Dr. Heleen Bollen



Dr. Evelyn Van de
Werf



Dr. Annelies
Maes



Dr. Mieke Govers



Bedankt voor uw aandacht!

Dr. Anne-Sophie Van de Velde
Radiotherapeut Jessa