

Medische straling

Joris Nens

Coördinator stralingsbechering

[← Back to Original Article](#)

Cedars-Sinai finds more patients exposed to excess radiation

Hospital officials apologize and offer to cover medical care needed because of overdoses.

November 10, 2009 | Nicole Santa Cruz

Cedars-Sinai Medical Center officials said Monday that 260 patients had been exposed to high doses of radiation during CT brain scans during an 18-month period, up from the hospital's original estimate of 206 in September.

A review by the hospital also found that about 20% of the patients received exposure directly to the lenses of their eyes, which puts them at a higher risk for cataracts, said Simi Singer, a spokeswoman for the Los Angeles hospital.

The New York Times

January 23, 2010

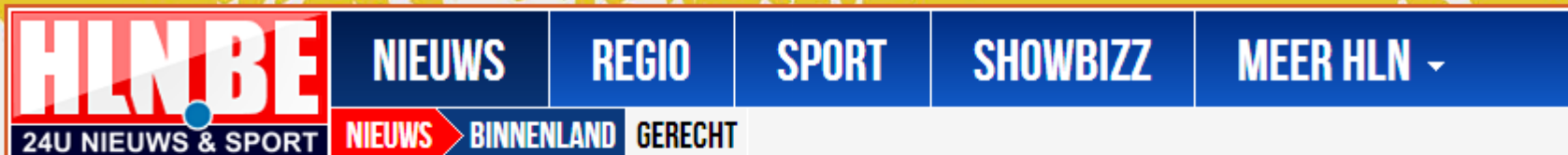
Radiation Offers New Cures, and Ways to Do Harm

By WALT BOGDANICH

As Scott Jerome-Parks lay dying, he clung to this wish: that his fatal radiation overdose — which left him deaf, struggling to see, unable to swallow, burned, with his teeth falling out, with ulcers in his mouth and throat, nauseated, in severe pain and finally unable to breathe — be studied and talked about publicly so that others might not have to live his nightmare.

Sensing death was near, Mr. Jerome-Parks summoned his family for a final Christmas. His friends sent two buckets of sand from the beach where they had played as children so he could touch it, feel it and remember better days.

Mr. Jerome-Parks died several weeks later in 2007. He was 43.



Negen patiënten sterven na foute bestraling: UZ Gent en radiotherapiebedrijf naar strafrechter

Volksgezondheid grijpt in tegen Belgische
scanverslaving

Gevaarlijk: Belgen krijgen te veel straling te
verwerken

Nieuwsblad.be

‘Röntgenstralen brengen meer schade toe dan eerst gedacht’ - 05/06/2014

Blootstelling aan X-stralen of röntgenstralen bij een CT-scan blijkt bij kinderen nóg schadelijker dan al gedacht. ‘Zelfs lage dosissen straling veroorzaken complexe schade aan het DNA, wat op latere leeftijd tot kanker kan leiden’, zegt professor Hubert Thierens.

Medische straling



INTERNATIONAL COMMISSION ON RADIOLOGICAL PROTECTION

DIAGNOSTIC REFERENCE LEVELS IN MEDICAL IMAGING: REVIEW AND ADDITIONAL ADVICE

*A web module produced by Committee 3 of the
International Commission on Radiological Protection (ICRP)*



World Health
Organization



IAEA

Radiation Protection of Patients (RPOP)



European Medical ALARA Network



ESR
EUROSAFE
IMAGING

European ALARA Network

HERCA



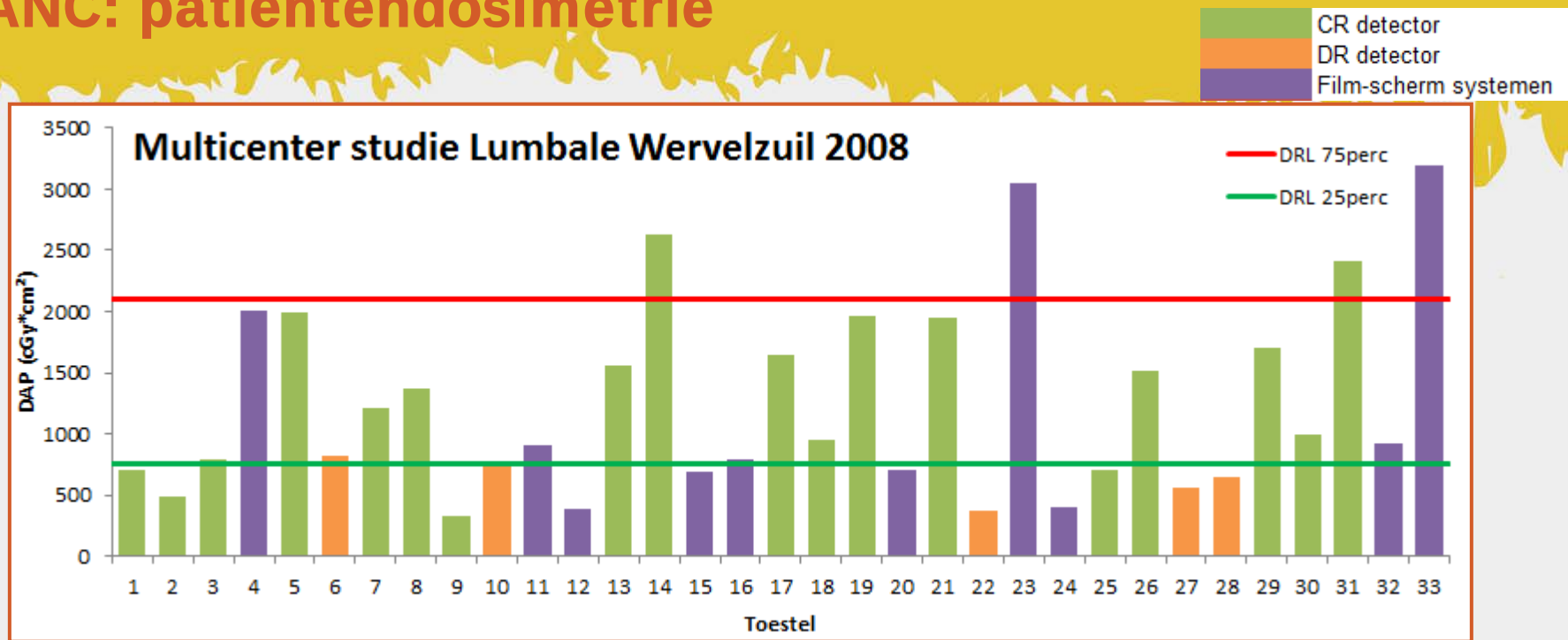
Heads of the European Radiological
protection Competent Authorities



Verplichte dosimetrie:

- **Eerste ronde 2008**
- **Tweede ronde 2012**

FANC: patiëntendosimetrie



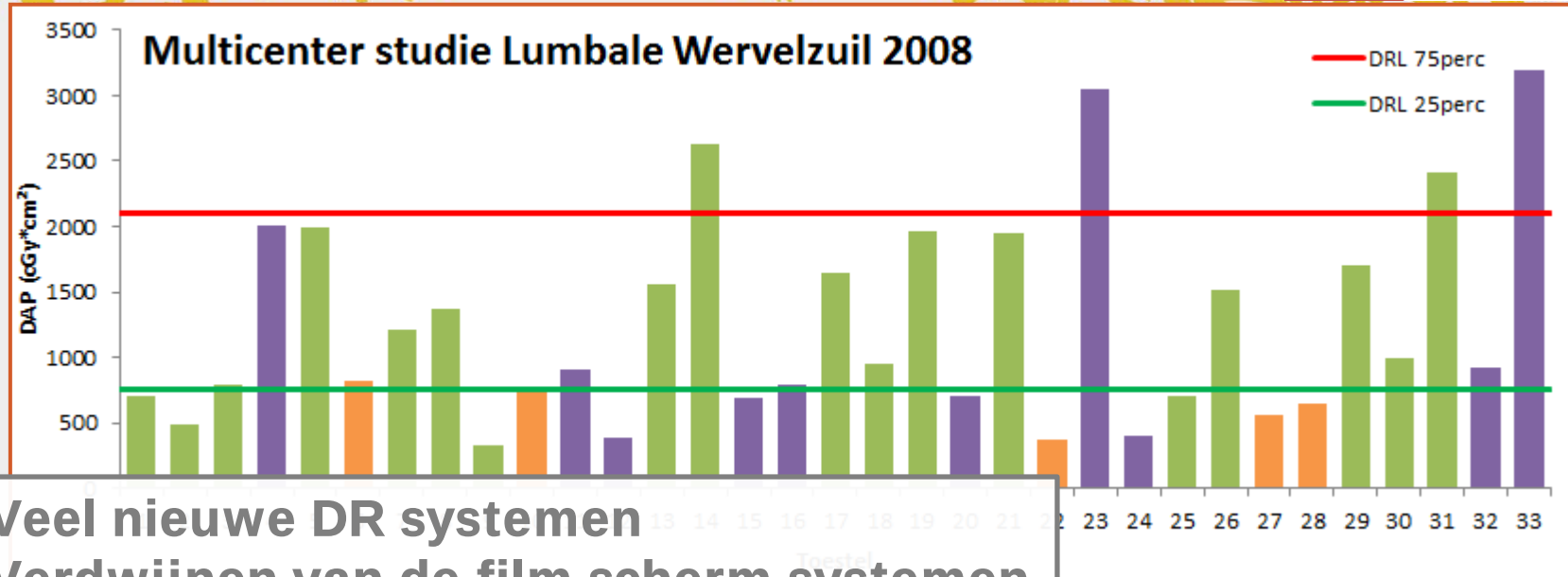
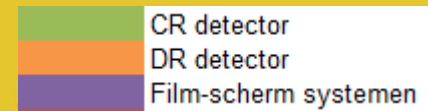
Bron: dosisverslag LUCMFR

Maximum waarde: 3200 cGy*cm²
Minimale waarde: 330 cGy*cm² } Factor 10 verschil in gemiddelde dosis

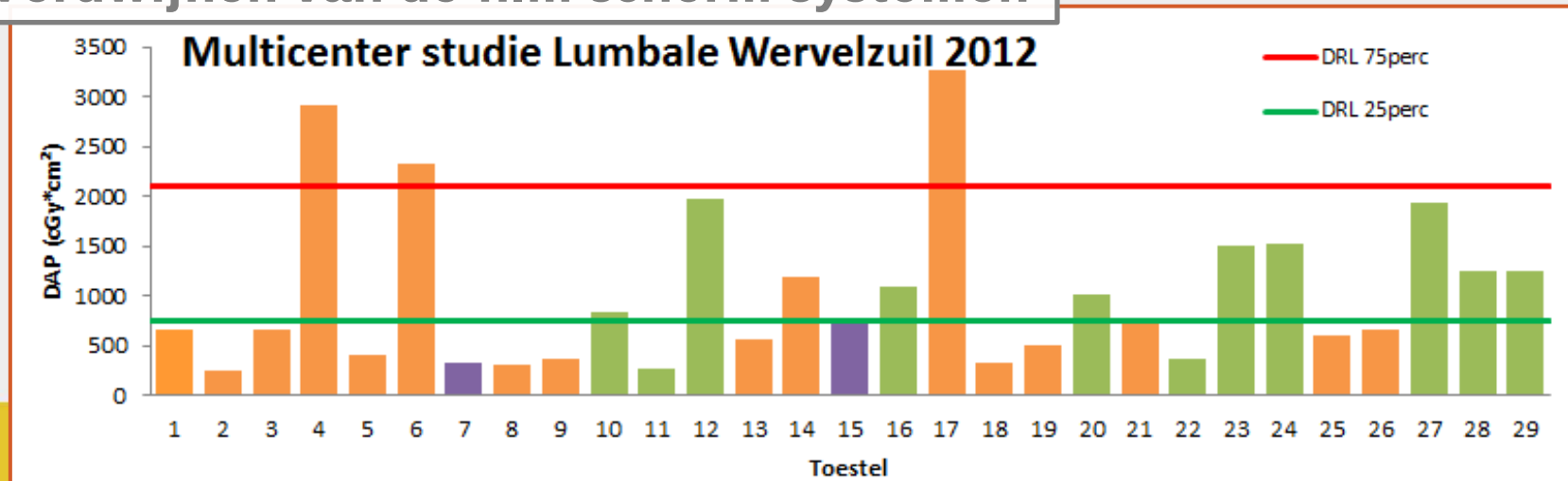
DRL (75 perc): 1700 cGy*cm²

DRL (25 perc): 700 cGy*cm²

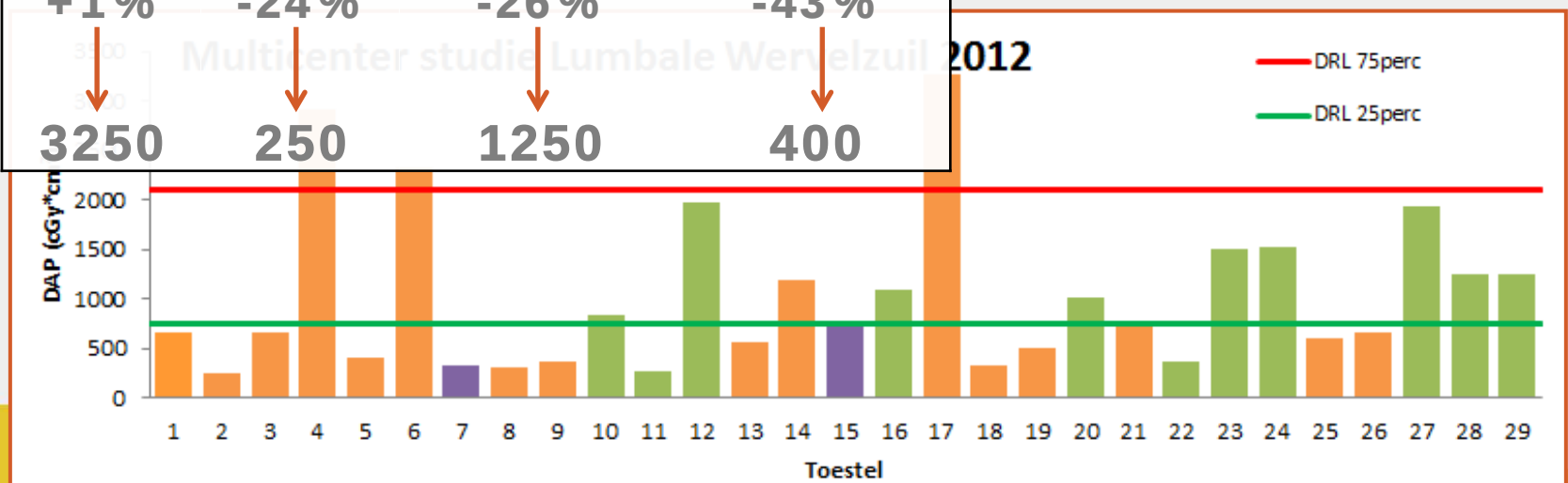
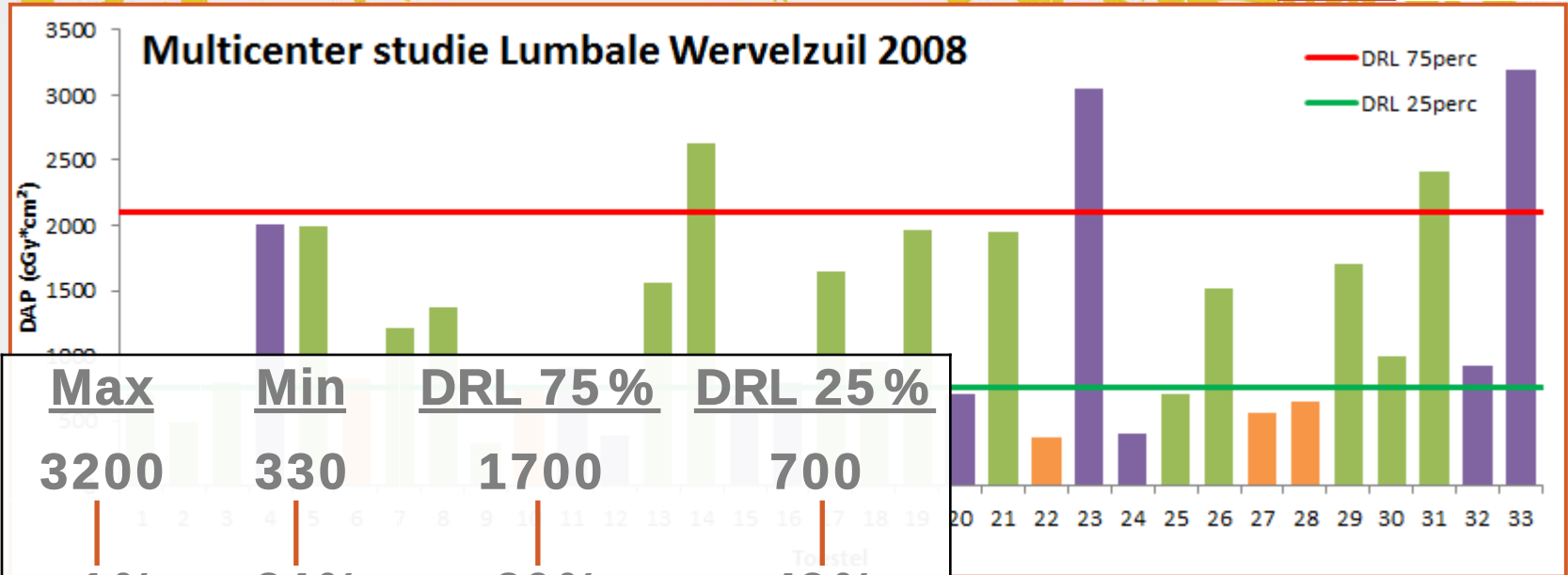
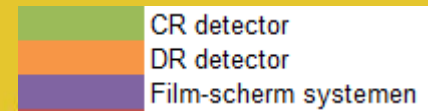
FANC: patiëntendosimetrie



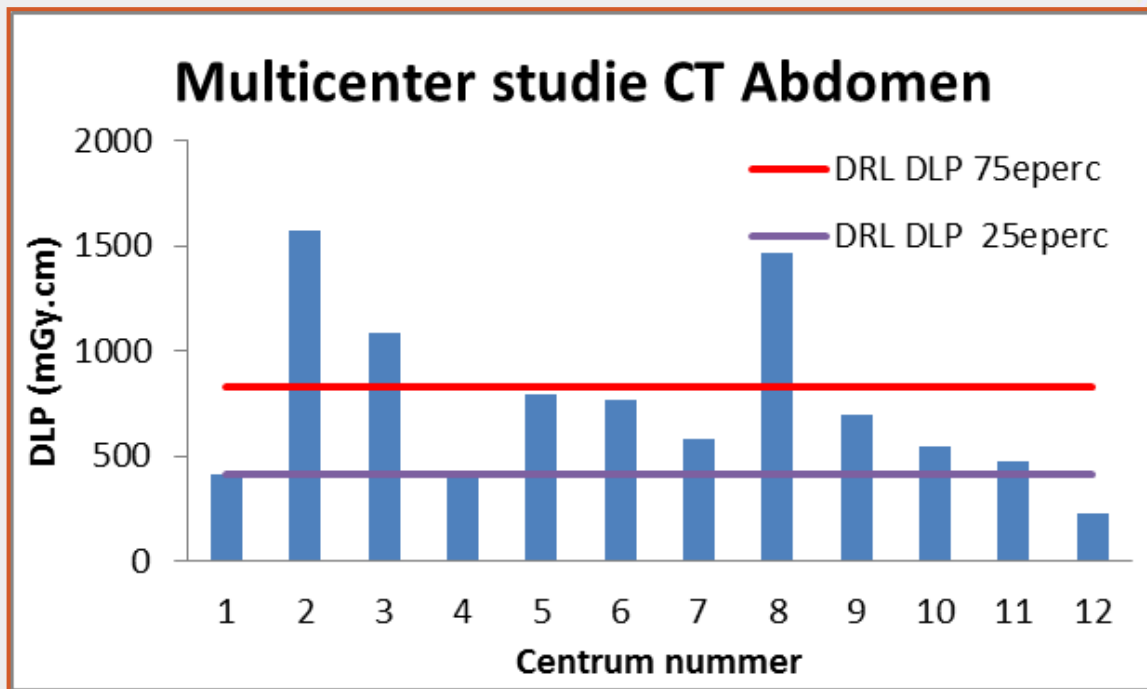
Veel nieuwe DR systemen
Verdwijnen van de film scherm systemen



FANC: patiëntendosimetrie



FANC: patiëntendosimetrie



DRL(75 %): 870 mGy.cm

DRL(25 %): 460 mGy.cm

Bron: dosisverslag LUCMFR

Max DLP: 1600 mGy.cm

Min DLP: 230 mGy.cm

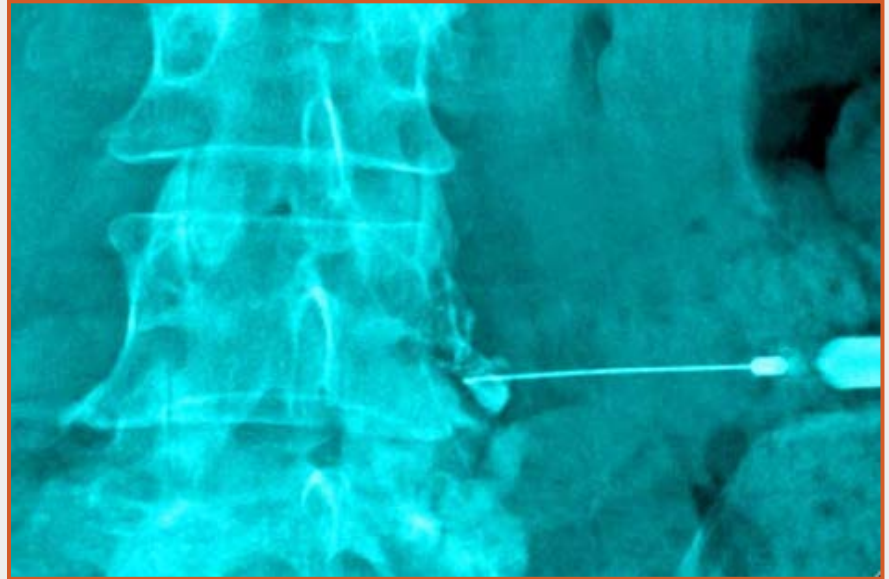
Factor 7 verschil in gemiddelde dosis

Niet enkel op de dienst Radiologie

Tandheelkunde



Pijnkliniek



Hartkatheterisatie

1



Urologie



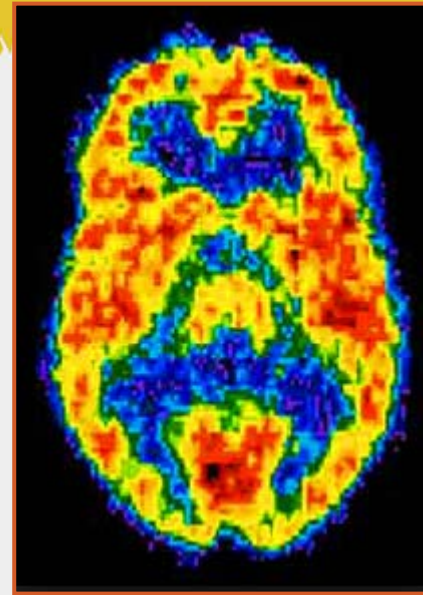
Medische straling

Operatiekwartier

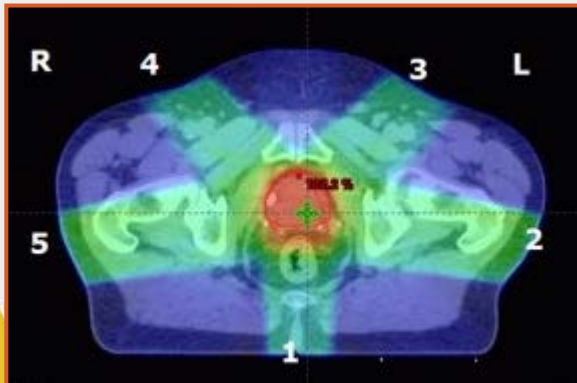


Medische straling

Nucleaire geneeskunde



Radiotherapie



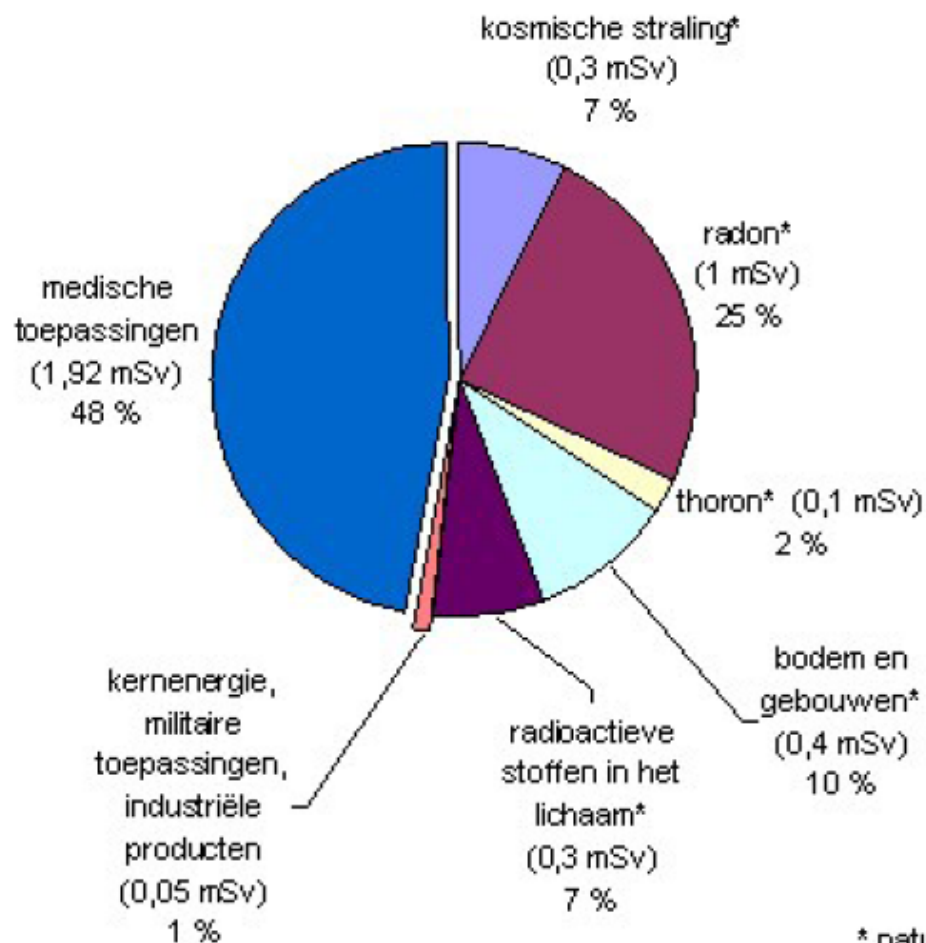
Hoeveel dosis krijgt de patiënt tijdens een onderzoek?

1 Sv (Sievert) = 5,5 % kans op fatale kanker

1 mSv (millisievert) = 0,0055 % kans op fatale kanker

**2 mSv (millisievert) = jaarlijkse dosis natuurlijke
achtergrondstralen**

Medische straling



* natuurlijke bronnen

MIRA verslag 2006

Medische straling

Tandheelkunde	Effectieve dosis (mSv)
Intra-oraal	0,005
Panoramische opname	0,01

Mettler FA: Effective Doses in Radiology and Diagnostic Nuclear Medicine: A Catalog, Radiology 2008
248:254-263

Conventionele radiografie 2D	Effectieve dosis (mSv)
Extremiteiten	0,001
Schedel	0,1
Cervicale wervelzuil	0,2
Dorsale wervelzuil	1
Lumbale wervelzuil	1,5
Abdomen	0,7

Mettler FA: Effective Doses in Radiology and Diagnostic Nuclear Medicine: A Catalog, Radiology
2008, 248:254-263

Medische straling

CT	Effectieve dosis (mSv)
Schedel	2
Thorax	7
Abdomen	8
Bekken	6
Lever 3 fasen	15
Wervelzuil	5
Coronaire angiografie	16
Virtuele colonoscopie	10

Mettler FA: Effective Doses in Radiology and Diagnostic Nuclear Medicine: A Catalog, Radiology 2008, 248:254-263

Medische straling

Interventionele onderzoeken	Effectieve dosis (mSv)
Coronaire angiografie (diagnostisch)	7
Coronaire angiografie (angioplastie, stent, ablatie)	15
Thoracale of pulmonaire angiografie	5
Abdominale angiografie	12
TIPS	70
Embolisatie venen bekken	60



Mettler FA: Effective Doses in Radiology and Diagnostic Nuclear Medicine: A Catalog, Radiology 2008, 248:254-263

Nucleaire geneeskunde	Effectieve dosis (mSv)
Hersenen (Tc99m)	5,7
Hersenen (F-18 FDG)	14,1
Hart stress-rust (Tc99m)	11,4
Hart (F-18 FDG)	14,1
Long scan (Tc99m)	2,2
Bot scan (Tc99m)	6,3

Mettler FA: Effective Doses in Radiology and Diagnostic Nuclear Medicine: A Catalog, Radiology 2008, 248:254-263

Tandheelkunde

Pijnkliniek

Hartkatheterisatie

Urologie

2D



3D

Operatiekwartier

Radiotherapie

Nucleaire geneeskunde

Medische straling

Tandheelkunde	Effectieve dosis (mSv)
Intra oraal	0,005
Panoramische opname	0,01
Cone Beam CT	0,2

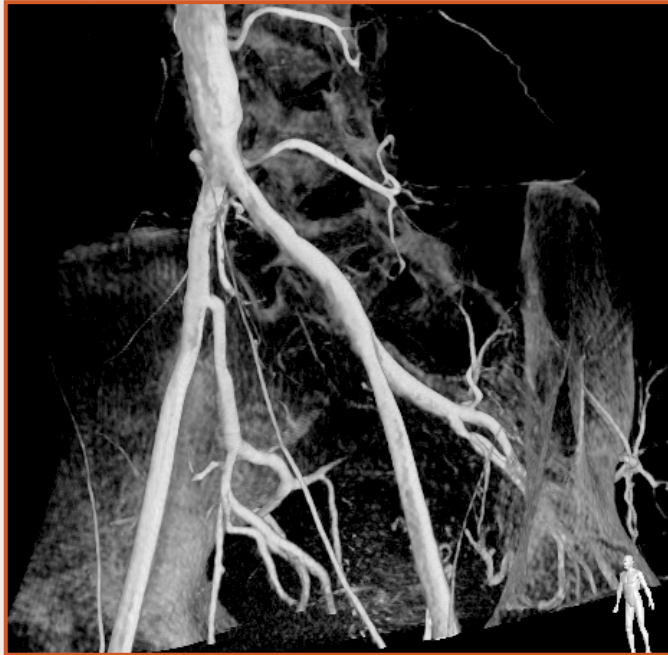
L NewTom 3G Large FOV	0,068 mSv
CB Mercuray facial FOV	0,569 mSv
i-CAT portrait mode	0,074 mSv
Iluma standard	0,098 mSv
Iluma Ultra	0,498 mSv

Somaton 64 MDCT 0,534 mSv

Factor 10 verschil

→ CBCT niet altijd lagere dosis dan CT

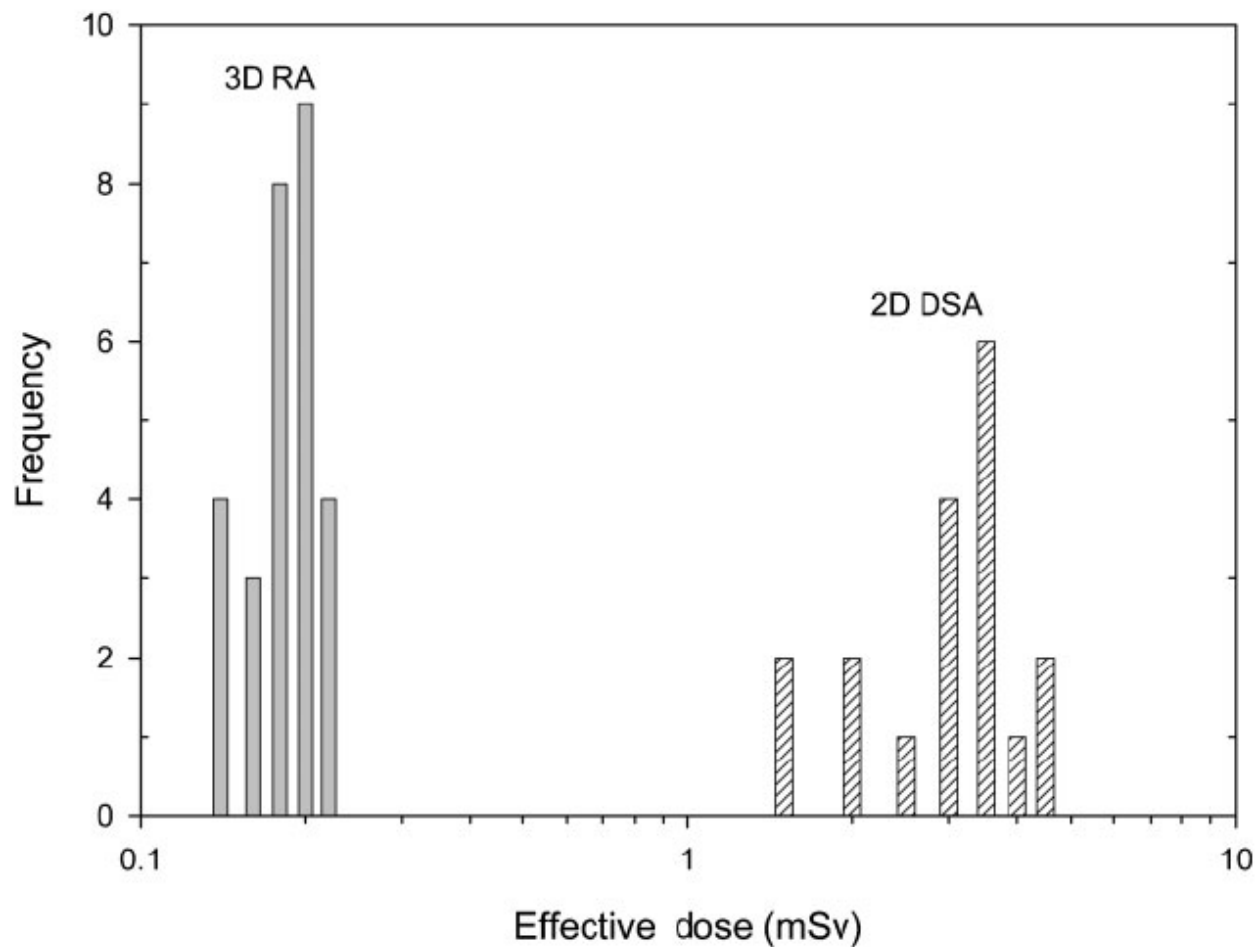
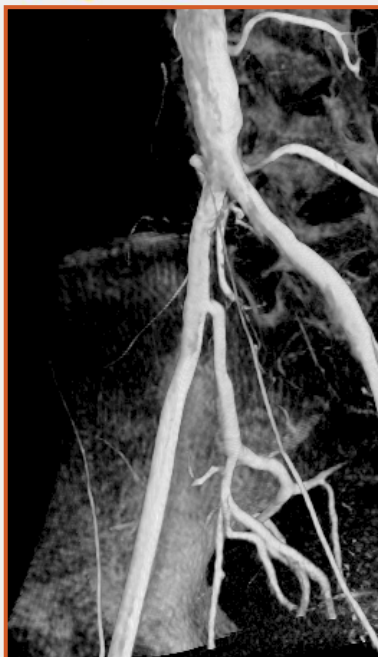
Referenties: Mettler FA: Effective Doses in Radiology and Diagnostic Nuclear Medicine: A Catalog, Radiology 2008 248:254-263
J. Ludlow: Comparative dosimetry of dental CBCT devices and 64-slice MDCT for oral and maxillofacial radiology, Oral Surgery Oral Medicine Oral Pathology Oral Radiology and Endodontology



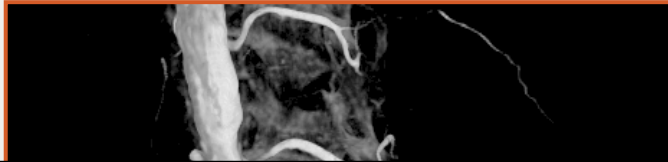
3D interventionele radiografie



3D interventionele radiografie

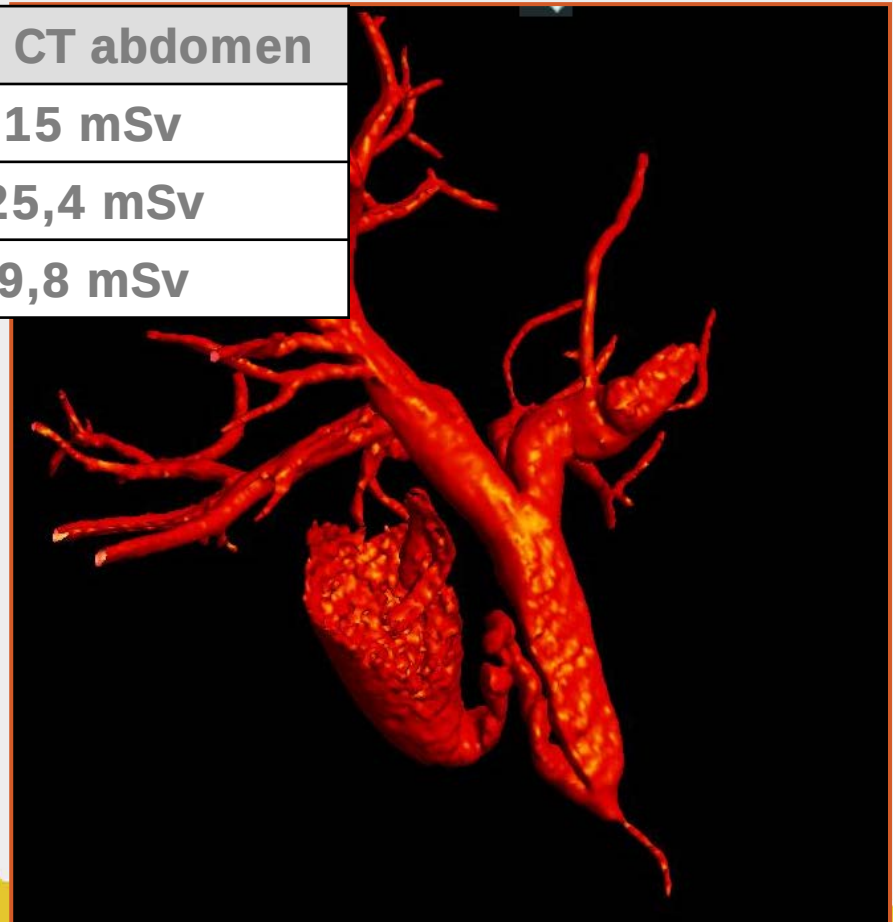


R. Bridcut : Patient dose from 3D rotational neurovascular studies BJR 2007



3D interventionele radiografie

Toestel	Dosis CT abdomen
Artis Zeego CBCT	15 mSv
Infinix VC-i CBCT	25,4 mSv
Aquilion 16 slice MDCT	9,8 mSv



R. Bridcut : Patient dose from 3D rotational neurovascular studies BJR 2007

Hoe al deze dosissen beheren?

- **Gestandaardiseerde eenheden**
 - **Conventionele radiografie: DAP**
 - **CT: DLP CTDI**
 - **Cone Beam: ????**
- **Conversie naar geschatte effectieve dosis**
- **Centrale registratie**

Medische straling: centrale registratie



SECTRA

DOSEMONITOR®

DoseWatch

NEXO™ [DOSE]
Multi-Modality Radiation Informatics



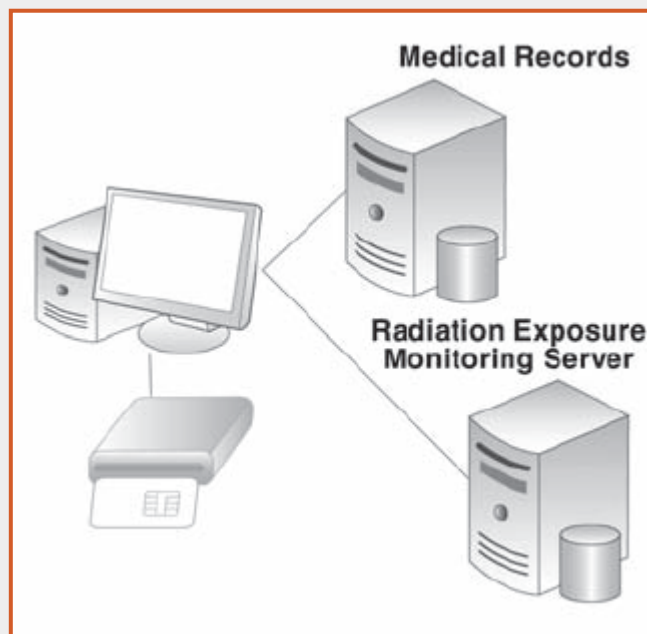
Bayer HealthCare
Radiology & Interventional

Medische straling: centrale registratie



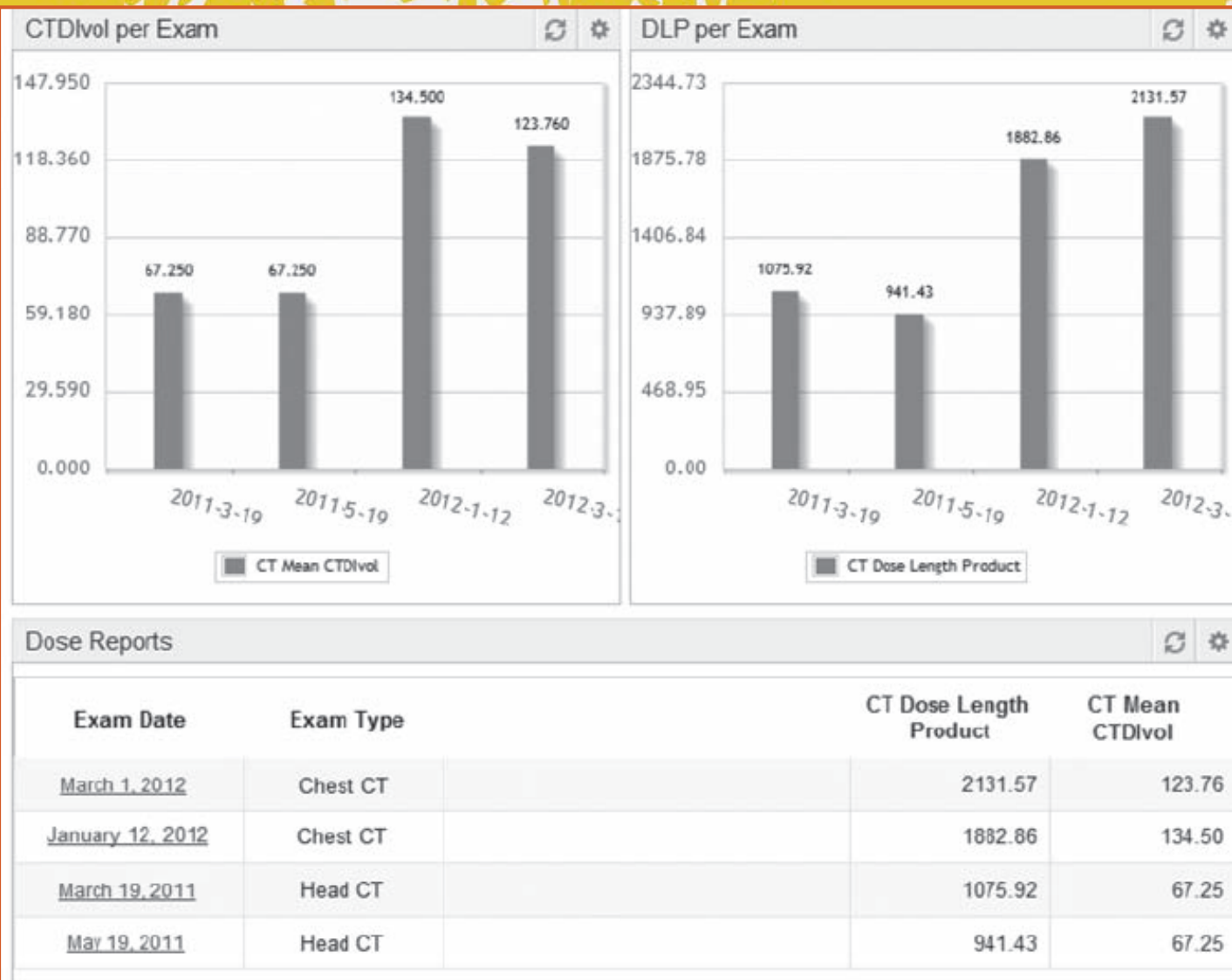
IAEA

Radiation Protection of Patients (RPOP)



M. Rehani A Study of Smart Card for Radiation Exposure History of Patient, AJR 2012

Medische straling: centrale registratie



M. Rehani A Study of Smart Card for Radiation Exposure History of Patient, AJR 2012

Dank u voor uw aandacht