



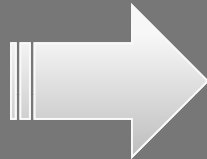
CARDIO MRI

IN DE PRAKTIJK

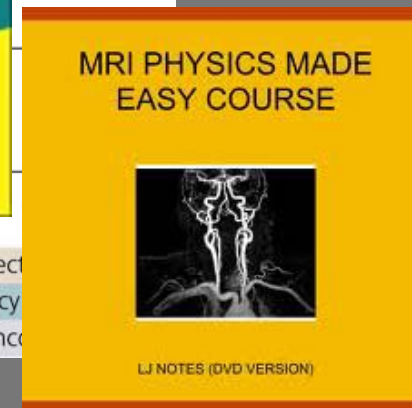
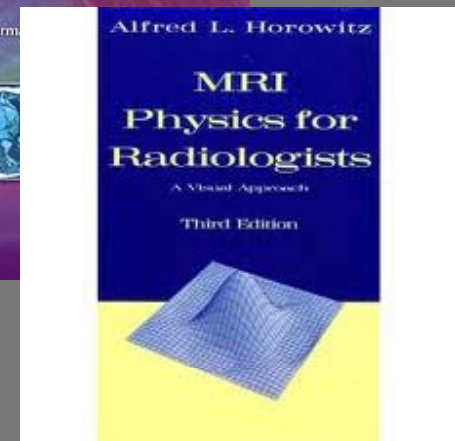
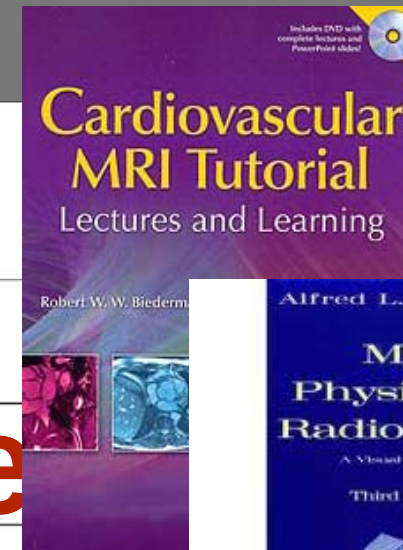
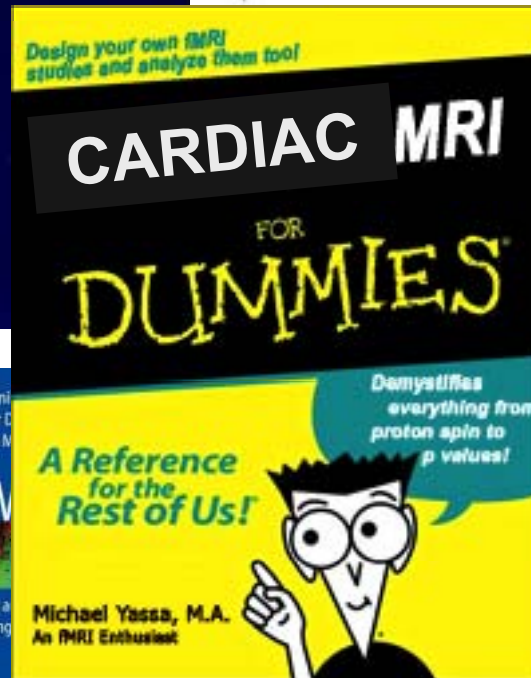
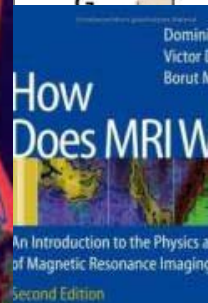
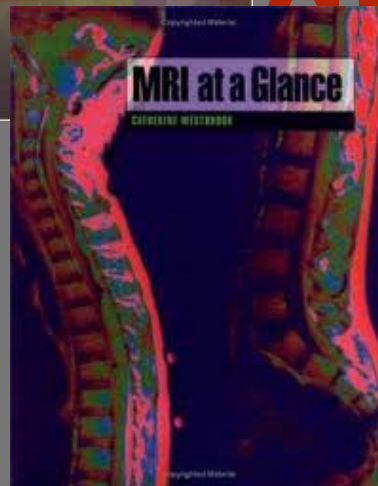
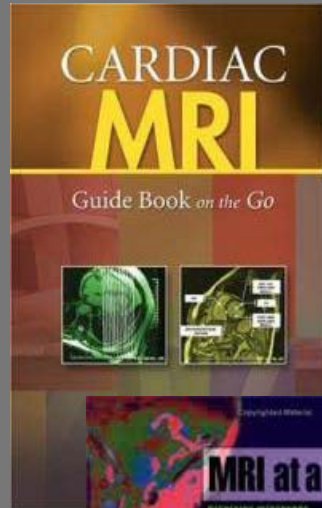
Dr. E. Willems – Medische Beeldvorming



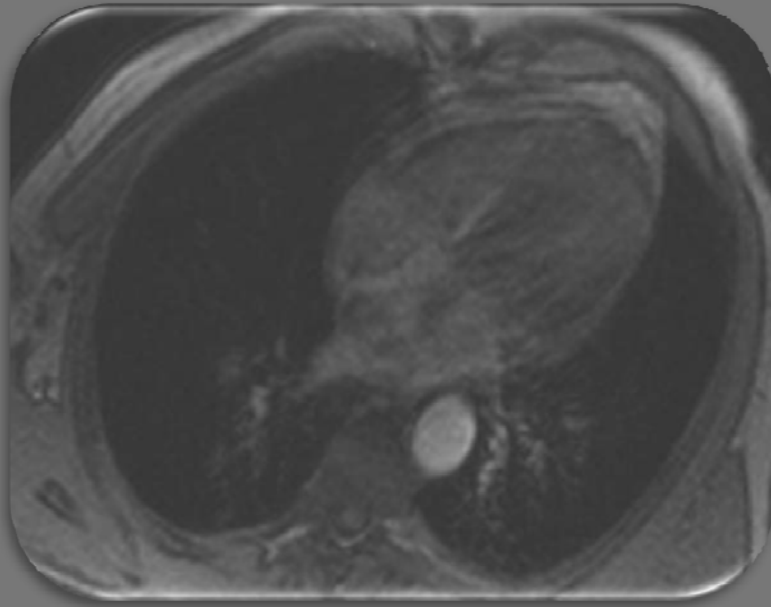
Wat is een cardio MRI?



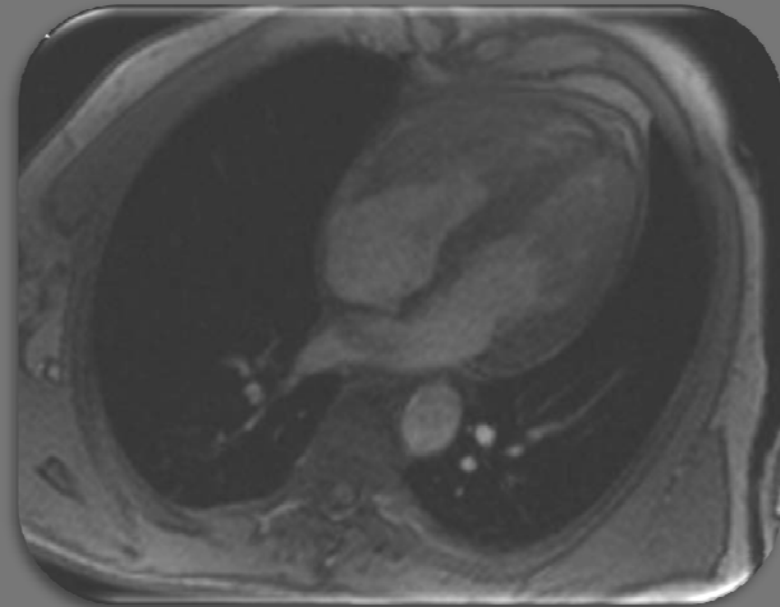
Een basiskennis MRI fysica is onontbeerlijk!



Welke hindernissen moeten we overwinnen?



Free-breathing

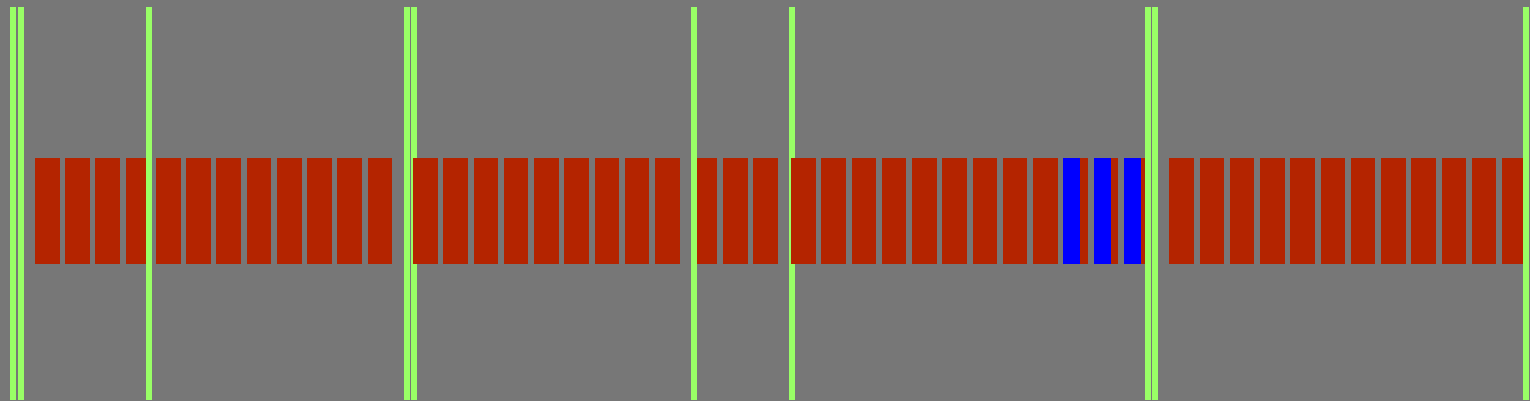
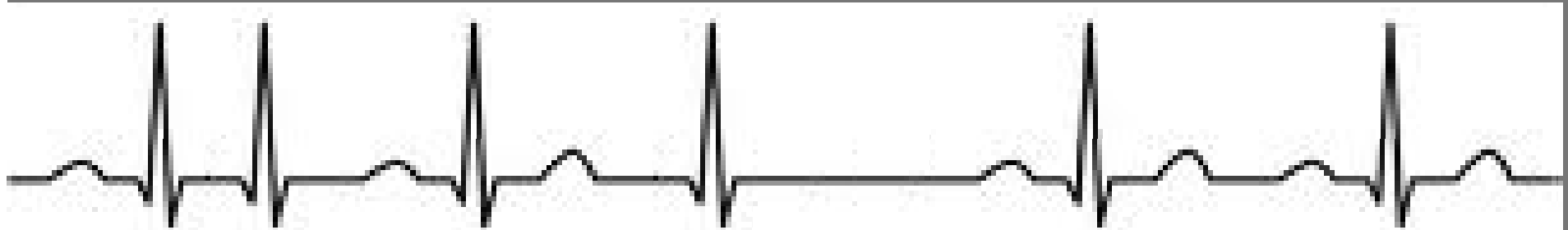


Breath-hold

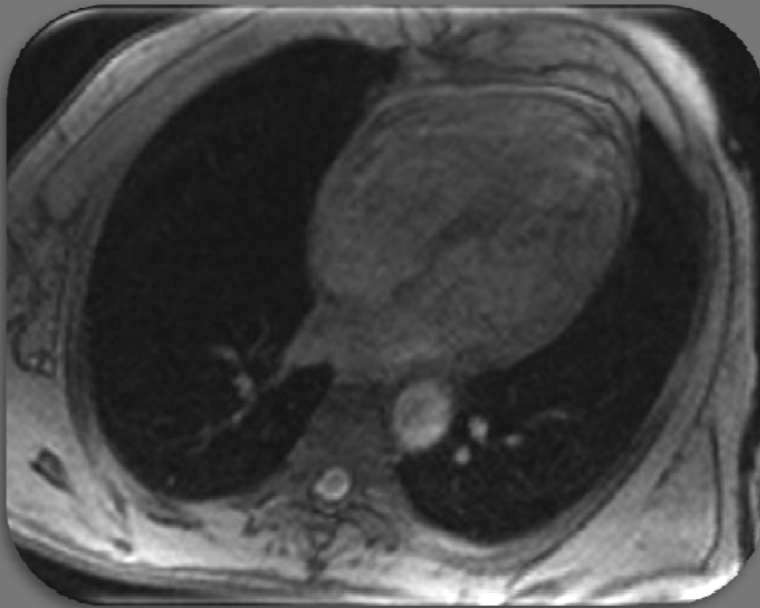


Welke hindernissen moeten we overwinnen?

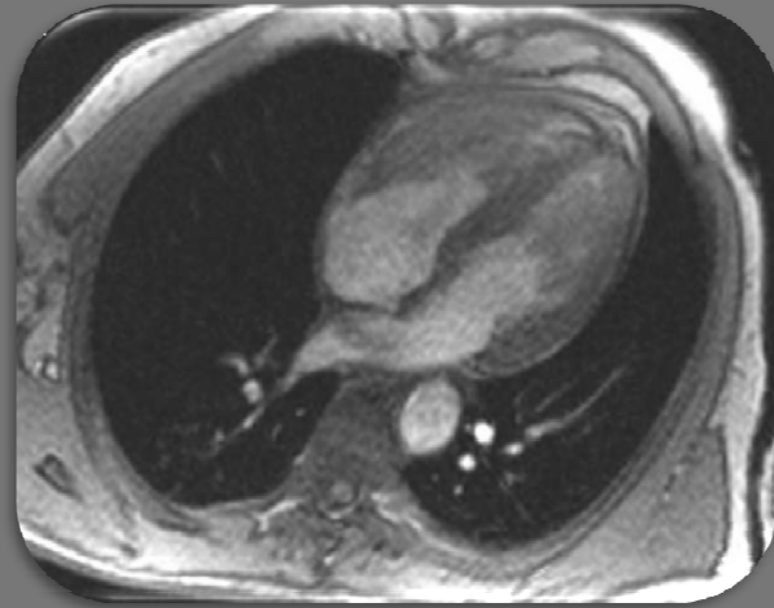
Ritmestoornissen!



Welke hindernissen moeten we overwinnen?



No cardiac-gating



Cardiac-gating



Wat houdt het in voor de patiënt?

MRI-onderzoek van 30-45 min

—

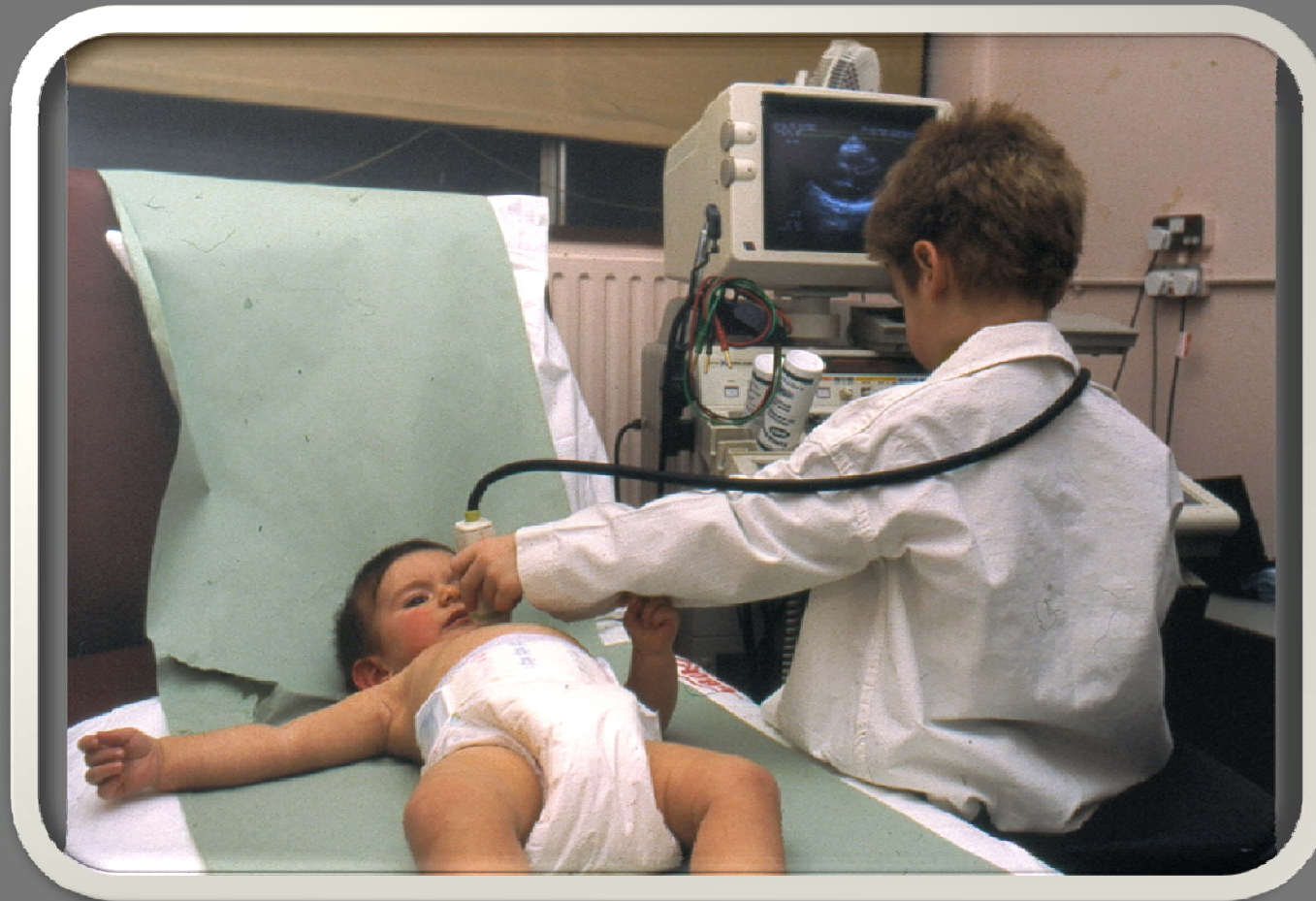
—

de
en

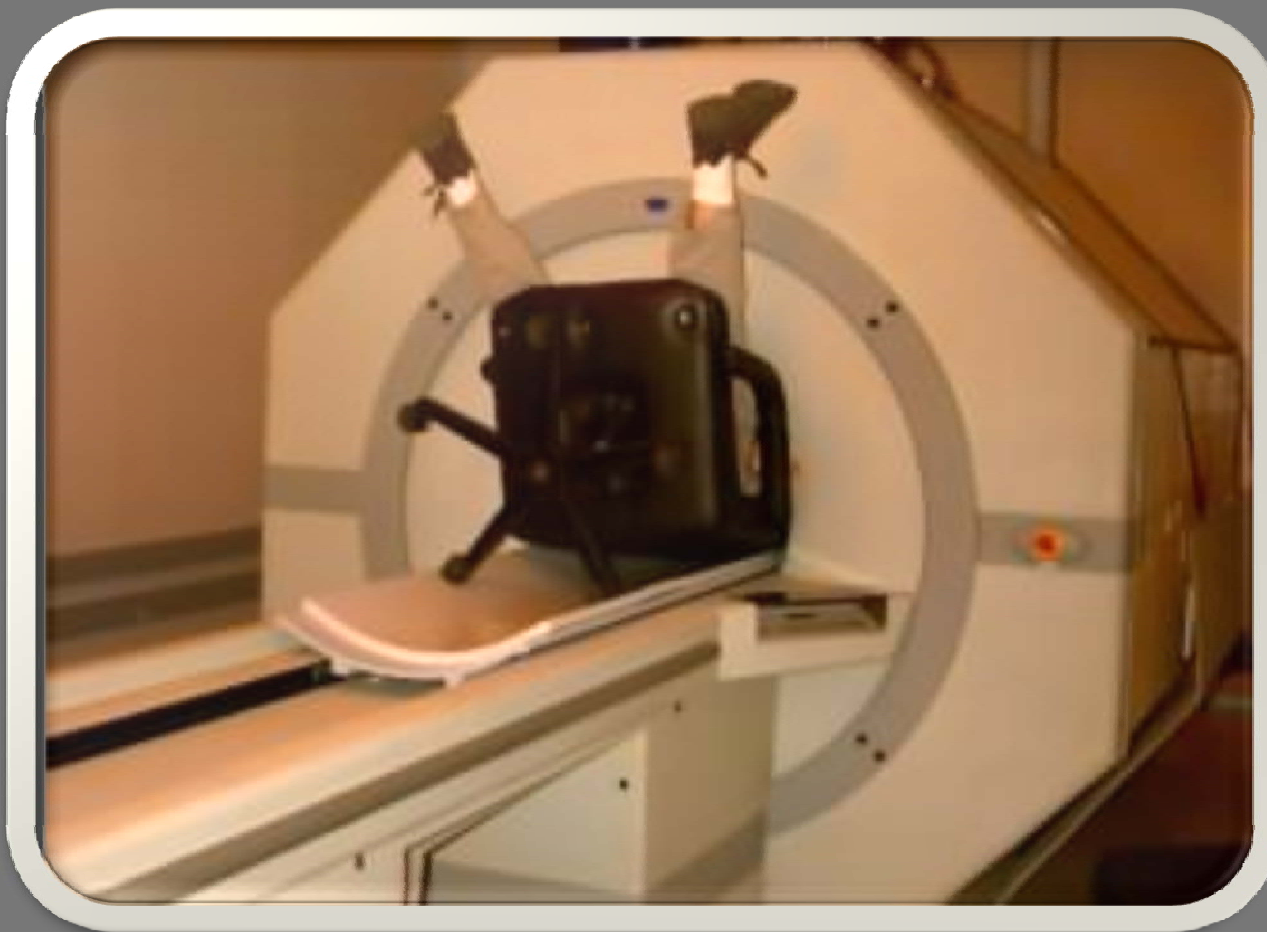
—

IV Gadoliniumtoediening

Waarom cardio MRI als er andere oplossingen zijn?



 **Die bovendien minder riskant zijn!**



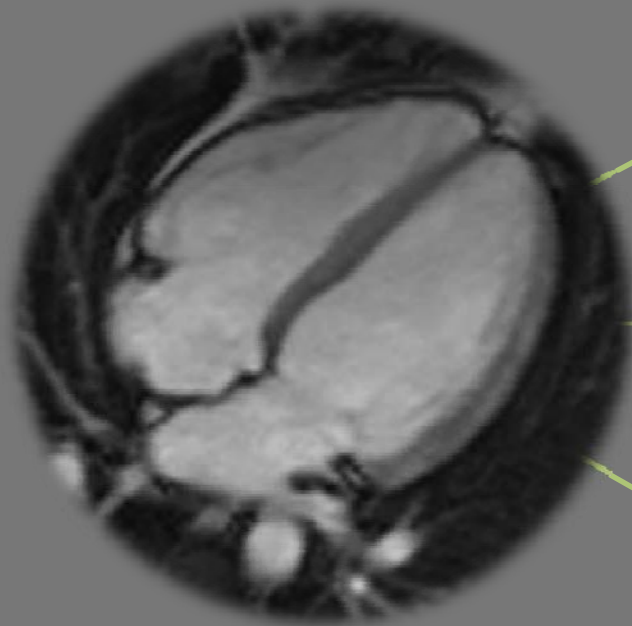


Wat zijn de sterke punten van cardio MRI?

- Beeldkwaliteit
- Multiplanaire beeldvorming
- Flow
- Niet-invasief
- Volumes, massa en functie
- Weefselkarakterisatie
- Uitgebreide evaluatie



Beeldkwaliteit



**Goede
spatiële
resolutie
(2.0 x 2.0
mm)**

**Goede
temporele
resolutie
(20-40ms)**

**Superieur
weefselcon-
trast**



Beeldkwaliteit



Normaal



Kawasaki



Multiplanaire beeldvorming

Evaluatie van alle thoracale structuren

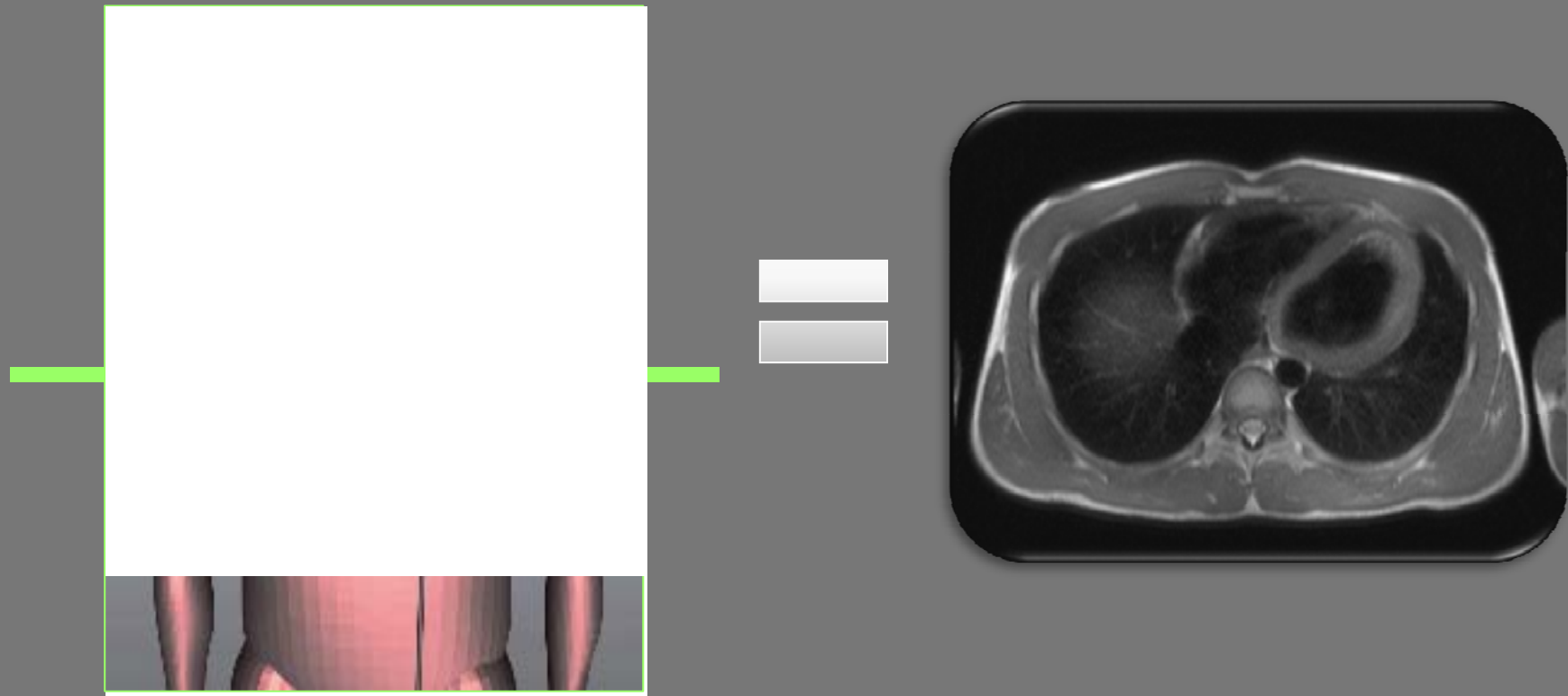
In eender welk vlak of positie

Geen beperkingen door slechte akoestische windows

Inter-studie reproduceerbaarheid

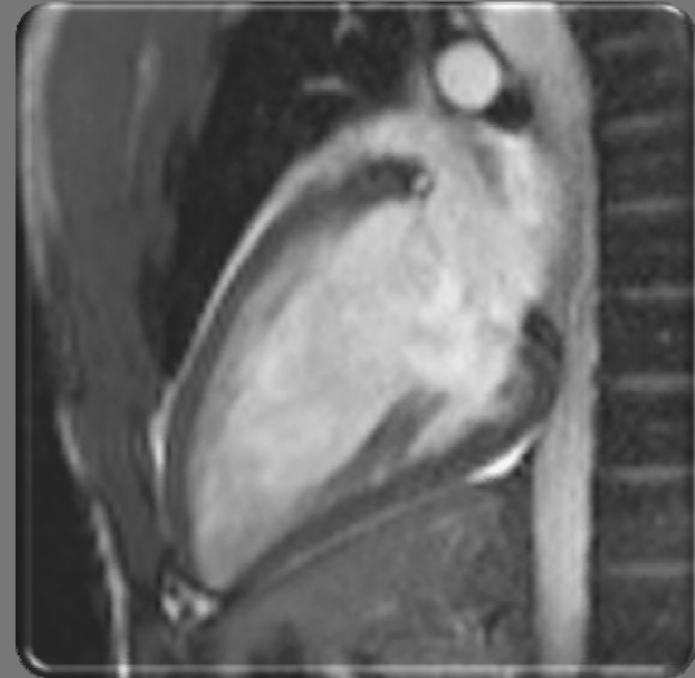
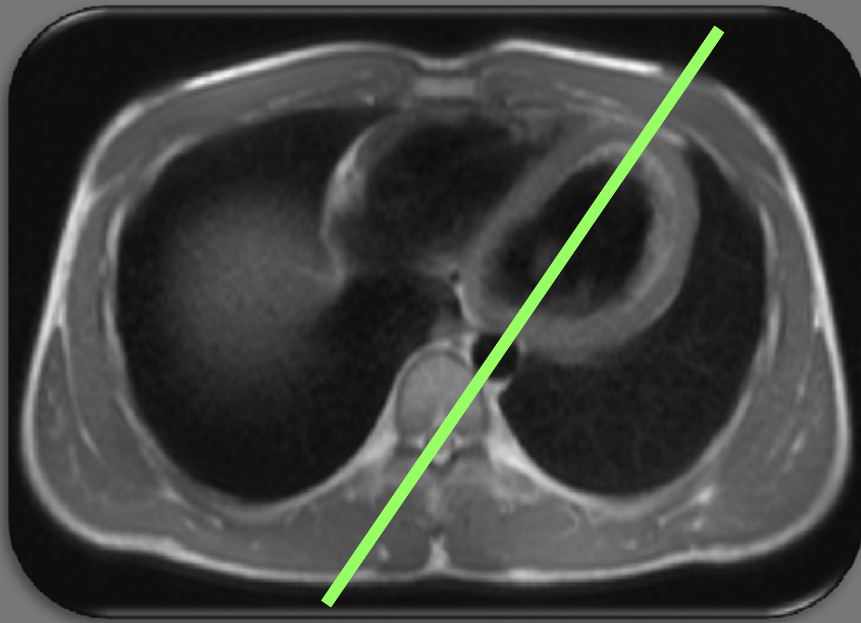


Multiplanaire beeldvorming



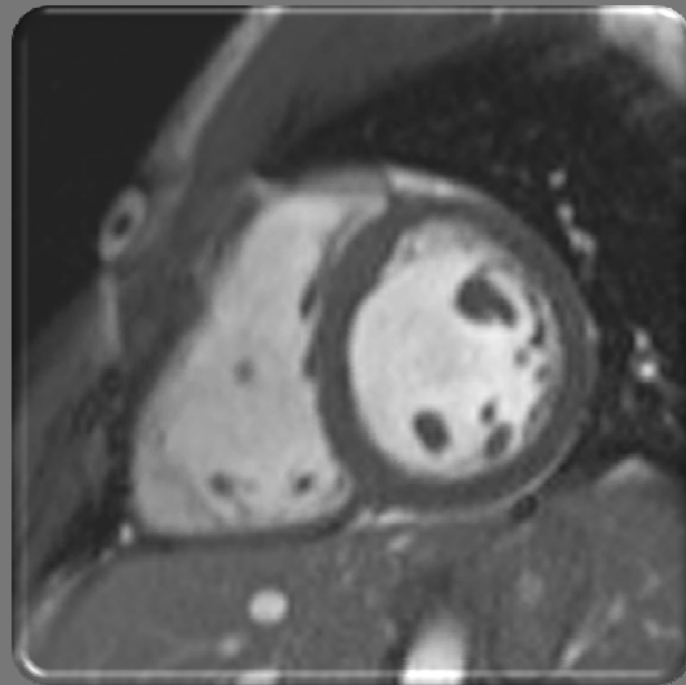
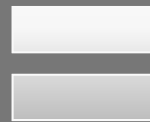
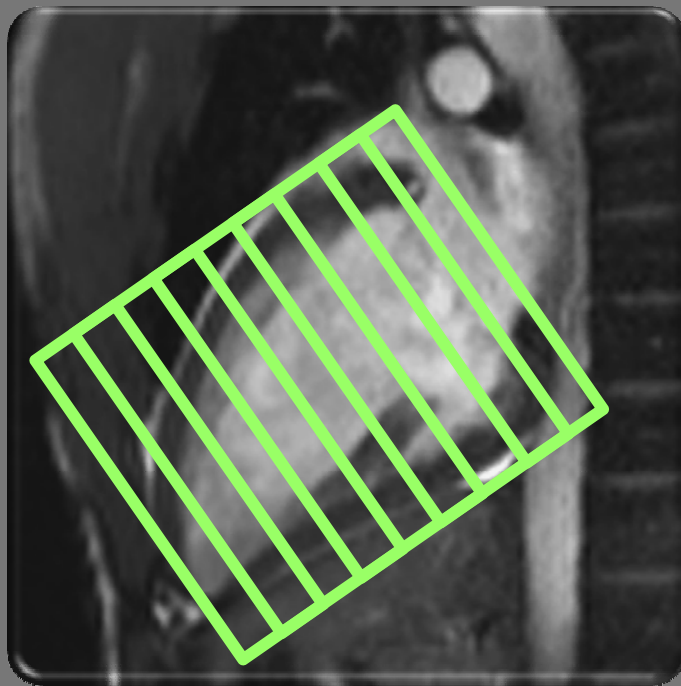


Multiplanaire beeldvorming



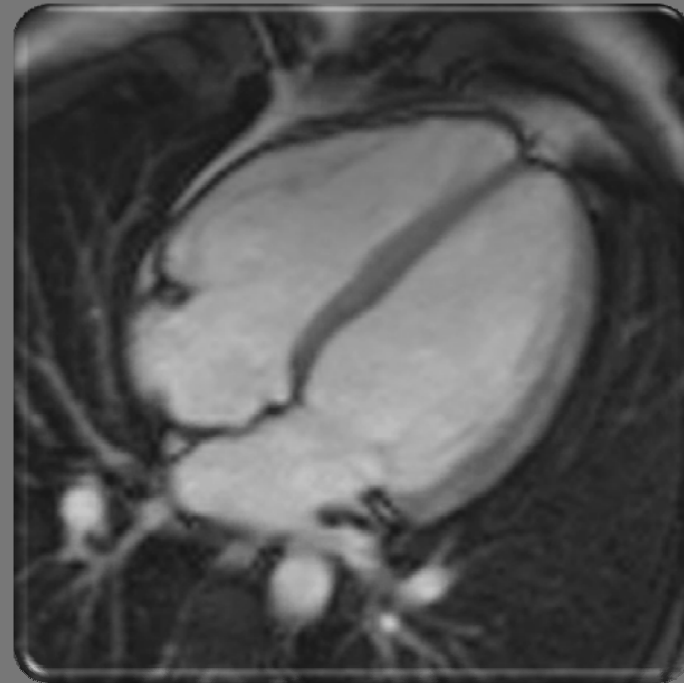
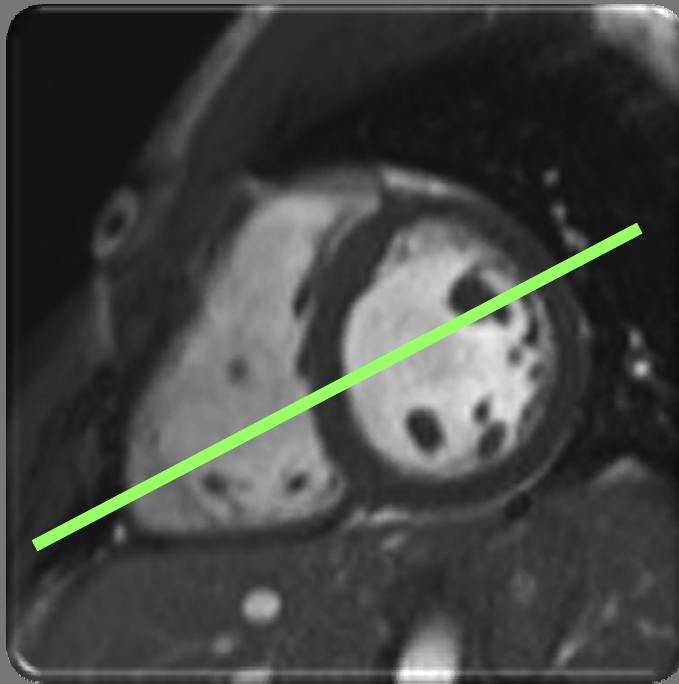


Multiplanaire beeldvorming



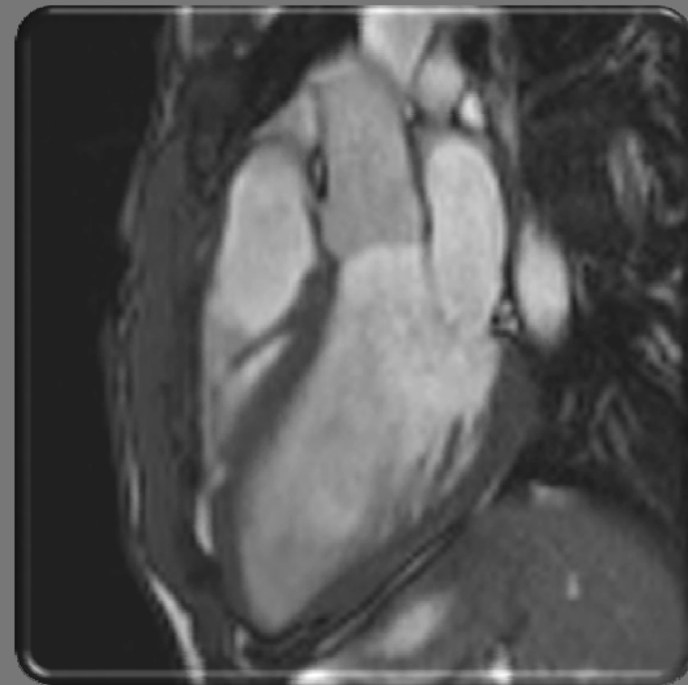
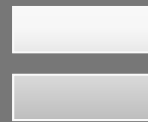
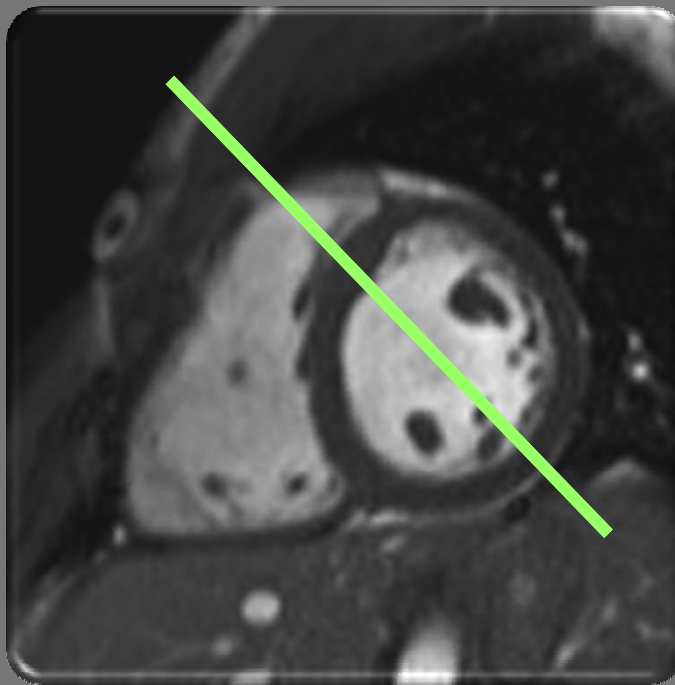


Multiplanaire beeldvorming



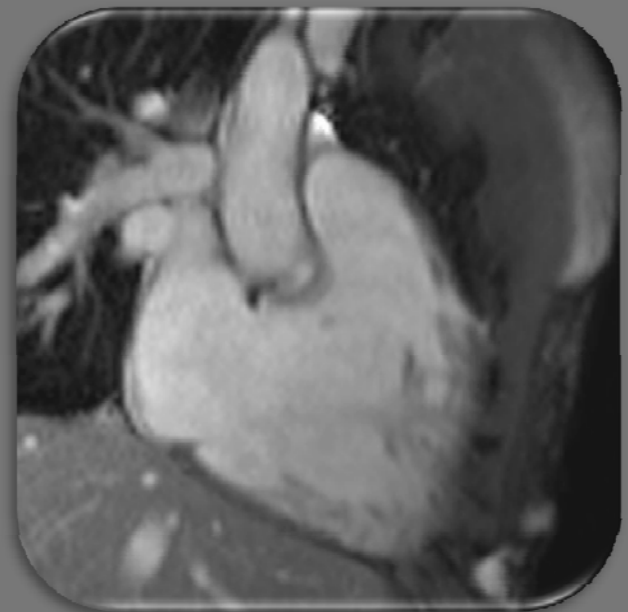
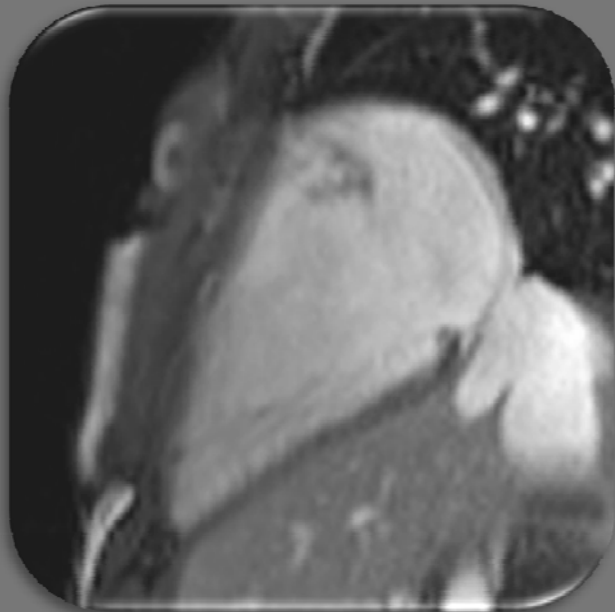


Multiplanaire beeldvorming



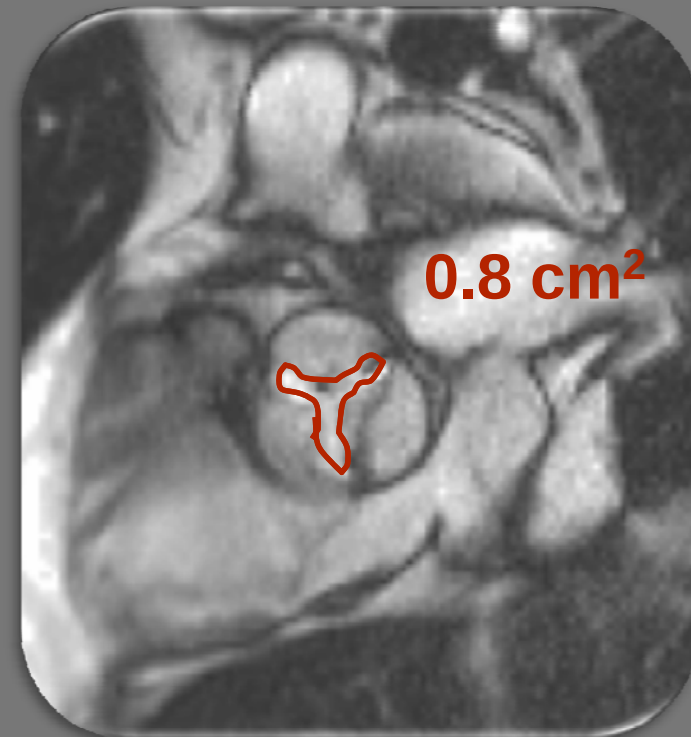
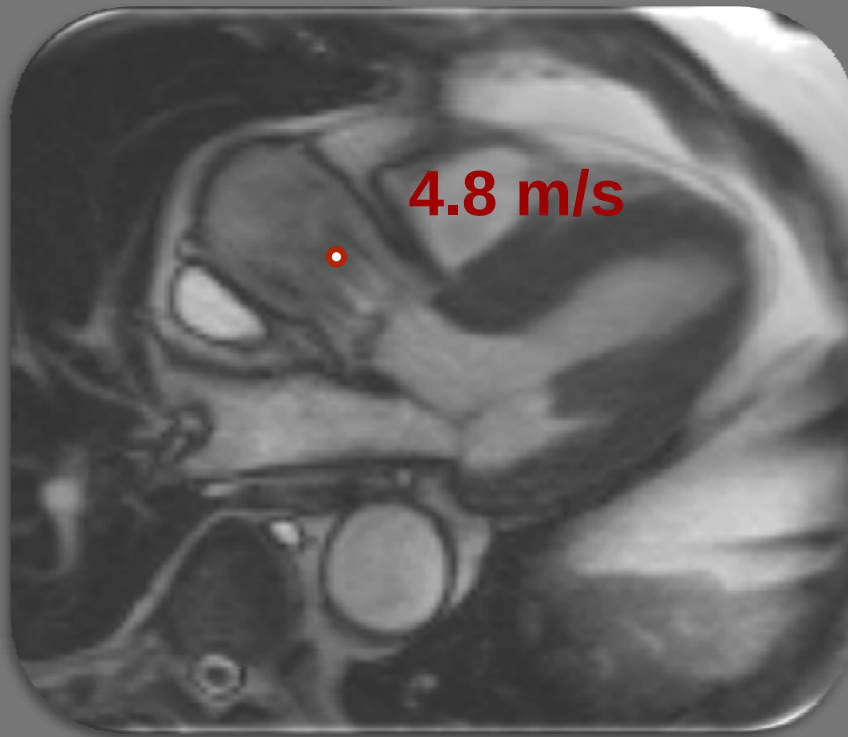


Multiplanaire beeldvorming





Evaluatie van kleplijden?





Niet-invasief

Geen Iodium-houdende contraststof

Geen ioniserende stralen



Follow-up onderzoeken

Patiënten gevoeliger voor ioniserende stralen



Jonge patiënten

Vrouwen



Maar wat zijn nu de selling points?

- Beeldkwaliteit
- Multiplanaire beeldvorming
- Flow
- Niet-invasief
- Volumes, massa en functie
- Weefselkarakterisatie
- Uitgebreide evaluatie



Volumes, massa en functie

Accuraat (ex-vivo validatie)

- Onafhankelijk van anatomie

Reproduceerbaar (follow-up!)

- Therapeutische respons

Hoe evalueren we de hartfunctie?

	EDV ml	ESV ml	SV ml	EF %	Massa g/m
LV	133 (77-195)	27 (19-72)	106 (51-133)	79 (56-78)	115 (<113)
RV	152 (88-227)	47 (23-103)	105 (52-138)	69 (47-74)	39



Weefselkarakterisatie

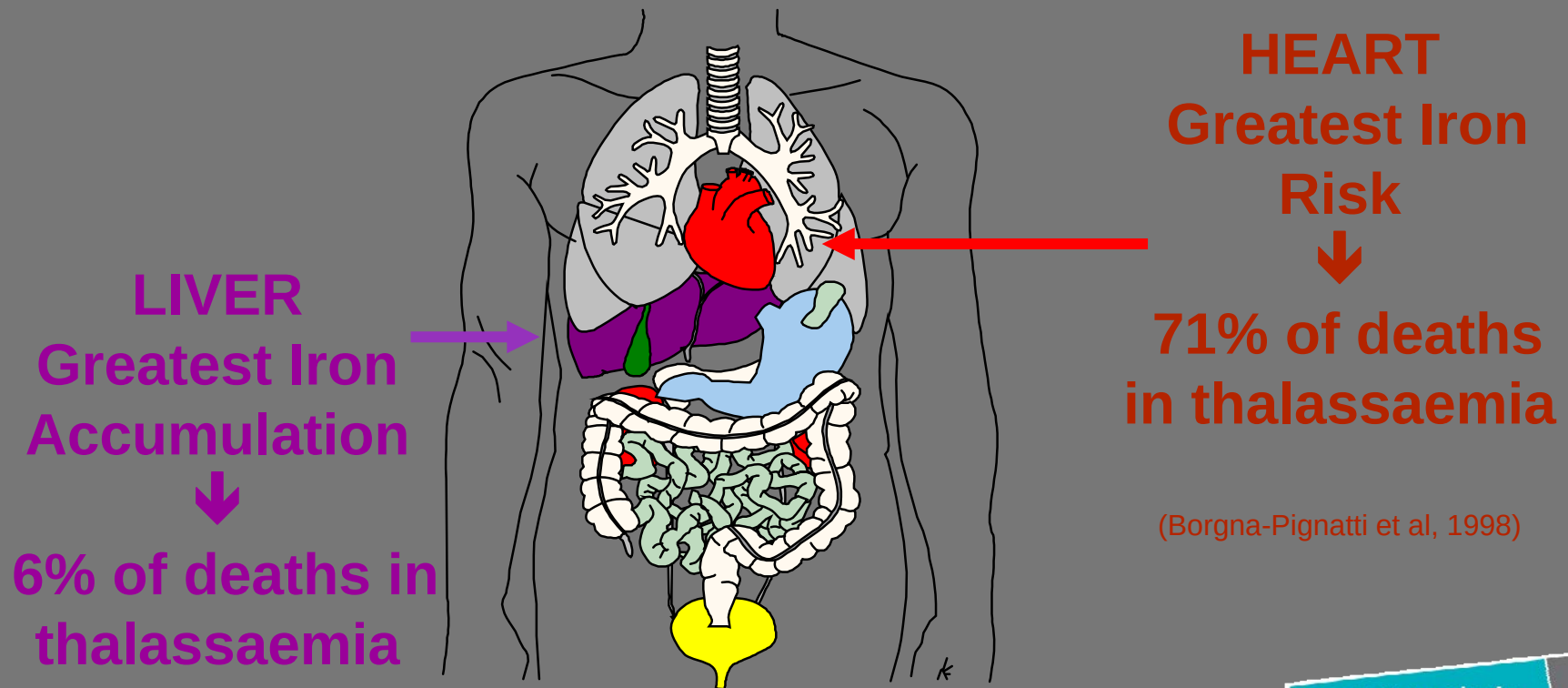
T1 en T2 sequenties: vet, water en ijzer

Gadolinium: fibrose, infarct, infiltratie



Weefselkarakterisatie

Hoe kan cardio MRI helpen bij de therapie van thalassemie?



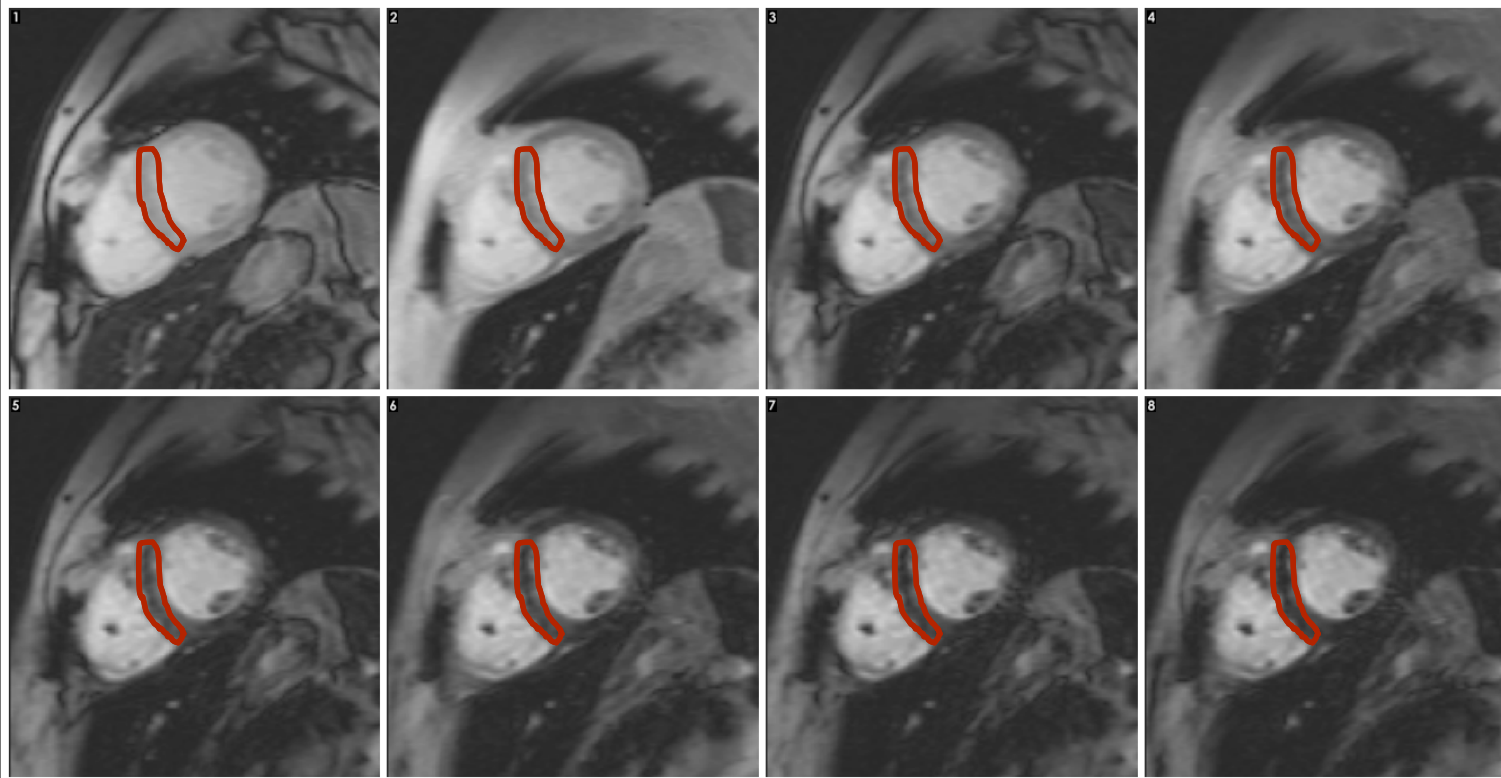
(Borgna-Pignatti et al, 1998)

(Borgna-Pignatti et al, 1998)



Weefselkarakterisatie

Verhoogde ijzerstapeling?

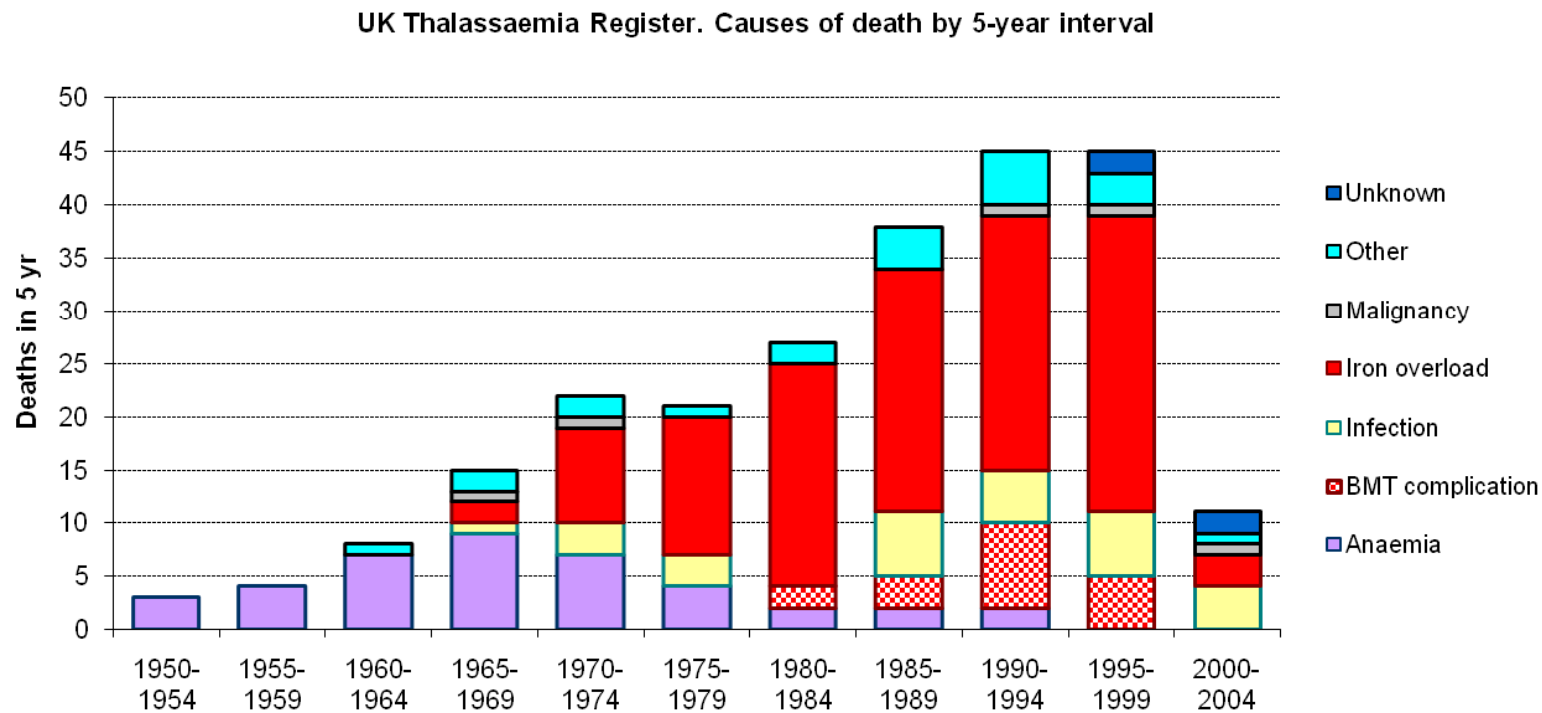


Ernstige ijzerstapeling, de T2* bedraagt 8.9 ms



Weefselkarakterisatie

Hoe kan cardio MRI helpen bij de therapie van thalassemie?





Weefselkarakterisatie

T1 en T2 sequenties: water, vet, ijzer

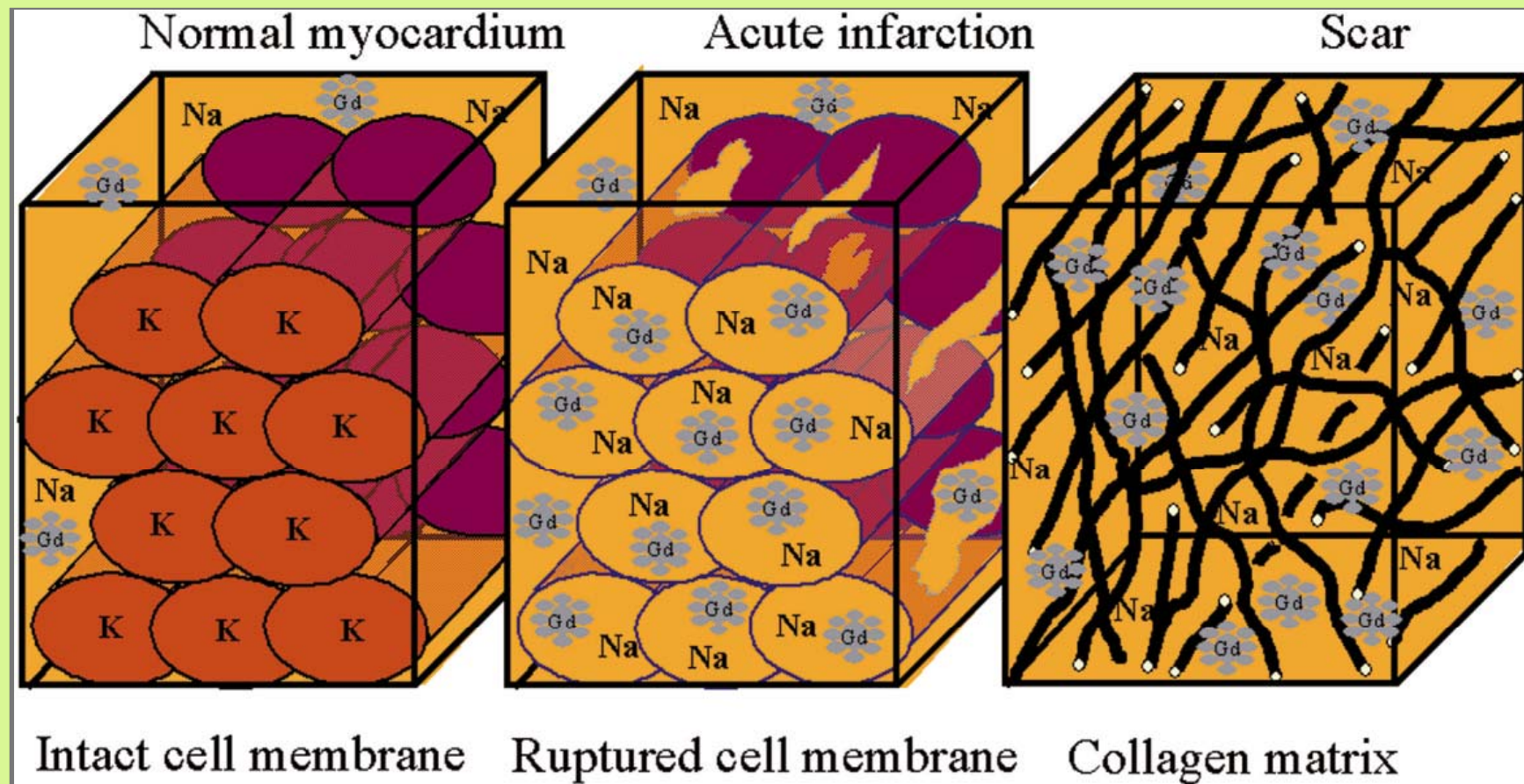
Gadolinium: fibrose, infarct, infiltratie



Histologische correlatie

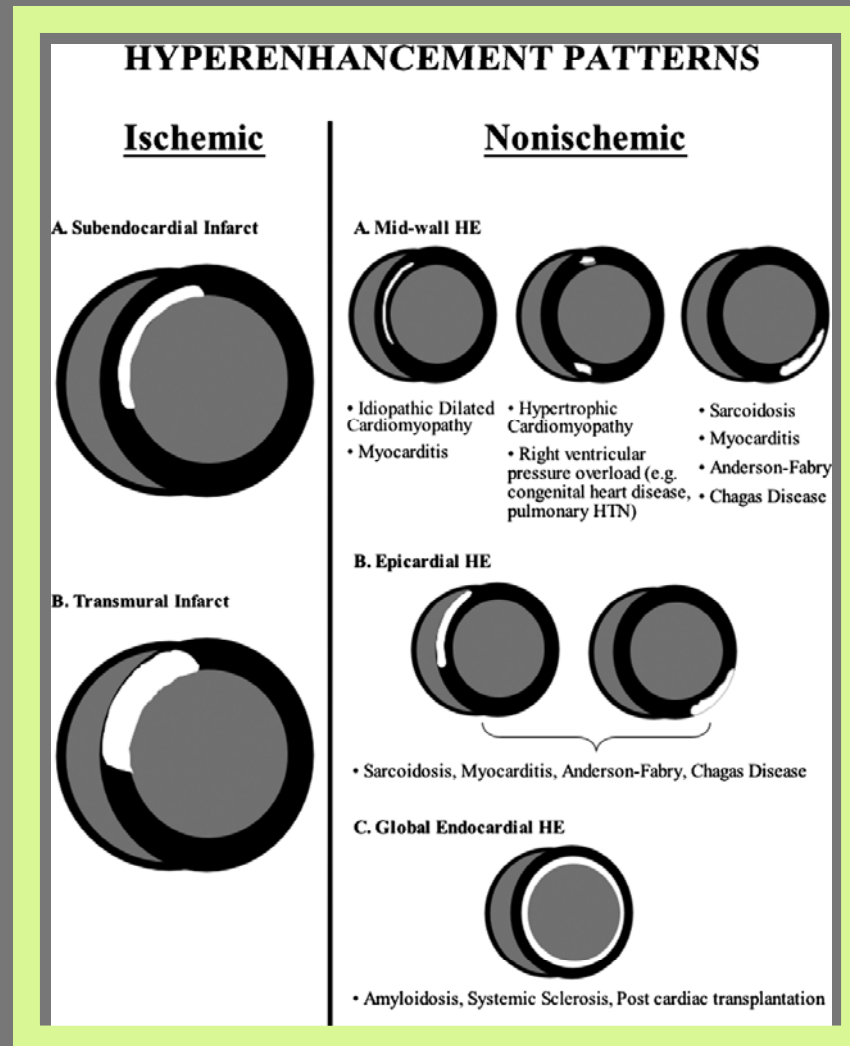
**VS biopsie: niet-invasief, geen
sampling error**

Hoe kan Gd helpen in de diagnose?





Hoe kan Gd helpen in de diagnose?

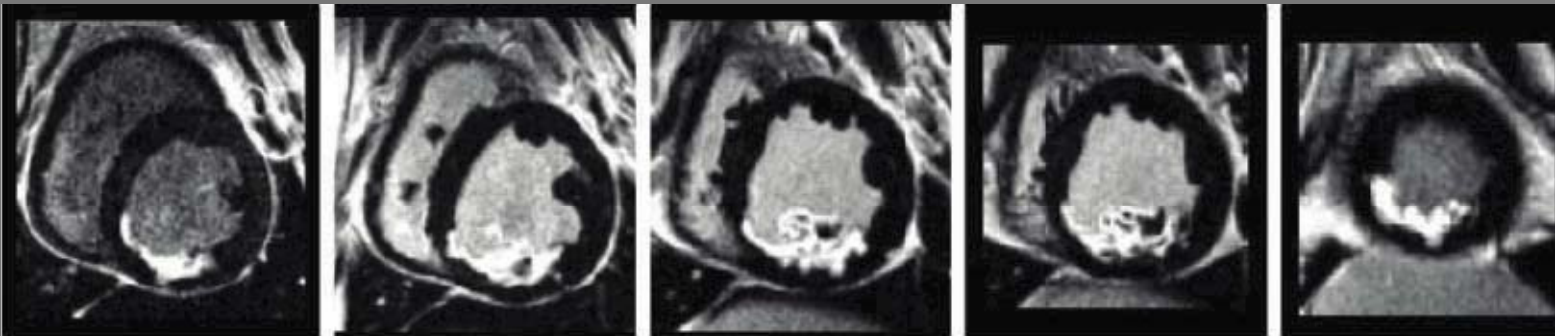




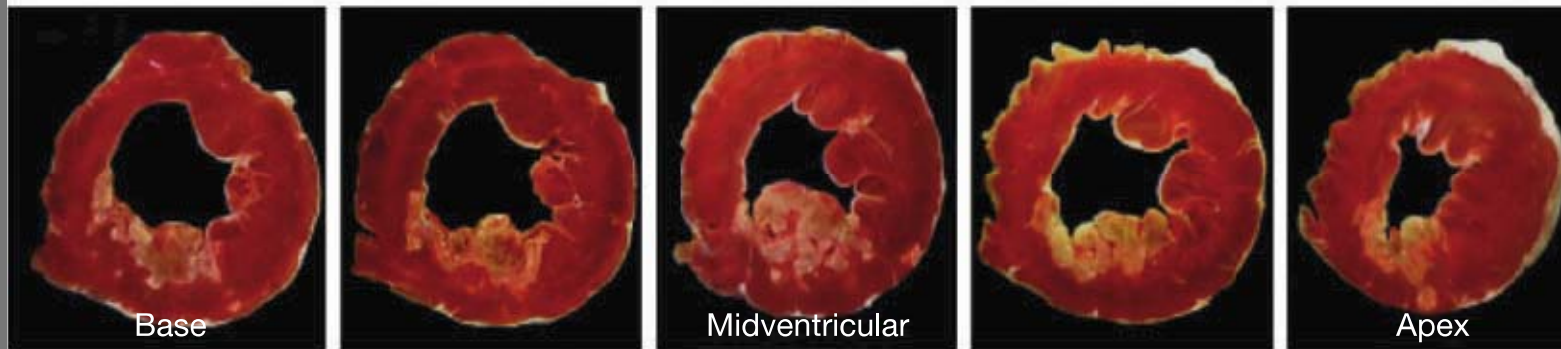
Weefselkarakterisatie

Kunnen we een infarctzone zien?

MRI



Histology



Base

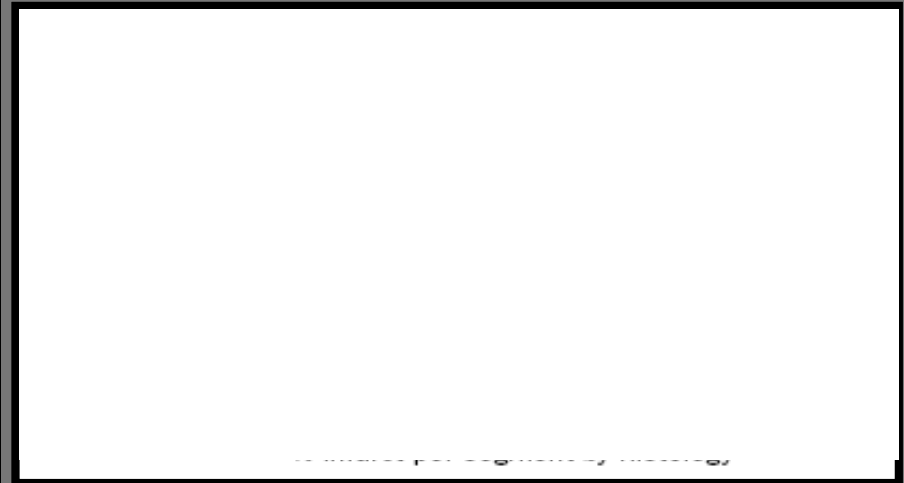
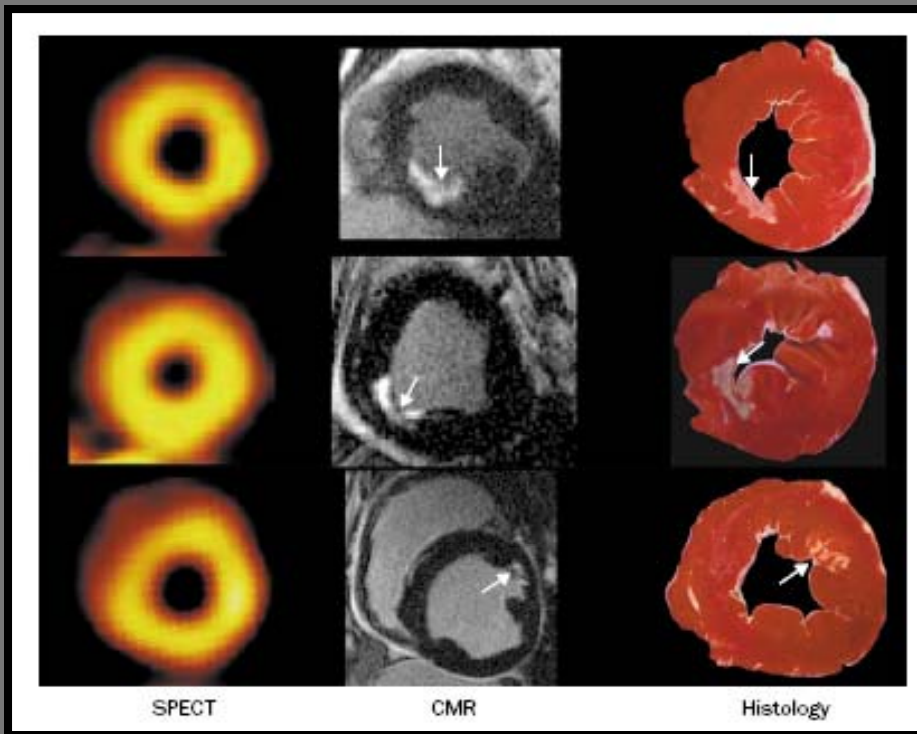
Midventricular

Apex



Weefselkarakterisatie

Detectie met Cardio MRI VS SPECT





Cardio MRI Perfusie

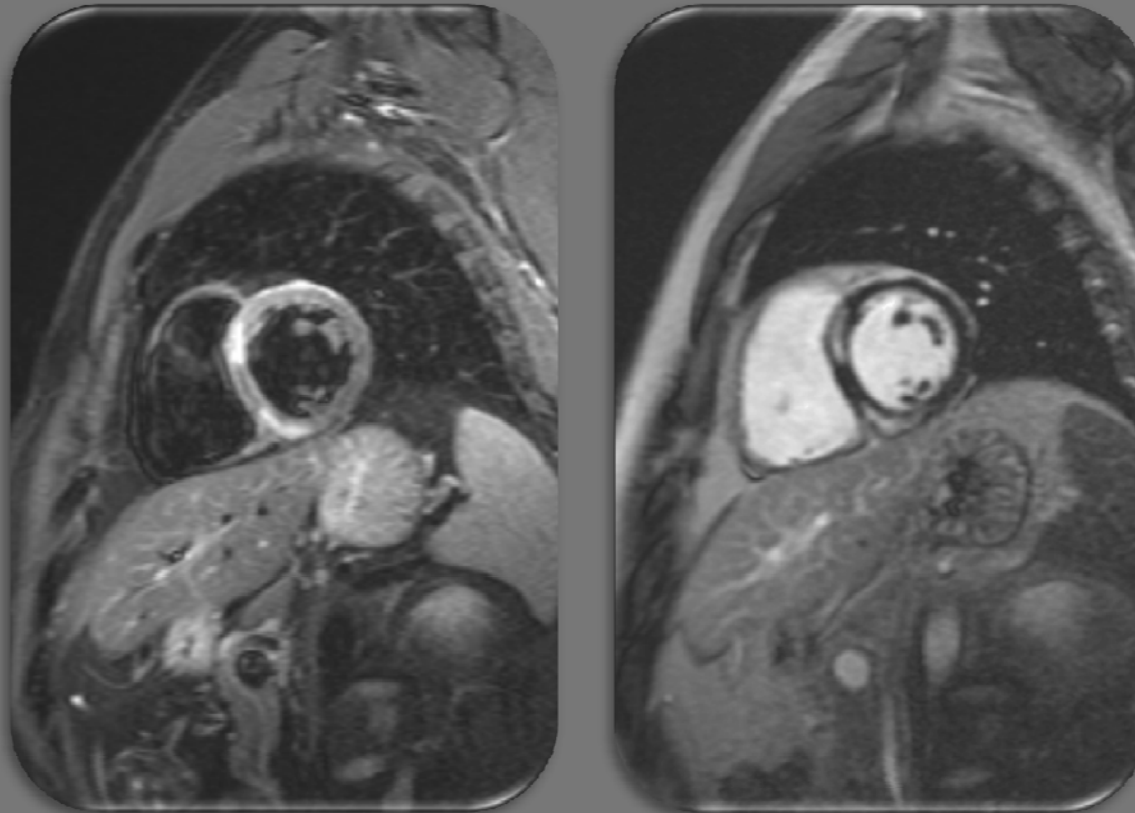
Hemodynamisch significante stenose?





Weefselkarakterisatie

En wat met andere CM?

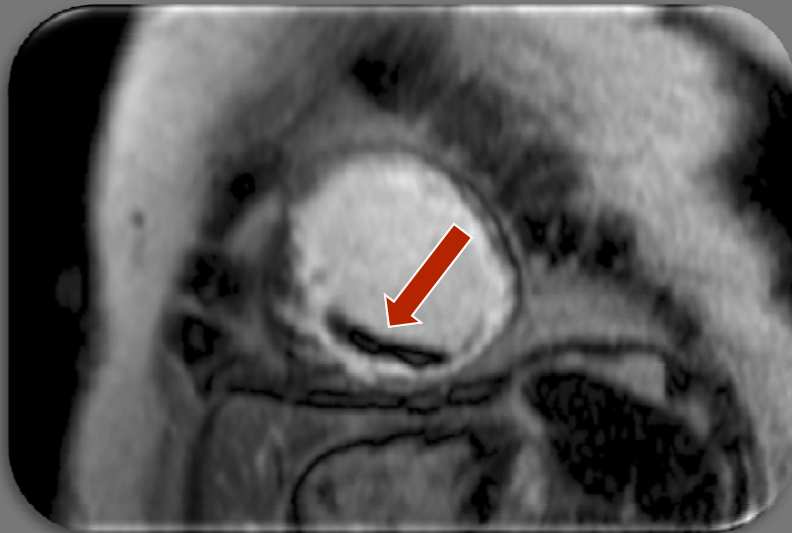


Myocarditis

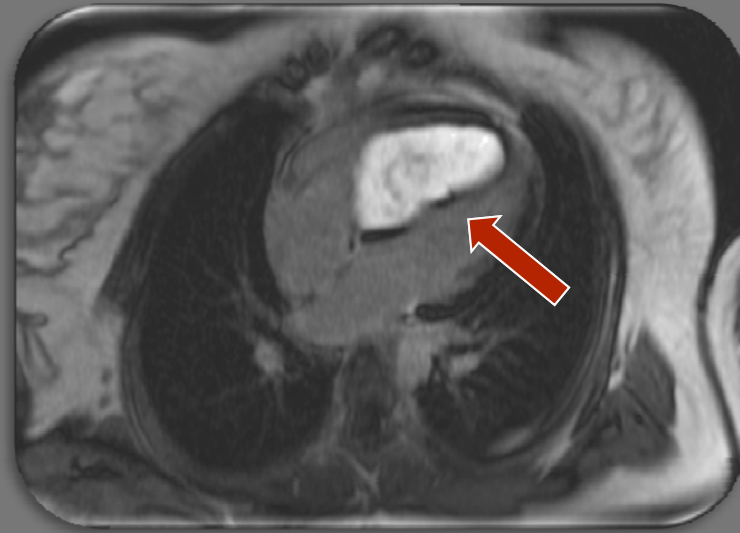


Weefselkarakterisatie

Thrombus of tumor?

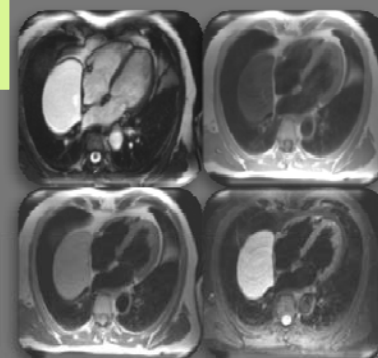
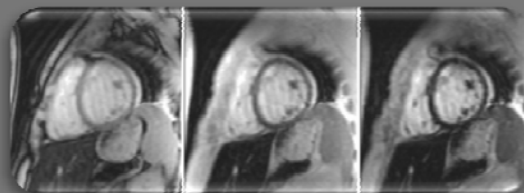
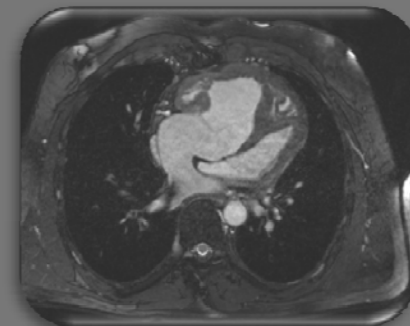
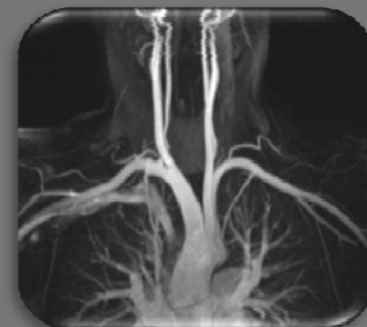
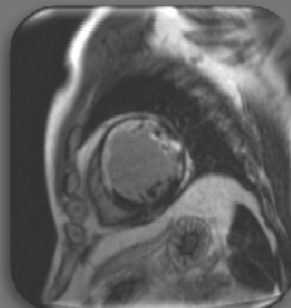
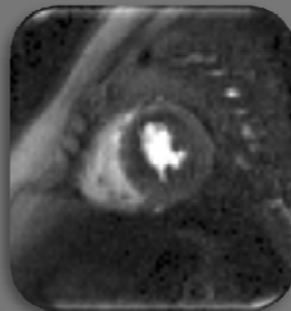
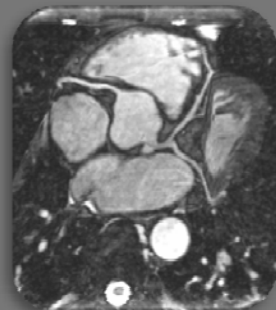


Thrombus



Septaal fibroma

Uitgebreide evaluatie



enhuis
Limburg



Wat zijn de beperkingen?

Kostelijk, gespecialiseerd onderzoek

Duur van het onderzoek

Ritmestoornissen

Niet geschikt voor alle patiënten (claustrofobie, PM,...)

Nefrogene systemische sclerose (GFR<30ml!)



Wat zijn de beperkingen?



Niet aan bed



rg



Bottom-line

One-stop shop!

Volumes, massa en functie

Weefselkarakterisatie



TOO BAD DESMOND HAD NEVER LEARNED TO RECOGNIZE
THE EARLY WARNING SIGNS OF A HEART ATTACK.