



Universitätsklinikum
Münster



Indikationen für Hochdosis- und Niedrigdosisuntersuchungen in der Computertomographie

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14. Fortbildungsseminar APT
Münster, 18.06.2010

Current Concepts: Computed Tomography - An Increasing Source of Radiation Exposure.

Brenner, David; Hall, Eric

New England Journal of Medicine. 357(22):2277-2284, November 29, 2007.

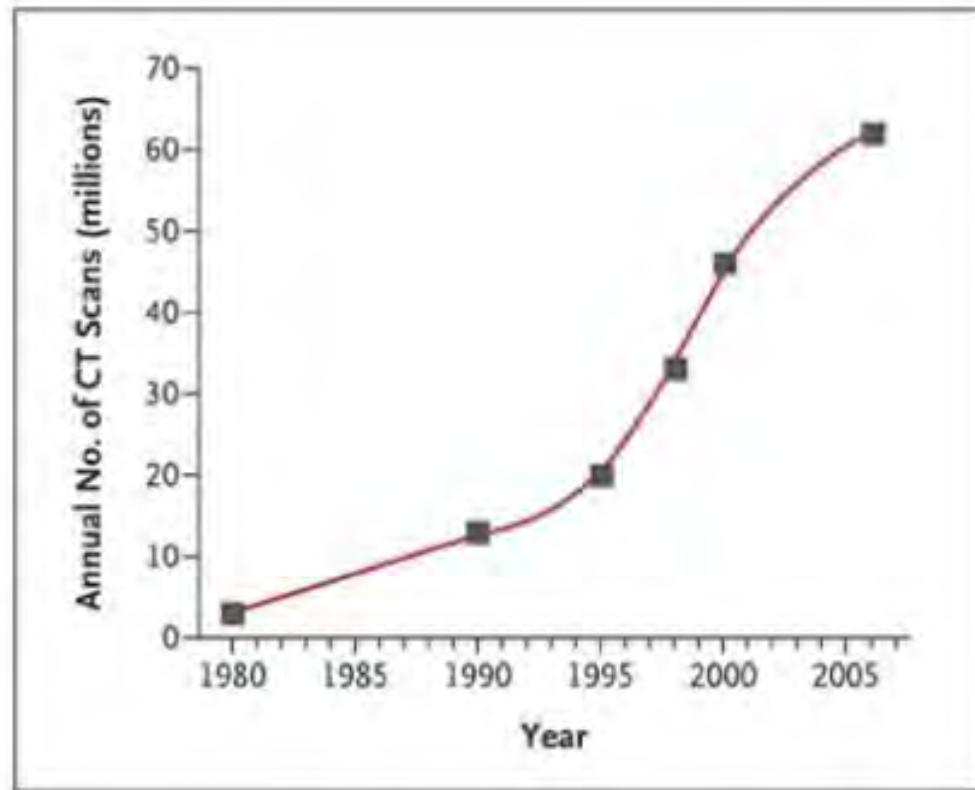


Figure 2 . Estimated Number of CT Scans Performed Annually in the United States. The most recent estimate of 62 million CT scans in 2006 is from an IMV CT Market Summary Report [3] .



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Die Vorreiter ...

Niedrigdosisanwendung

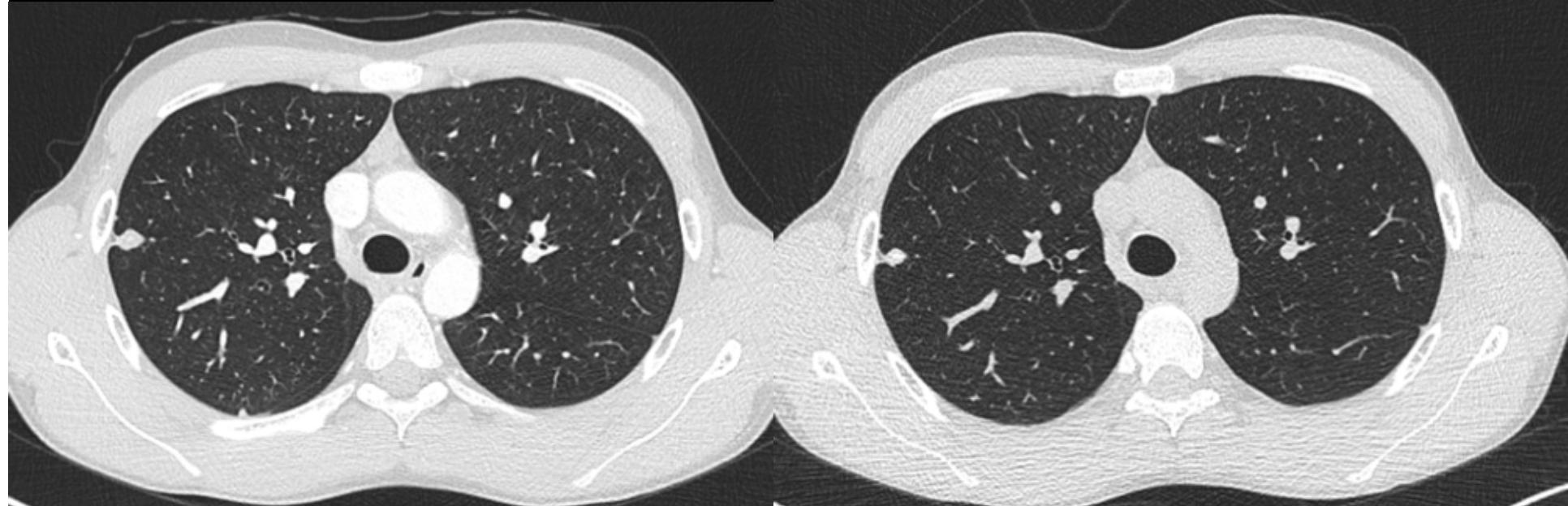
- Regionen mit anatomisch vorgegebenem hohem Objektkontrast
 - Situationen mit künstlich angehobenem Kontrast
- Lunge/Skelett/Urolithiasis/CTA

THE LANCET

Early Lung Cancer Action Project: overall design and findings from baseline screening.

Henschke CL et al.

1999 Jul 10;354(9173):99-105.



„Normaldosis“

„Niedrigdosis“

Follow up eines Rundherdes



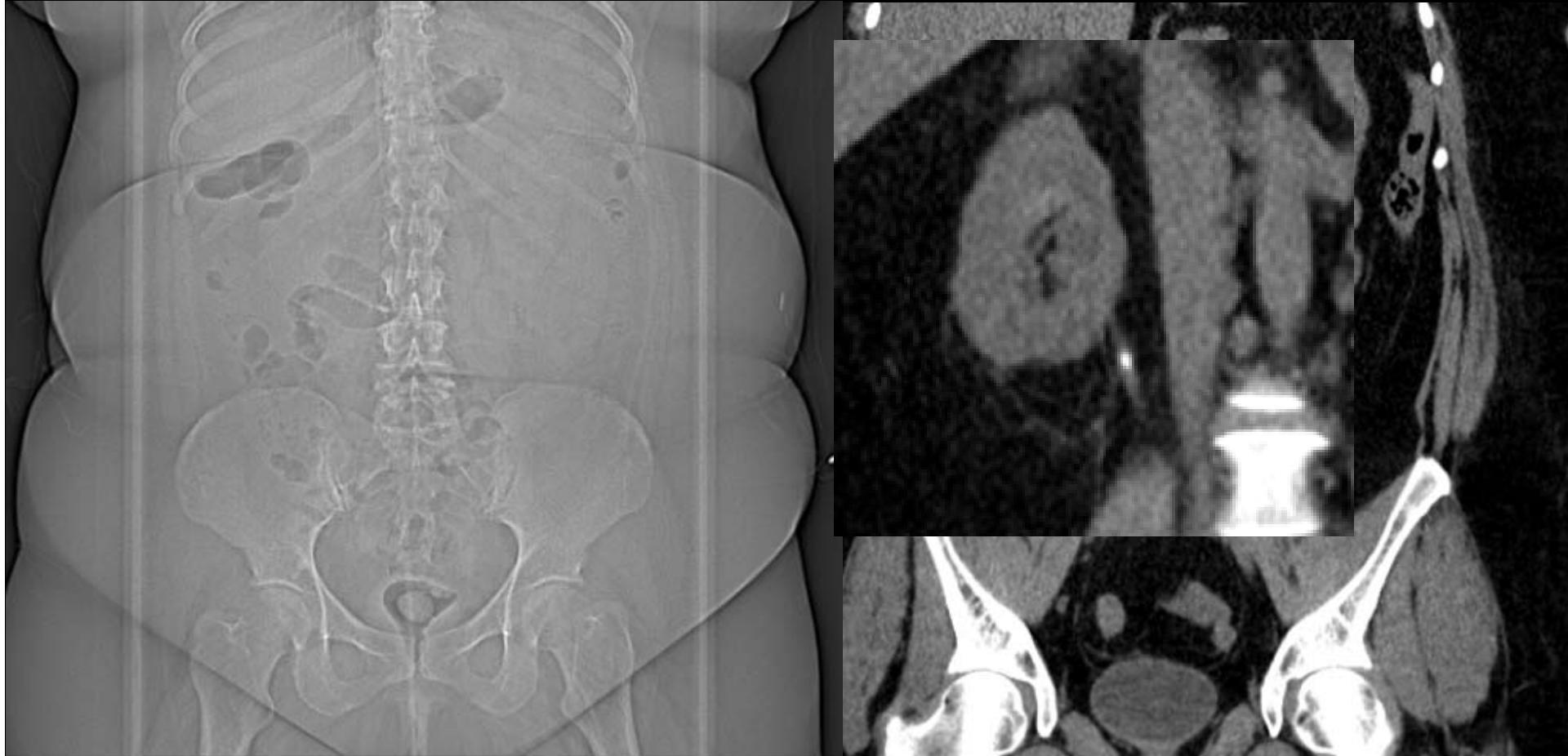
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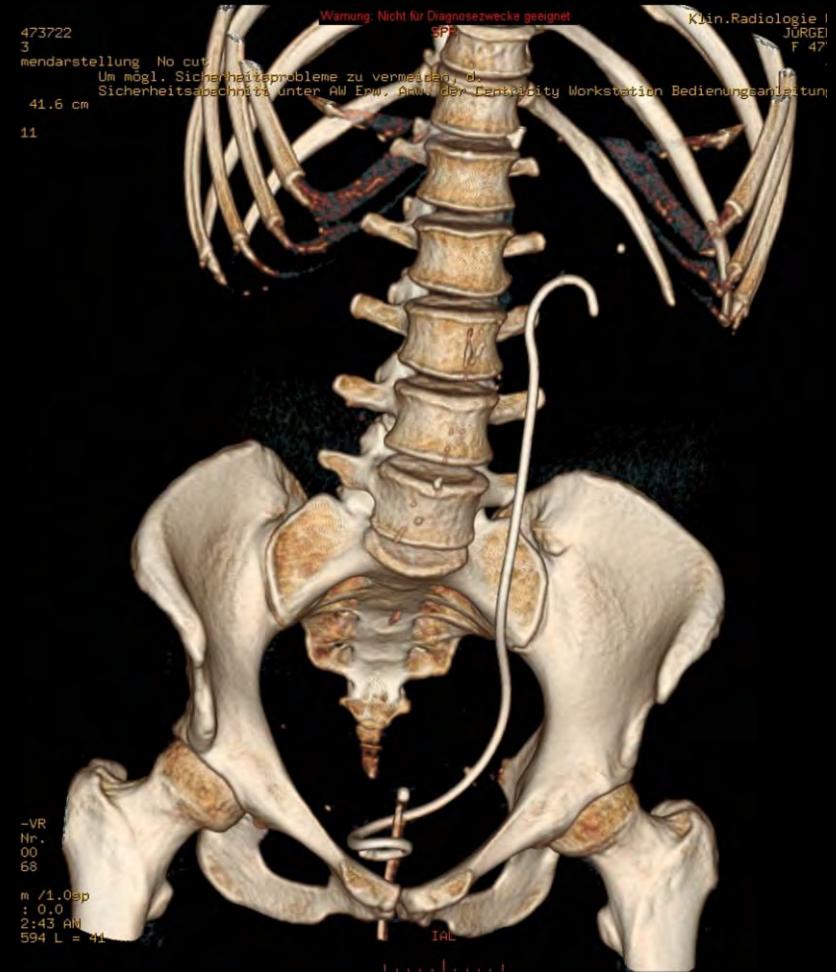
Total mAs 550 Total DLP 54 mGycm

	Scan	KV	mAs / ref.	CTDlvol mGy	DLP mGycm
Patient Position F-SP					
Topogram	1	120	33 mA		
LungLowDose	2	120	20	1.39	54

Low dose Thorax CT



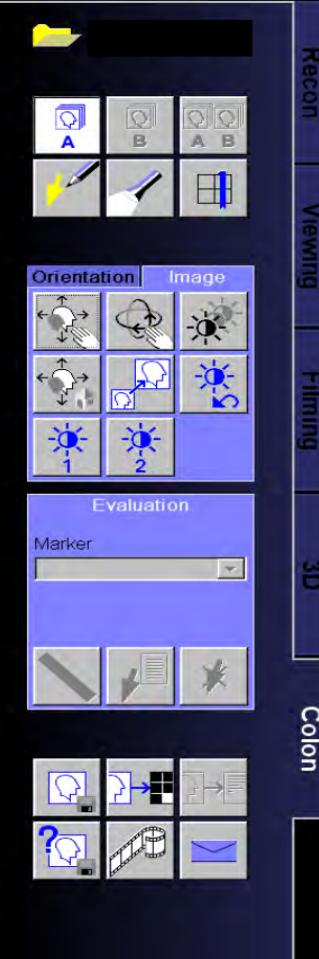
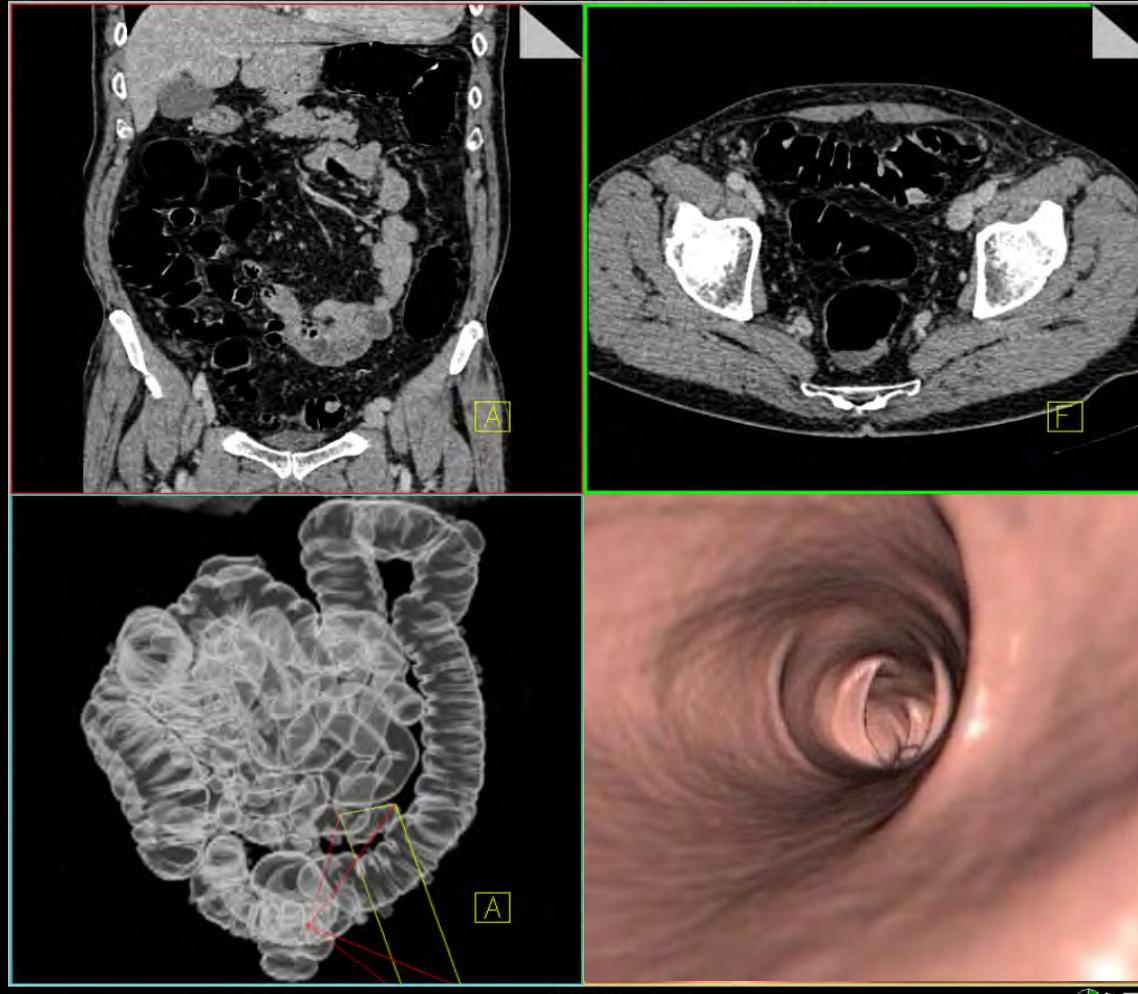
„Stone-CT“¹⁴ in Niedrigdosis



„Stone-CT“ in Niedrigdosis



Patient Applications Edit View Evaluation Orientation Image Options System Help





Rückenlage



Bauchlage

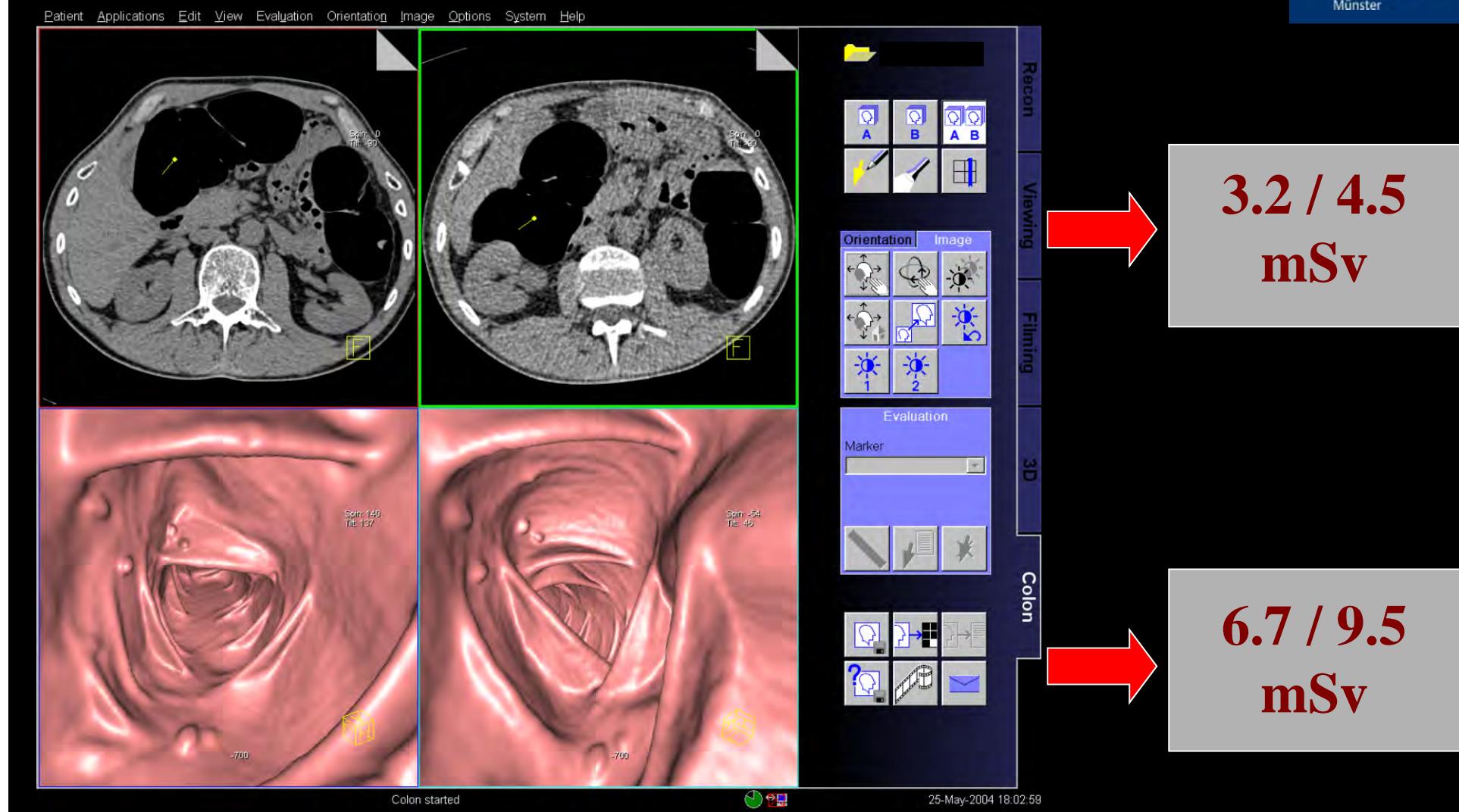


Stuart A. Taylor
Andrea Laghi
Philippe Lefere
Steve Halligan
Jaap Stoker

European society of gastrointestinal and abdominal radiology (ESGAR): Consensus statement on CT colonography

- komplette Darmreinigung, reduziert mit fecal tagging
- kein i.v. Kontrastmittel
- Darmrelaxation nur bei Bedarf
- CO₂ oder Raumluft
- **Bauch- und Rückenlage**
- Schichtdicke \leq 3 mm
- **geringst mögliche Strahlenexposition**
- Auswertung: 2D oder 3D-Ansatz

Münster-Protokoll



100 mAs
(Rückenlage)

10 mAs
(Bauchlage)

Wessling et al., Radiology 2006

Total mAs 1648 Total DLP 309 mGy*cm

	Scan	KV	mAs / ref.	CTDIvol mGy	DLP mGy*cm
Patient Position F-SP					
Topogram RL	1	120	33 mA		
Abdomen RL	2	120	75 / 100	5.05	252
New Position F-PR					
Topogram BL	3	120	33 mA		
Abdomen BL	4	120	15 / 15	1.10	57

Total mAs 2118 Total DLP 374

	Scan	KV	mAs / ref.	CTDIvol	DLP
Patient Position H-SP					
Topogram		1	120		
Abdomen	2	120	120 / 200	8.12	374

CT-Kolo versus Abdomen CT

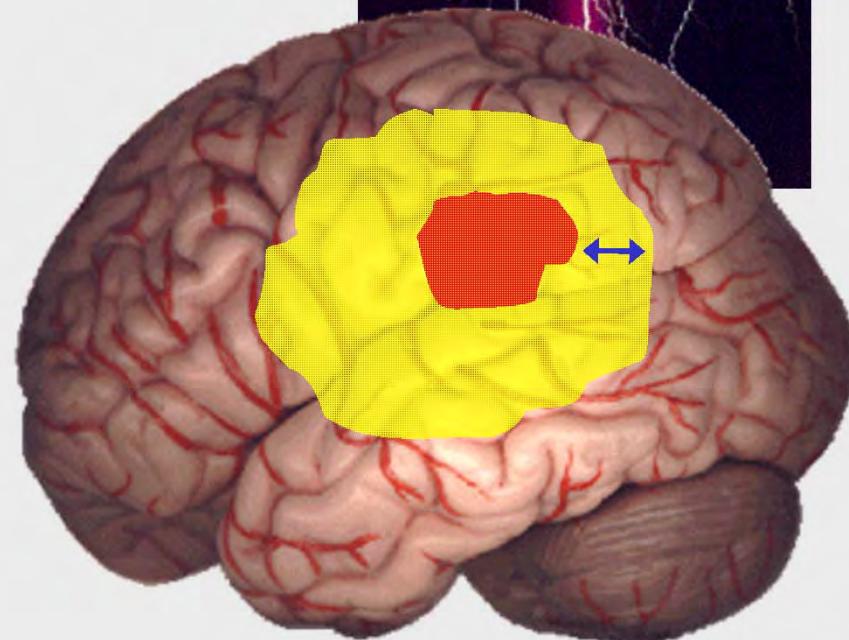


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Die Problemfälle ...

Ischämie Modell



■ Infarktkern

↔ Penumbra

Stroke CT

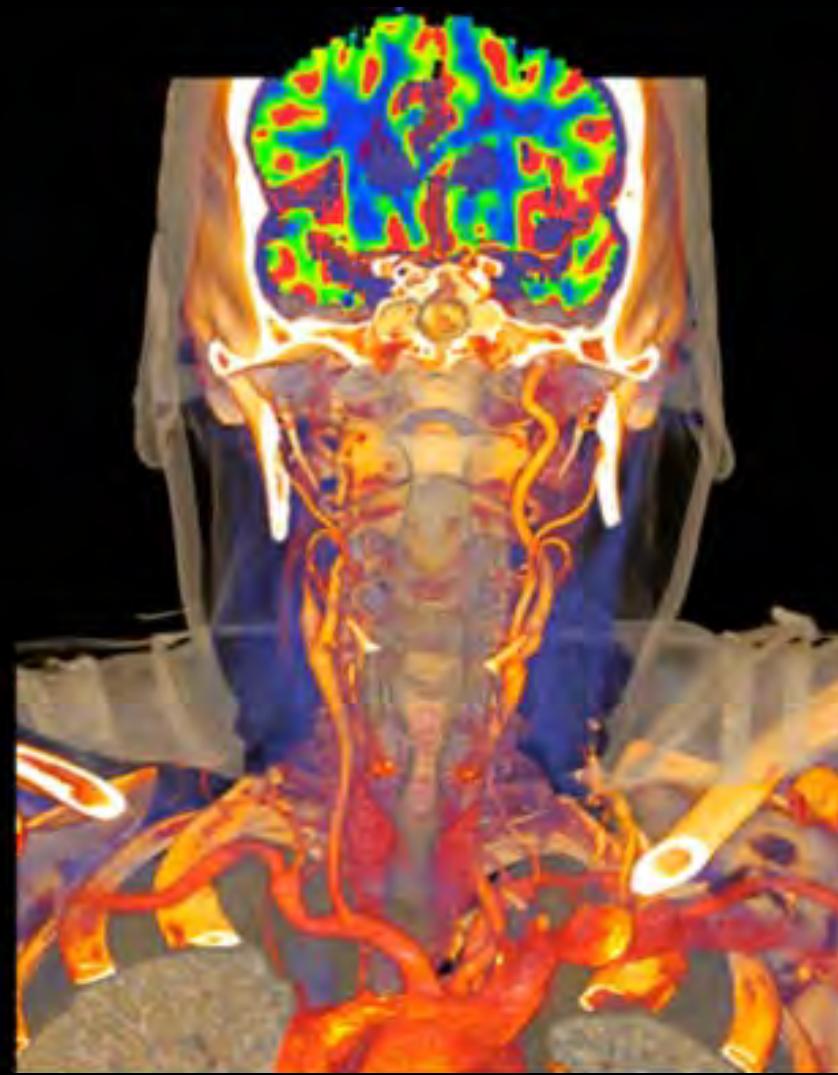
Non-enhanced CT



- 43 y/o female
- 3.5 hrs. after s/o
- l/s hemiplegia



- 44 y/o female
- 2 hrs. after s/o
- l/s hemiplegia



Quelle: Siemens

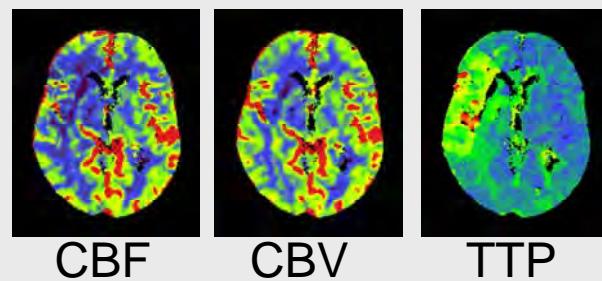
natives CT
6 s



CT Angiographie
10 s

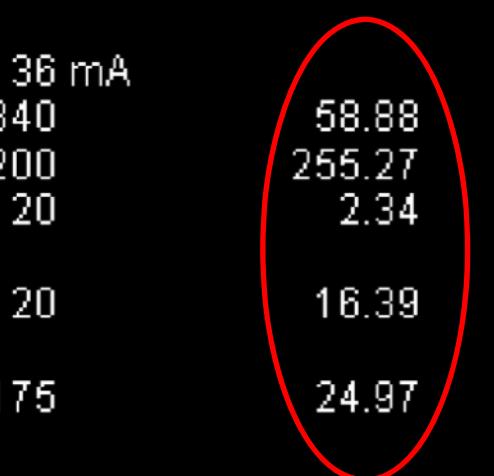


Perfusions CT
40 s

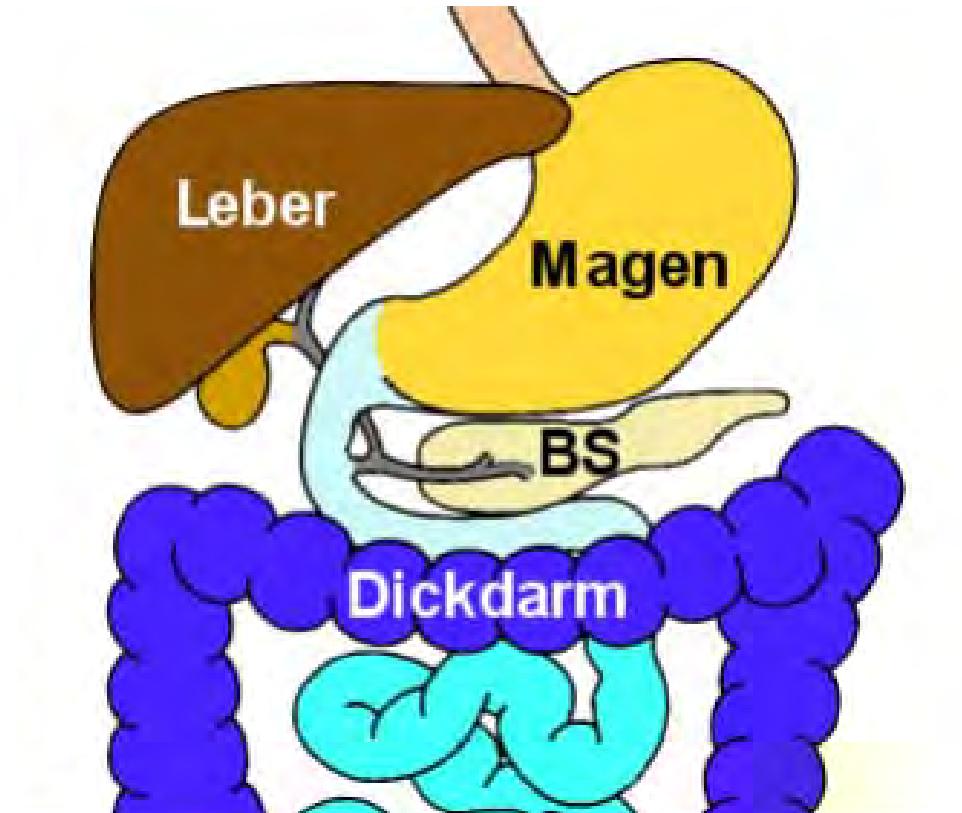
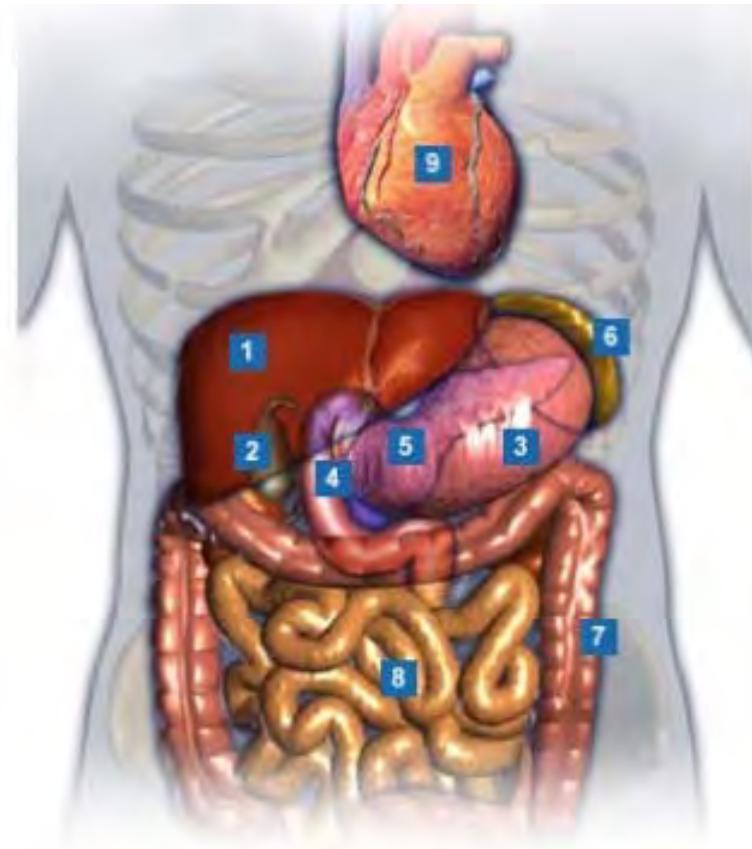


Total mAs 24118 Total DLP 4694 mGy*cm

	Scan	kV	mAs / ref.	CTDlvol mGy	DLP mGy*cm	TI s	cSL mm
Patient Position H-SP							
Topogram	1	120	36 mA	58.88	896	5.3	0.6
CCT	2	120	340	255.27	2920	1.0	0.6
DynMulti4D	3	80	200	2.34	2	0.6	0.6
PreMonitoring	38	120	20	16.39	16	0.5	10.0
Contrast				24.97	860	0.5	0.6
Monitoring	39	120	20				
Last scan no.	45						
CCT Angio	46	120	175				



Stroke CT



- Endosonographie
- ERCP
- IDUS



Transabdomineller Ultraschall (TAU)



- Multislice-CT
- MRT
- PET/CT

Tri-(Bi)phasisches Pankreas-CT

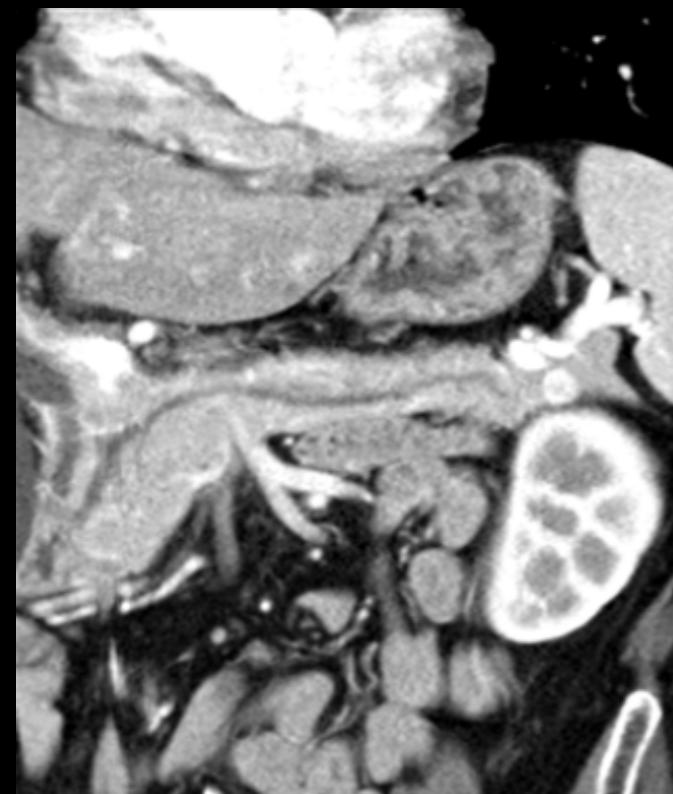


arteriell

Pankreasparenchym
(ca. 35-55 Sek.)

portalvenös (65 Sek.)

Bolus tracking oder Testbolus, Schichtdicke 0,75 bis 3 mm



Neuroendokrine Tumoren (Insulinom)

Tri-(Bi)phasisches Pankreas-CT



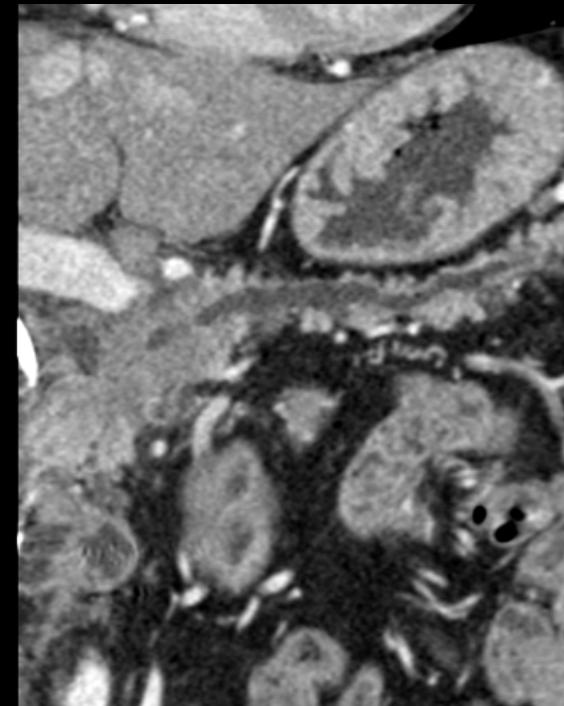
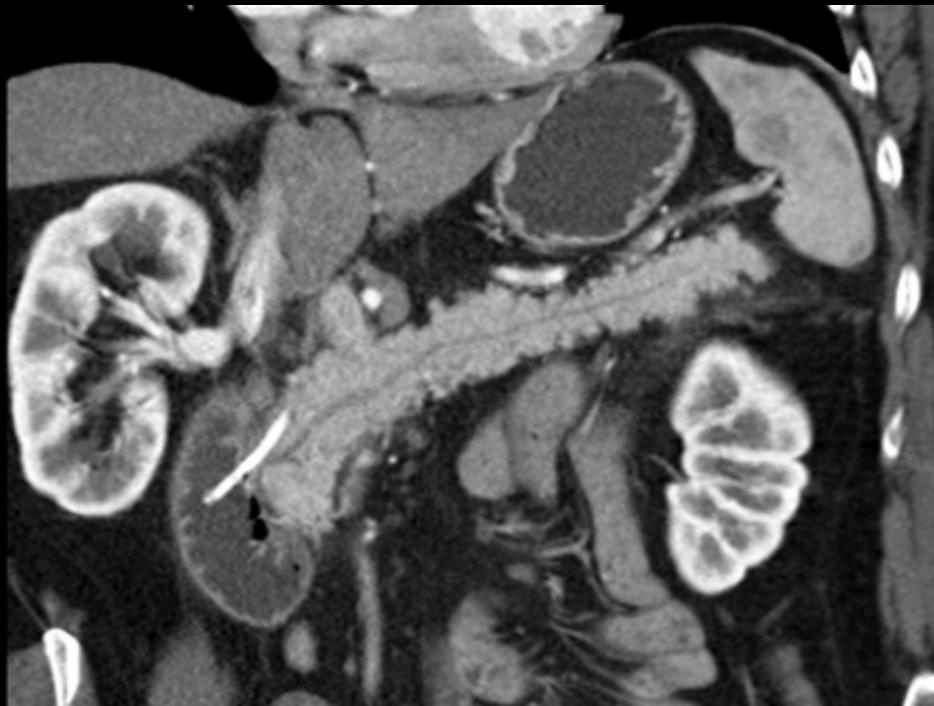
arteriell

Pankreasparenchym
(ca. 35-55 Sek.)

portalvenös (65 Sek.)

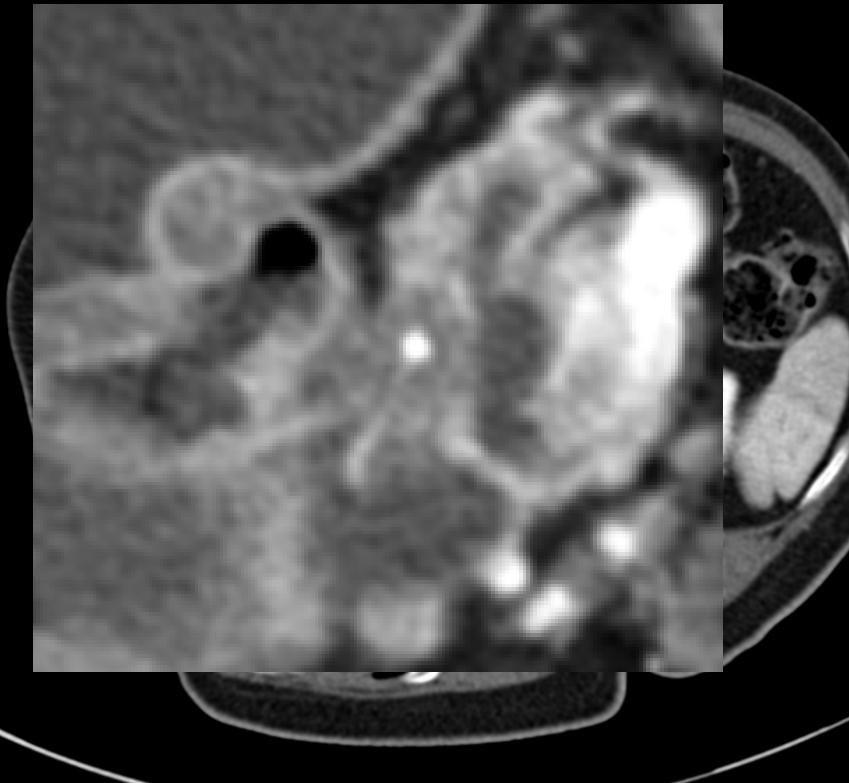
Bolus tracking oder Testbolus, Schichtdicke 0,75 bis 3 mm

Zystischer Pankreastumor: IPMN



Multiplanare (curved) Rekonstruktionen

Gefäßinfiltration



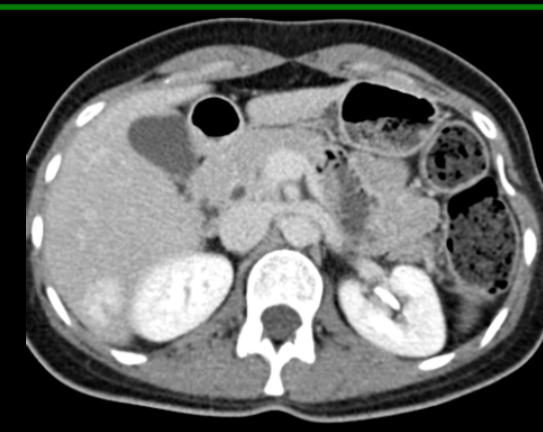
Triphasches Leber-CT



spätarteriell (ca. 35 Sek.)



portalvenös (65 Sek.)



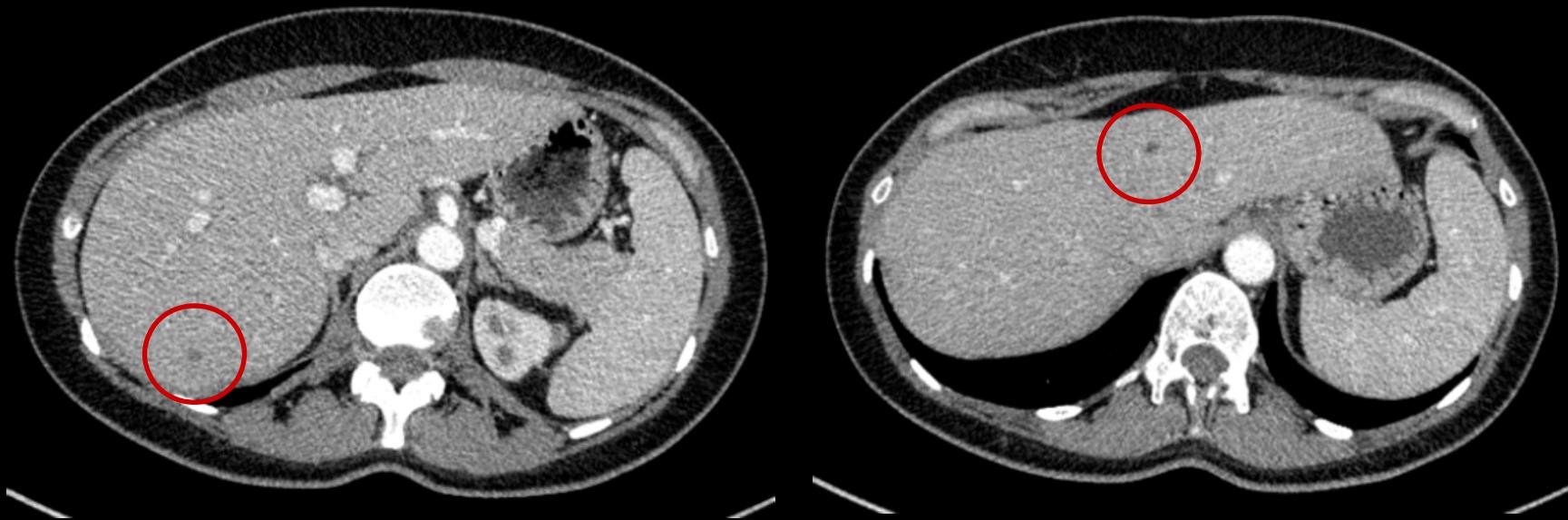
Spätphase (5-10 Minuten)

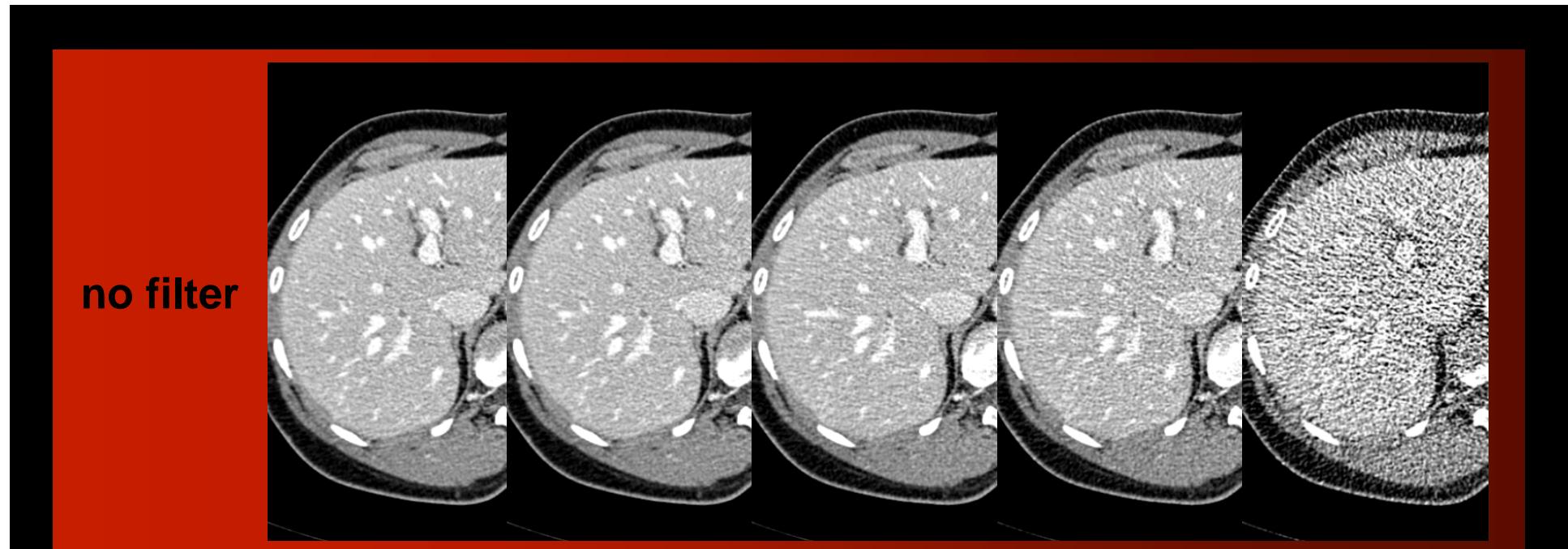
Total mAs 5468 Total DLP 820 mGycm

	Scan	kV	mAs / ref.	CTDlvol mGy	DLP mGycm
Patient Position F-SP					
Topogram	1	120	34 mA		
PreMonitoring	2	120	20	1.07	1
Contrast					
Monitoring	3	120	20	9.64	10
OB arteriell	12	120	172 / 210	12.47	428
OB venous	13	120	168 / 210	11.13	381

Leber CT

Zyste und/oder Metastase?





180

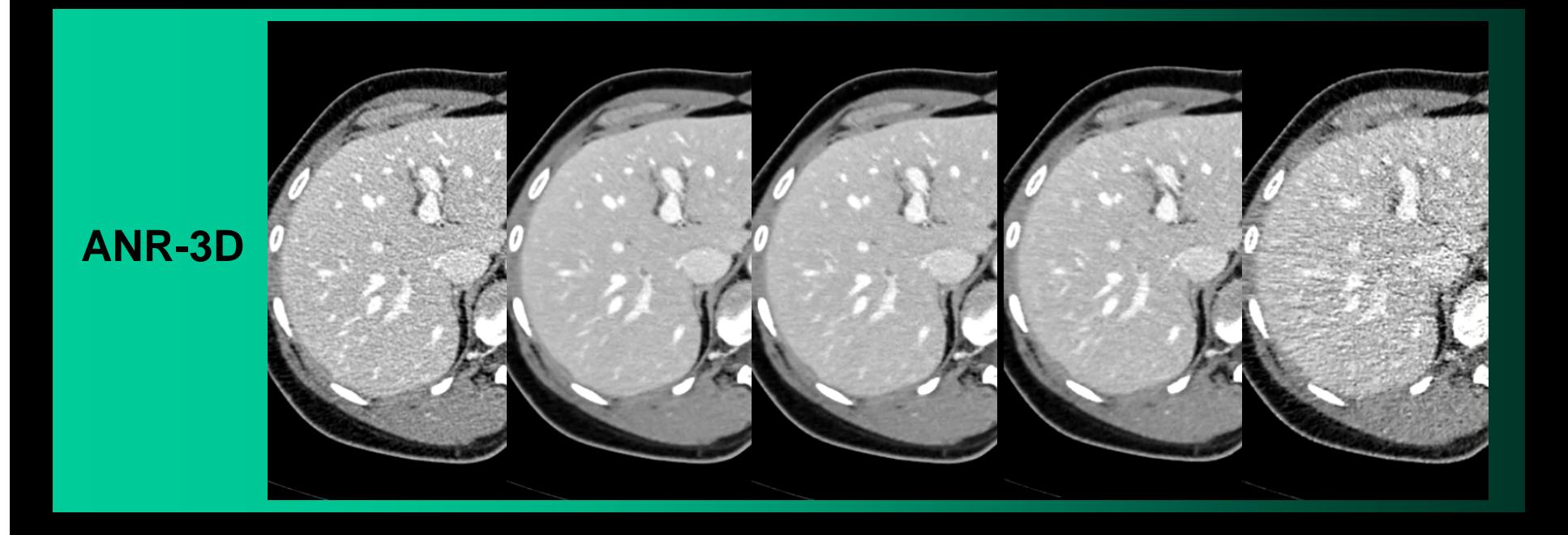
155

105

55

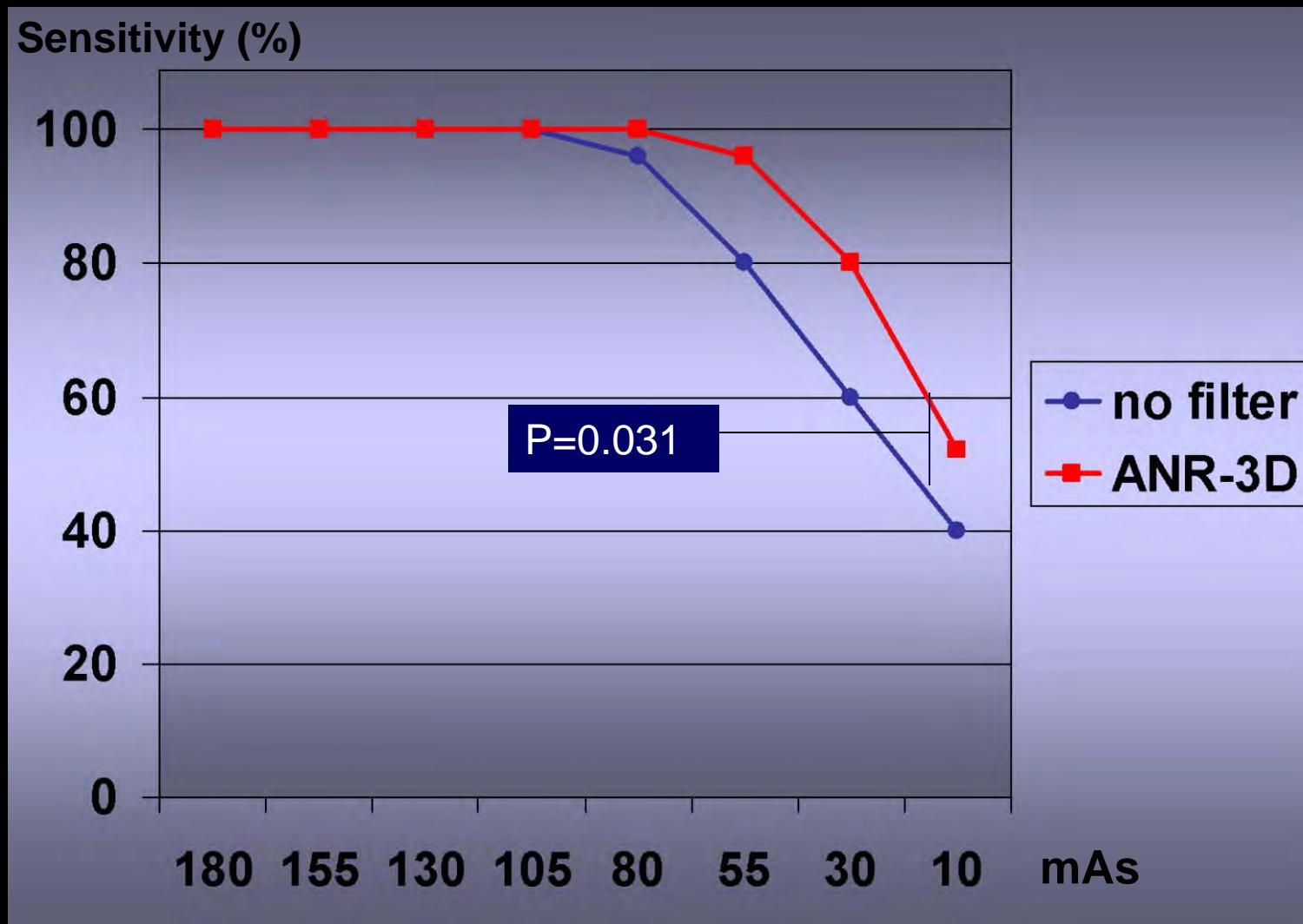
10

mAs



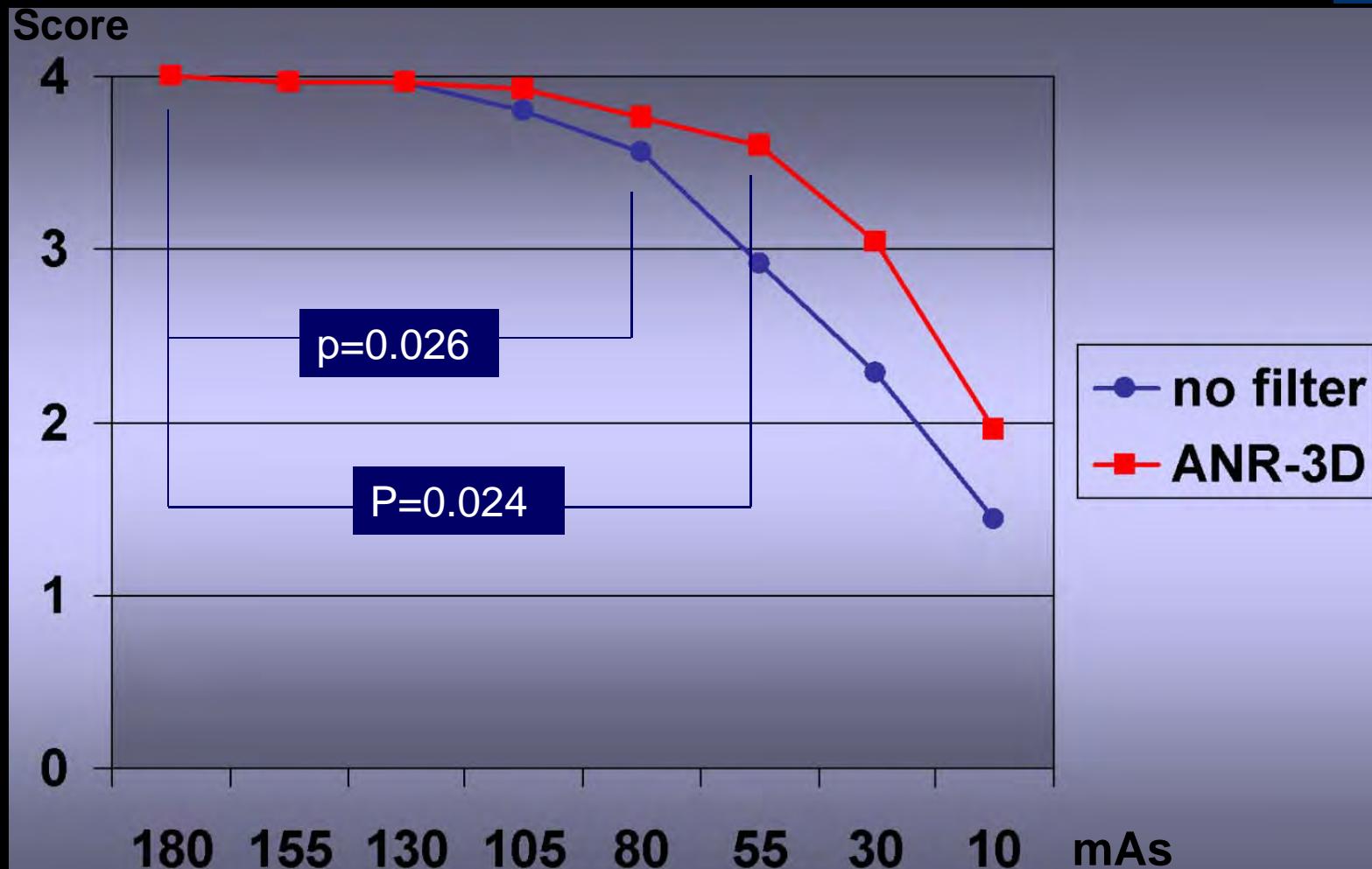
Ergebnisse

Detektion von Leberläsionen (n=56)



Ergebnisse

Confidence





ASIR

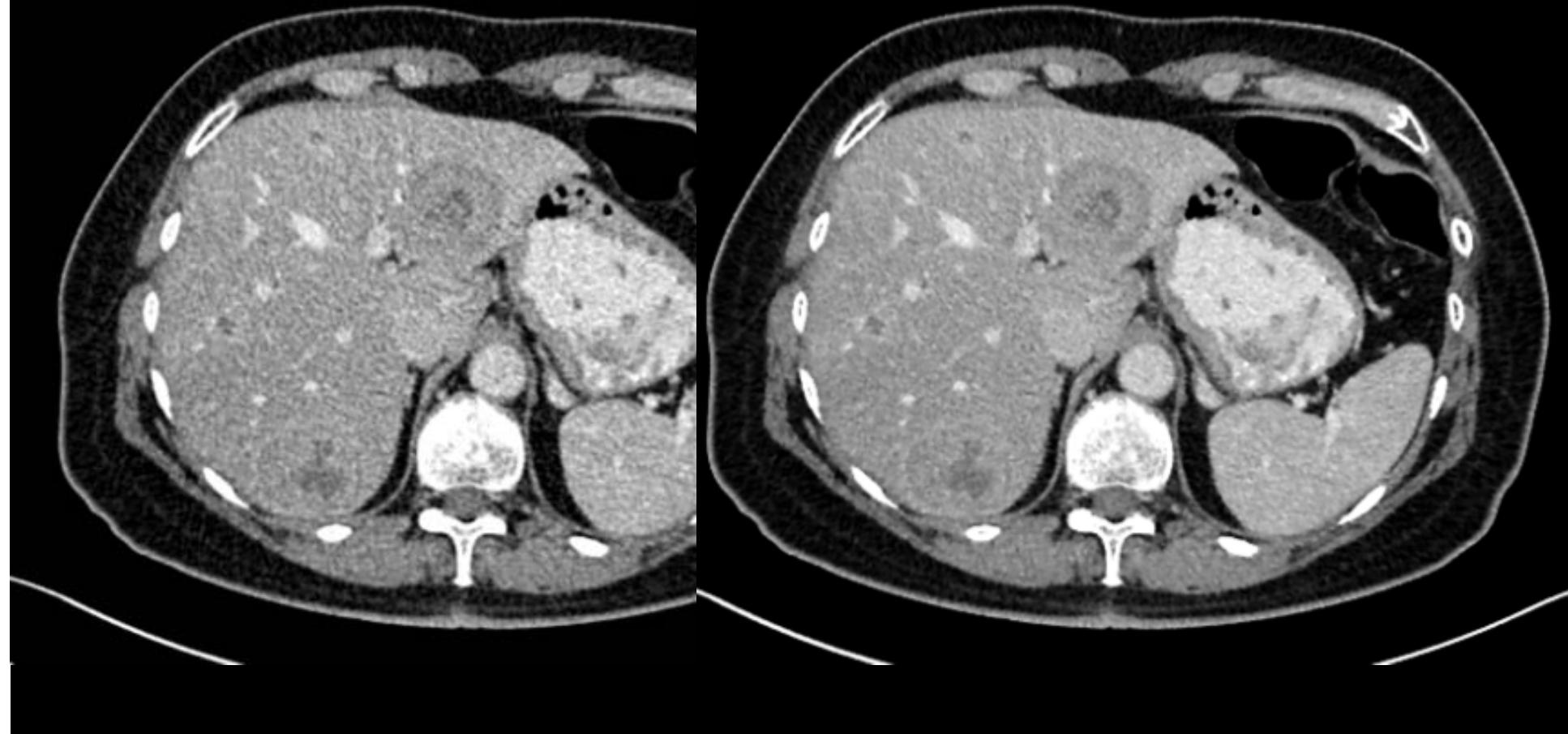
**CARE-Dose,
auto mA, DoseRight,
Real EC**

4D Noise reduction

SnapShot™ Pulse

Iris

**Adaptive
Dose Shield**



Iterative Rekonstruktion



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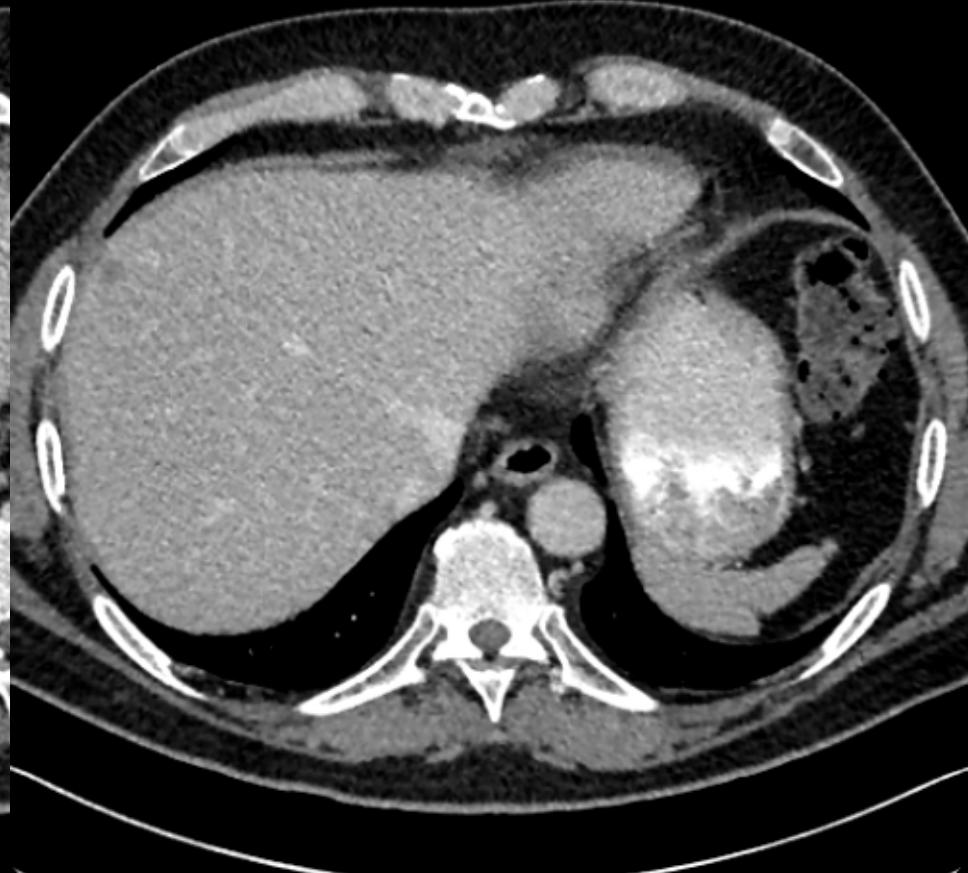
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B30f



B20f



iterativ



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Die Unerkannten...



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International CT Image Contest

[Overview](#)[!\[\]\(40ba2574699c97e19cbf2cf0651266d5_img.jpg\) Text Size](#)[!\[\]\(4985bbc5724fd585b9db1db8fcf4821a_img.jpg\) | !\[\]\(3e88bed46ef86323ee5a4623a9940953_img.jpg\) | !\[\]\(78884b2bc305a33dc7c52aa1ef401f64_img.jpg\)](#)

International CT Image Contest – highest image quality at lowest dose

Should a patient have a CT examination or not? The decision made is almost always a medical one. Does the potential benefit outweigh possible radiation risks for the patient?

While CT imaging entails a dose of radiation, it undoubtedly provides valuable information about our health and supports the physician in making the right diagnosis.

In maximizing patient benefits, the challenge is how to obtain the highest possible image quality at the lowest possible radiation dose.

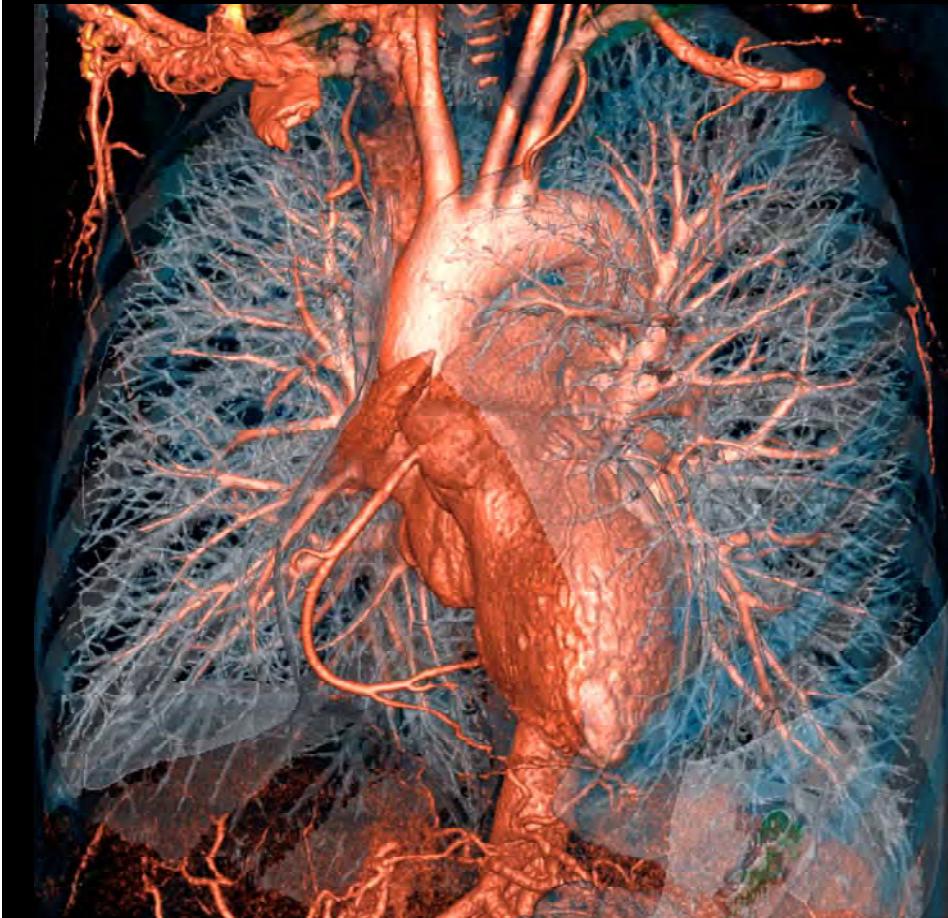
International CT Image Contest – the ALARA principle

For years, physicians have been educated to follow the ALARA (as low as reasonably achievable) principle. This means using the minimum radiation dose required to obtain the necessary image quality. At Siemens, we see it as our responsibility to provide medical institutions with solutions that enable them to further lower the radiation dose without compromising on image quality.

We aim to encourage users from all over the world to utilize their SOMATOM CT to the full extent and to show us their best, low-radiation images.

Share your work with the international community. Enter the Siemens International CT Image Contest today!

Please note: The identity of every contest entrant will be withheld from the judges.



Chest pain (0.82 mSv)



High pitch Kinder (0.37 mSv)