

# The role of Angio-CT in Interventional Oncology



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# Disclosure

Speaker name:

Michael Moche

I have the following potential conflicts of interest to report:

- Consulting
- Employment in industry
- Stockholder of a healthcare company
- Owner of a healthcare company
- Other(s)
  
- I do not have any potential conflict of interest

# Gold standards in IO

percutaneous

transarterial

3D

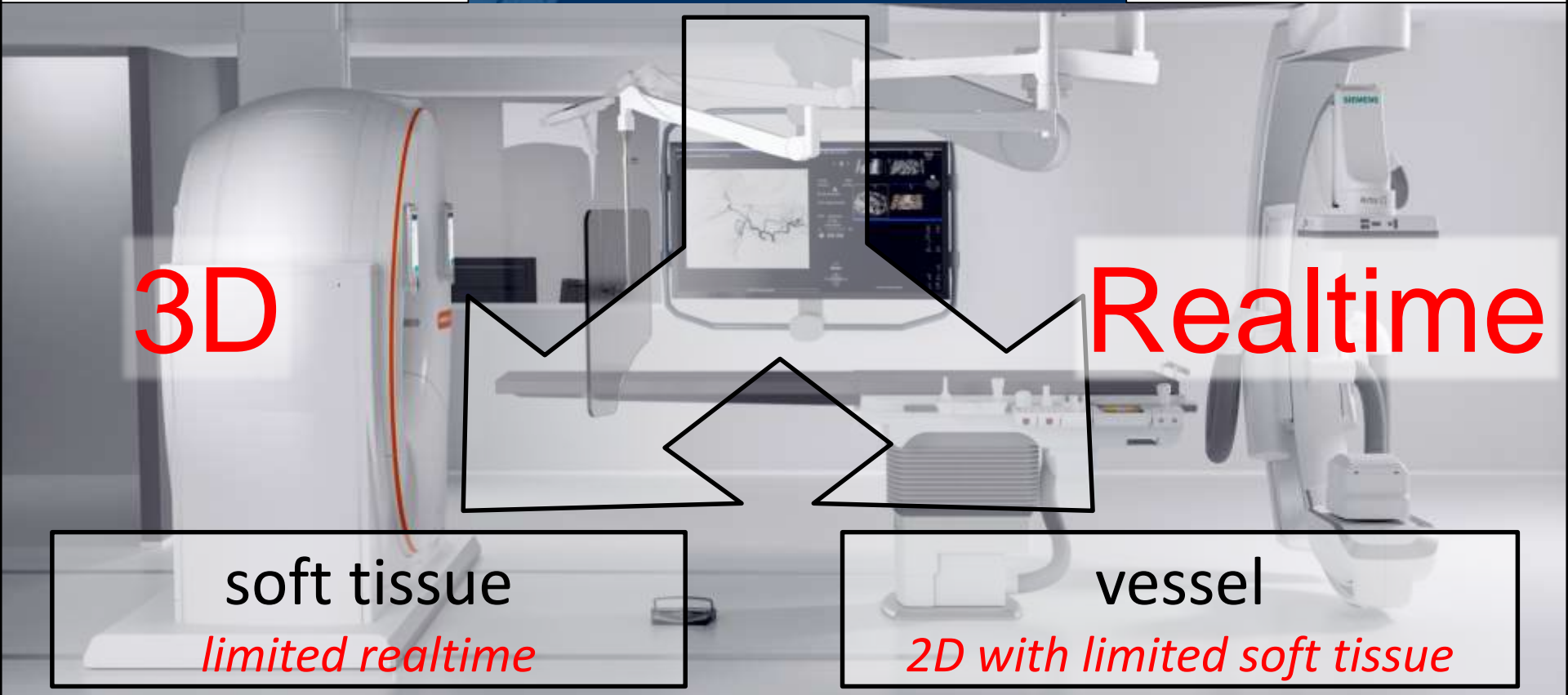
Realtime

soft tissue

*limited realtime*

vessel

*2D with limited soft tissue*



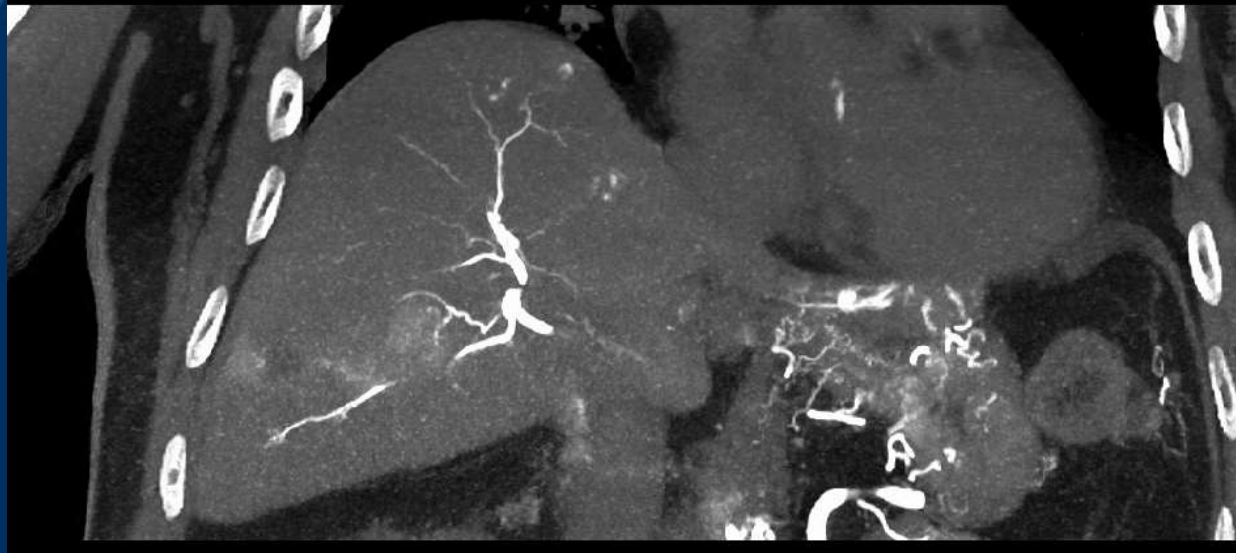
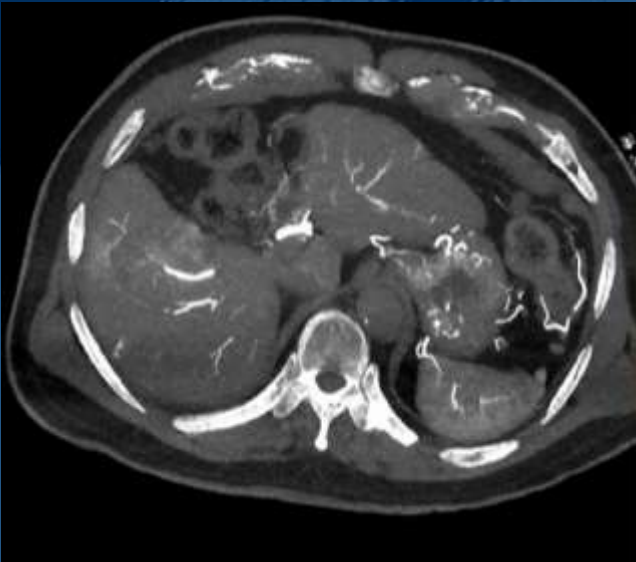
# Angio-CT $\neq$ Angio + CT

Common Co-ordinate System

- Quick switching
- Automatic image overlay
- Collision prevention



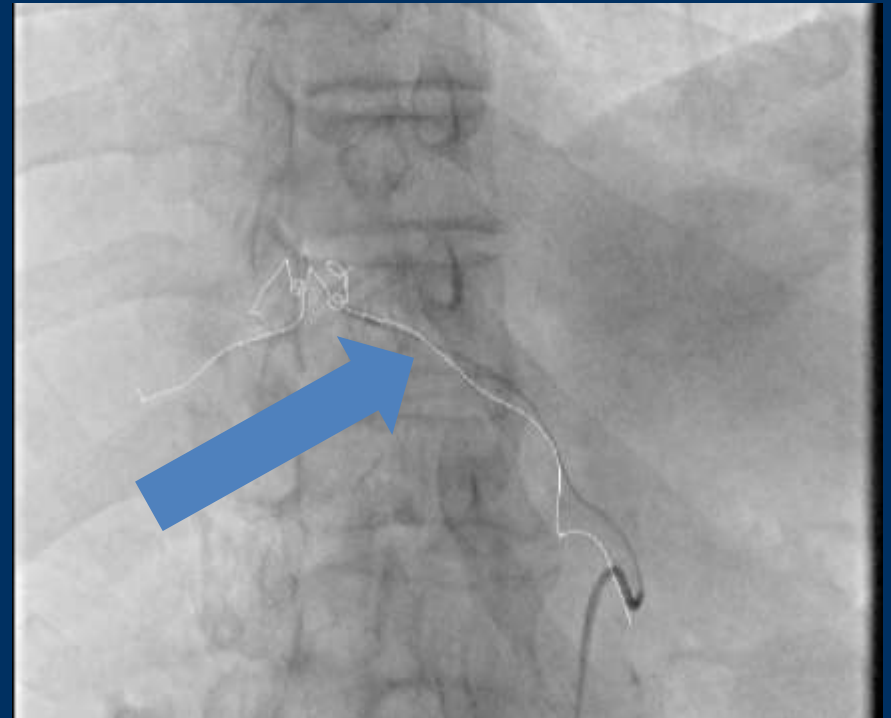
# Intra-arterial CT-Angio with minimal CM



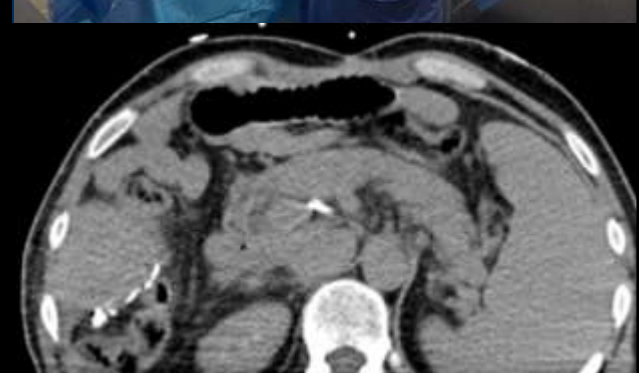
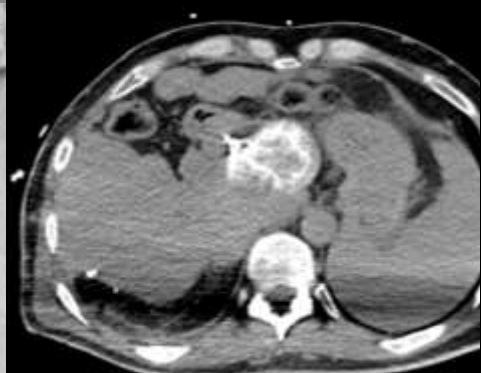
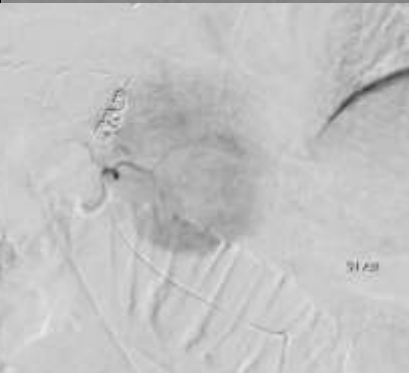
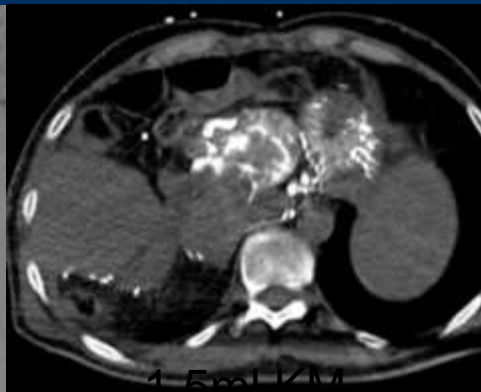
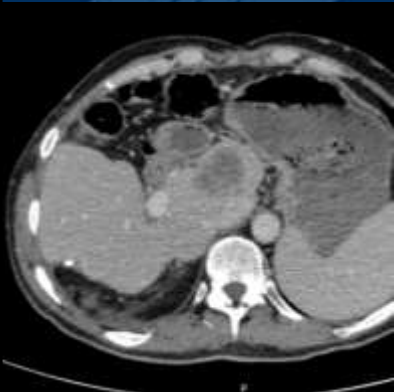
Coeliac injection of 15 ml diluted CM

➤ 1:5 = 3 ml

# Instant fusion of i.a. CT-Angio with live fluoro

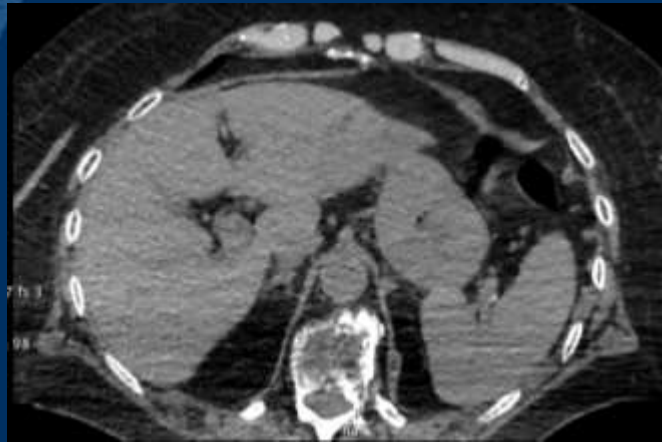
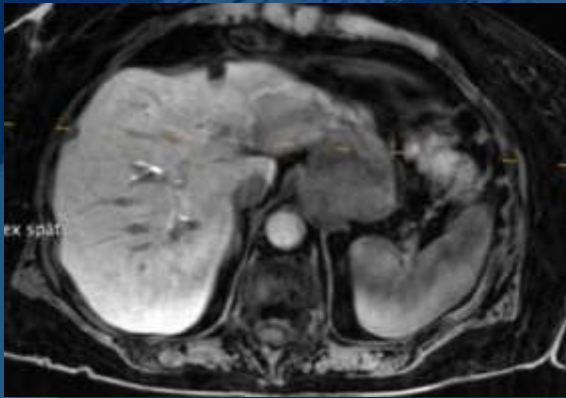


# Accurate targeting for superselective treatment

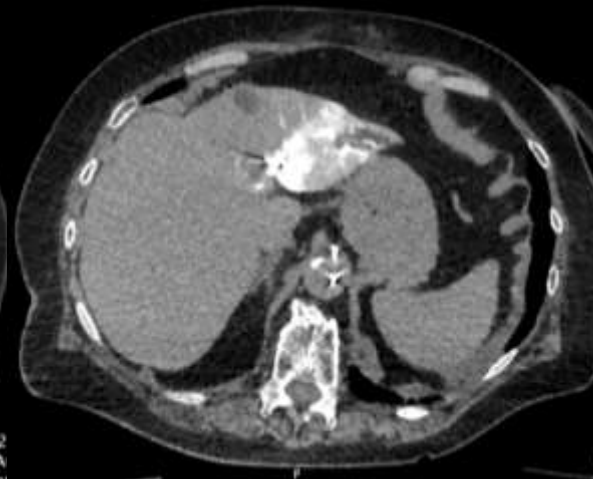


1.5 ml CM

# Hybrid approach



Single slice with aortic  
injection of 15 ml  
contrast 1:10 = 1.5 ml





# Do we need CT like images?

J Vasc Interv Radiol. 2007

Usefulness of cone-beam volume CT with flat panel detectors in conjunction with catheter angiography for transcatheter arterial embolization.

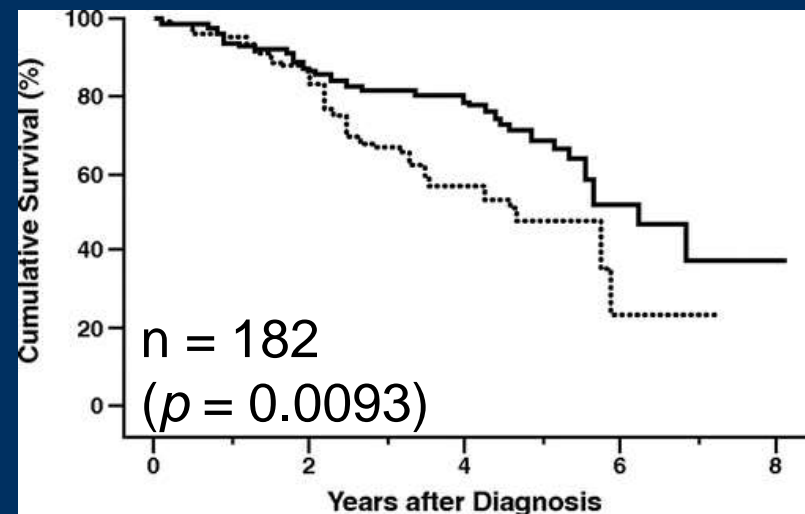
Kakeda et al.

*„In 42 of the 52 lesions (81%), cone-beam CT provided additional useful information for therapeutic decision making or TACE compared with DSA.”*

AJR Am J Roentgenol. 2009

Impact of a unified CT angiography system on outcome of patients with hepatocellular carcinoma.

Toyoda et al.



**Significant survival benefit**

# Do we need CT like images?

Lucatell et al Radiol Med 2019

„Sequential dual-phase cone-beam CT is able to intra-procedurally **predict the one-month treatment outcome** of multi-focal HCC, in course of degradable starch microsphere TACE.“

O`Connor et al. Cardiovasc Intervent Radiol. 2020

Feasibility of **Yttrium-90 Radioembolization Dose Calculation**  
Utilizing Intra-procedural Open Trajectory Cone Beam CT.

# Do we need CT like images?

J Vasc Interv Radiol. 2017  
The Role of Cone-Beam CT in Transcatheter  
Arterial Chemoembolization for Hepatocellular  
Carcinoma: A Systematic Review and **Meta-  
analysis (18 studies)**.  
Pung et al.

“CB- CT ...should be considered as an  
adjunct tool to DSA during TACE of  
HCC.”

CB - CT



?

Angio - cCT



# CB-CT vs conventional CT

## Coverage and Artifacts

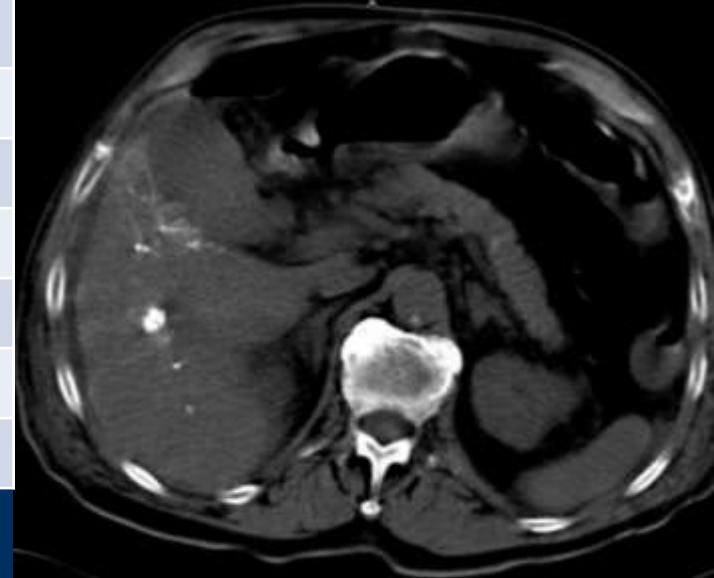
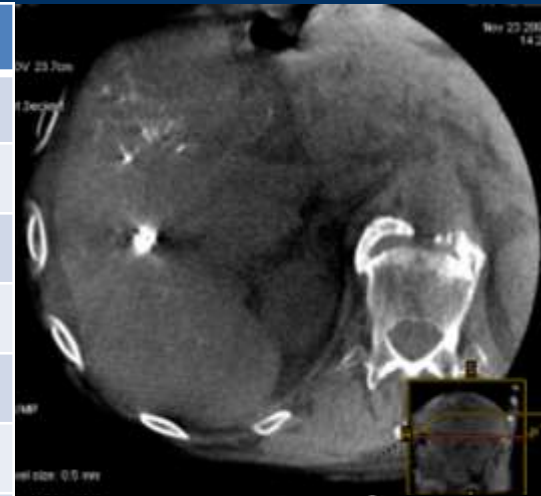
Am J Roentgenol. 2008  
 Visualization of hypervascular liver lesions  
 During TACE: comparison of angiographic  
 C-arm CT and MDCT.  
 Meyer et al.

- liver not be visualized completely in 2/3 of the pat.
- Significant more Artifacts

Segments	MDCT	C-Arm CT	Classification of Artifacts <sup>a</sup>	MDCT	C-Arm CT
No. of resected liver segments	3	3	None (A1)	115 (98)	68 (58)
Segments incompletely covered by imaging			Minor (A2)	2 (2)	21 (18)
In both phases	0	8 (7)	Moderate (A3)	0	28 (24)
In one phase	6 (5)	8 (7)	Major, not diagnostic (A4)	0	0
Segments completely covered by imaging in both phases	111 (95)	101 (86)			
$p^a$	0.042		$p^b$	0.017	

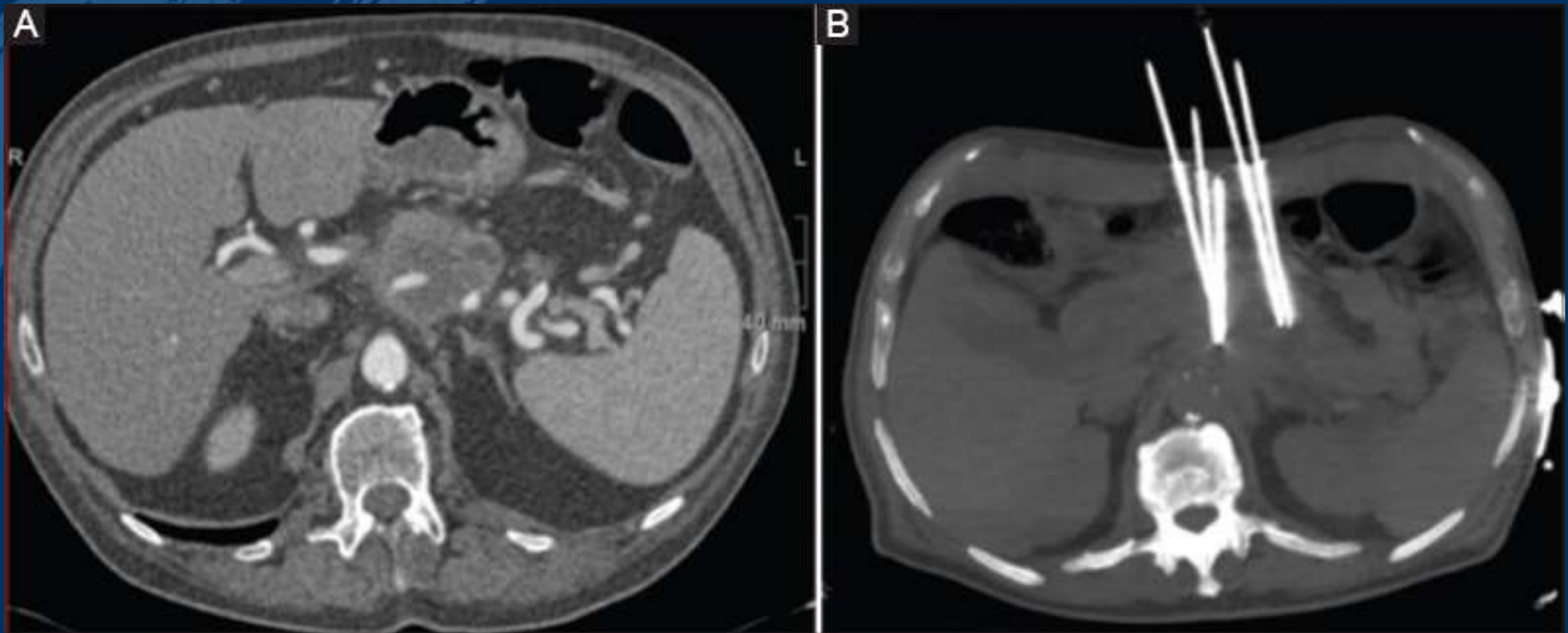
# CB-CT vs conventional CT

	CB-CT	cCT
Contrast resolution	5-10 HE	1 HE
Contrast dilution	1:1	1:10
Spatial resolution	max. 2000 <sup>2</sup>	512 <sup>2</sup>
Temporal resolution	low	high
CM Phase	single-double	multiple
Single slice imaging	difficult	easy
Speed incl. prep	90 sec	20 sec
Breath hold	yes	no
Post-processing	more	less
Scan range - coverage	fixed	flexible
FoV	max. 30cm	~50cm
Isocentering	tricky	easy
Dose	high	ca. 40% of CB-CT <sup>1</sup>



<sup>1</sup> Piron et al. Cardiovasc Intervent Radiol. 2019 Radiation Exposure During Transarterial Chemoembolization: Angio-CT Versus Cone-Beam CT.

# „CT-guidance is native“



Ierardi et al. Percutaneous ablation therapies of inoperable pancreatic cancer: a systematic review. Ann Gastroenterol 2015

# Make CT-guidance enhanced with Angio-CT



Single slice CT with intraaortic  
injection (dual head HP-injector)  
**20ml contrast dilution 1:10 = 2ml**

# Take home points

- CT-like imaging is crucial for i.a. IO
- Increase in targeting & safety & workflow
- cCT superior to CB-CT (IQ, FOV, Speed, reduction of CM)
- Hybrid procedures
- CM enhanced single slice CT-guidance

Thank you!



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