

HCC diagnostik: Radiologi

Nikolaos Kartalis

MD, PhD, Associate professor

Department of Radiology Huddinge, Karolinska University Hospital

Division of Radiology, CLINTEC, Karolinska Institutet

Stockholm, Sweden

nikolaos.kartalis@ki.se



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Disclosures

- Institutional consultation and lecturing fees: Bayer, Guerbet, Ascelia Pharma, Icepharma, Servier Sweden, AstraZeneca
- Research grants: Siemens Healthineers



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Upplägg



Karolinska
Institutet



- Hur gör vi?
- Utmaningar 
- Frågor
- Take-home

Upplägg



Karolinska
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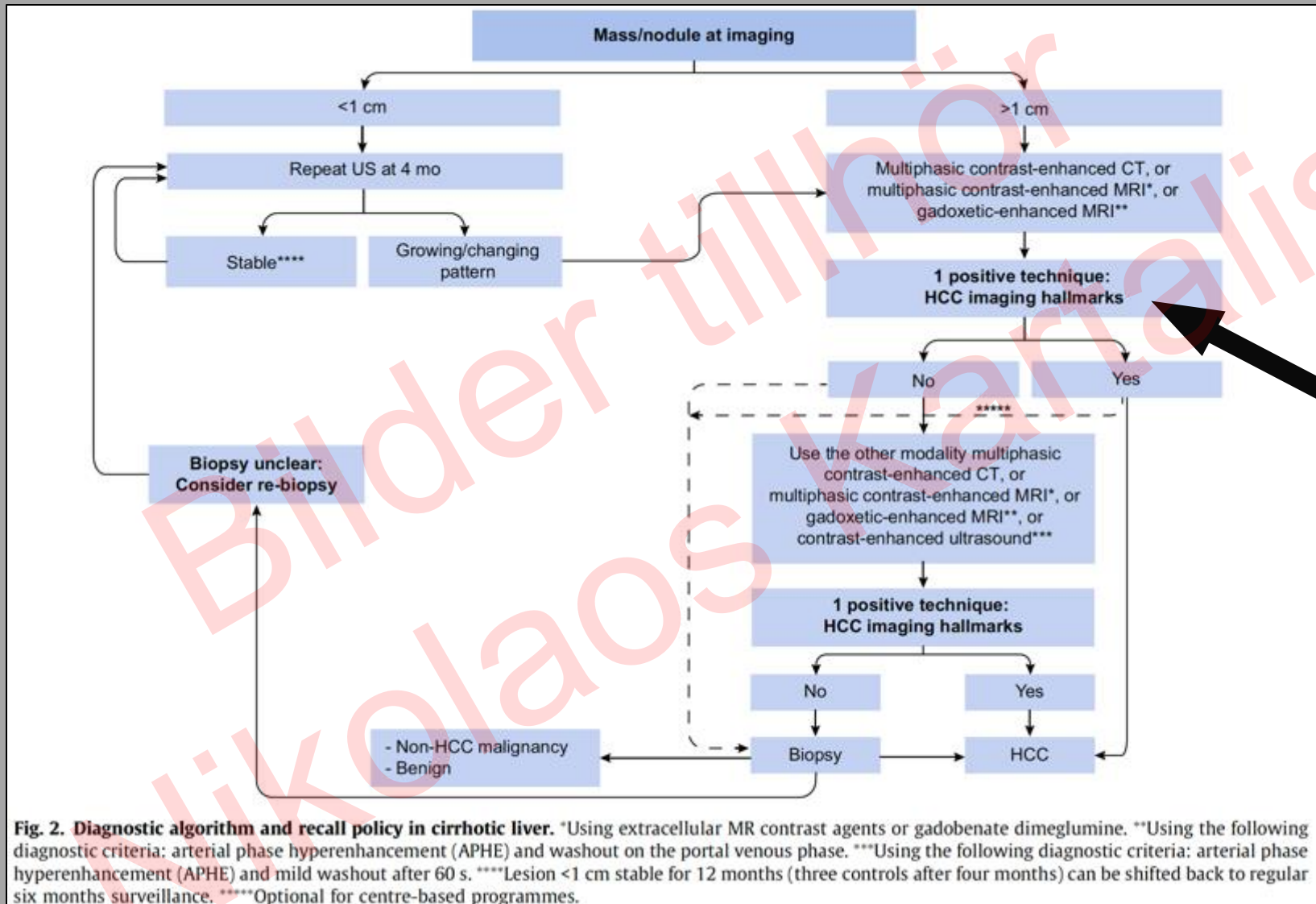


- ***Hur gör vi?***
- Utmaningar
- Frågor
- Take-home

Mål

- Detektion
- Karakteristik
- Prognostisering
- Behandlingsplanering & respons

EASL diagnostic algorithm and recall policy



Arterial
hypervascularity
(APHE)
&
venous/late phase
washout

Fig. 2. Diagnostic algorithm and recall policy in cirrhotic liver. *Using extracellular MR contrast agents or gadobenate dimeglumine. **Using the following diagnostic criteria: arterial phase hyperenhancement (APHE) and washout on the portal venous phase. ***Using the following diagnostic criteria: arterial phase hyperenhancement (APHE) and mild washout after 60 s. ****Lesion <1 cm stable for 12 months (three controls after four months) can be shifted back to regular six months surveillance. *****Optional for centre-based programmes.

EASL-EORTC clinical practice guidelines: management of hepatocellular carcinoma. J Hepatol. 2018

N. Kartalis, Karolinska Univ. Hospital

CT/MRI LI-RADS v2018

CT/MRI Diagnostic Table

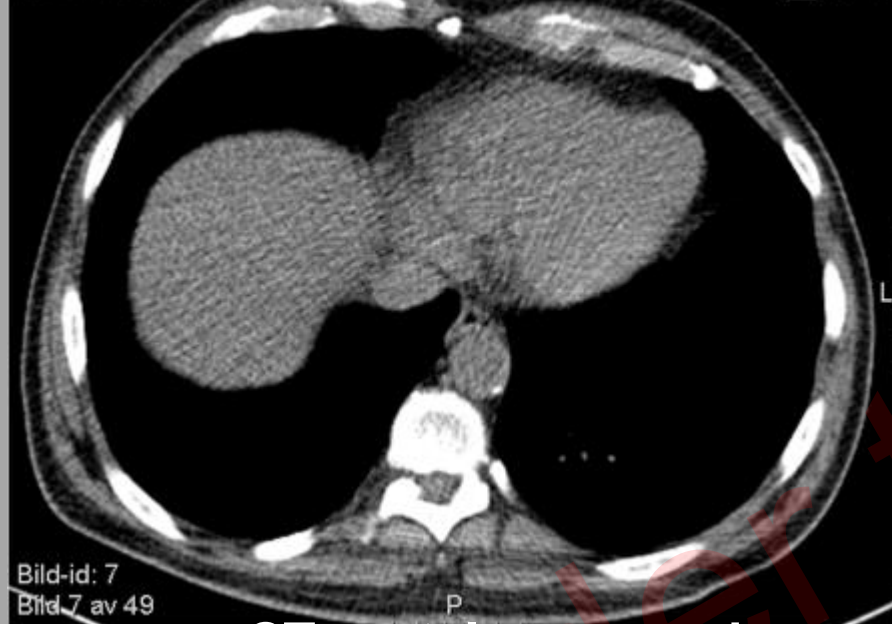
Arterial phase hyperenhancement (APHE)		No APHE		Nonrim APHE		
Observation size (mm)		< 20	≥ 20	< 10	10-19	≥ 20
Count additional major features: - Enhancing “capsule” - Nonperipheral “washout” - Threshold growth	None	LR-3	LR-3	LR-3	LR-3	LR-4
	One	LR-3	LR-4	LR-4	LR-4 / LR-5	LR-5
	≥ Two	LR-4	LR-4	LR-4	LR-5	LR-5



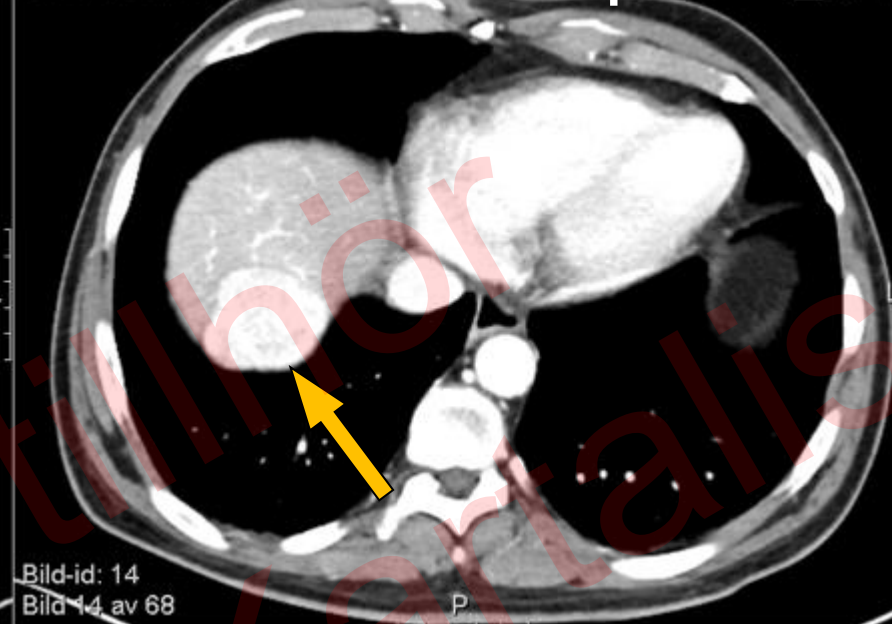
Observations in this cell are categorized based on one additional major feature:

- LR-4 – if enhancing “capsule”
- LR-5 – if nonperipheral “washout” **OR** threshold growth

2014-09-23, 13:44:39 **CT, unenhanced**



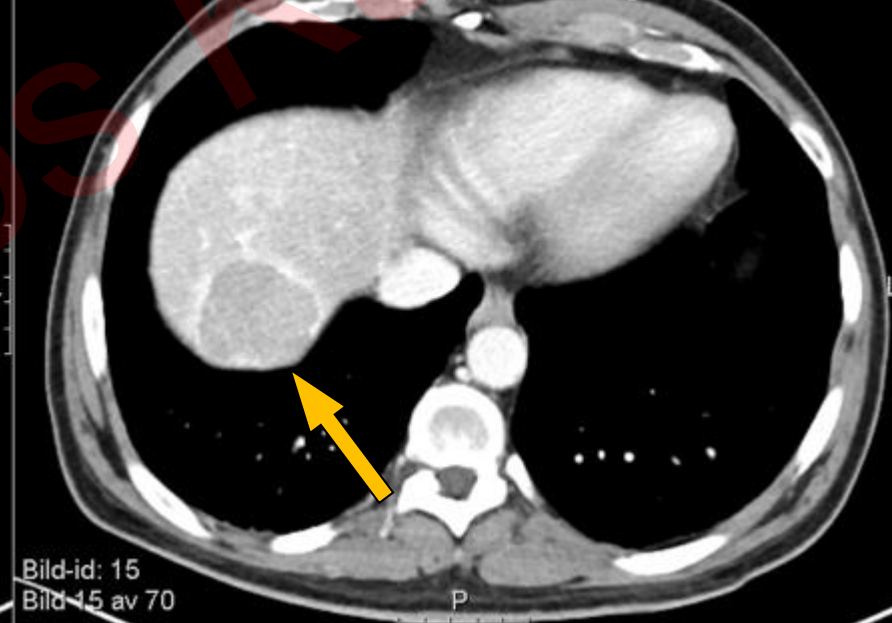
2014-09-23, 13:53:38 **CT arterial ph**



2014-09-23, 13:54:05 **CT portal venous ph**



2014-09-23, 13:54:55 **CT late venous ph**



2015-10-13, 12:44:49

CT portal venous ph

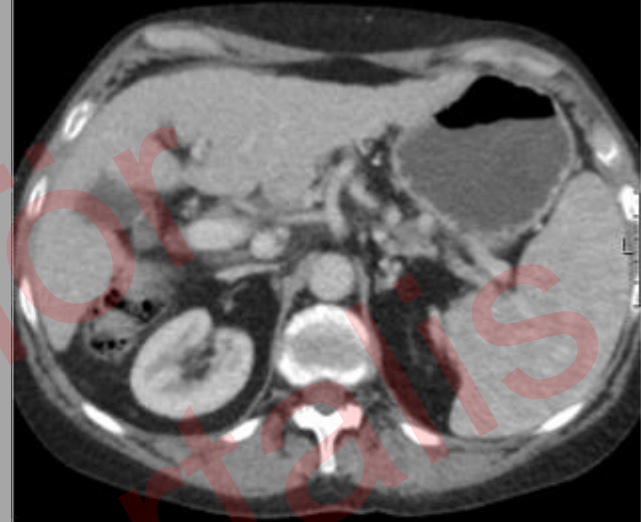


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Image 145 of 186

2015-10-13, 12:44:49

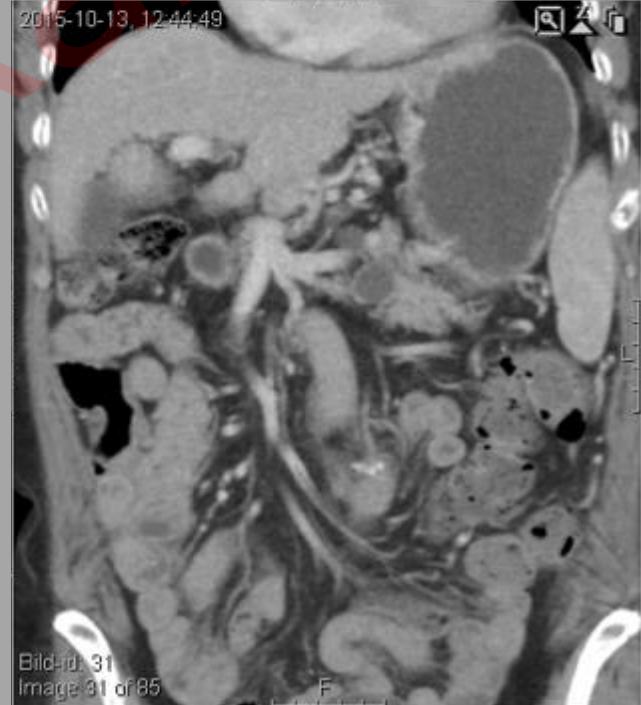
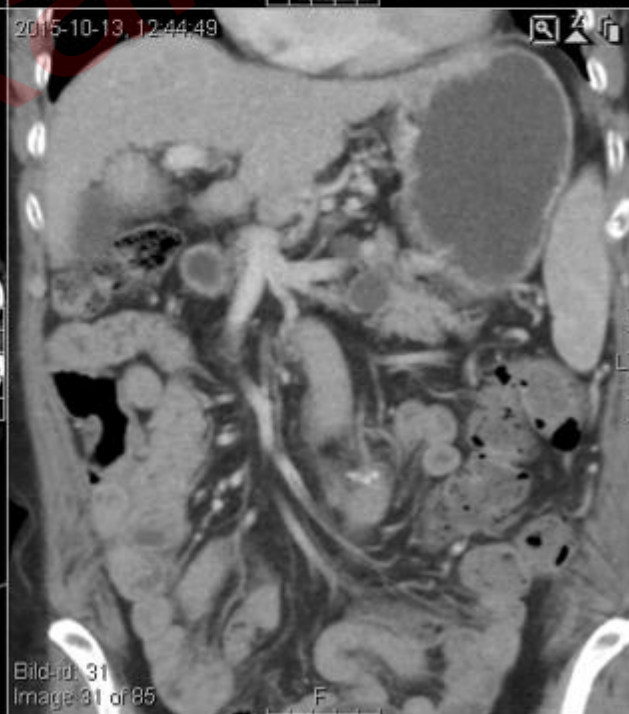
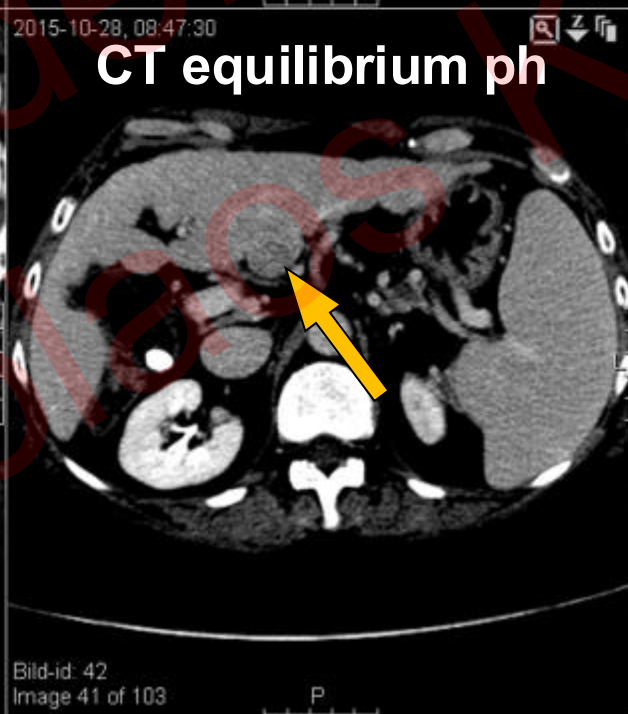
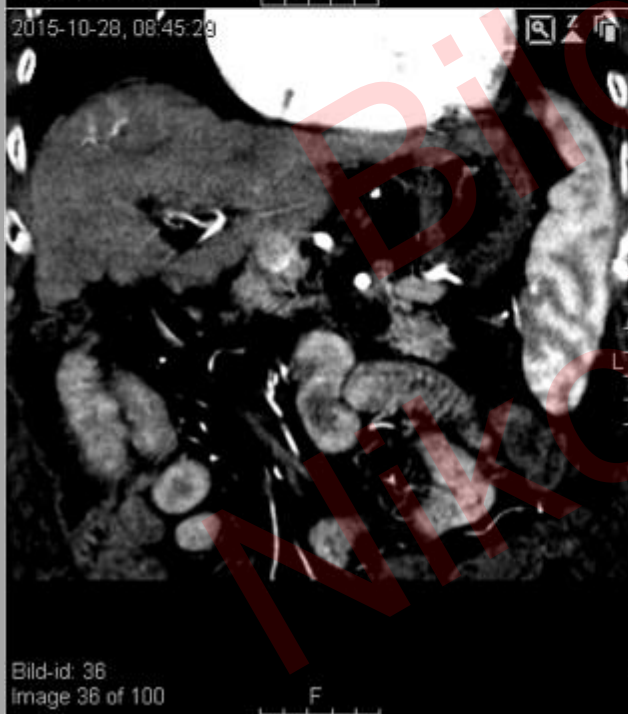
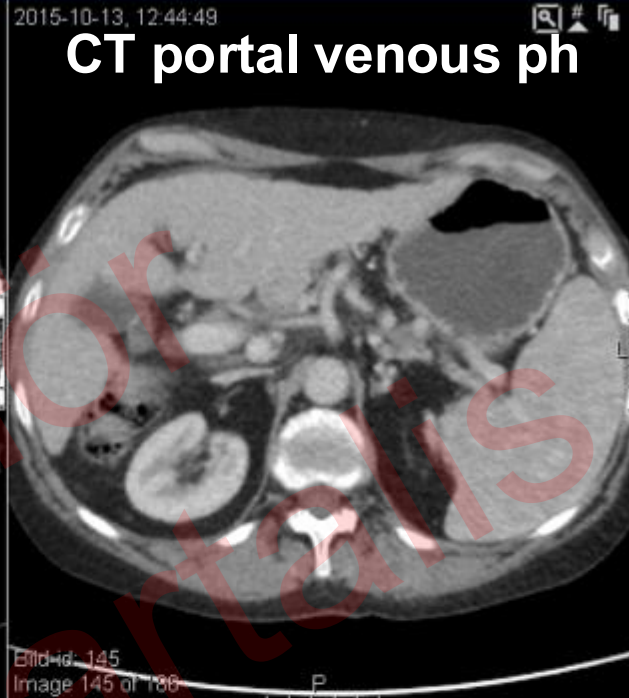
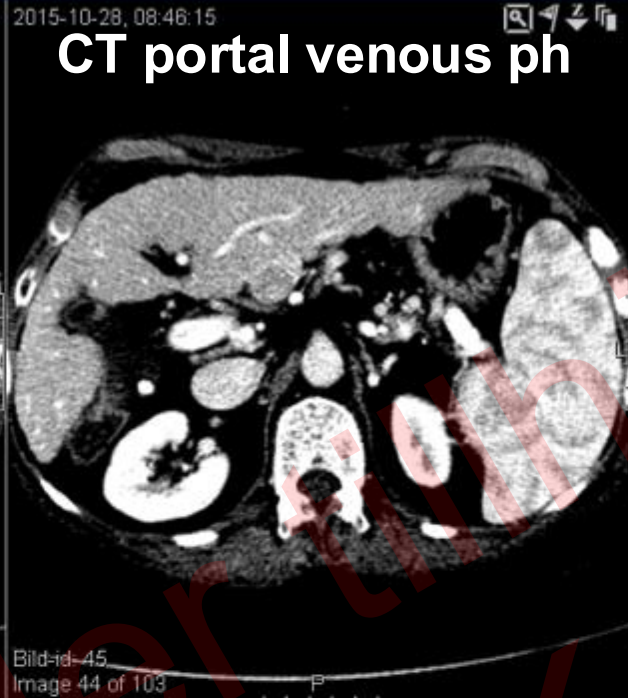
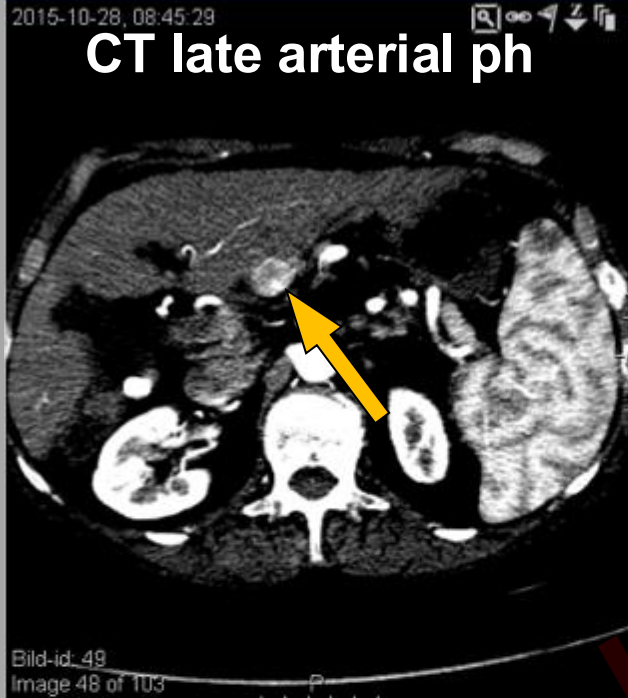


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Image 31 of 85





Bilder tillhör
Nikolaos Kartalis

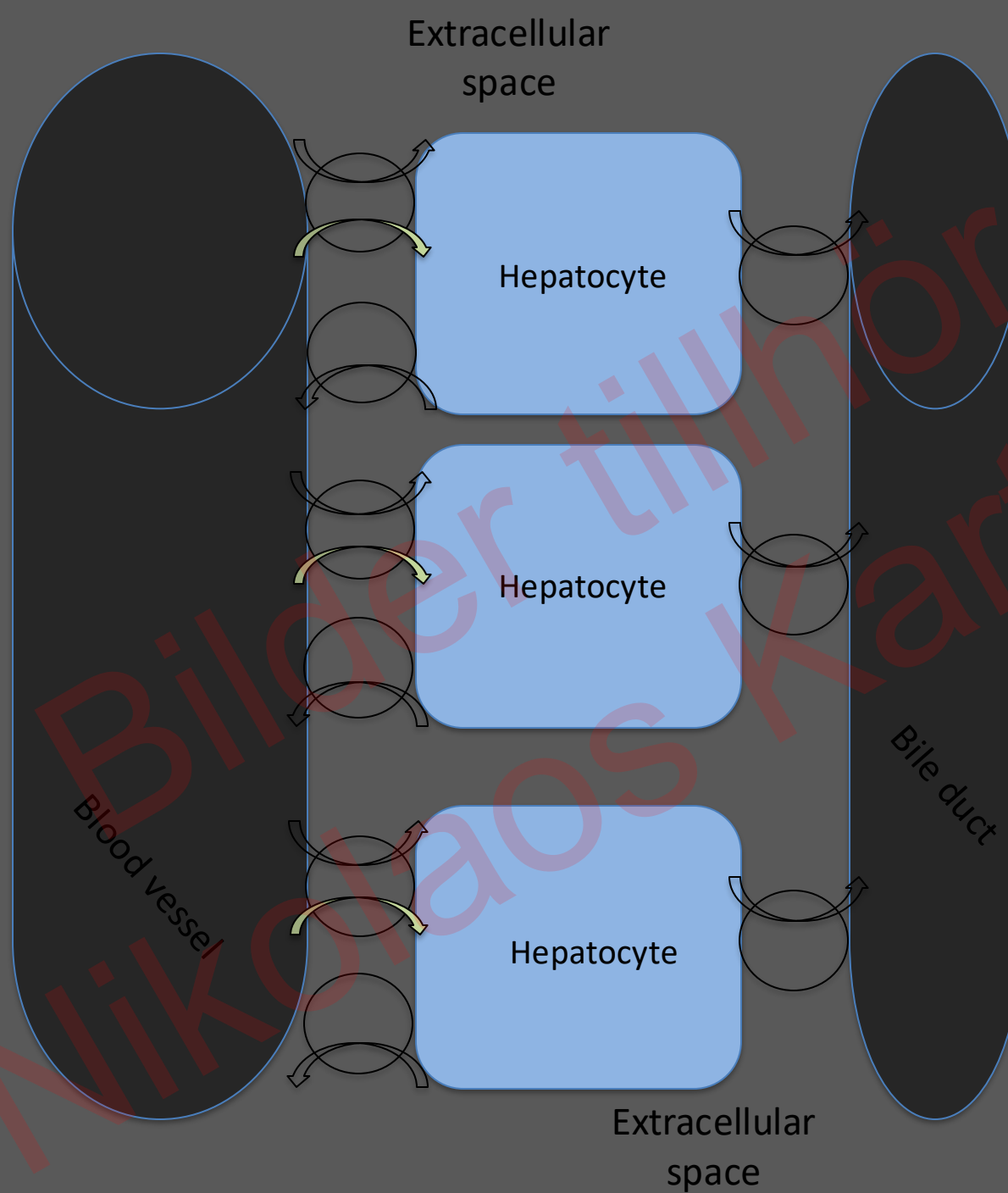


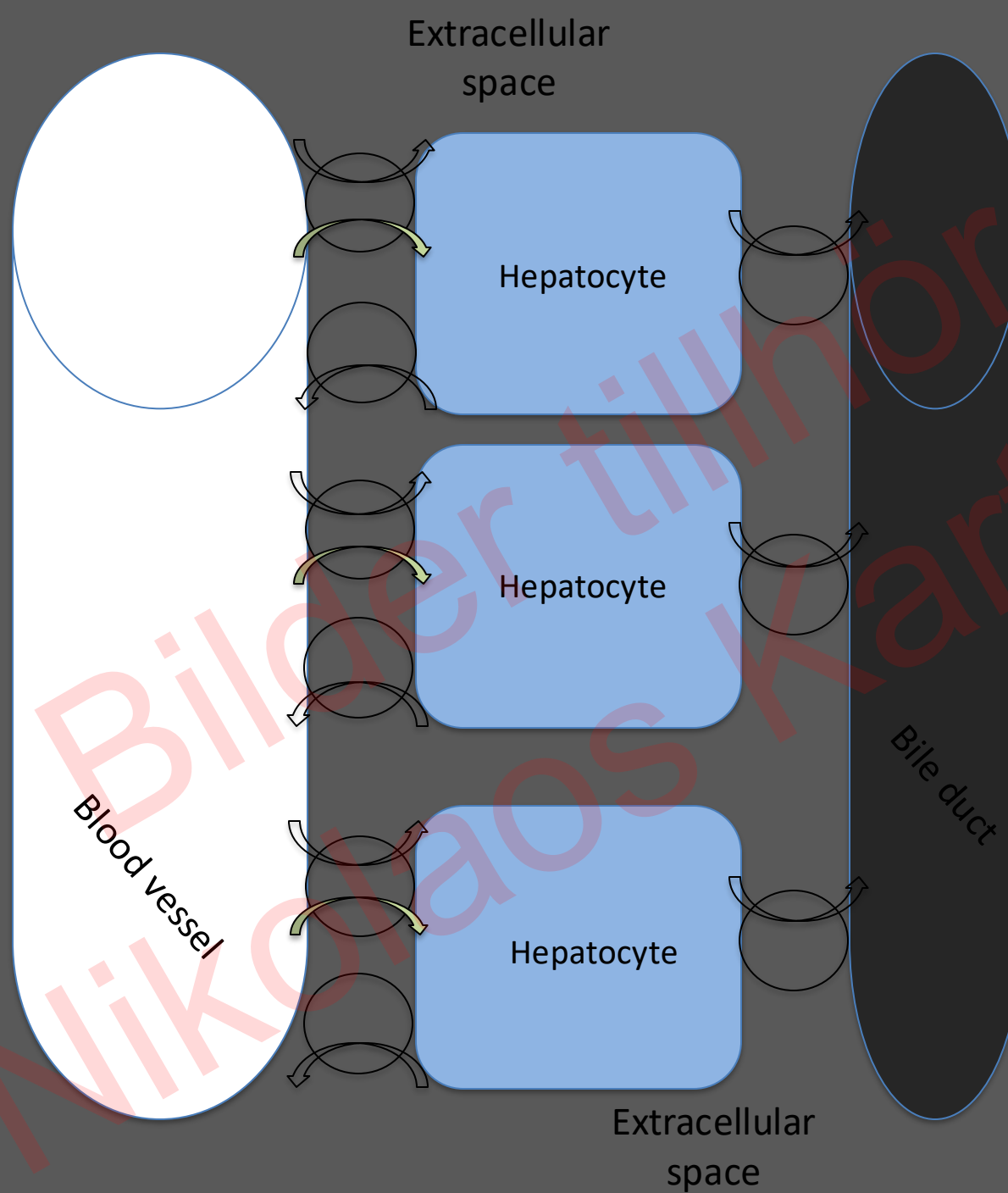
- Varför?

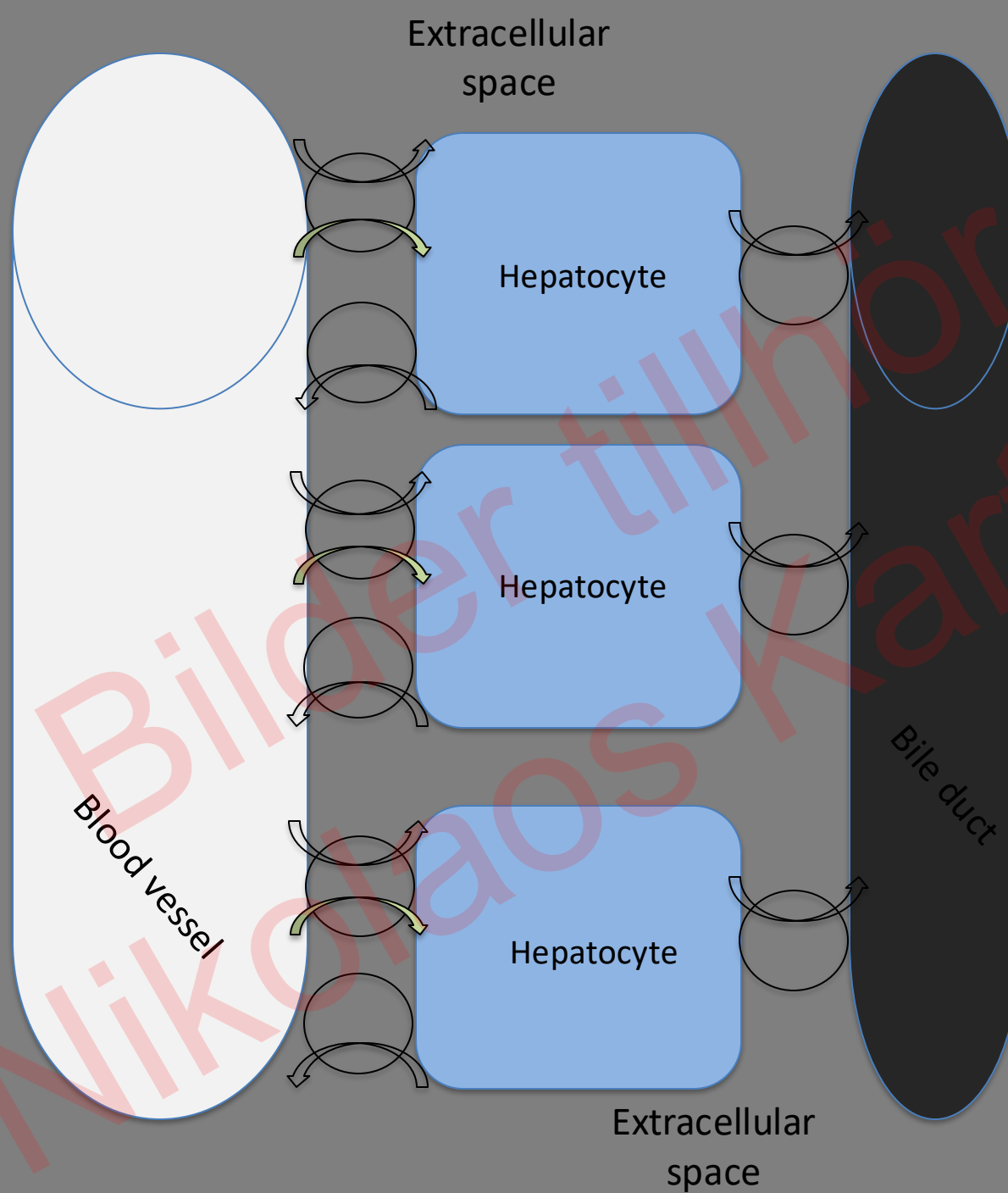
A. Vaskularitet

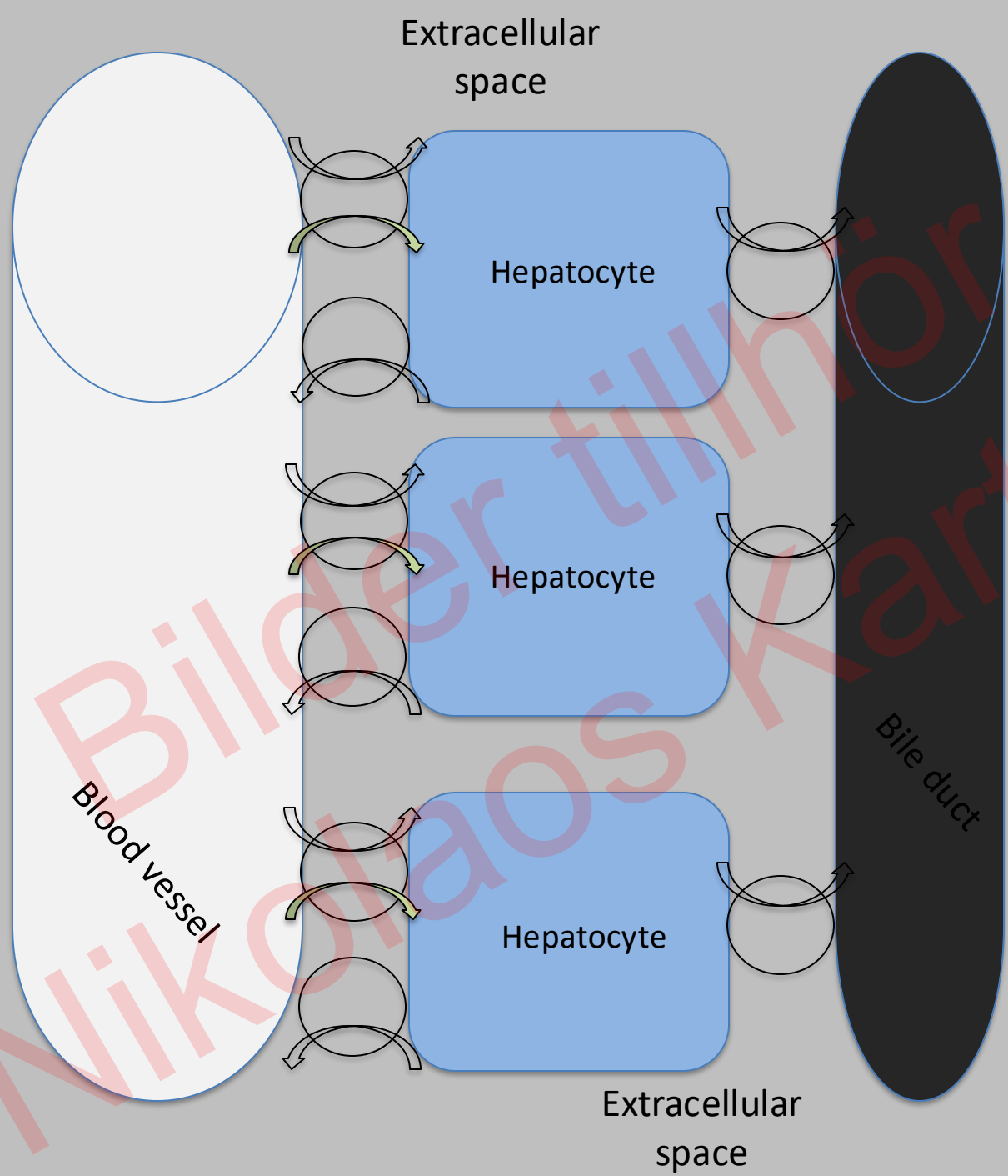
Extracellulärt KM (DT + MR)

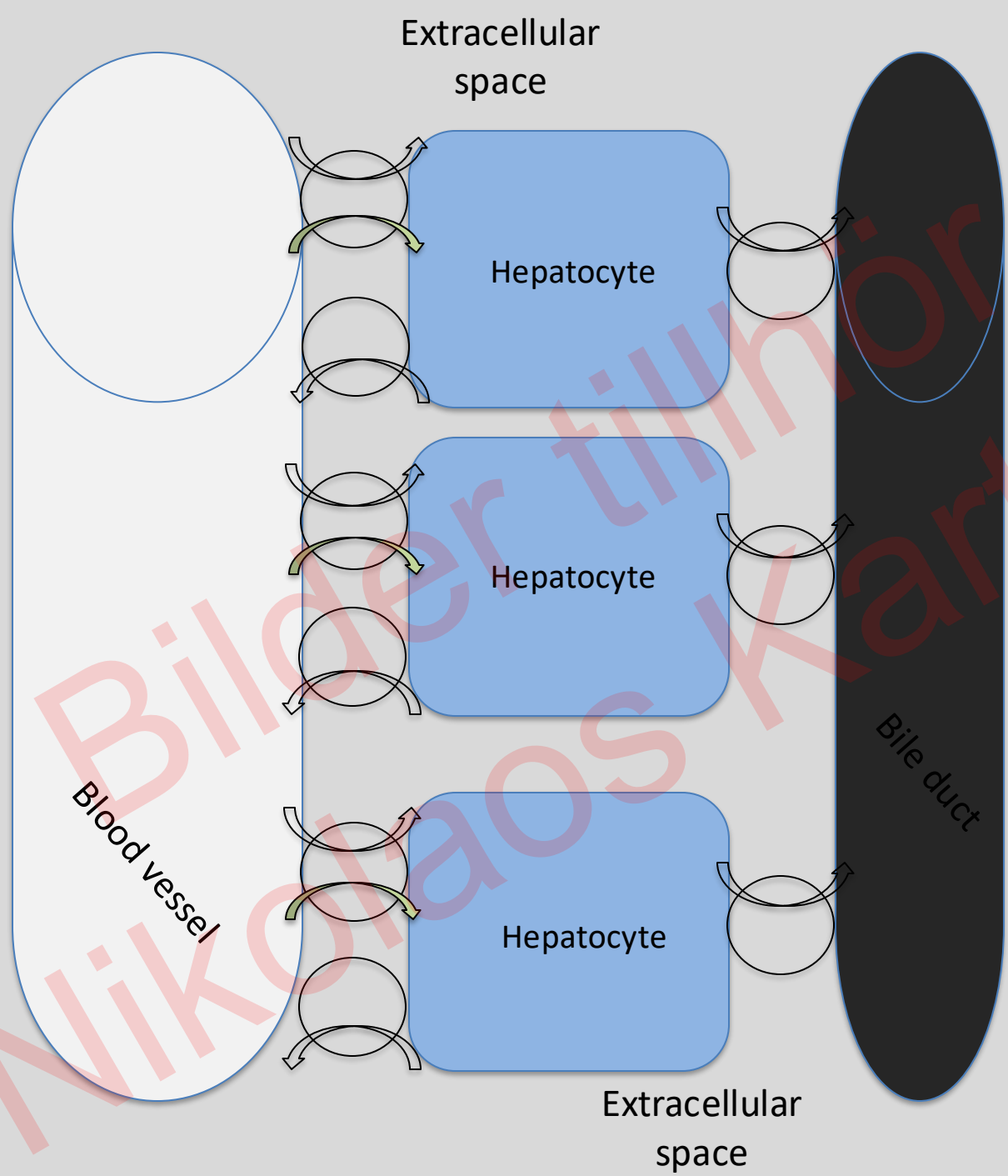
Bilder tillhör
Nikolaos Kartalis

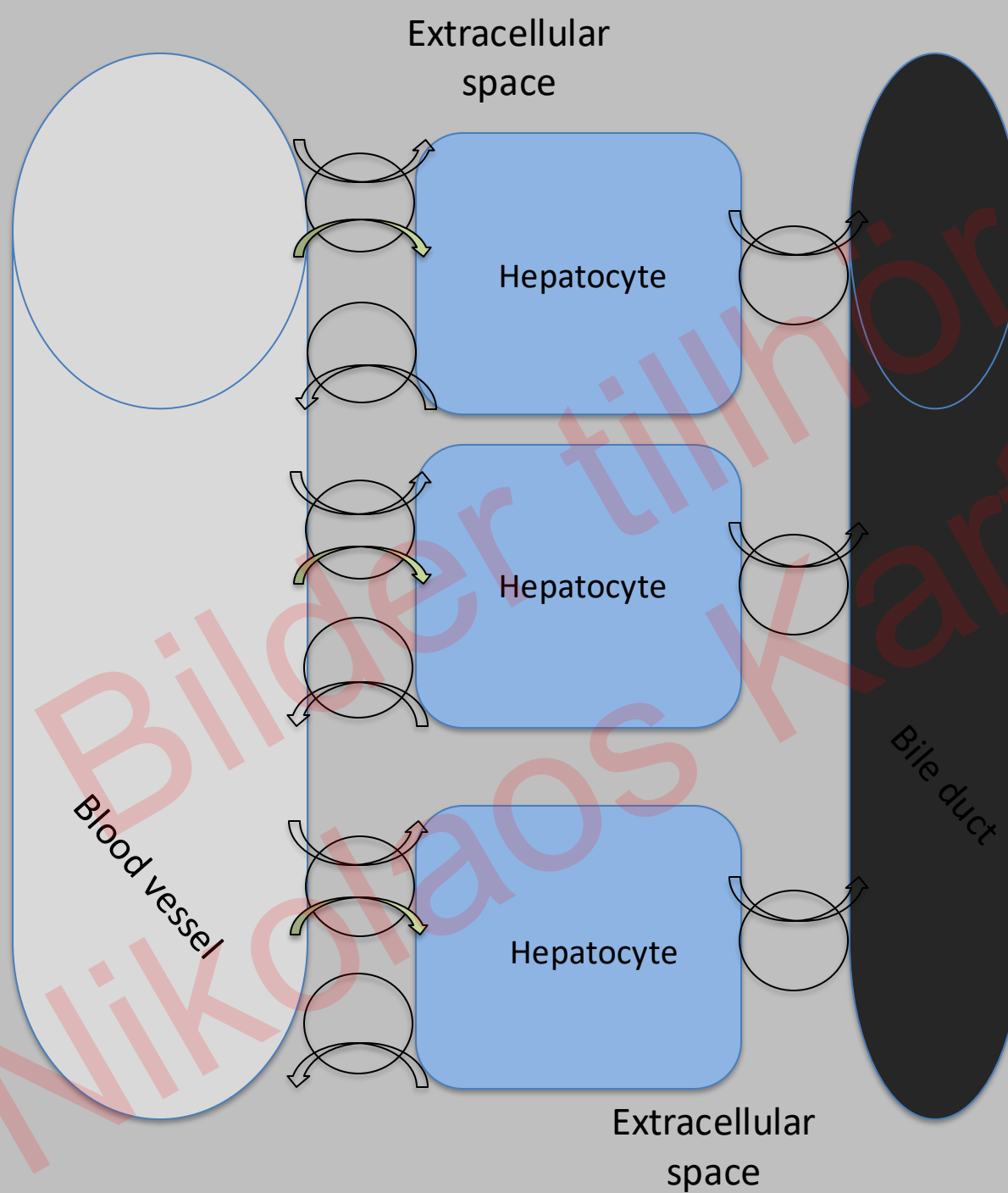


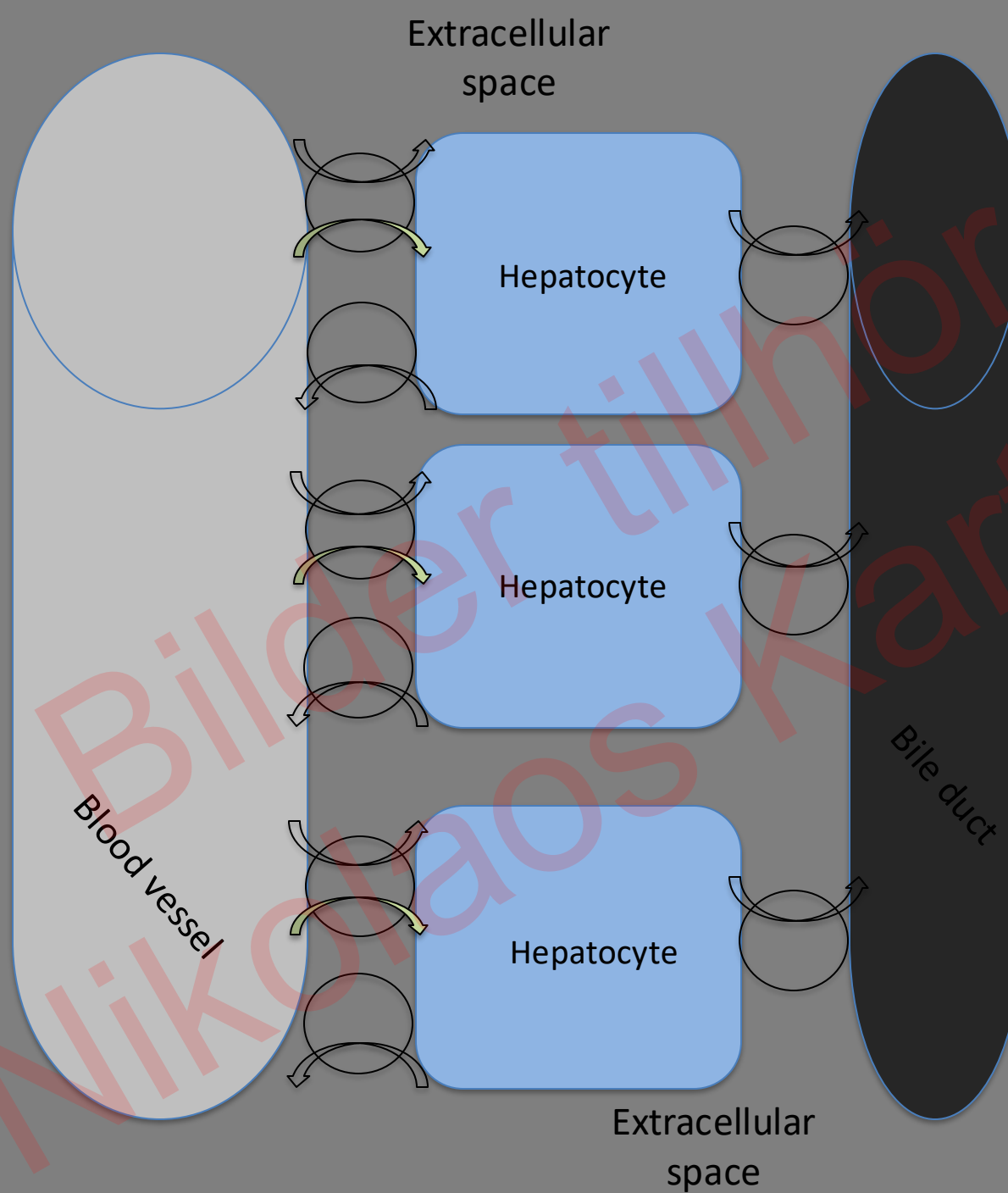


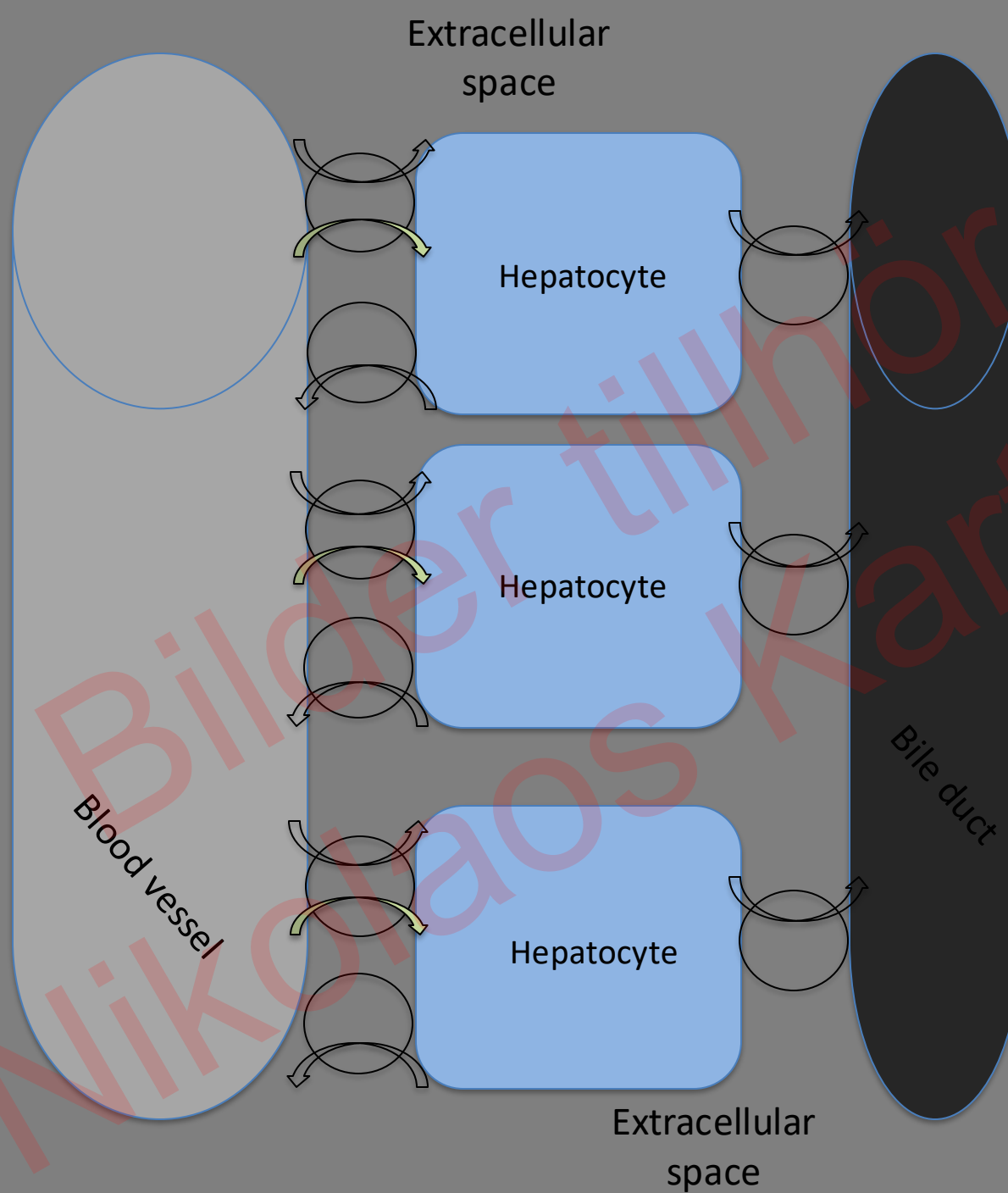


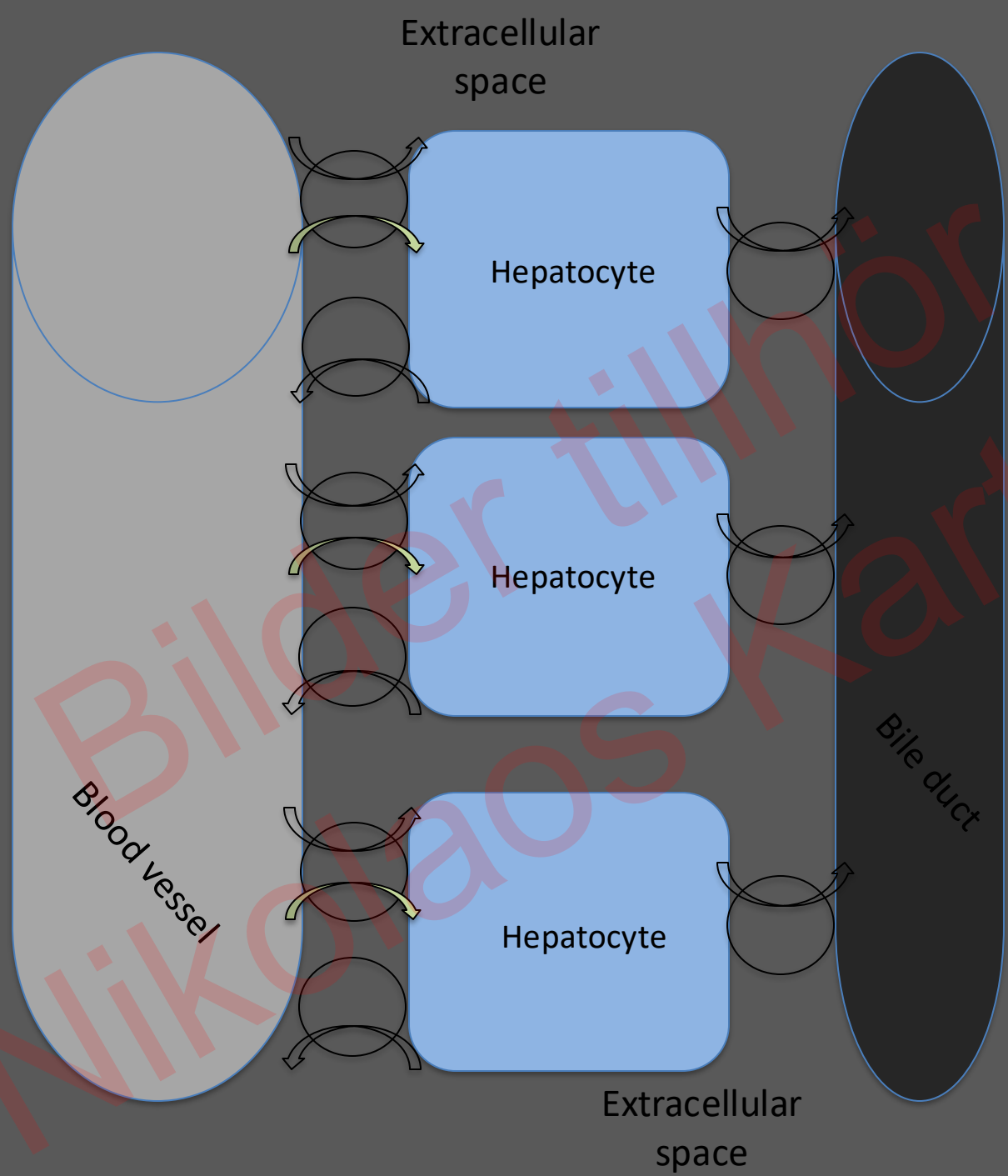


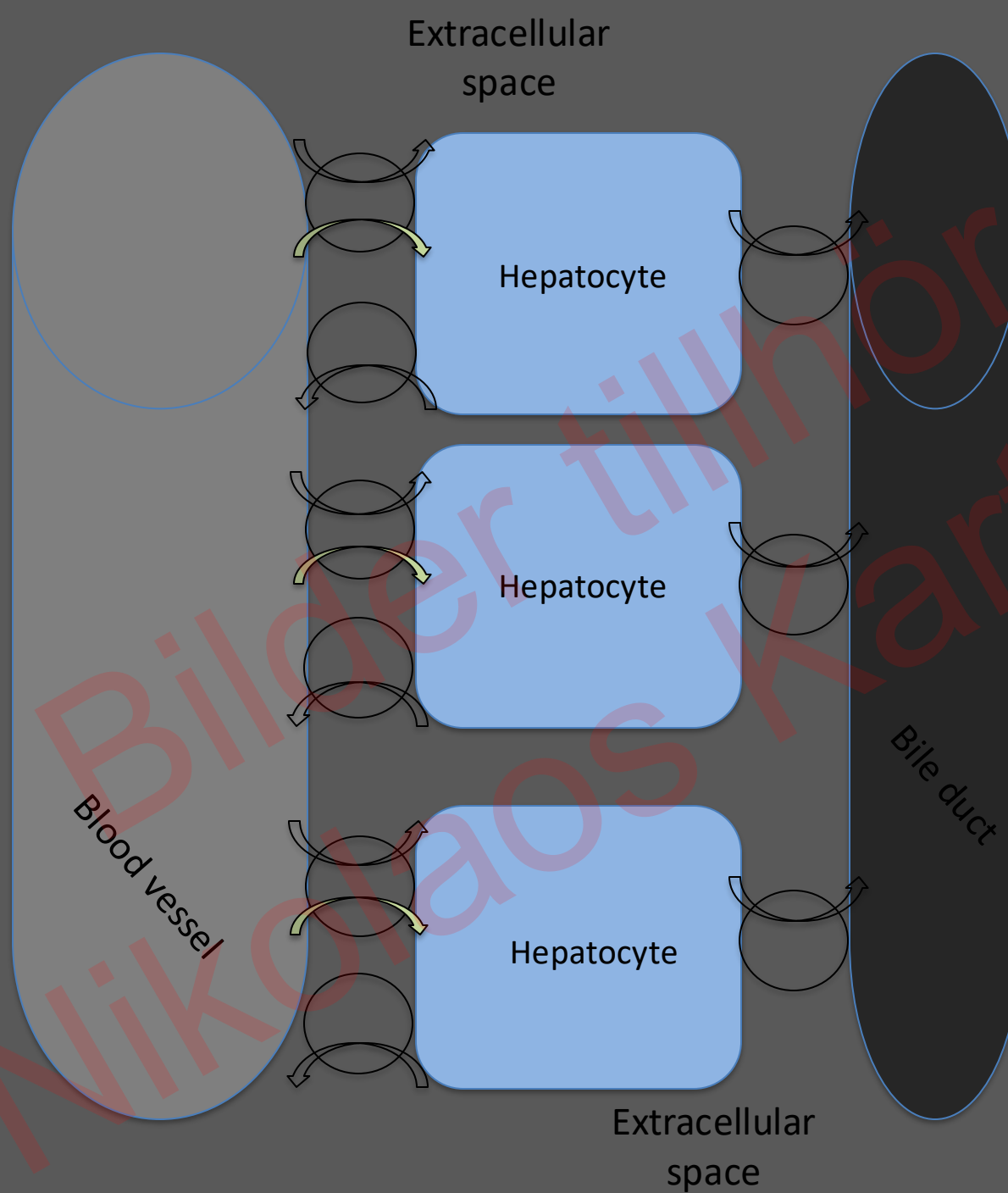


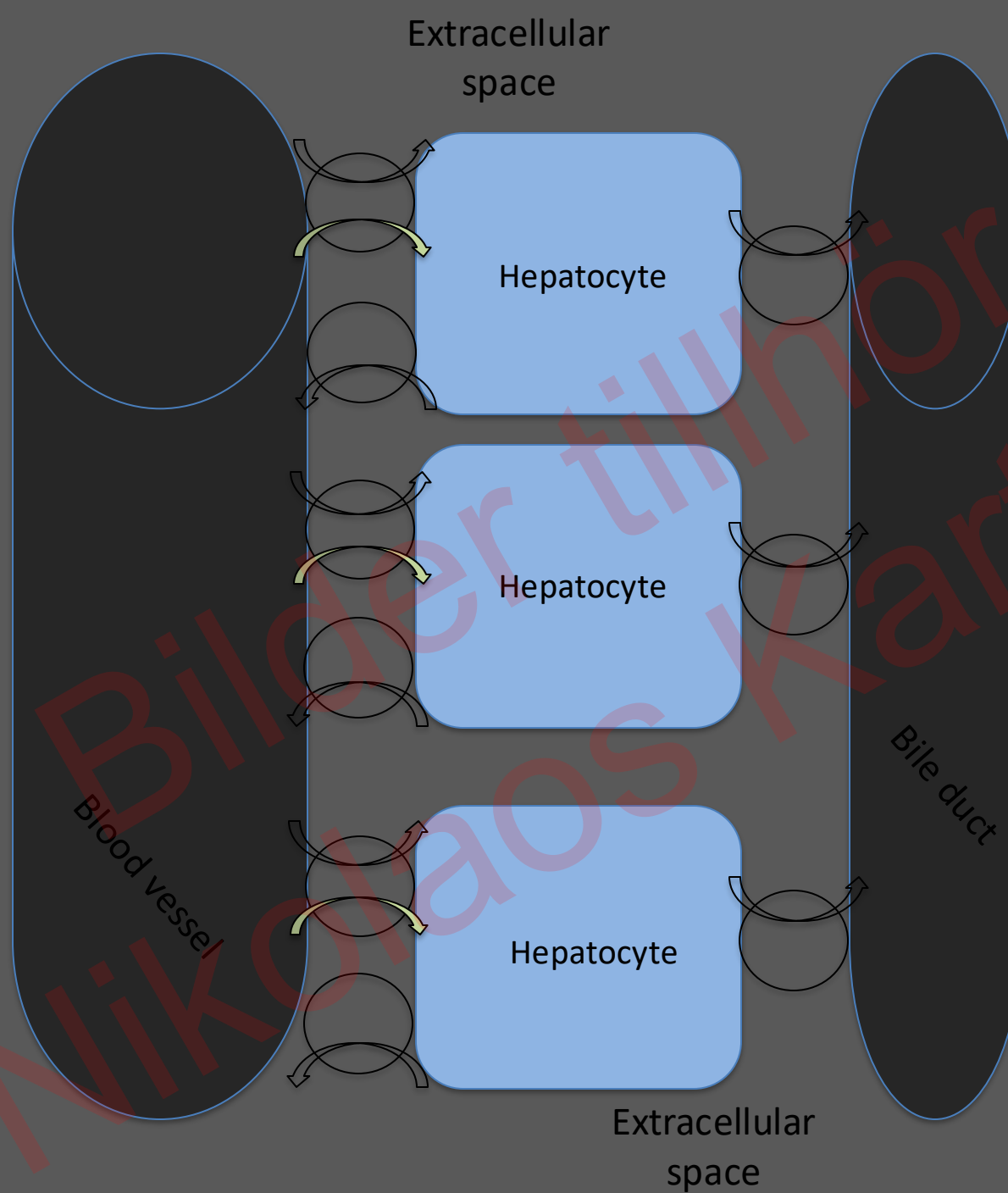


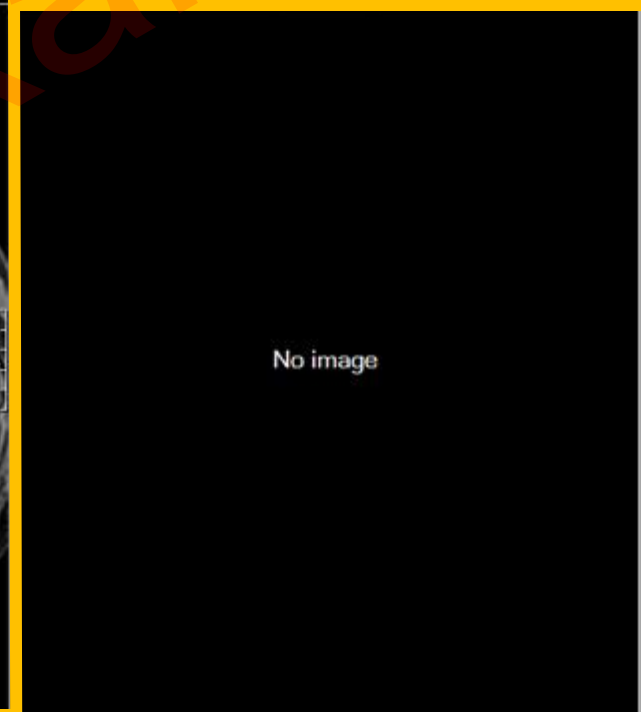
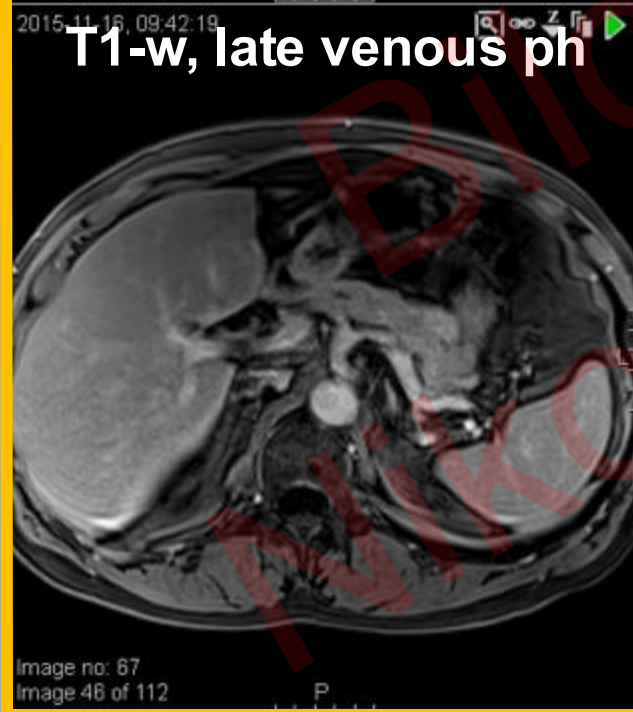
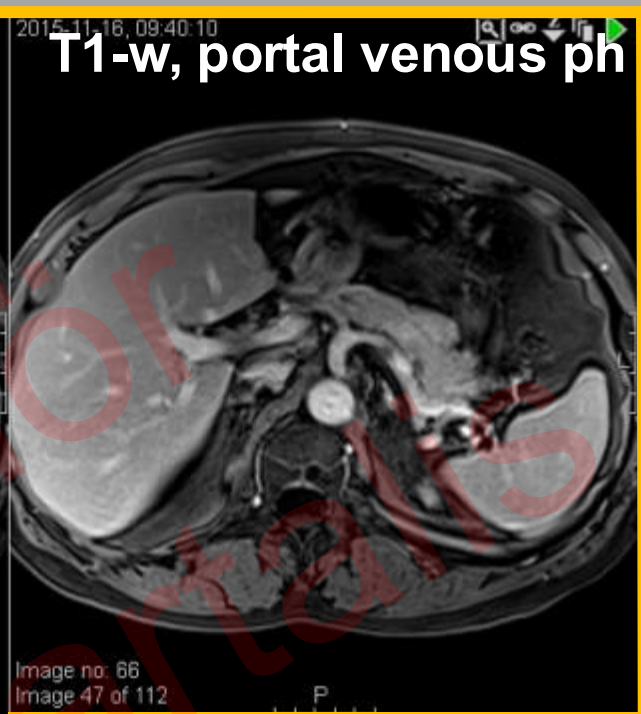


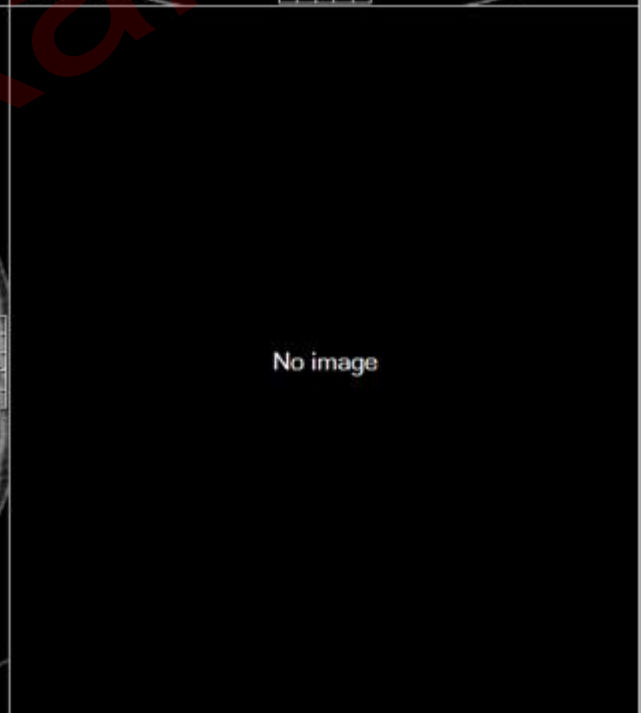
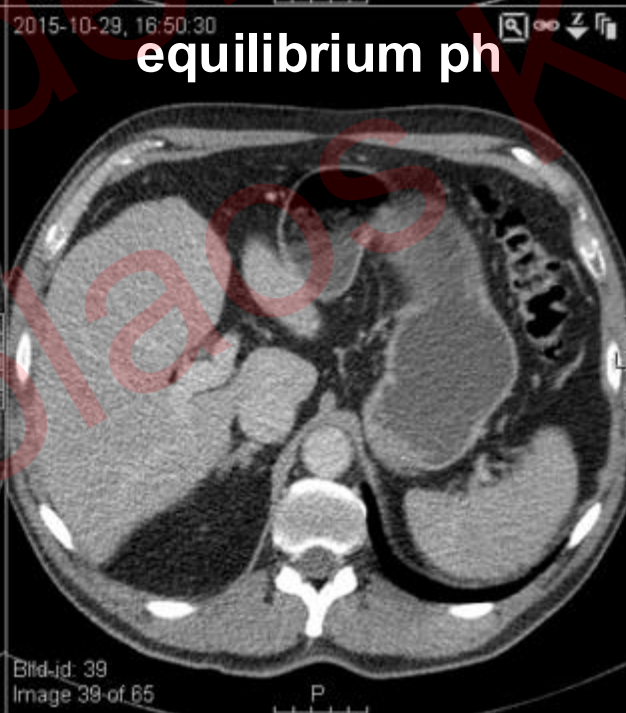
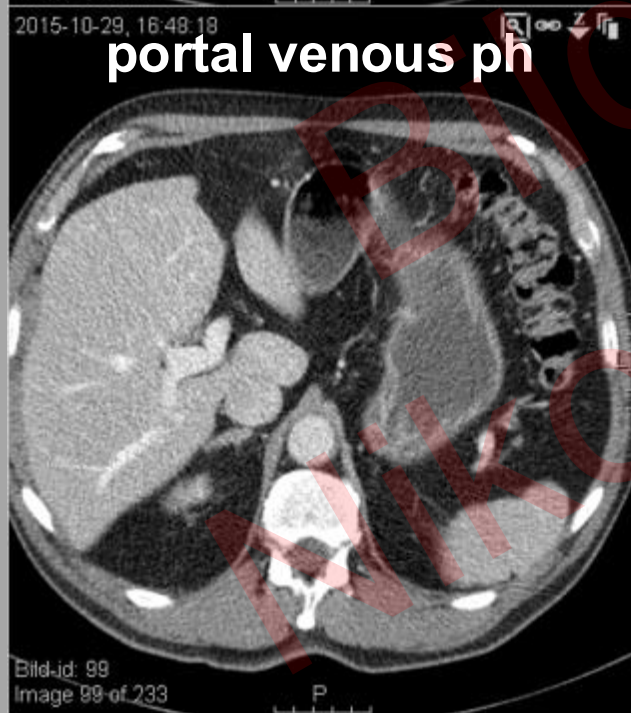
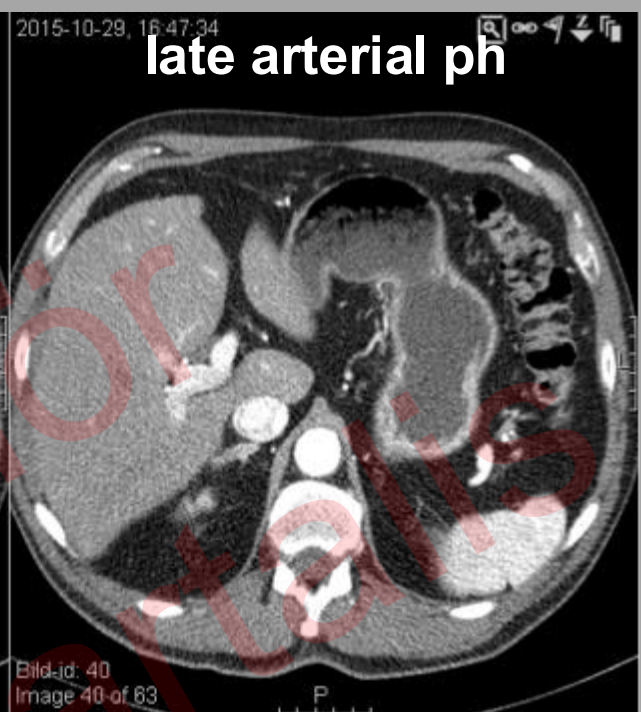
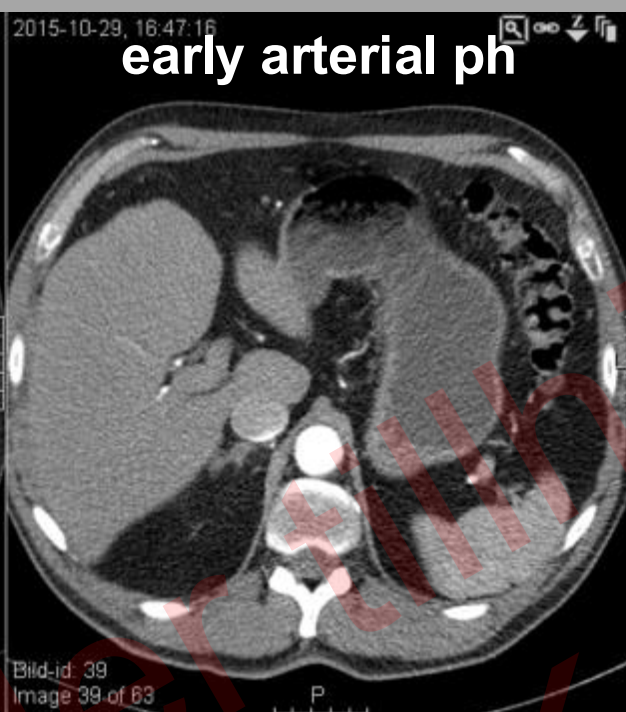
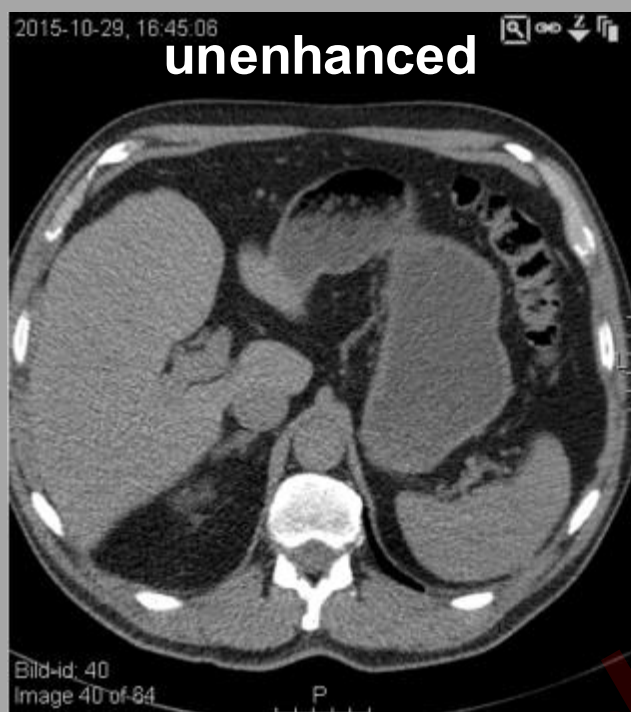


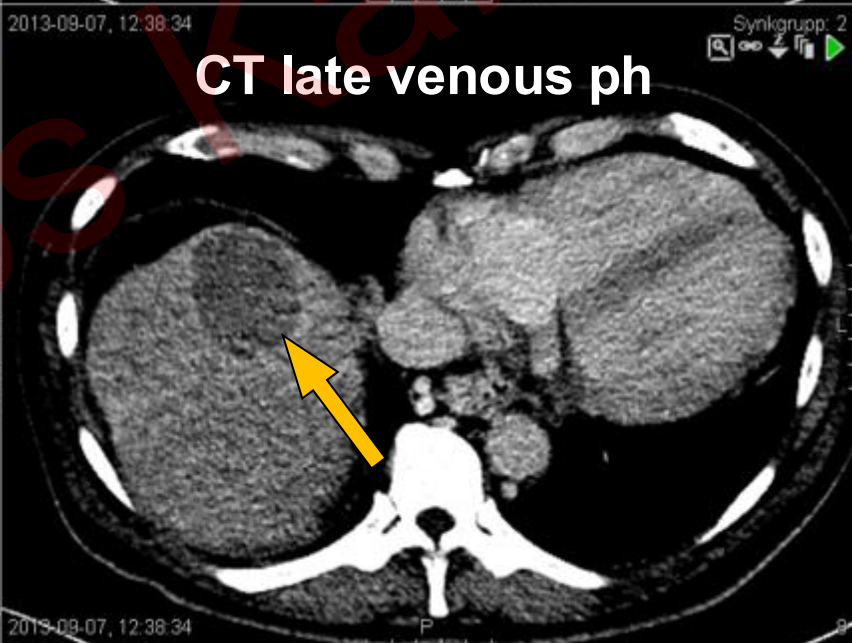
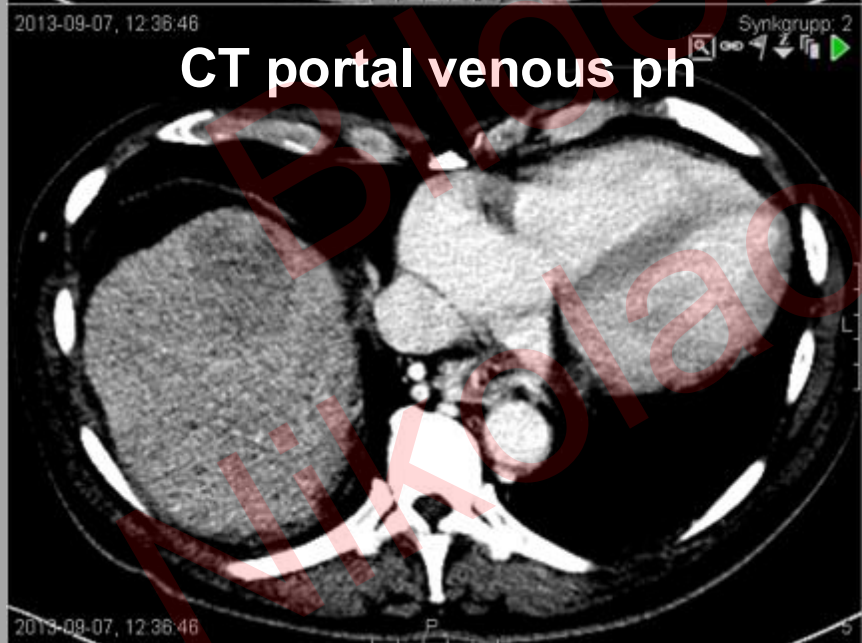
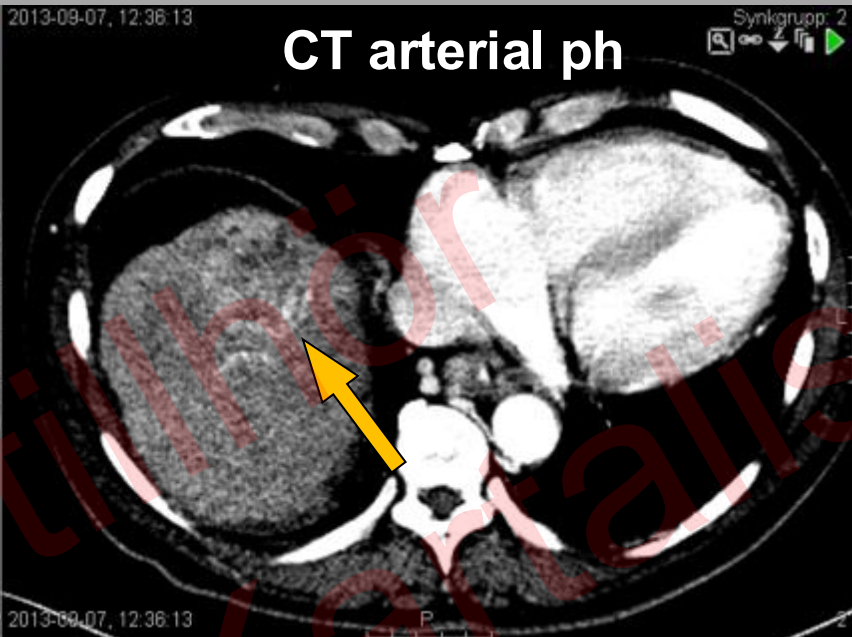
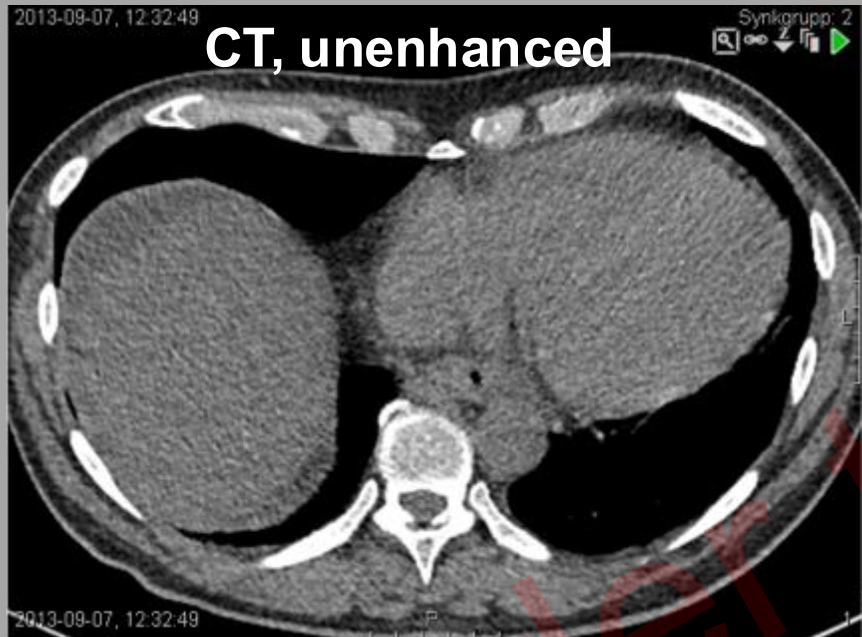


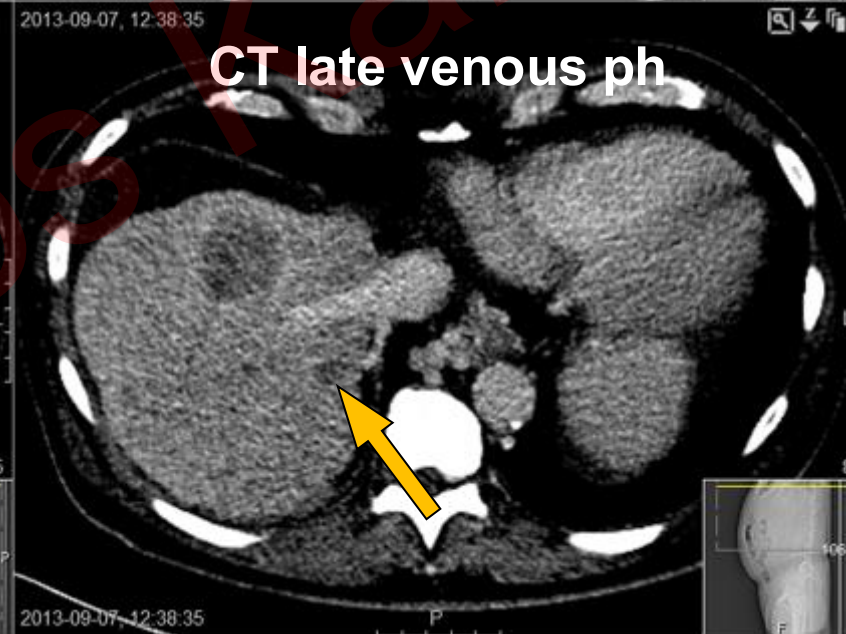
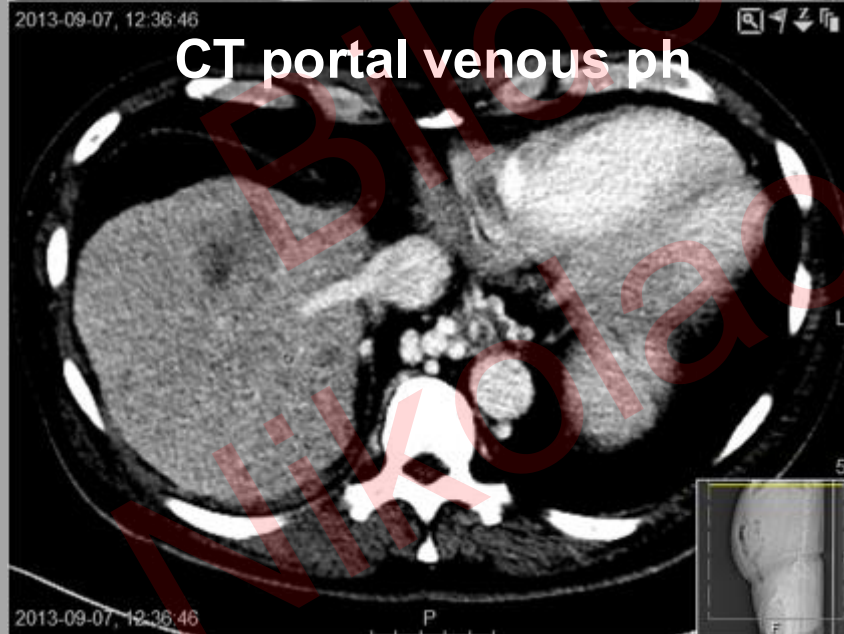
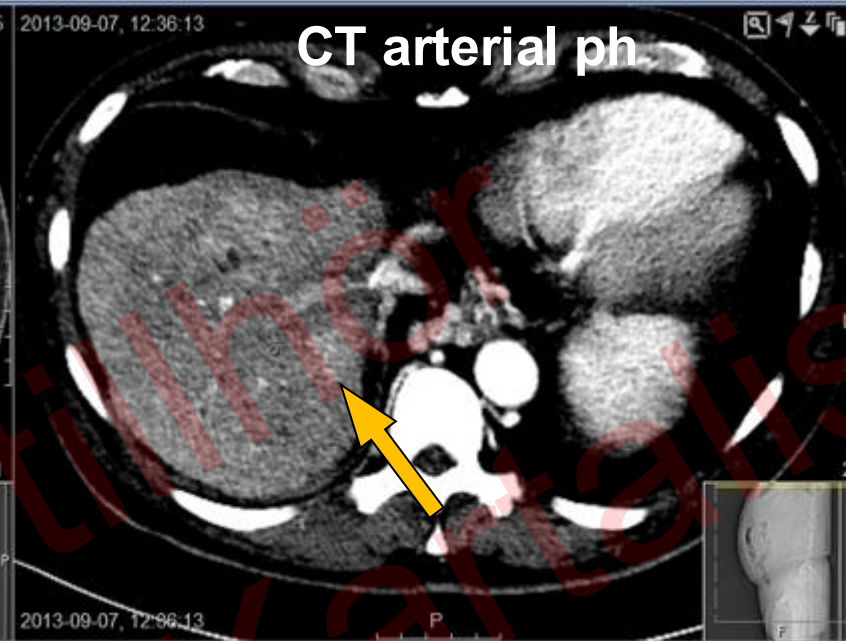
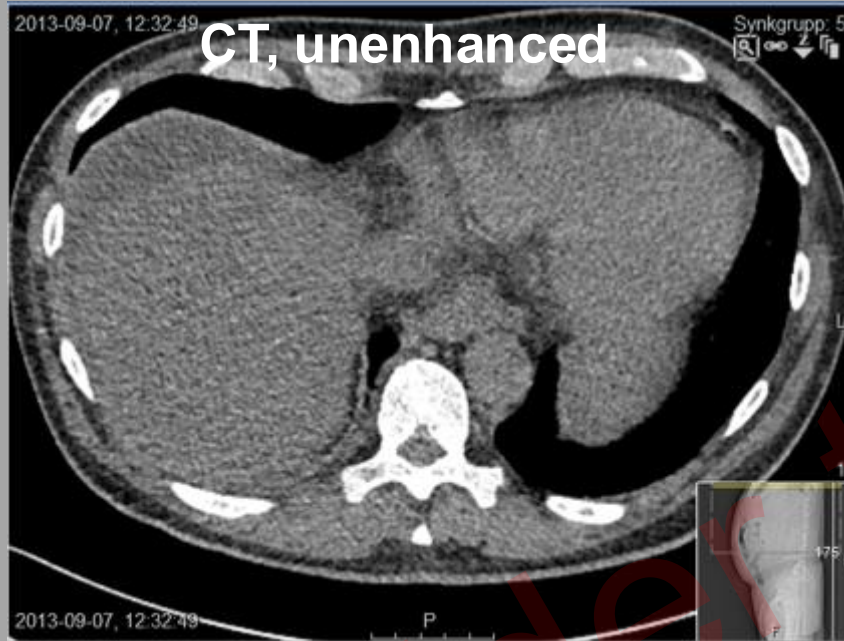


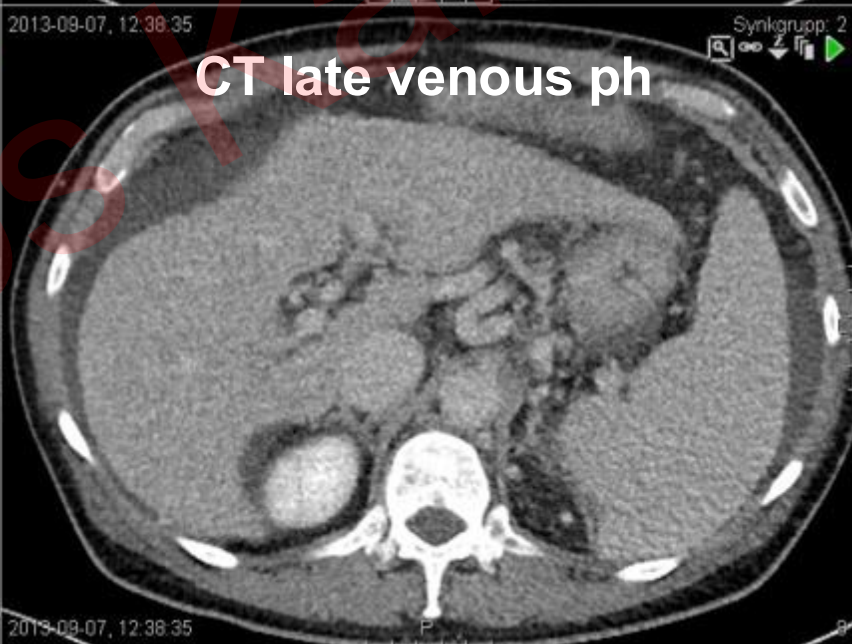
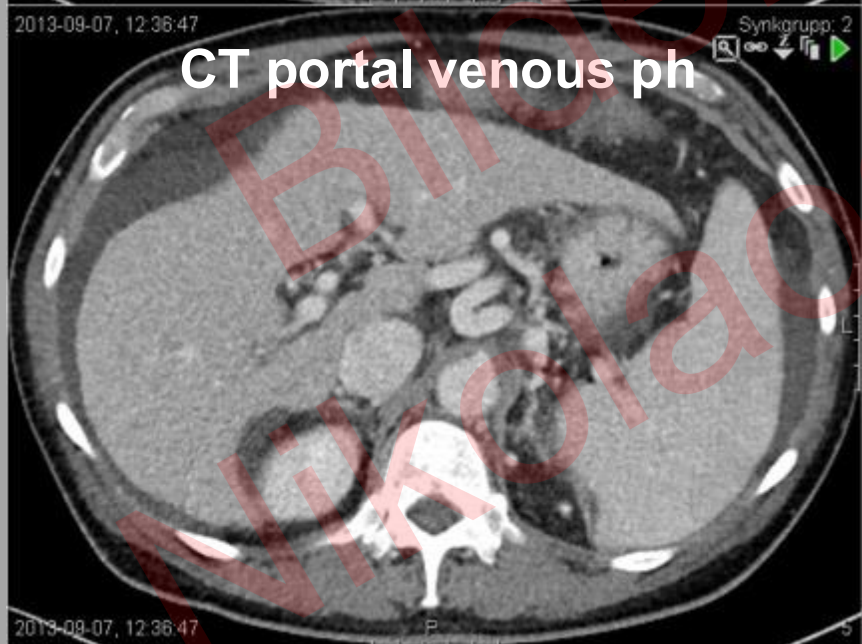
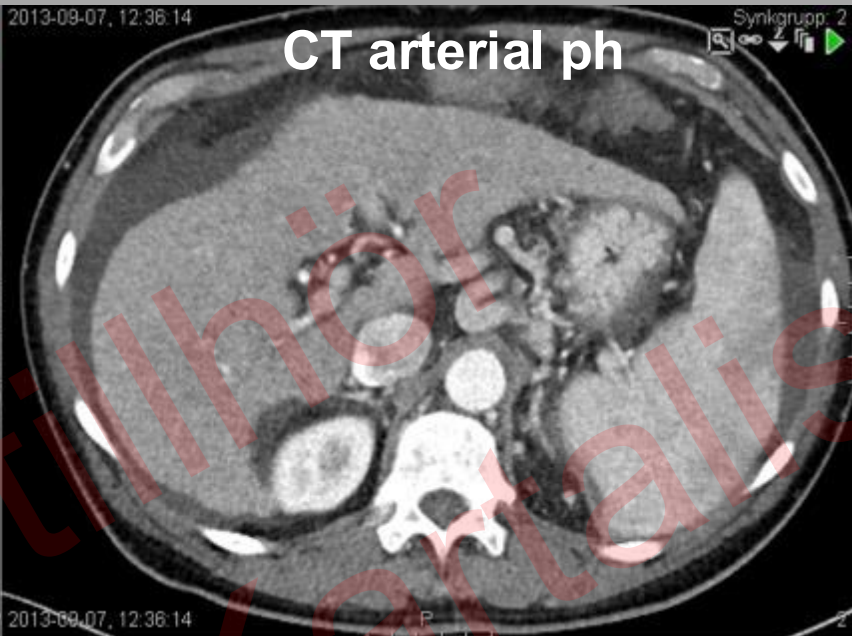


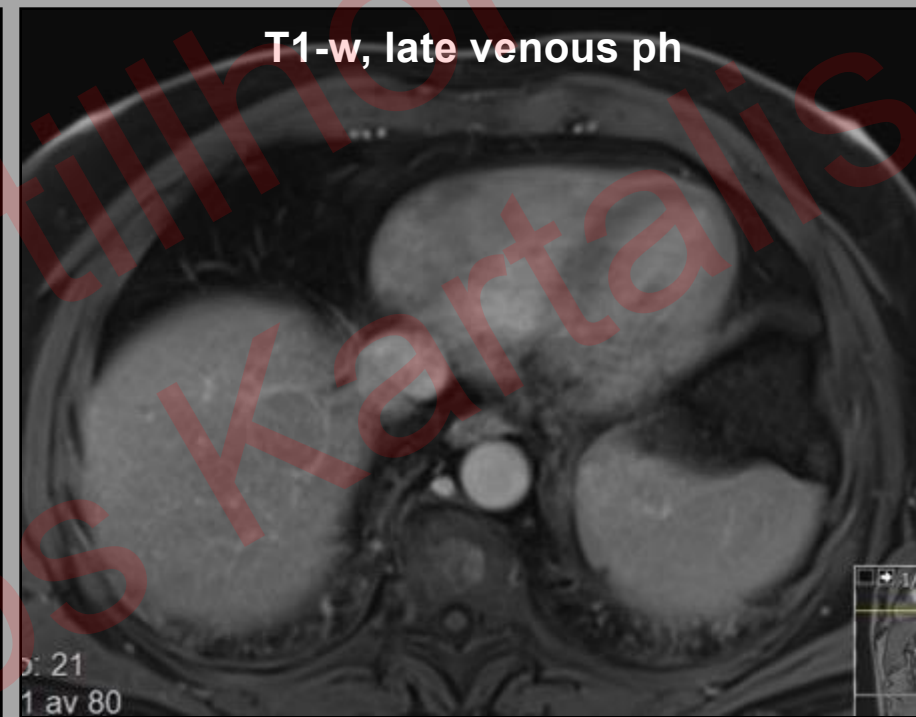
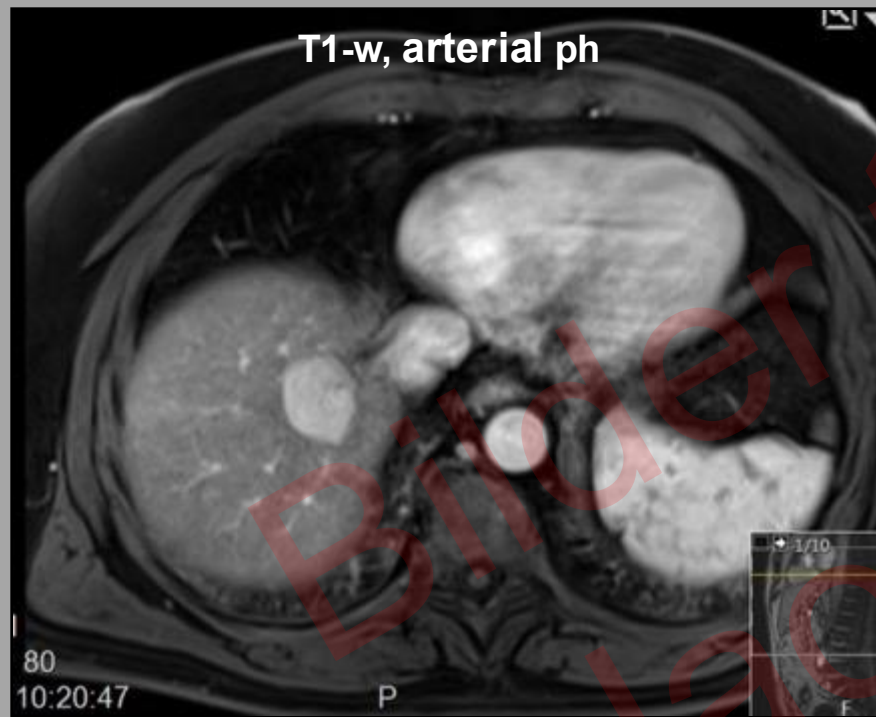














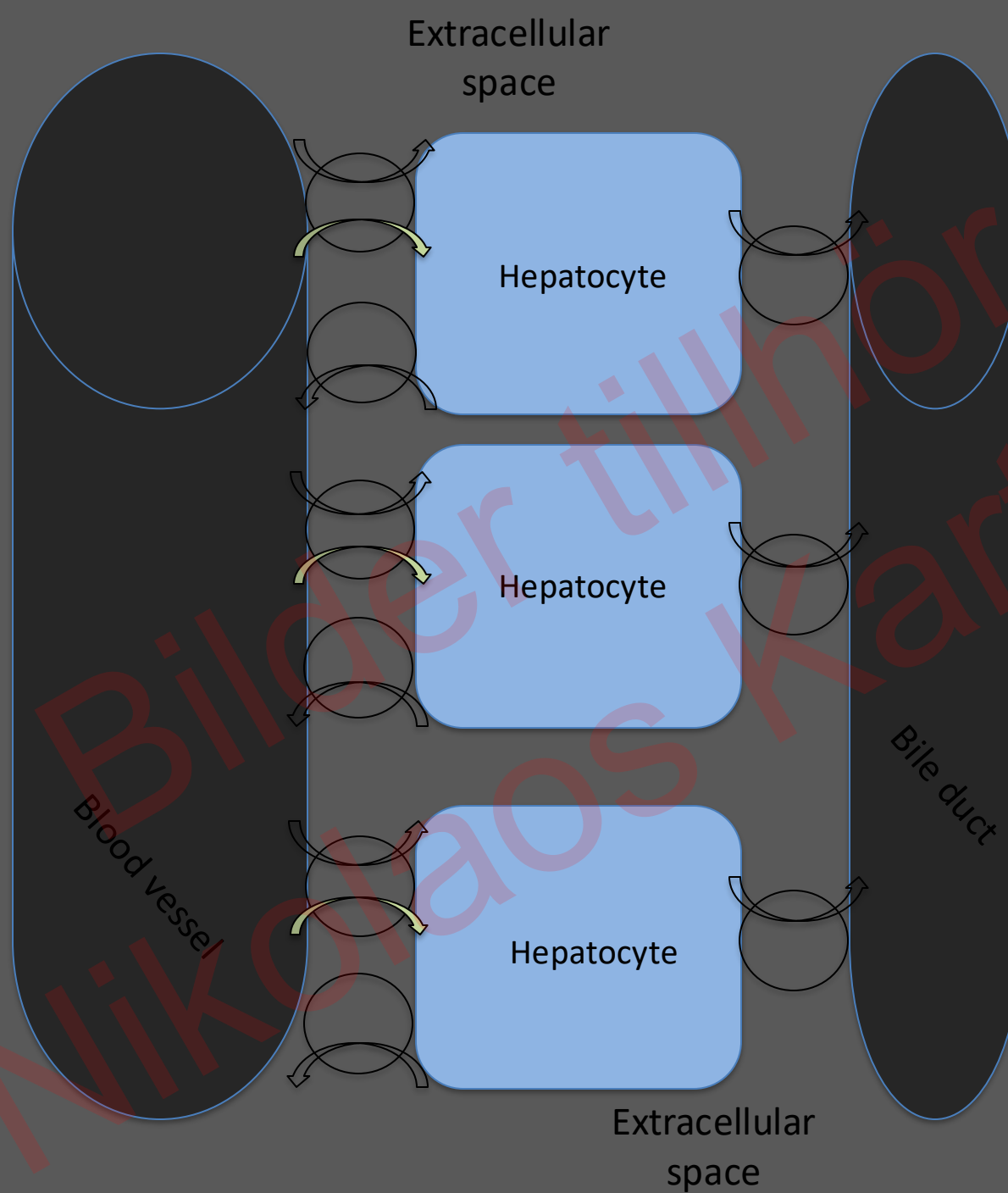
- Varför?

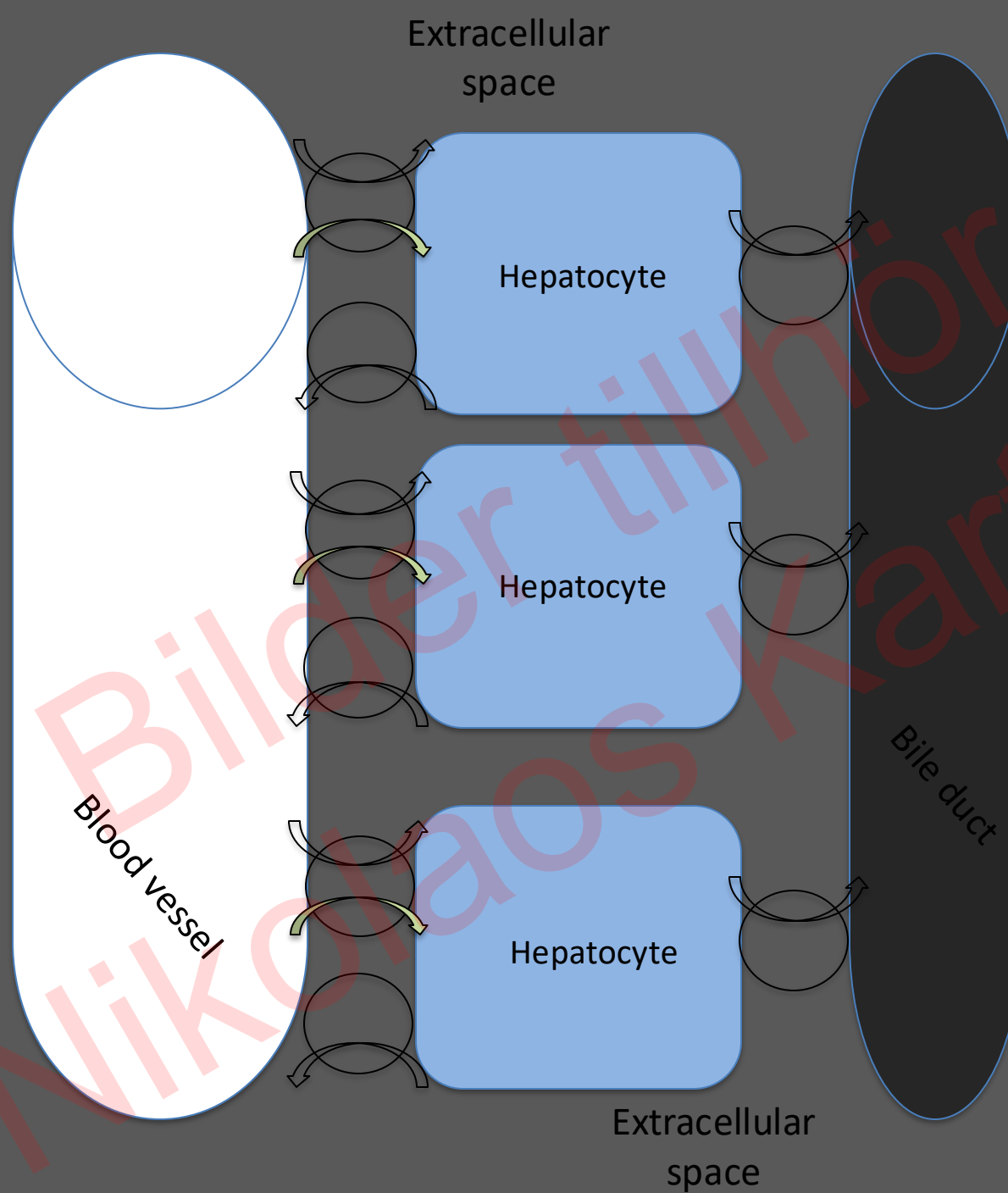
A. Vaskularitet

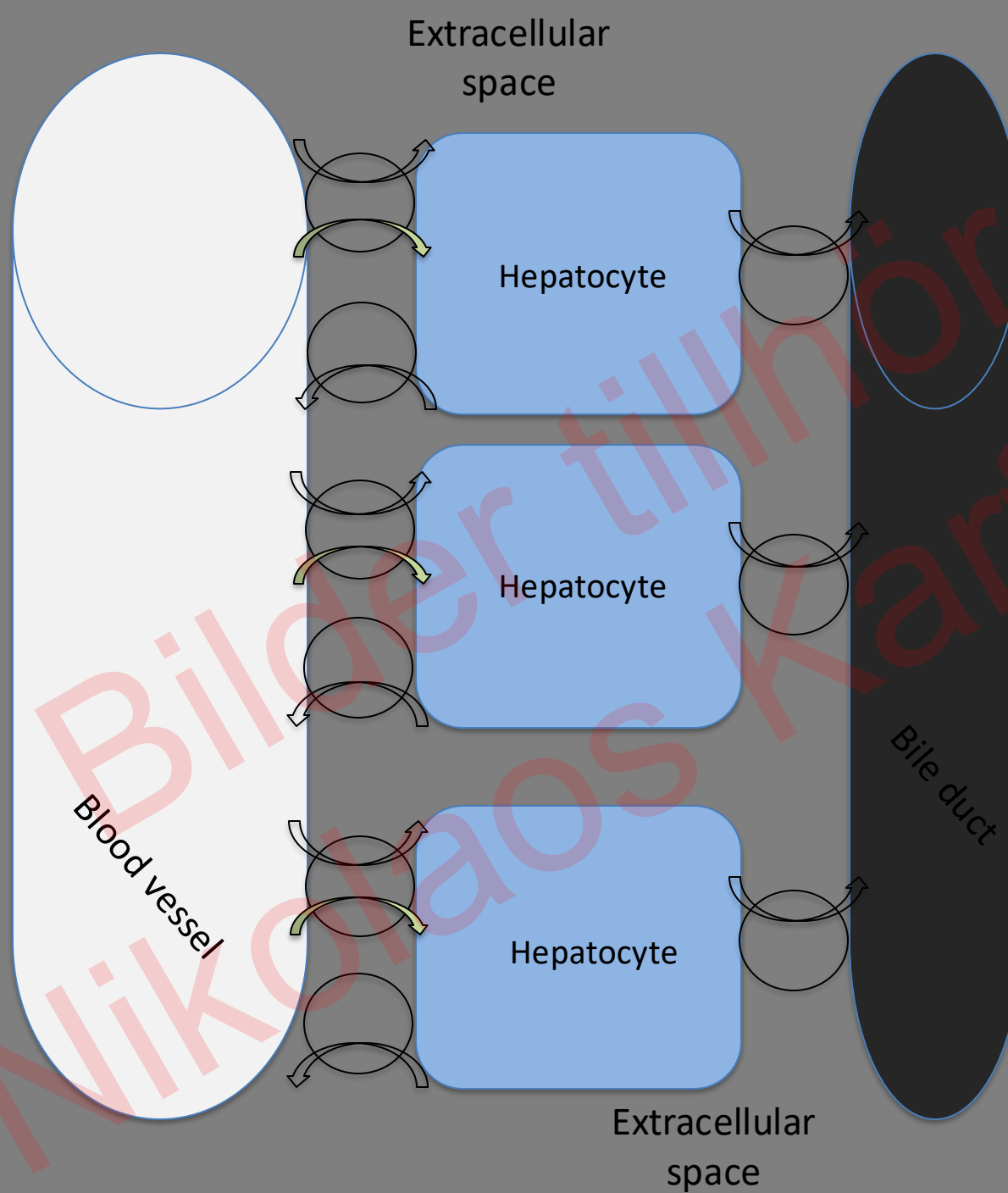
B. Hepatobiliärfunktion

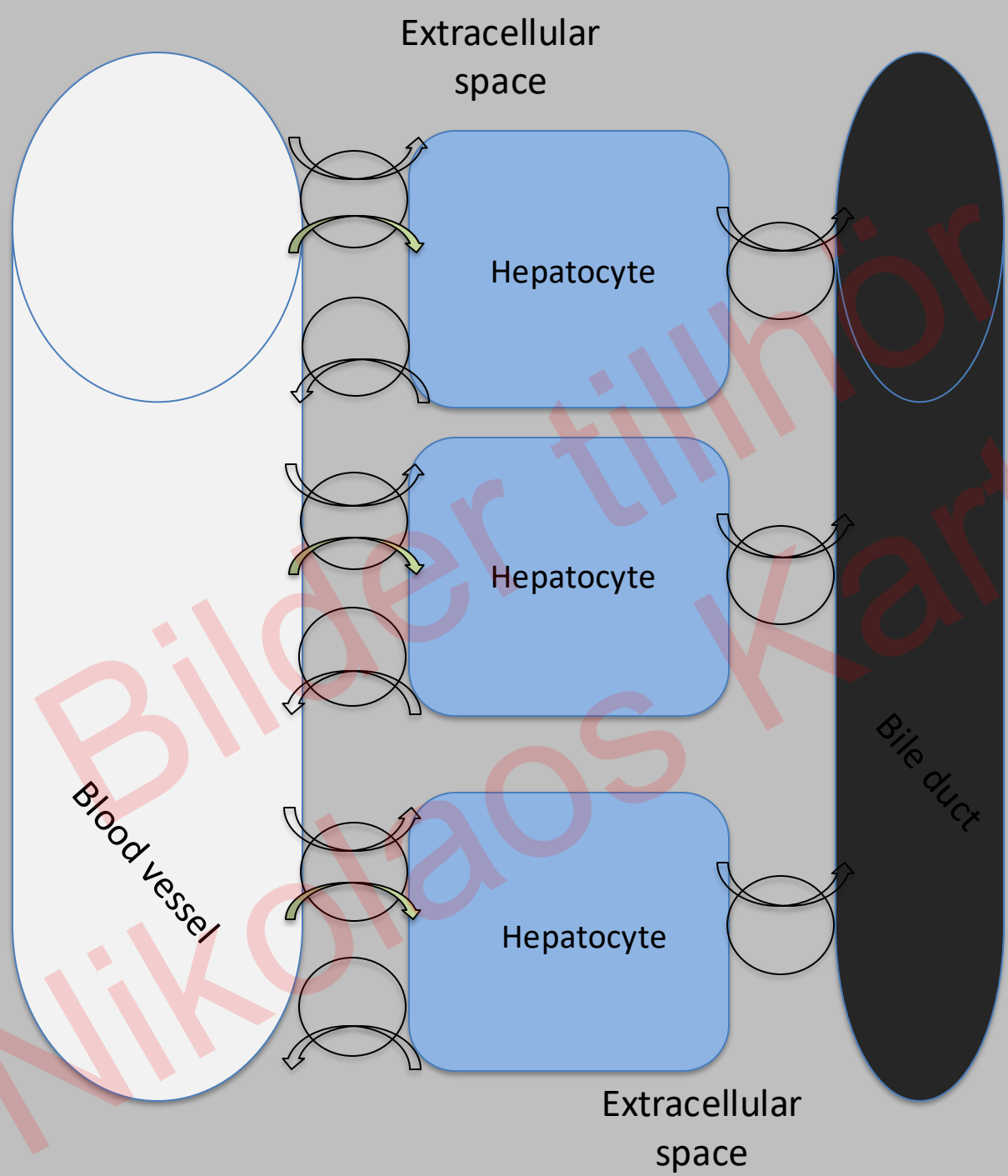
Hepatobiliart KM (MR)

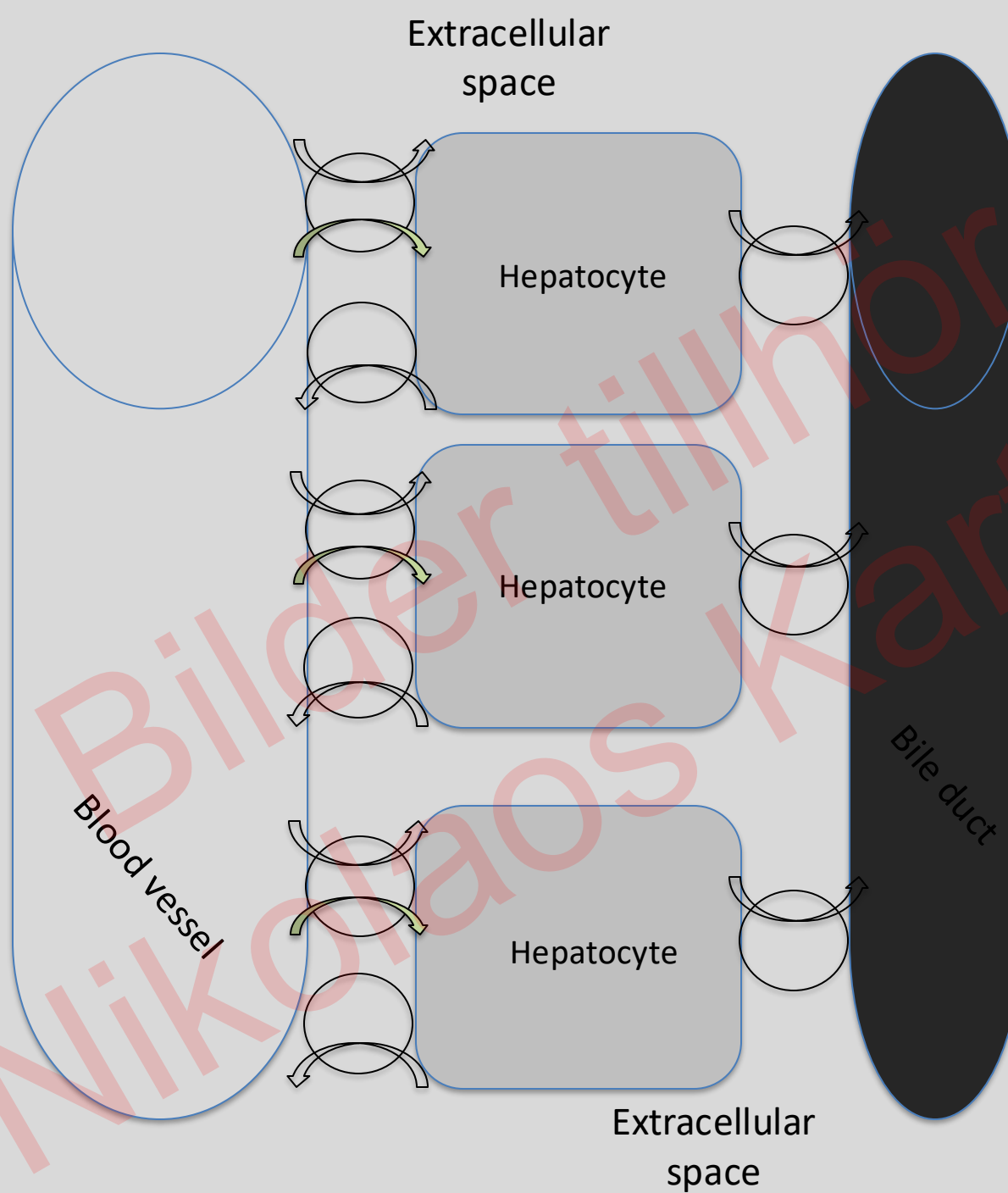
- Gadobenate dimeglumine
Gd-BOPTA
- Gadoxetic acid
Gd-EOB-DTPA

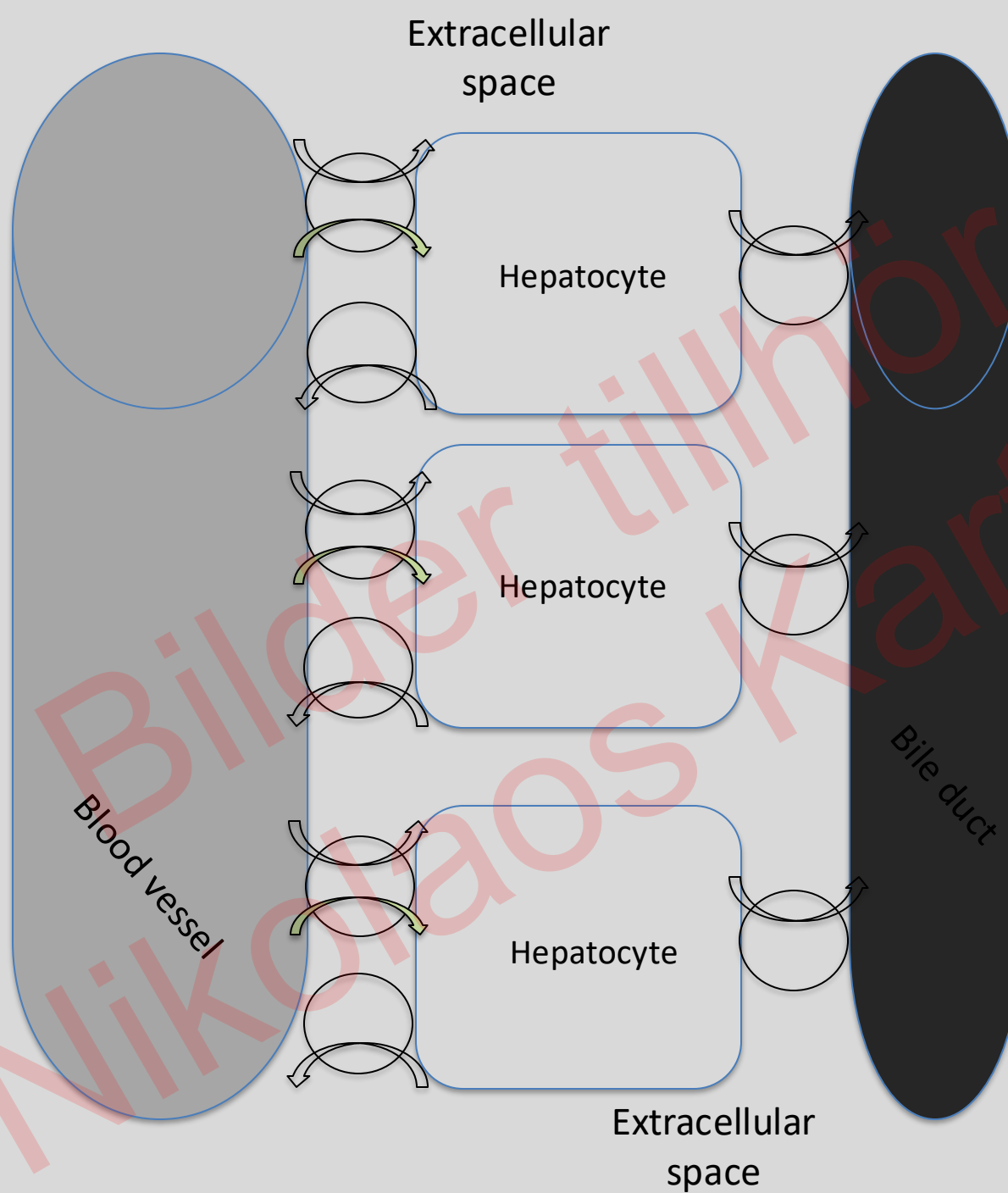


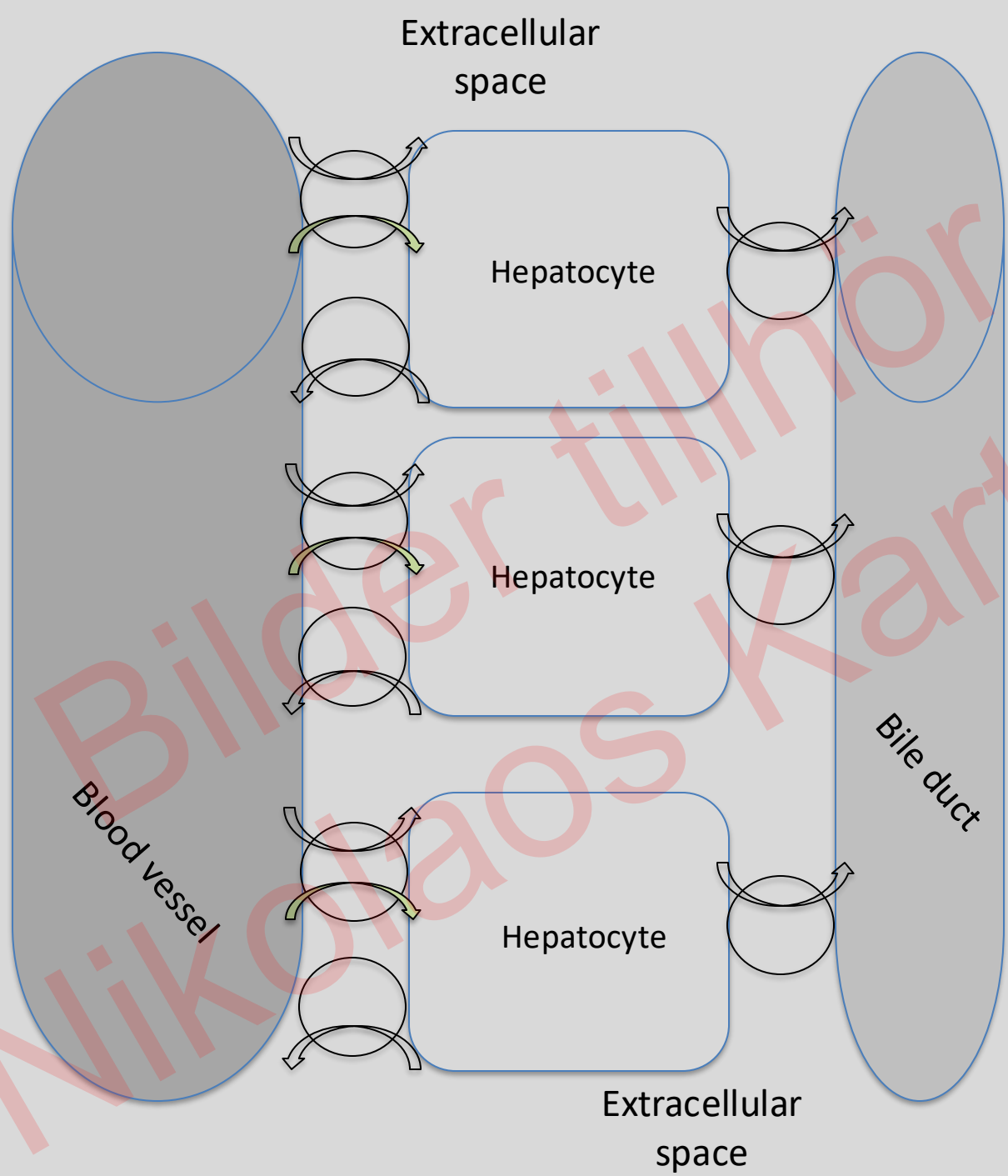


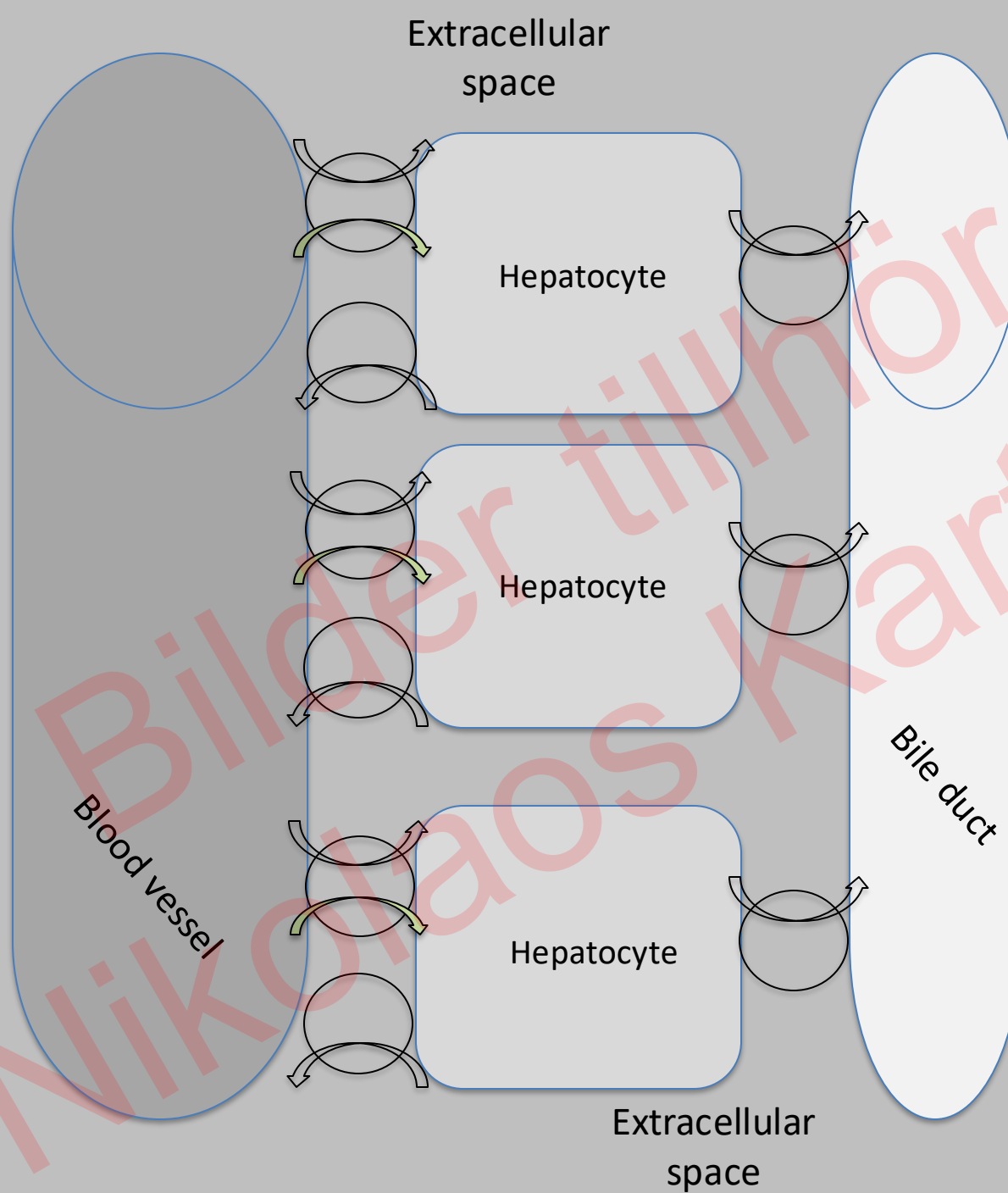


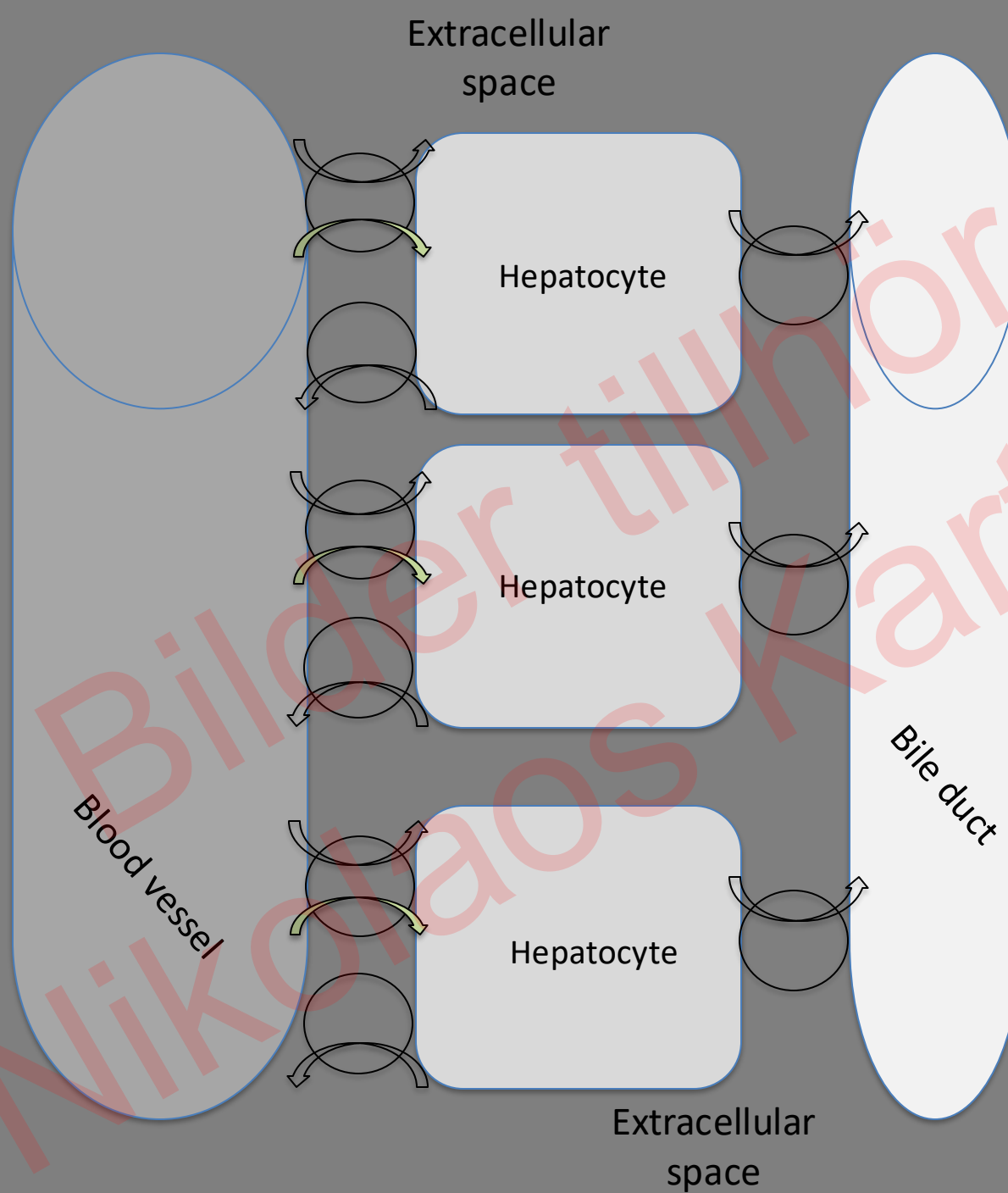


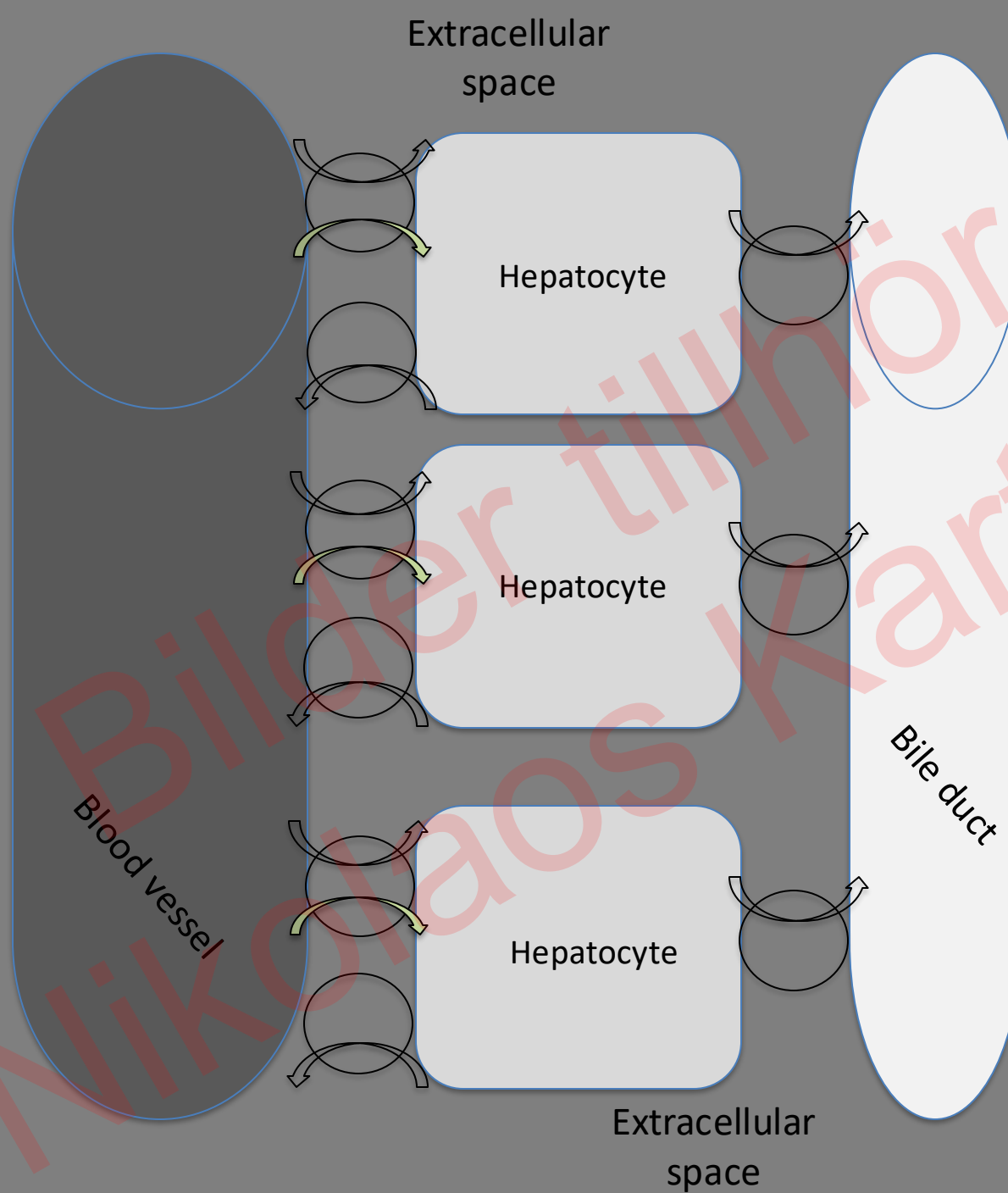


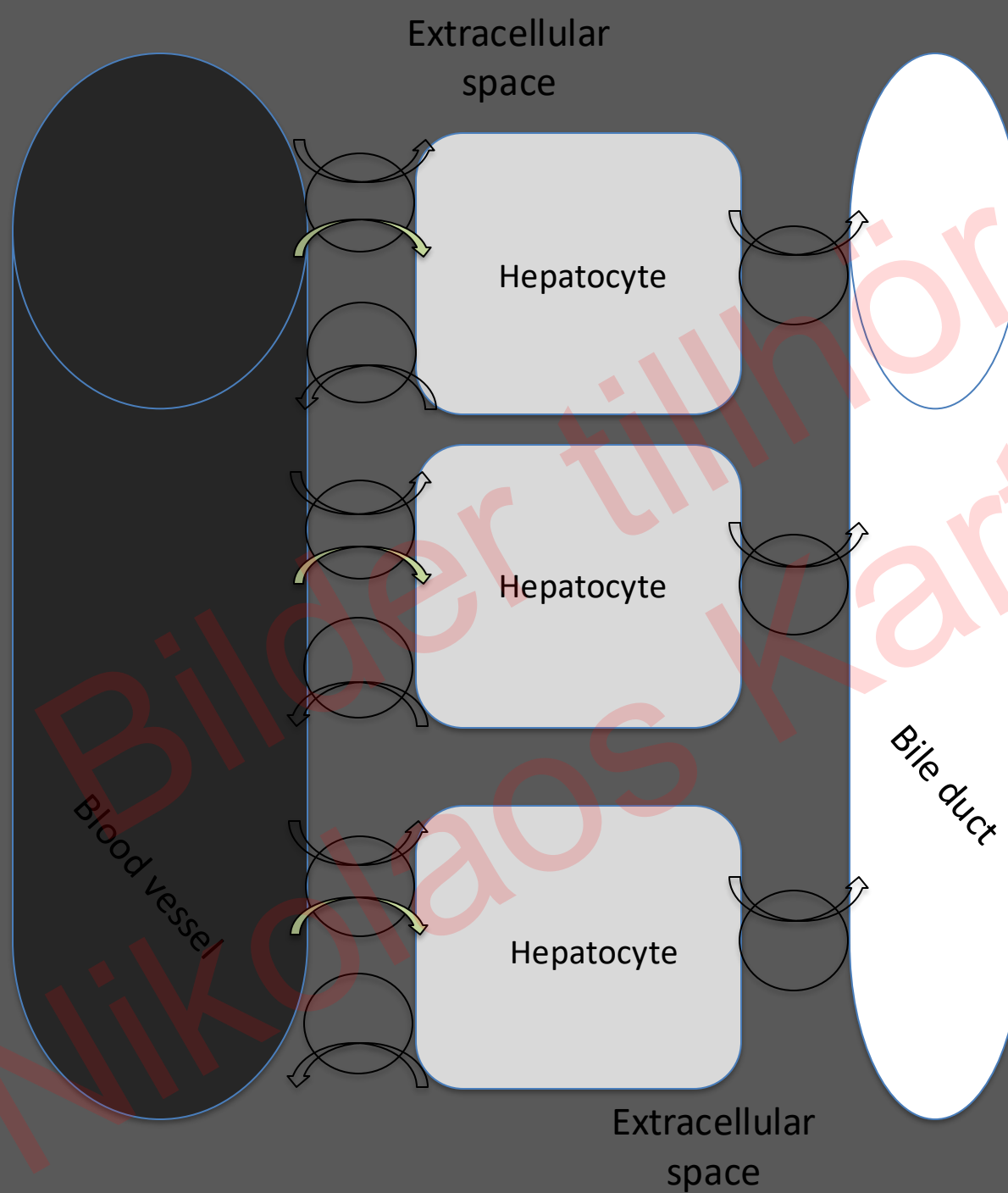


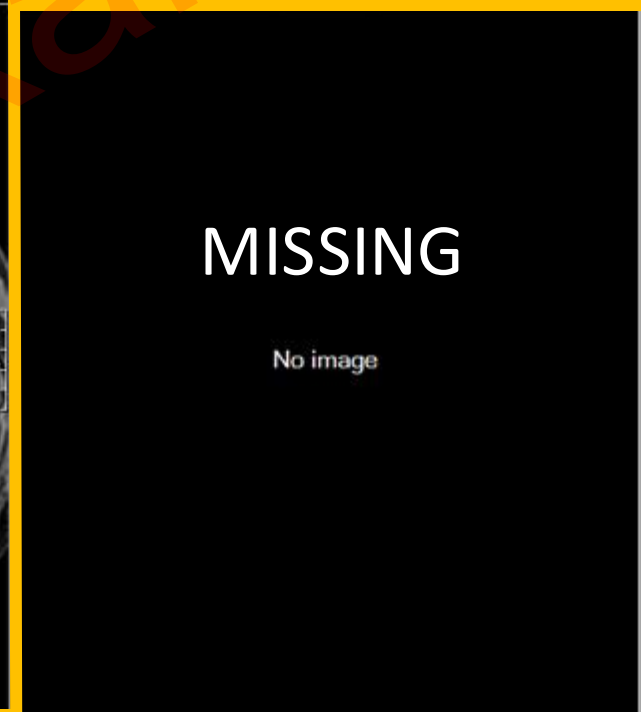
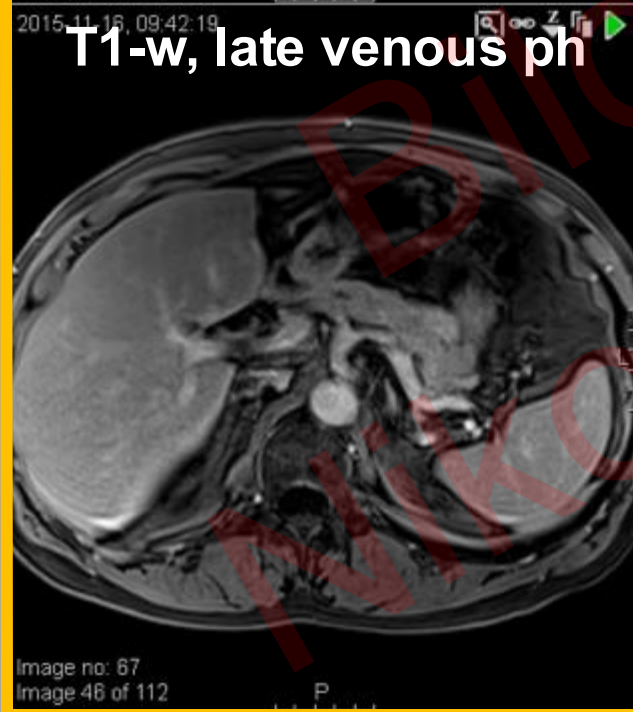
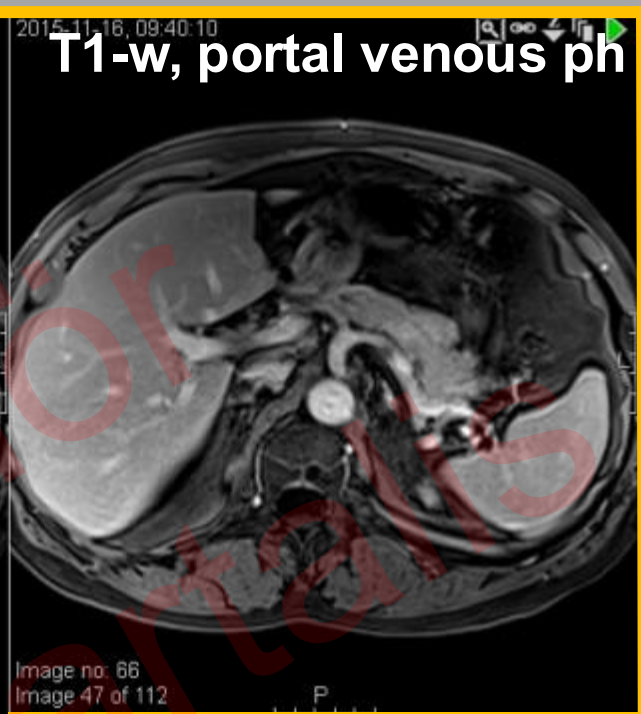








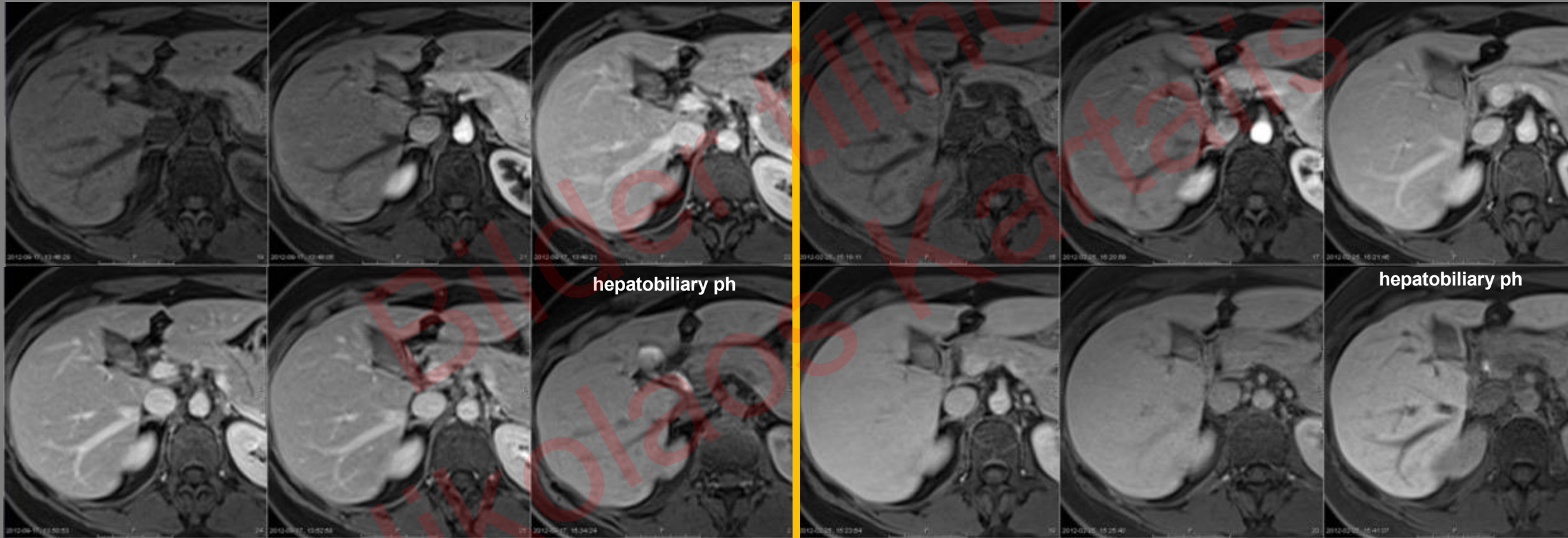




Teknik HBKM

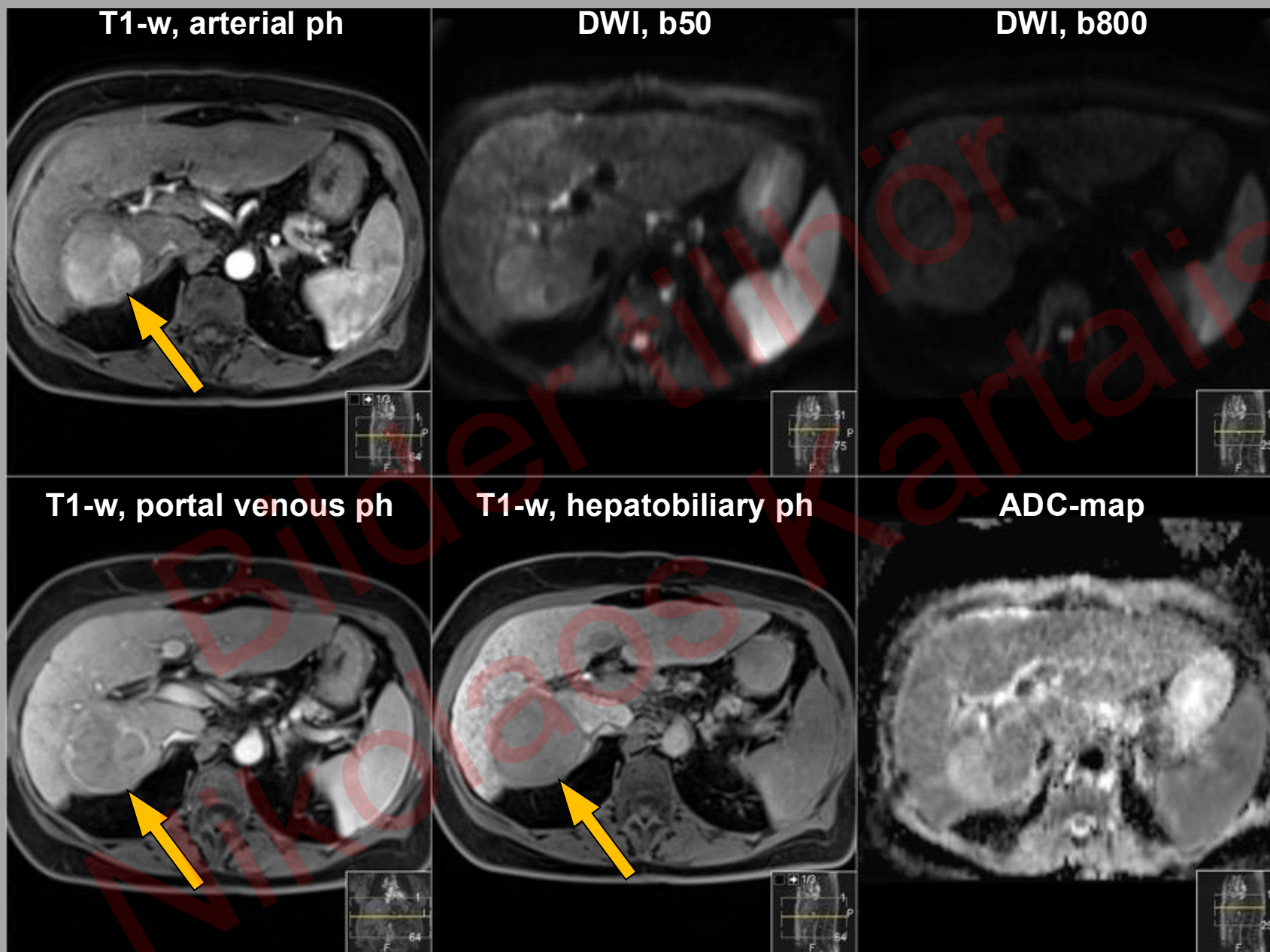
Gadobenate dimeglumine

Gadoxetic acid



HB phase 1-2 h

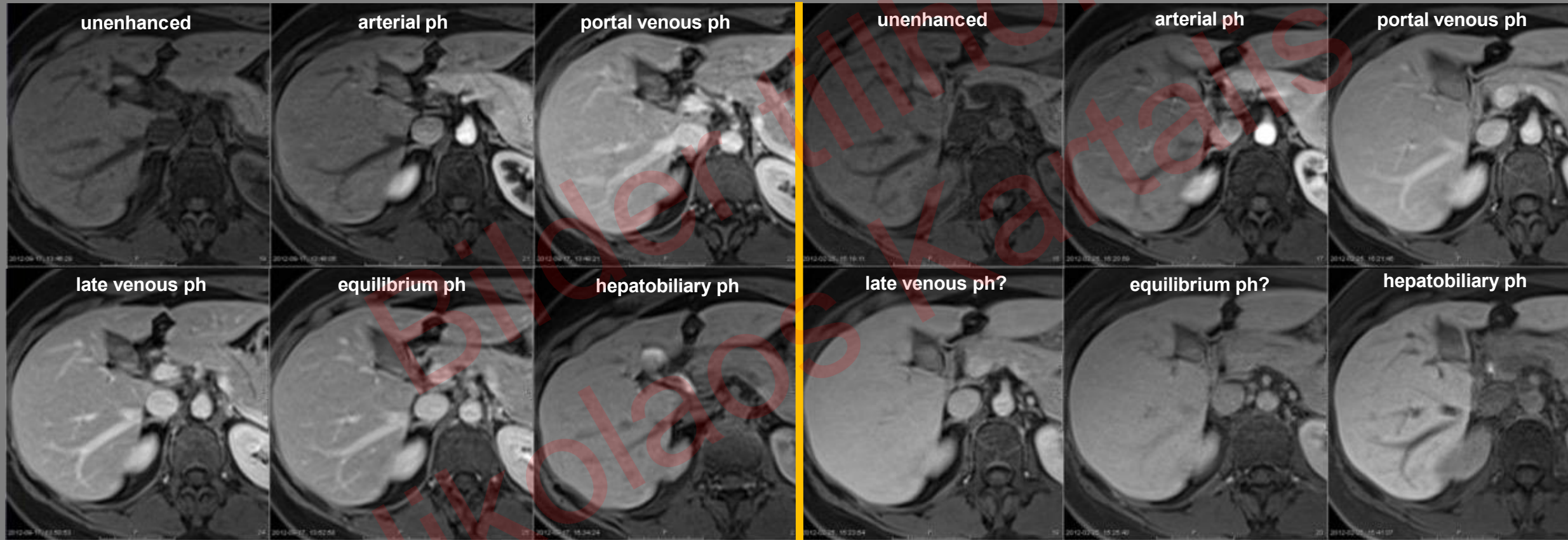
HB phase 10-20 min



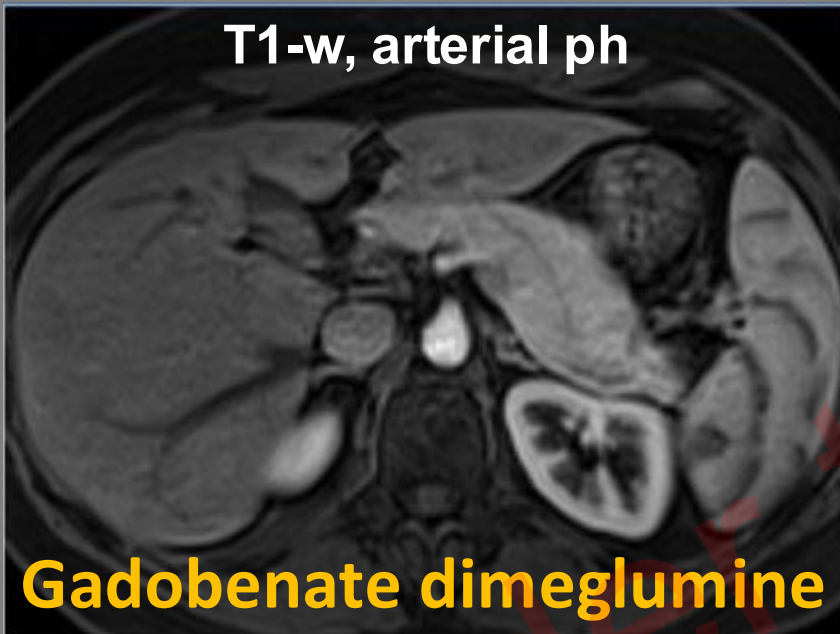
Teknik HBKM

Gadobenate dimeglumine

Gadoxetic acid

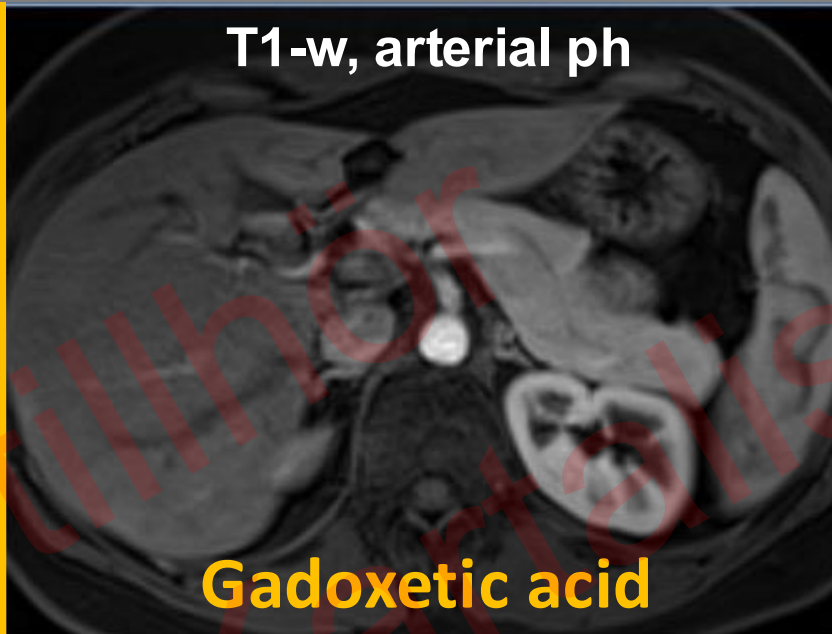


T1-w, arterial ph



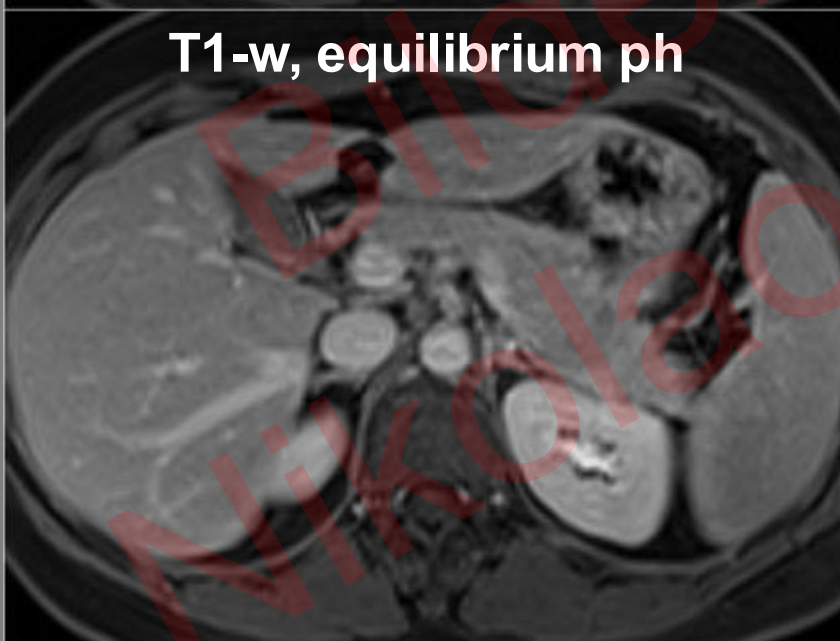
Gadobenate dimeglumine

T1-w, arterial ph

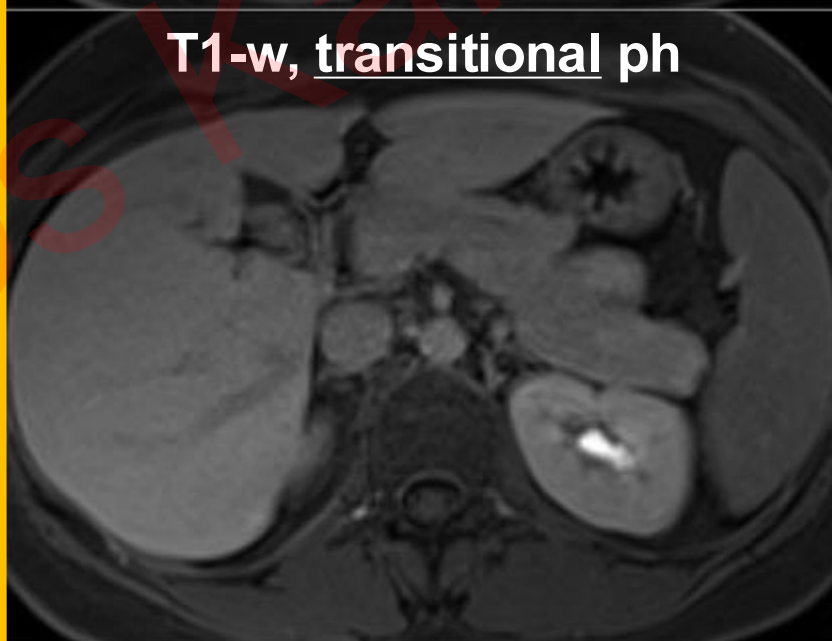


Gadoxetic acid

T1-w, equilibrium ph



T1-w, transitional ph





- Varför?

- A. Vaskularitet
- B. Hepatobiliärfunktion
- C. Vätskeinhåll



• Varför?

- A. Vaskularitet
- B. Hepatobiliärfunktion
- C. Vätskeinhåll
- D. Cellularitet



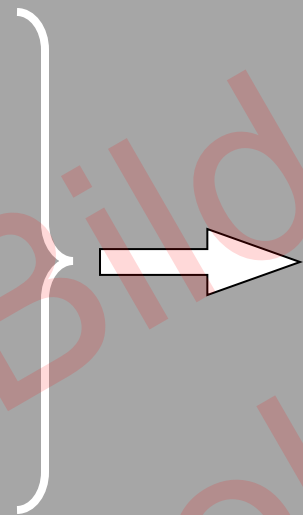
• Varför?

- A. Vaskularitet
- B. Hepatobiliärfunktion
- C. Vätskeinhåll
- D. Cellularitet
- E. Fetinnehåll



• Varför?

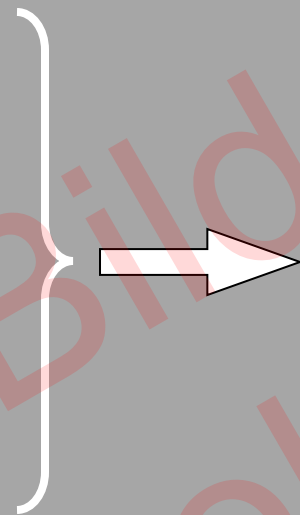
- A. Vaskularitet
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• Varför?

- A. Vaskularitet
- B. Hepatobiliärfunktion
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• Mål

- Detektion
- Karakterisering
- Prognostisering
- Behandlingsplanering/respons

Upplägg



Karolinska
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- Hur gör vi?
- ***Utmaningar***
- Frågor
- Take-home

Utmaningar

- Teknik

Bilder tillhör
Nikolaos Kartalis

2014-12-04, 08:42:23 CT arterial ph

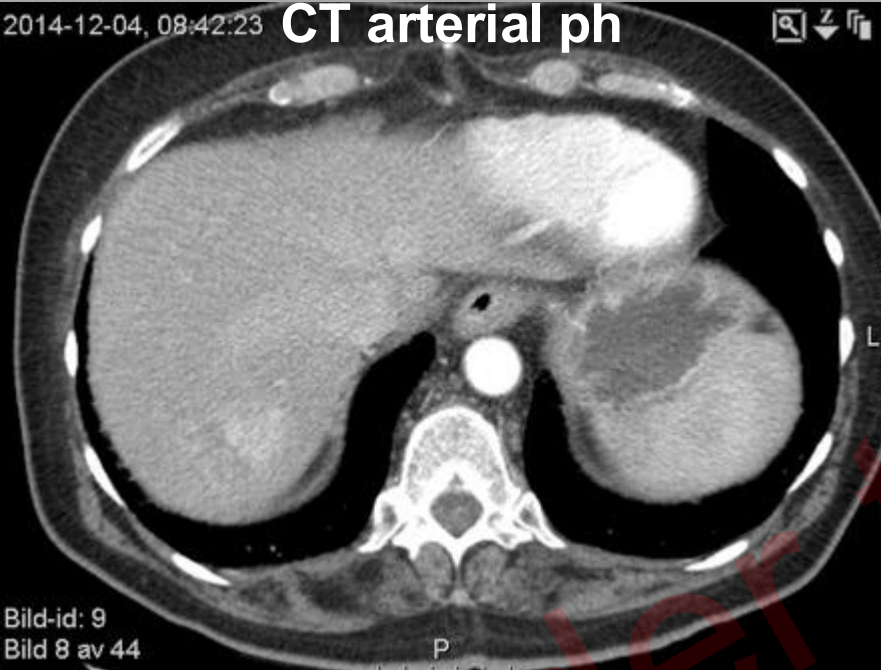


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Bild 8 av 44

2014-12-04, 08:42:17 CT portal venous ph

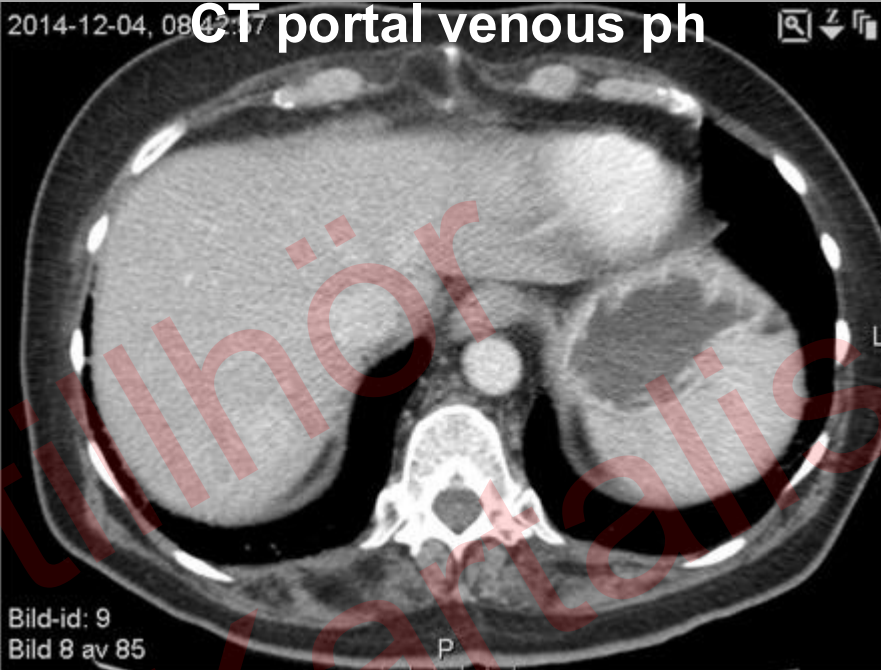


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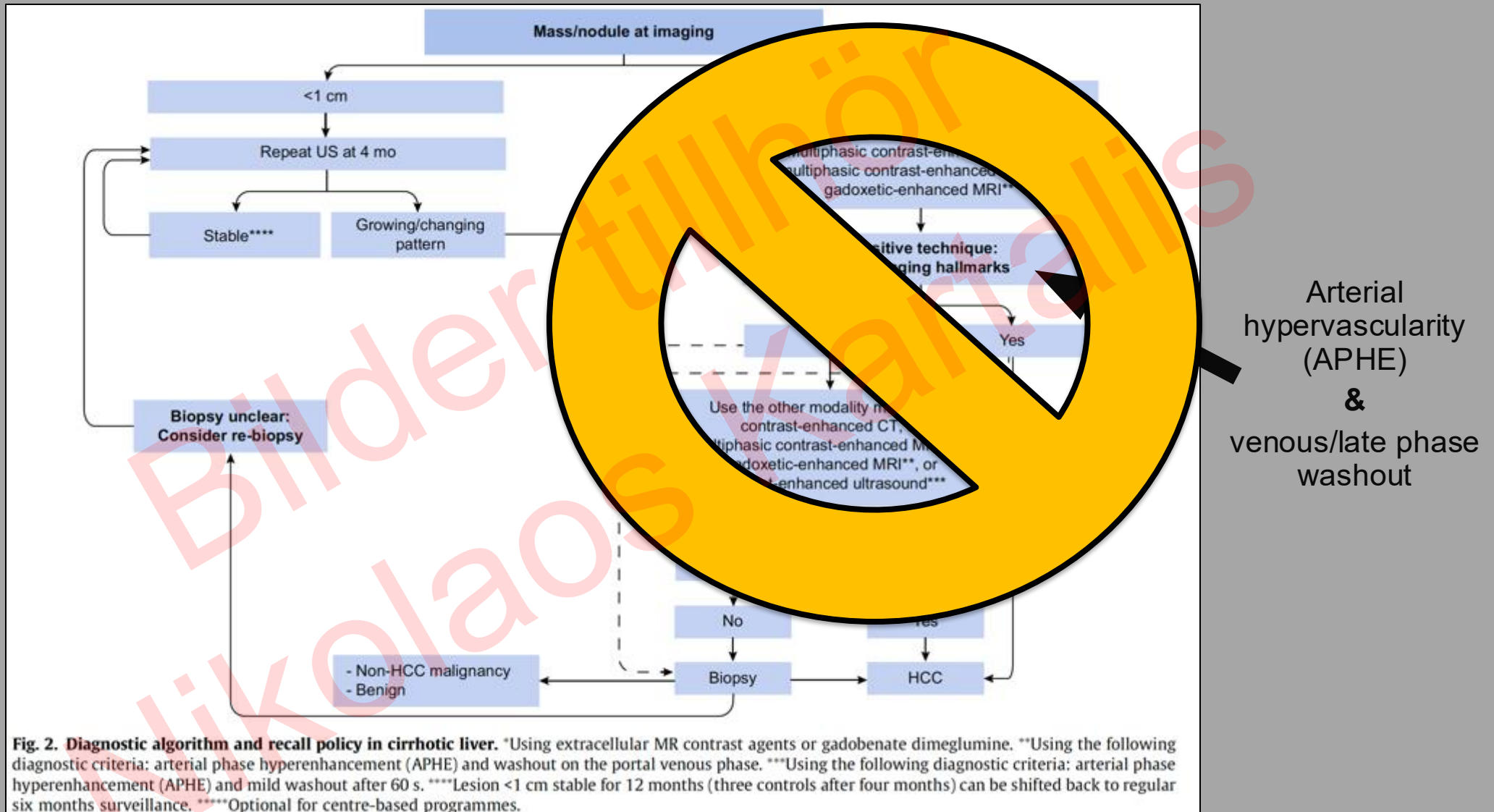
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Bild 34 av 55

2014-12-04, 08:42:57



Bild-id: 30
Bild 30 av 55

EASL diagnostic algorithm and recall policy



EASL-EORTC clinical practice guidelines: management of hepatocellular carcinoma. J Hepatol. 2018

N. Kartalis, Karolinska Univ. Hospital

2015-01-23, 09:28:01 CT arterial ph



Bild-id: 14
Bild 13 av 134

2015-01-23, 09:28:58 CT portal venous ph



10
v 40

2015-01-23, 09:28:01



Bild-id: 58
Bild 58 av 91

2015-01-23, 09:28:58

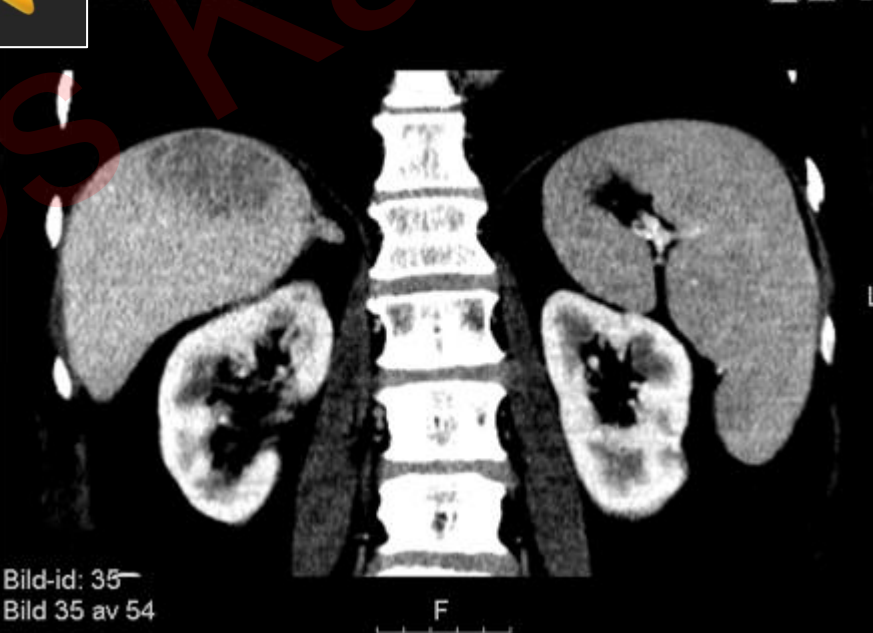
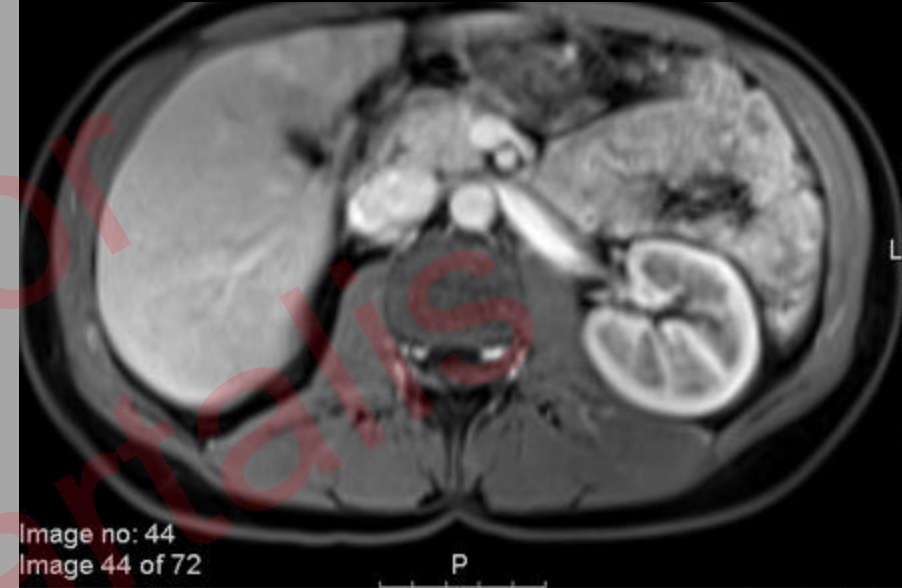


Bild-id: 35
Bild 35 av 54

Fråga

- Ser du några lesioner?
- A. Nej, inga lesioner
- B. En hypervasculär
- C. En hypovasculär
- D. Ingen aning...jag är kirurg!

"arterial ph"



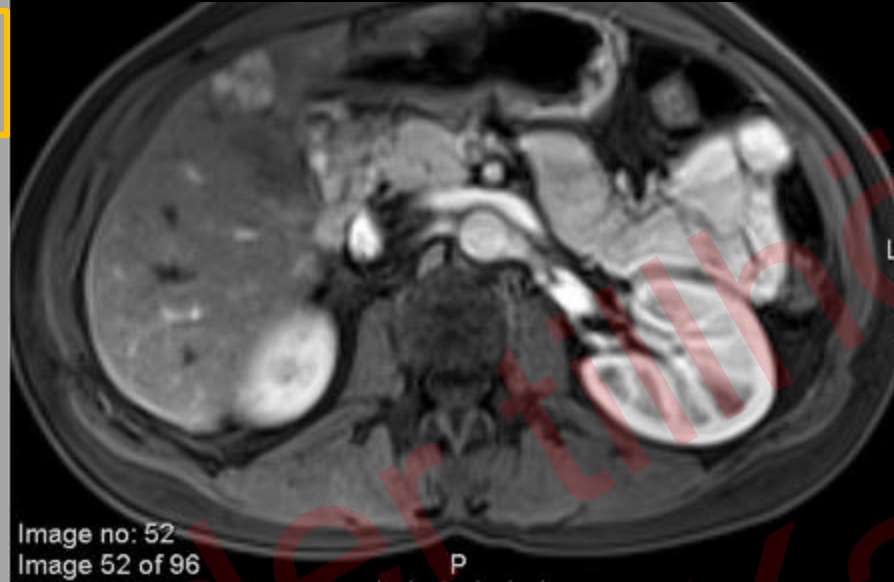
portal venous ph



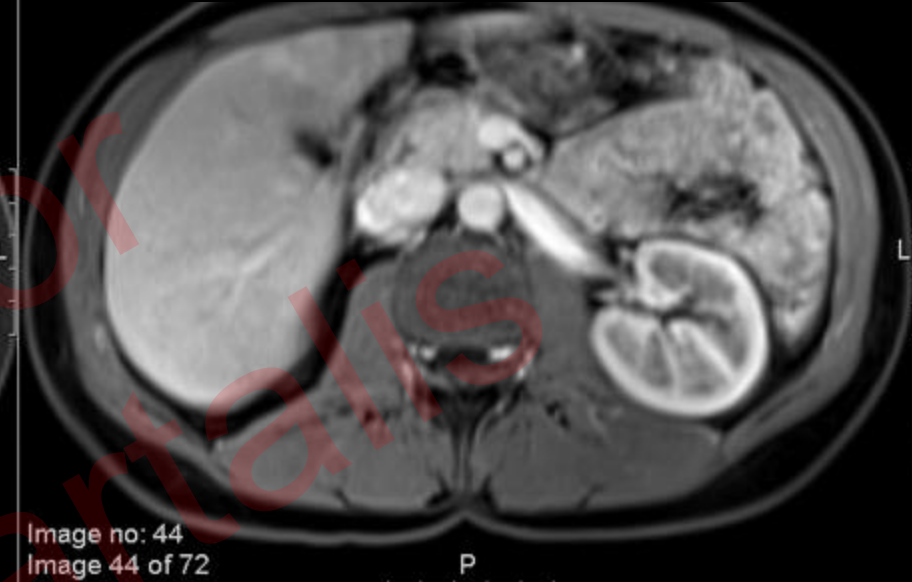
Fråga

- Ser du några lesioner?
- A. Nej, inga lesioner
- B. En hypervasculär
- C. En hypovasculär
- D. Ingen aning...jag är kirurg!

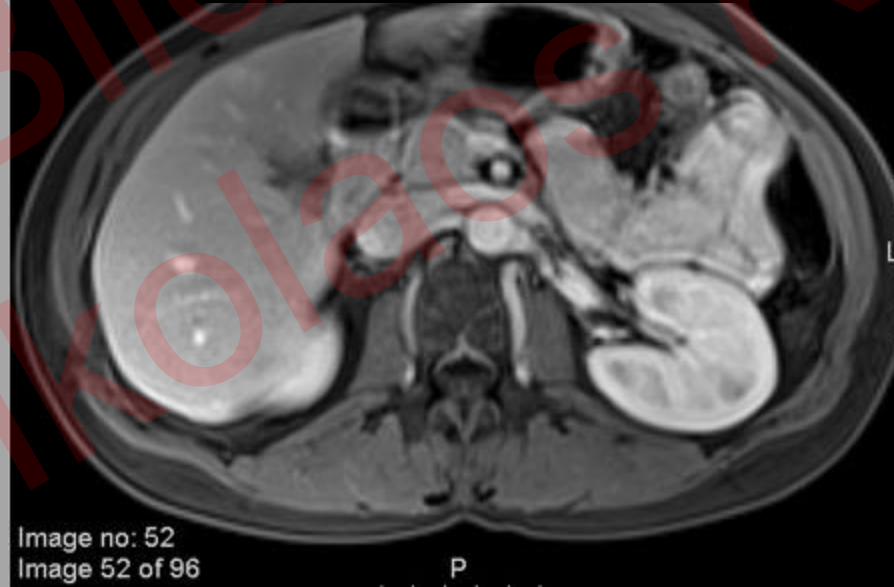
arterial ph



"arterial ph"



portal venous ph



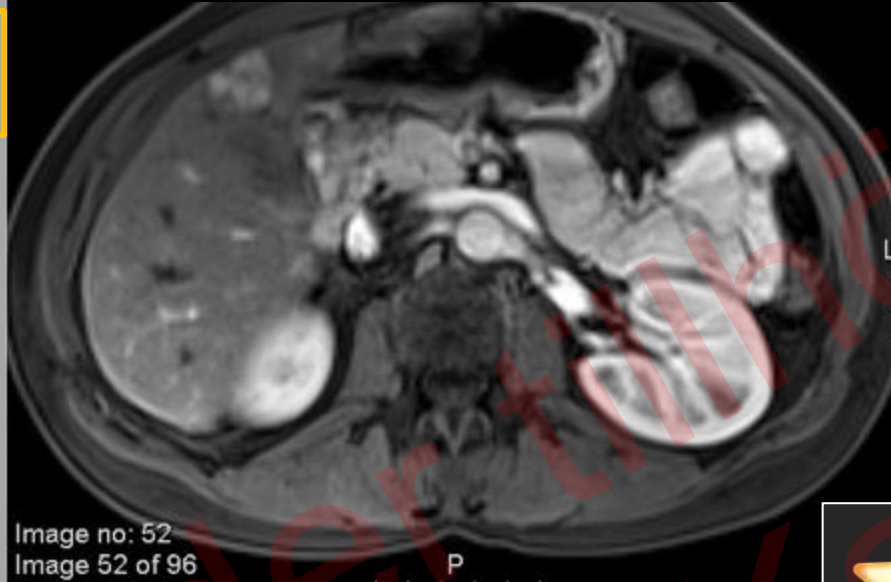
portal venous ph



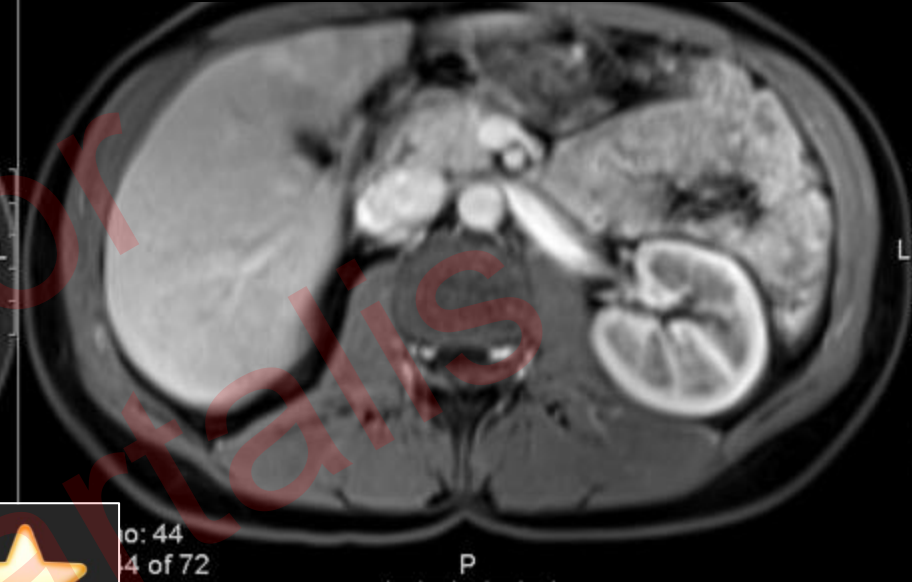
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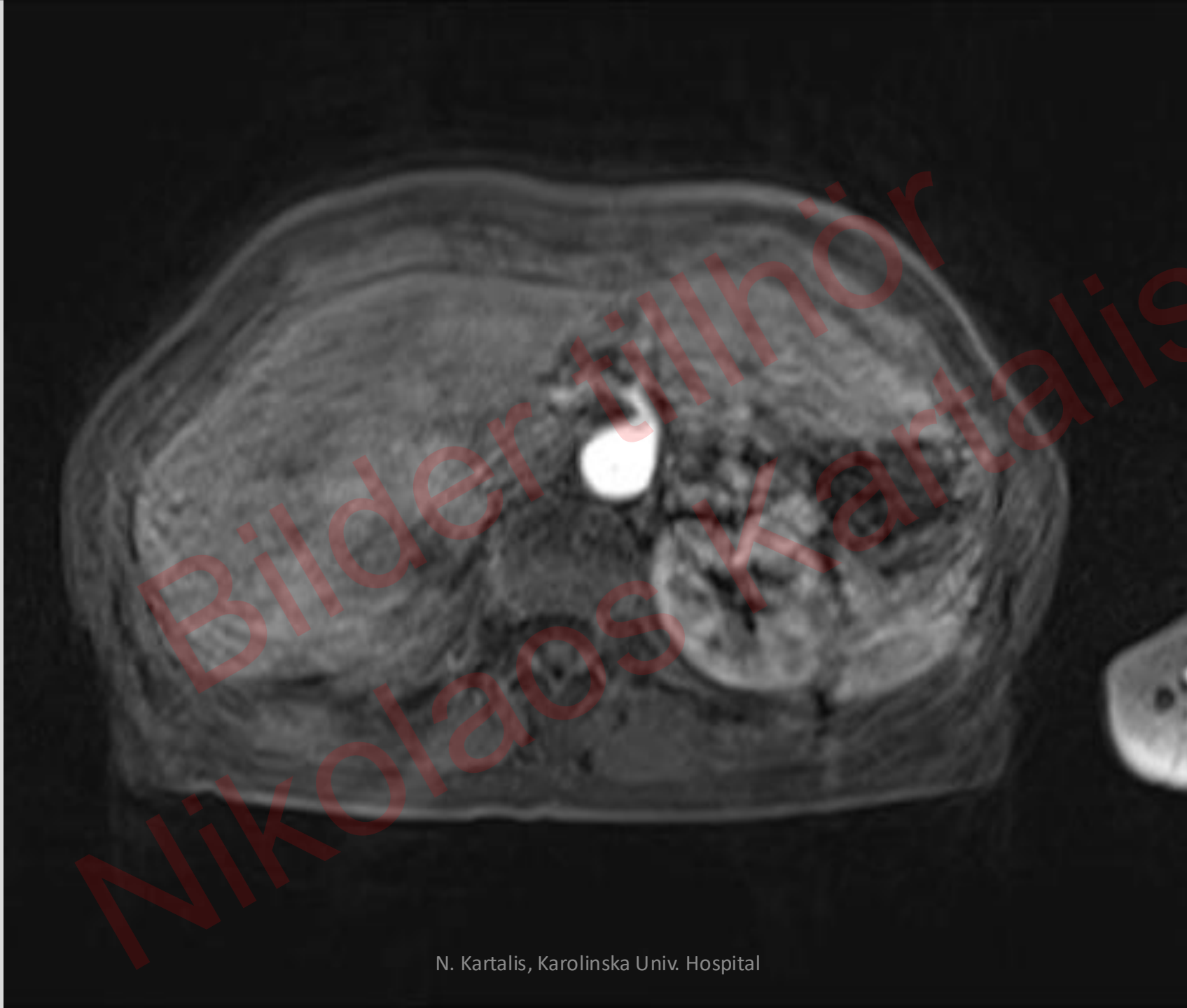


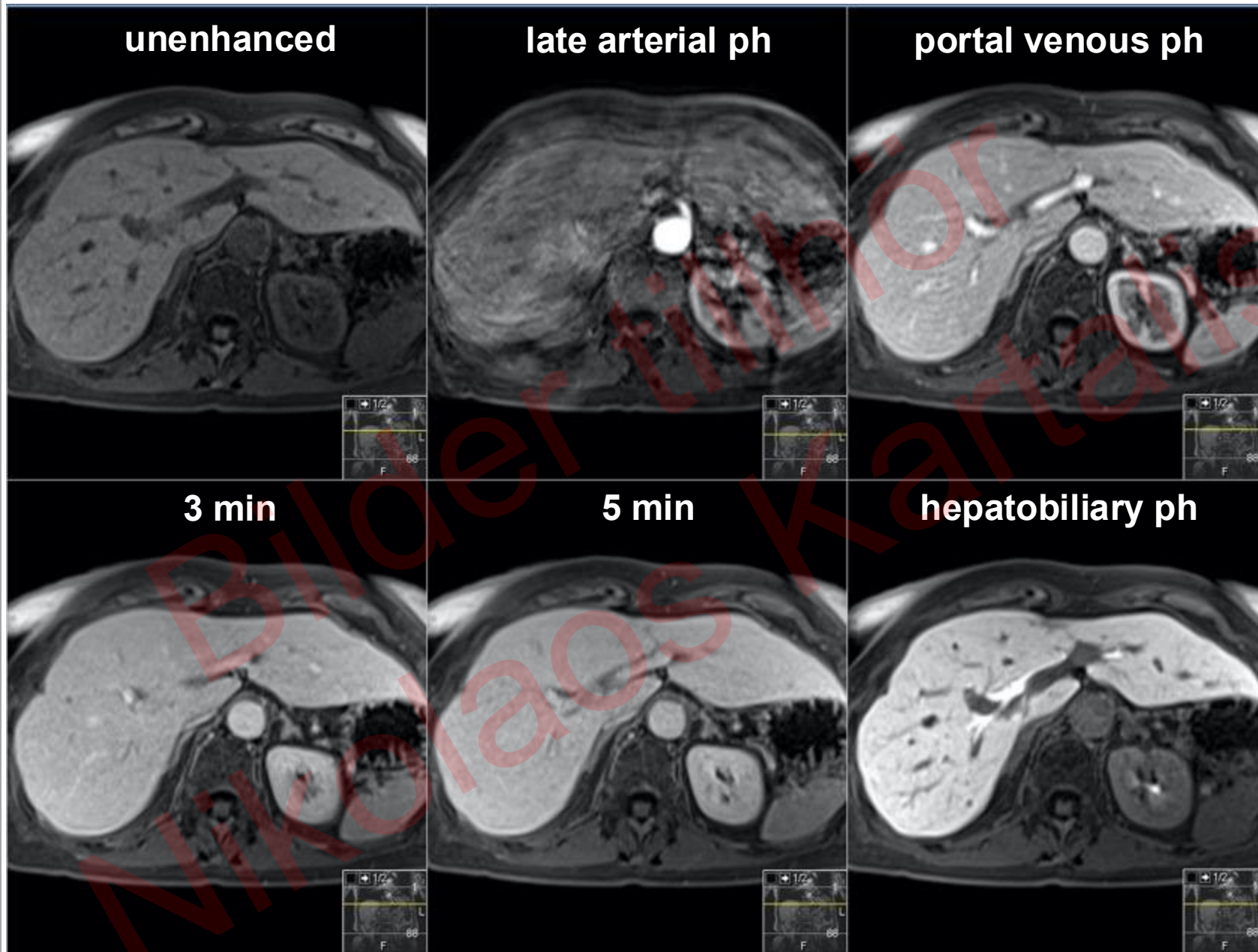
portal venous ph

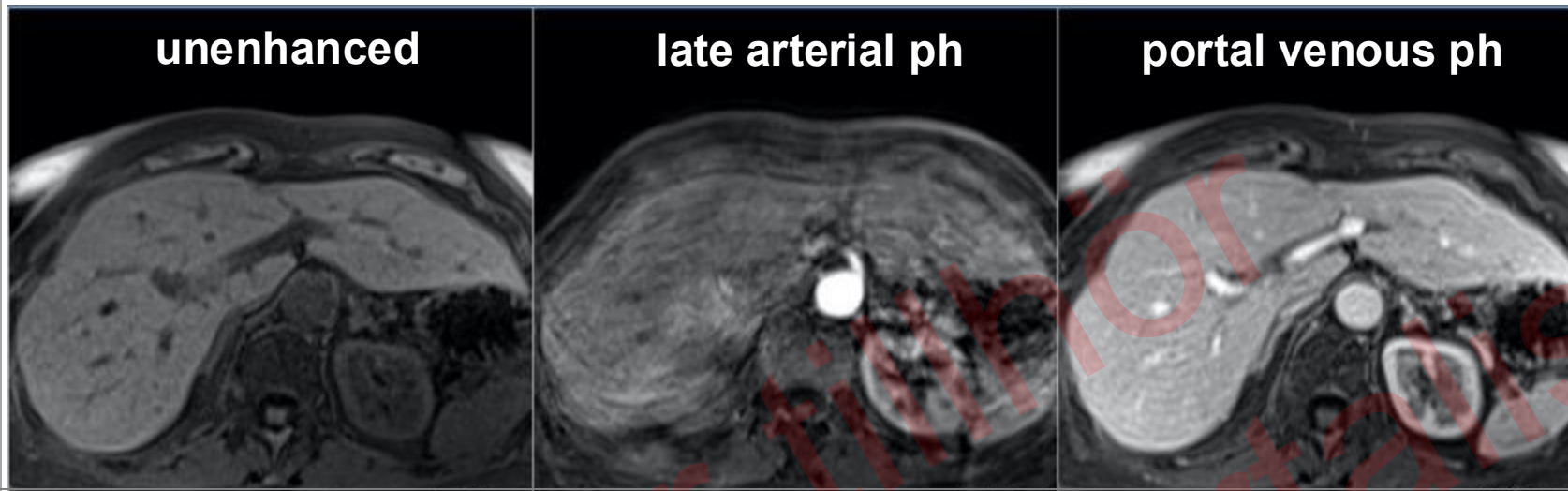


portal venous ph





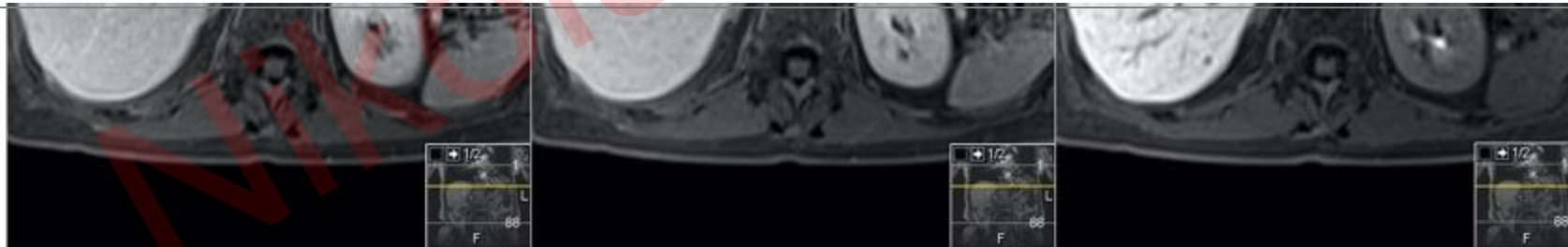


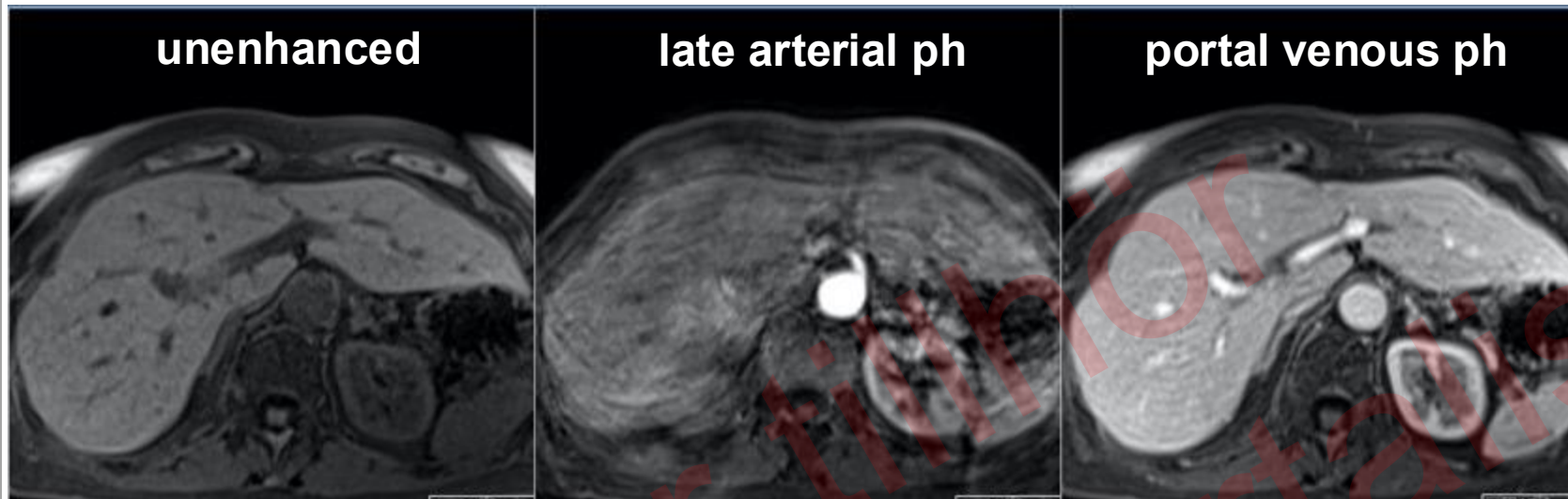


Radiology. 2013 Feb;266(2):452-61. doi: 10.1148/radiol.12120826. Epub 2012 Nov 28.

Comparison of acute transient dyspnea after intravenous administration of gadoxetate disodium and gadobenate dimeglumine: effect on arterial phase image quality.

Davenport MS¹, Viglianti BL, Al-Hawary MM, Caoili EM, Kaza RK, Liu PS, Maturen KE, Chenevert TL, Hussain HK.





European Radiology (2020) 30:281–290
<https://doi.org/10.1007/s00330-019-06358-7>

CONTRAST MEDIA



Gadoxetate disodium-related event during image acquisition: a prospective multi-institutional study for better MR practice

Marie-Luise Kromrey^{1,2} • Masatoshi Hori³ • Satoshi Goshima⁴ • Kazuto Kozaka⁵ • Tomoko Hyodo⁶ • Yuko Nakamura⁷ • Akihiro Nishie⁸ • Tsutomu Tamada⁹ • Tatsuya Shimizu¹ • Akihiko Kanki⁹ • Utaroh Motosugi¹ 





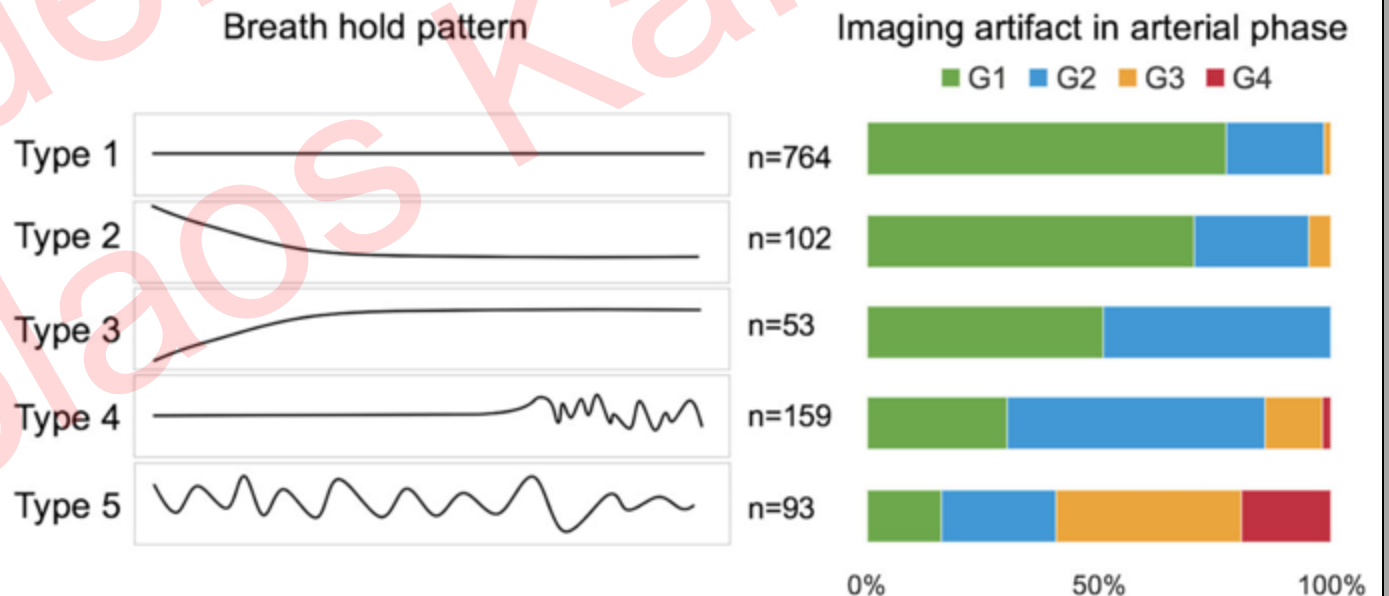
European Radiology (2020) 30:281–290
<https://doi.org/10.1007/s00330-019-06358-7>

CONTRAST MEDIA

Gadoxetate disodium-related a prospective multi-institut

Marie-Luise Kromrey^{1,2} • Masatoshi Hori
Akihiro Nishie⁸ • Tsutomu Tamada⁹ • Ta

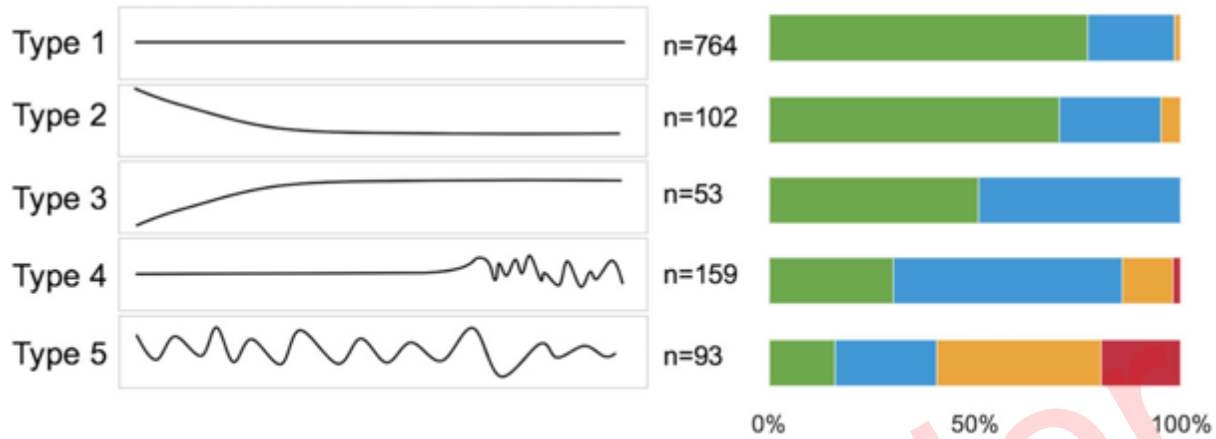
Eur Radiol (2020) 30:281–290



Breath hold pattern

Imaging artifact in arterial phase

■ G1 ■ G2 ■ G3 ■ G4

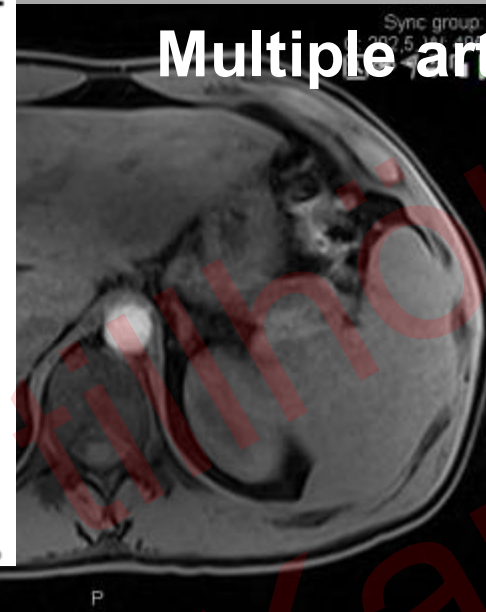
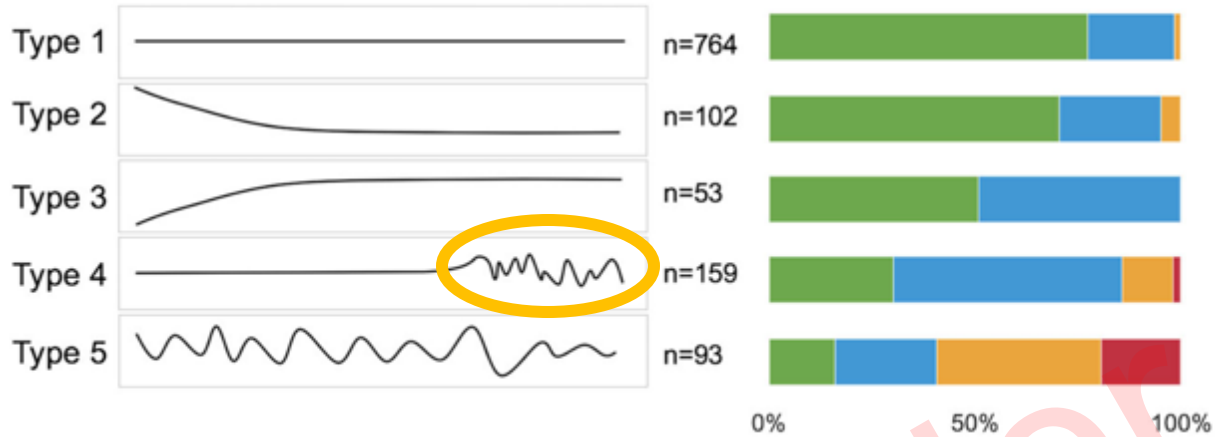


Multiple arterial phases

Breath hold pattern

Imaging artifact in arterial phase

■ G1 ■ G2 ■ G3 ■ G4



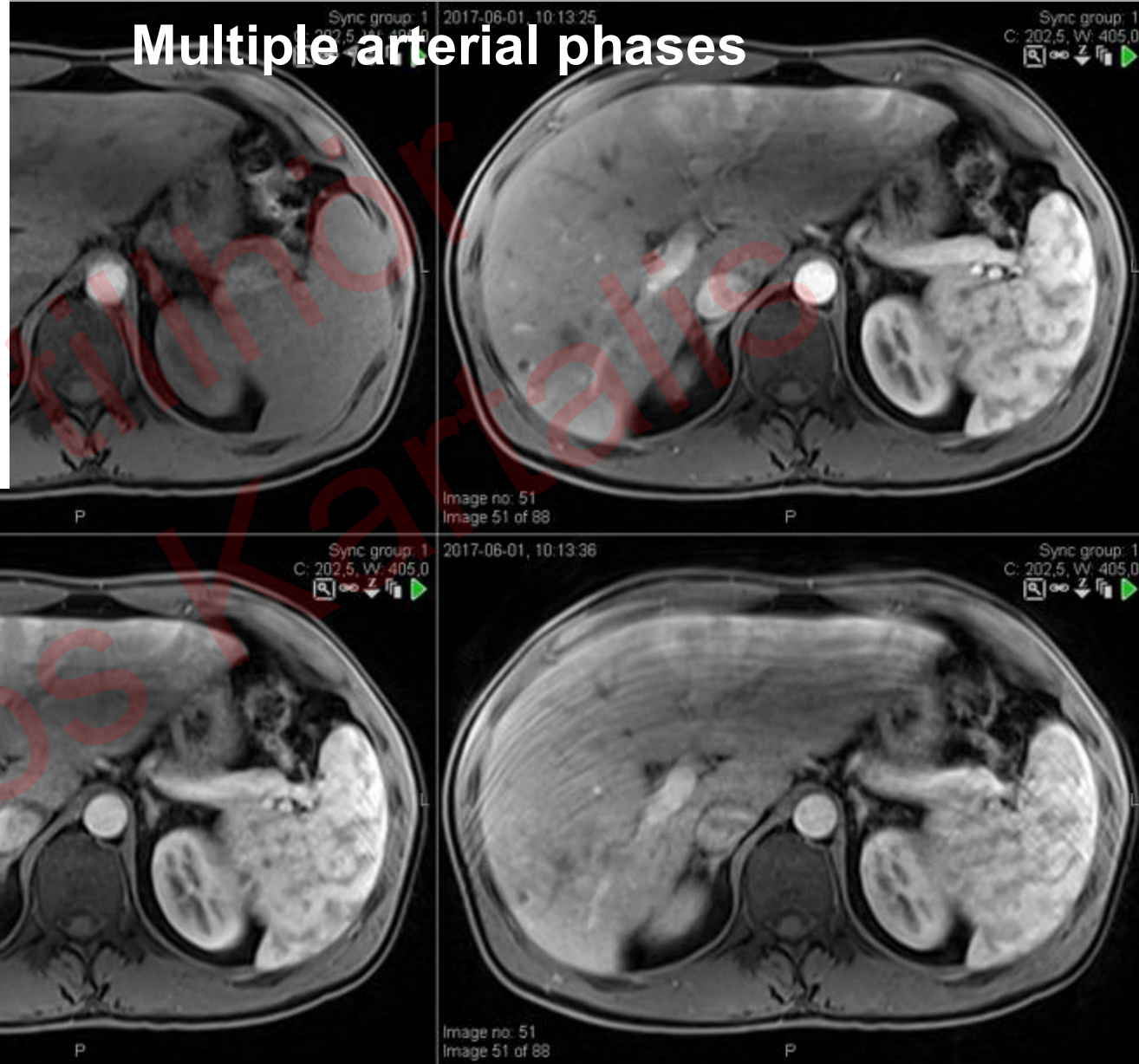
Breath hold pattern

Imaging artifact in arterial phase

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Multiple arterial phases

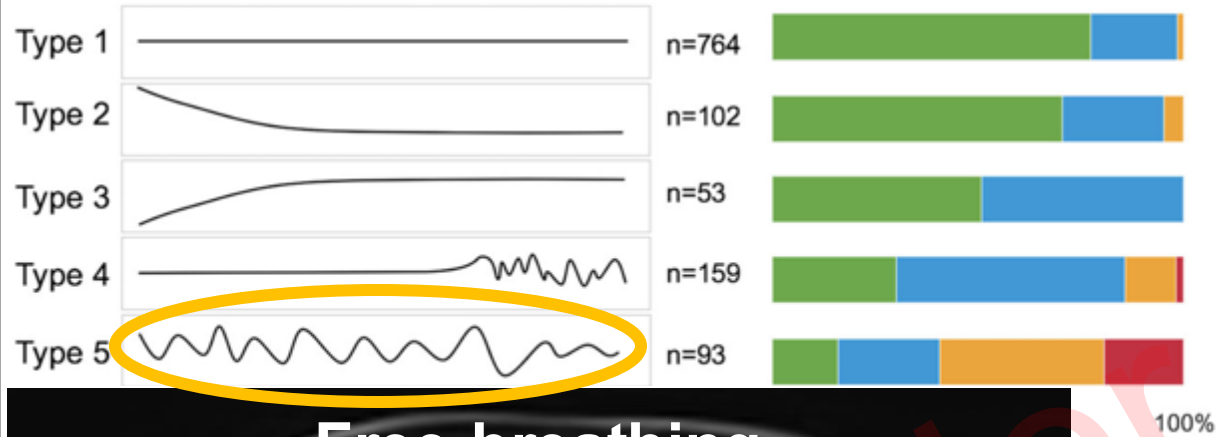


Free-breathing

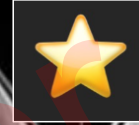
Breath hold pattern

Imaging artifact in arterial phase

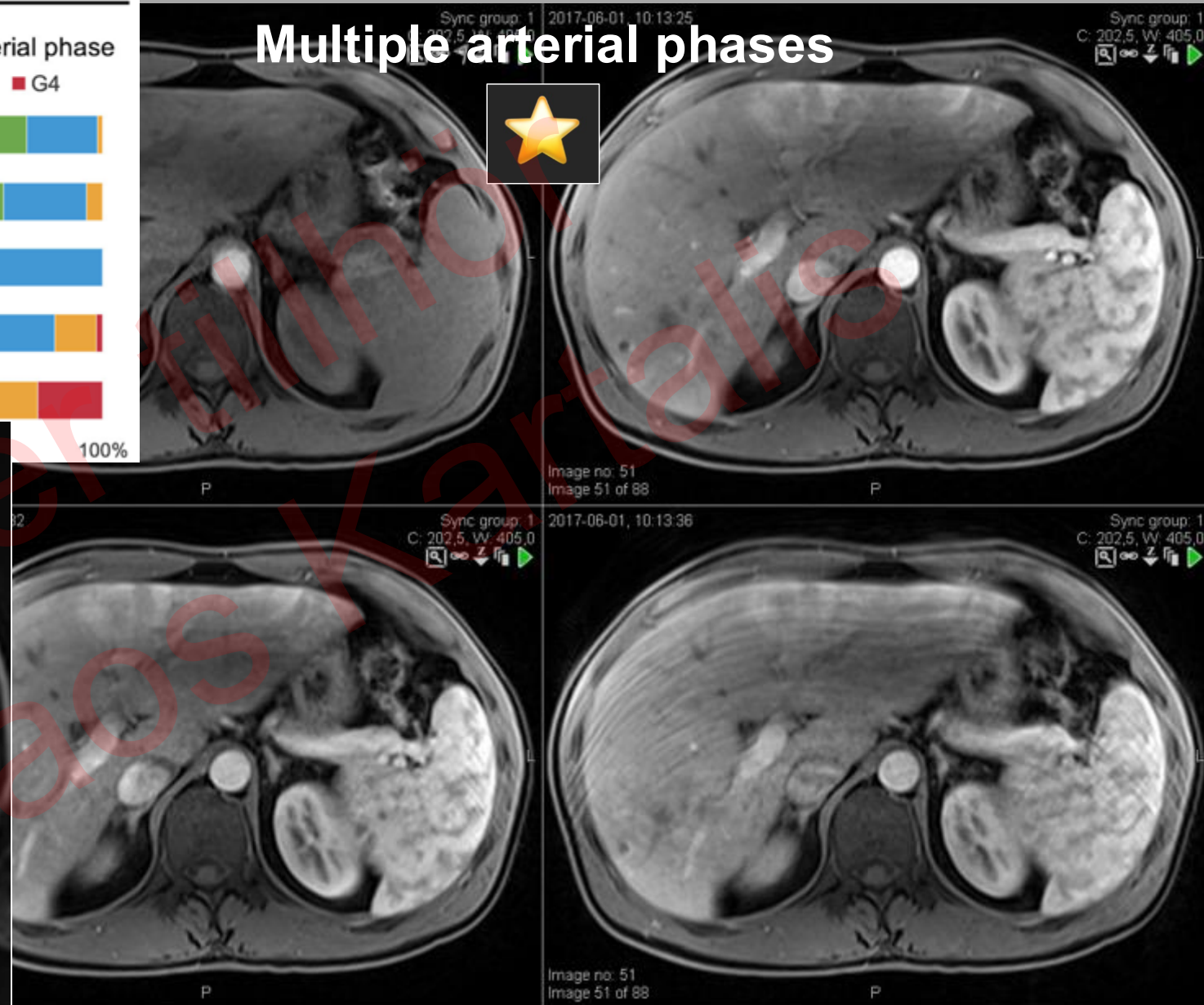
■ G1 ■ G2 ■ G3 ■ G4



Multiple arterial phases



Free-breathing



T1-w, unenhanced

T1-w, arterial ph

Gadoxetic acid

T1-w, portal venous ph

T1-w, 3 min



**Washout
appearance??**

T1-w, unenhanced

T1-w, arterial ph

T1-w, unenhanced

T1-w, arterial ph

Gadoxetic acid

T1-w, portal venous ph

T1-w, 3 min

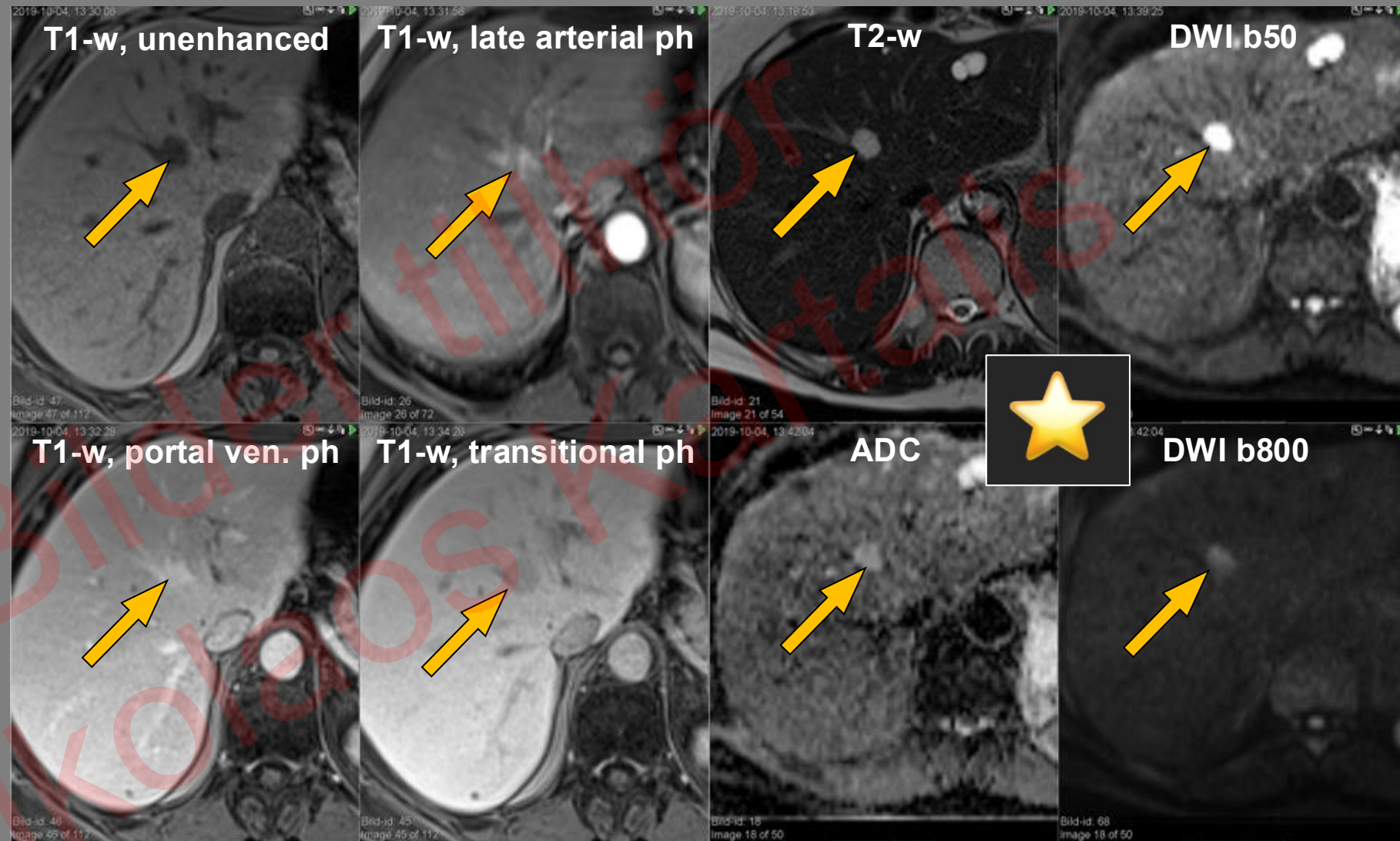
EC KM

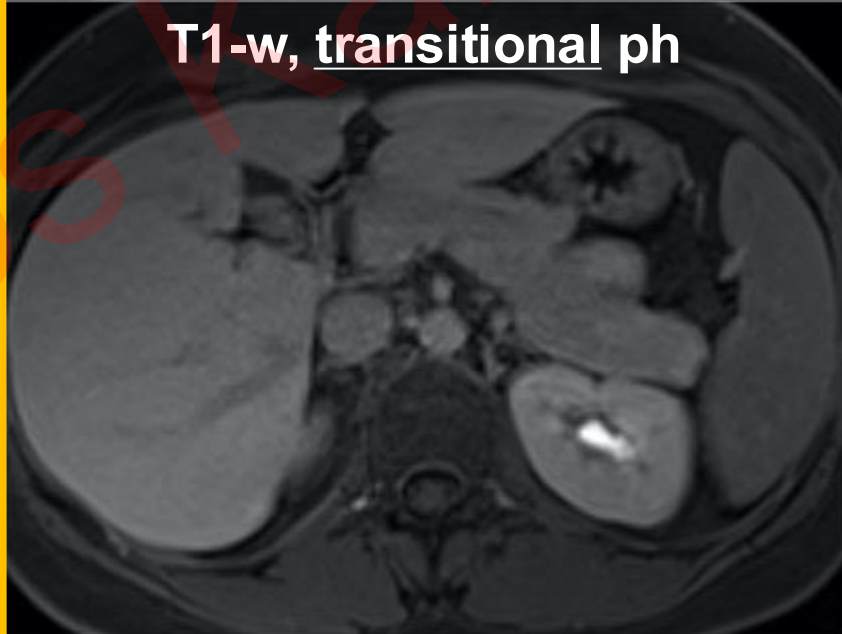
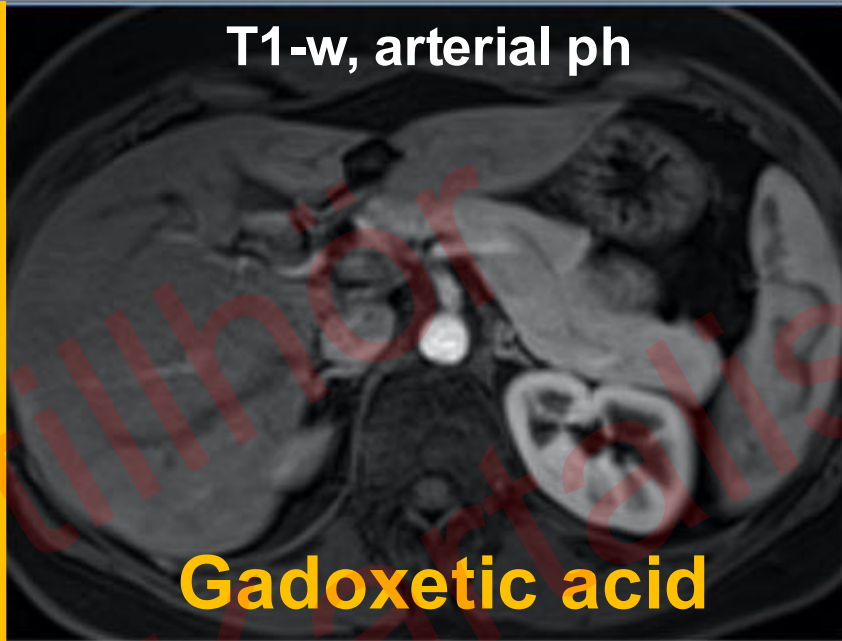
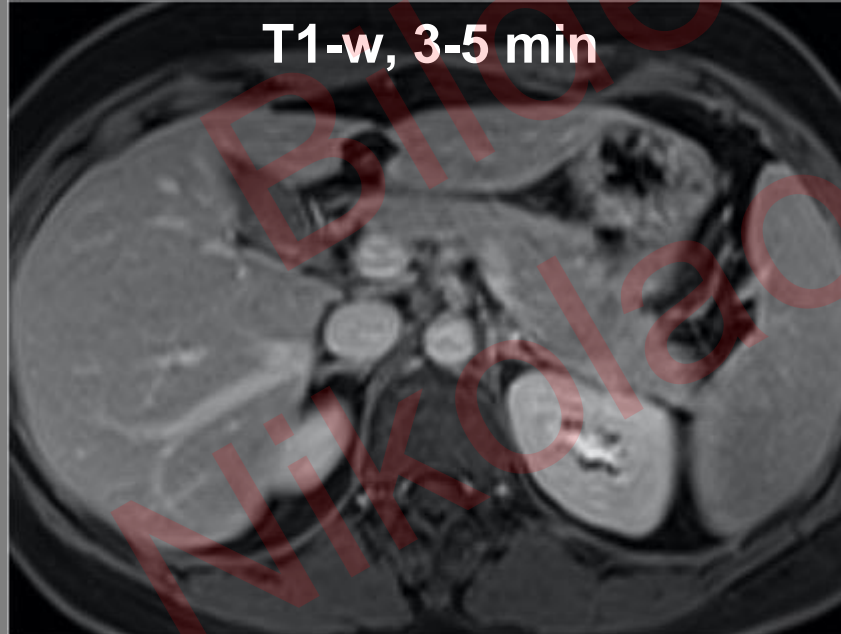
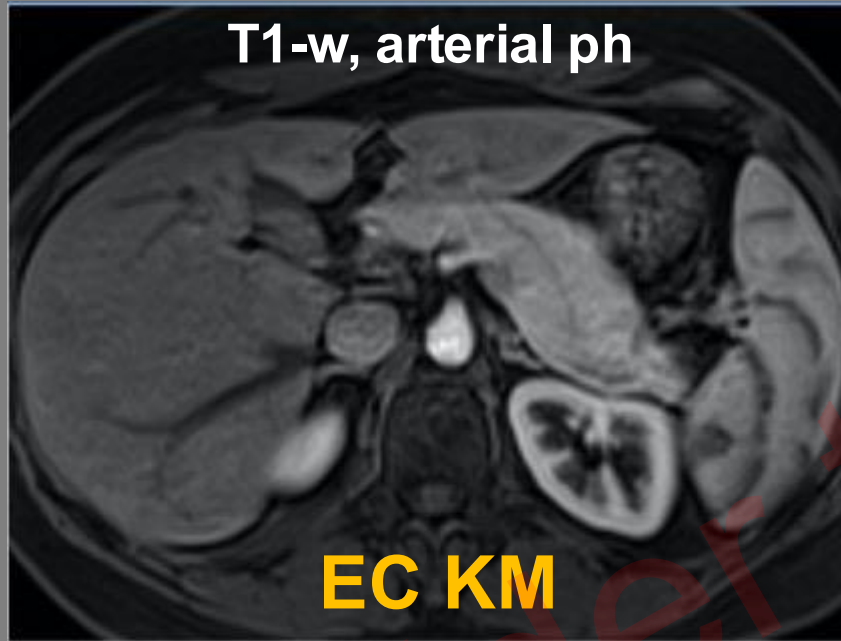
T1-w, portal venous ph

T1-w, 3 min

**Washout
appearance**

- Hemangioma
 - “Flash-filling”:
pseudo-washout



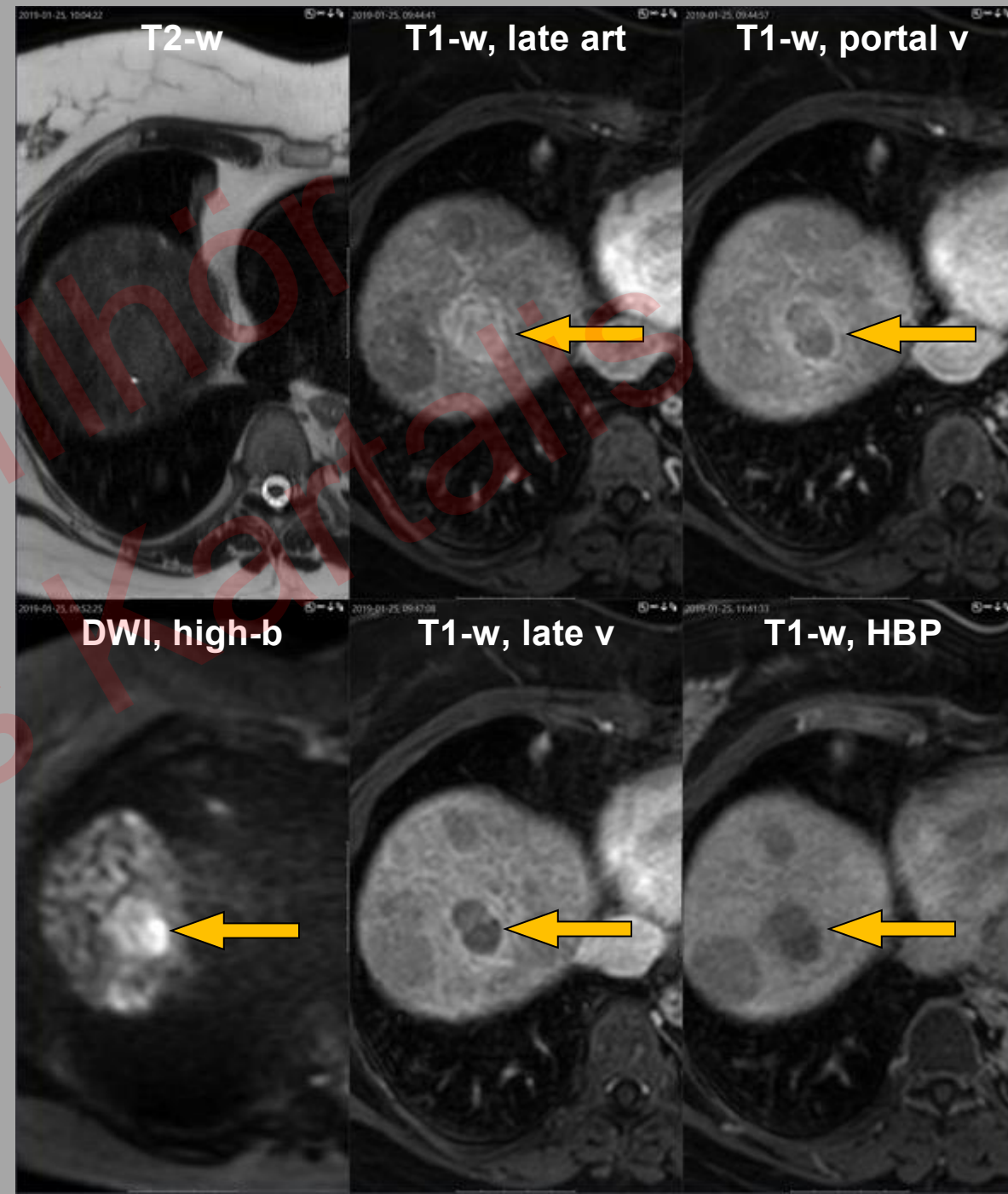


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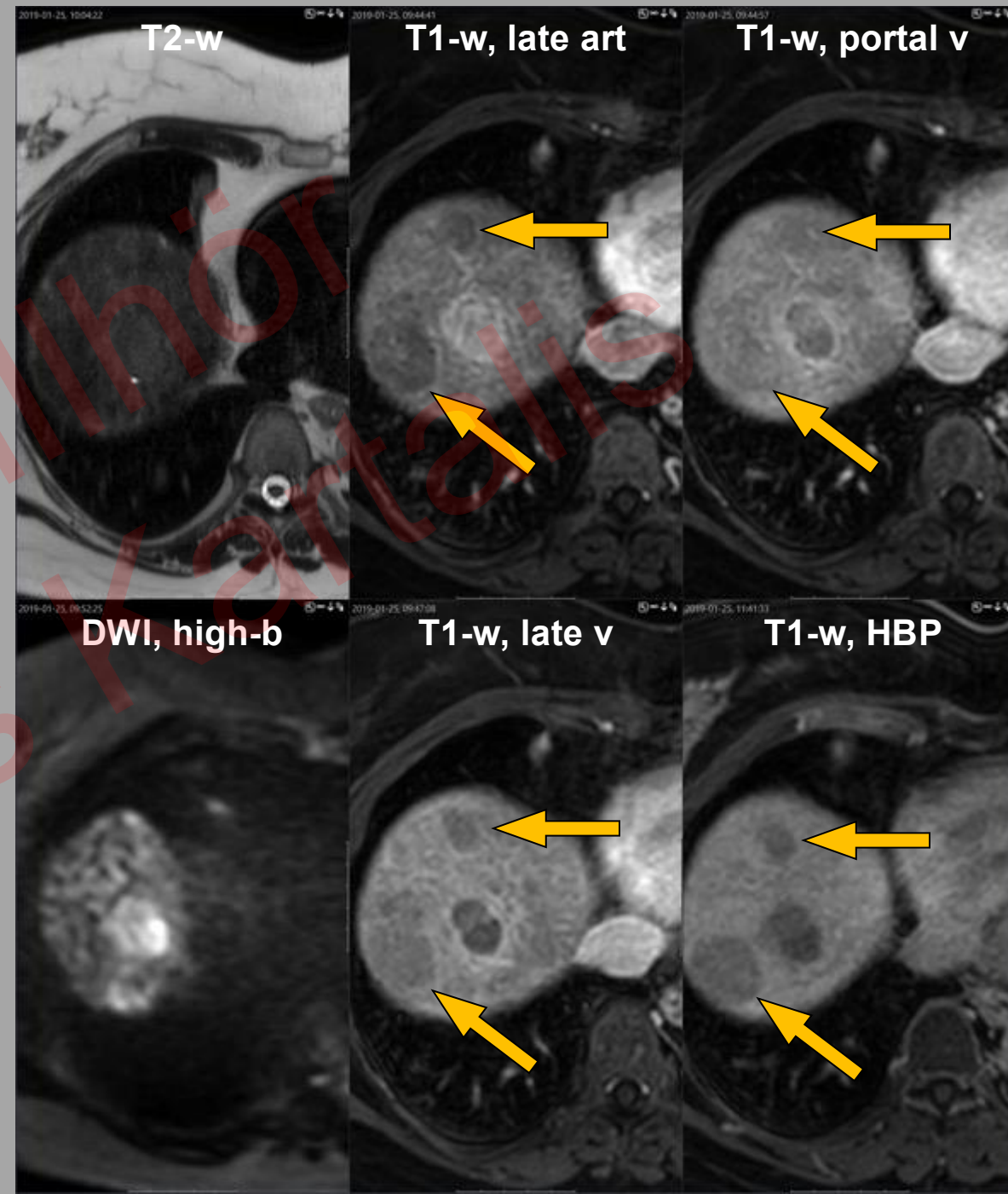
Utmaningar

- Teknik
- Låg sensitivitet för HCC

- 66 y.o.♀, HBV-cirrhosis
- FLL @ surveillance US



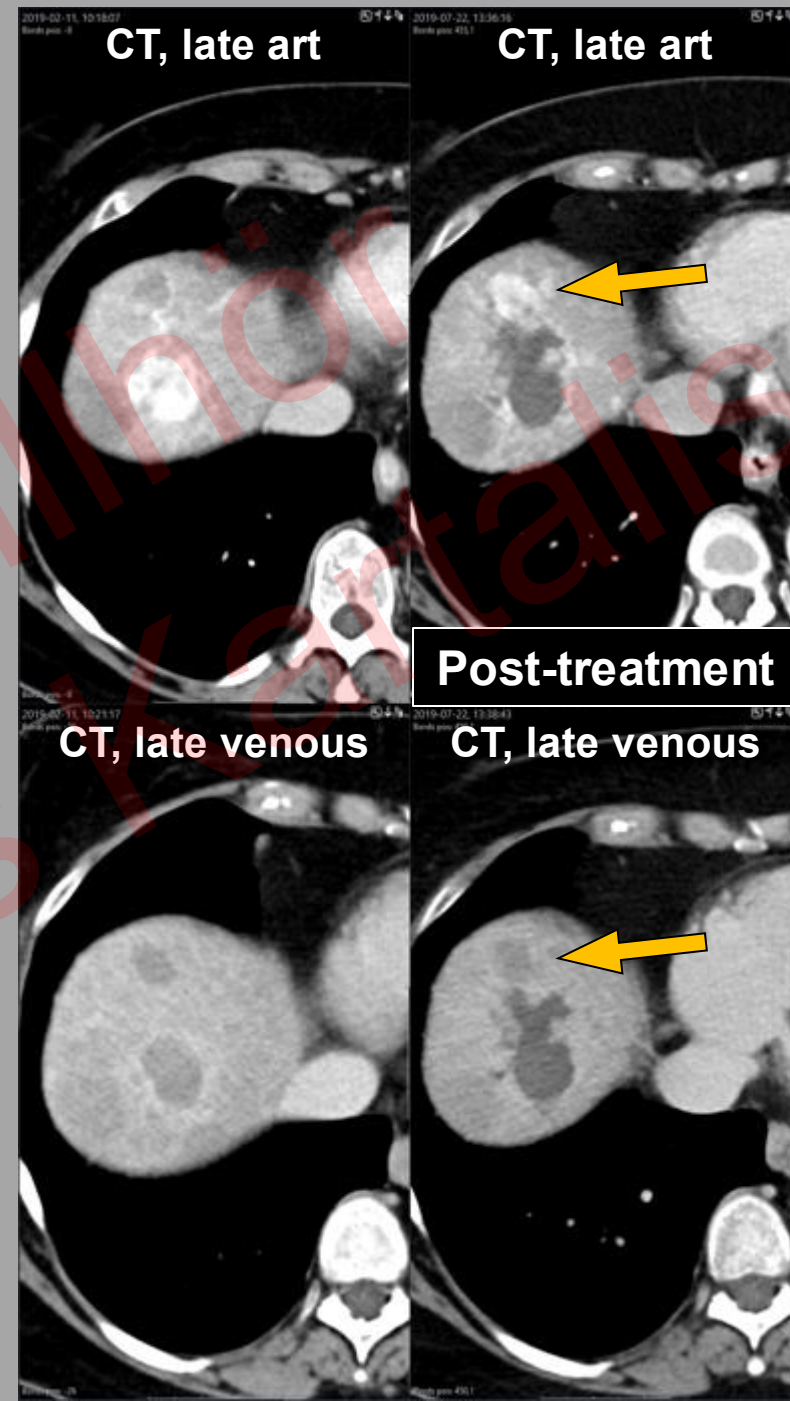
- 66 y.o.♀, HBV-cirrhosis
- FLL @ surveillance US



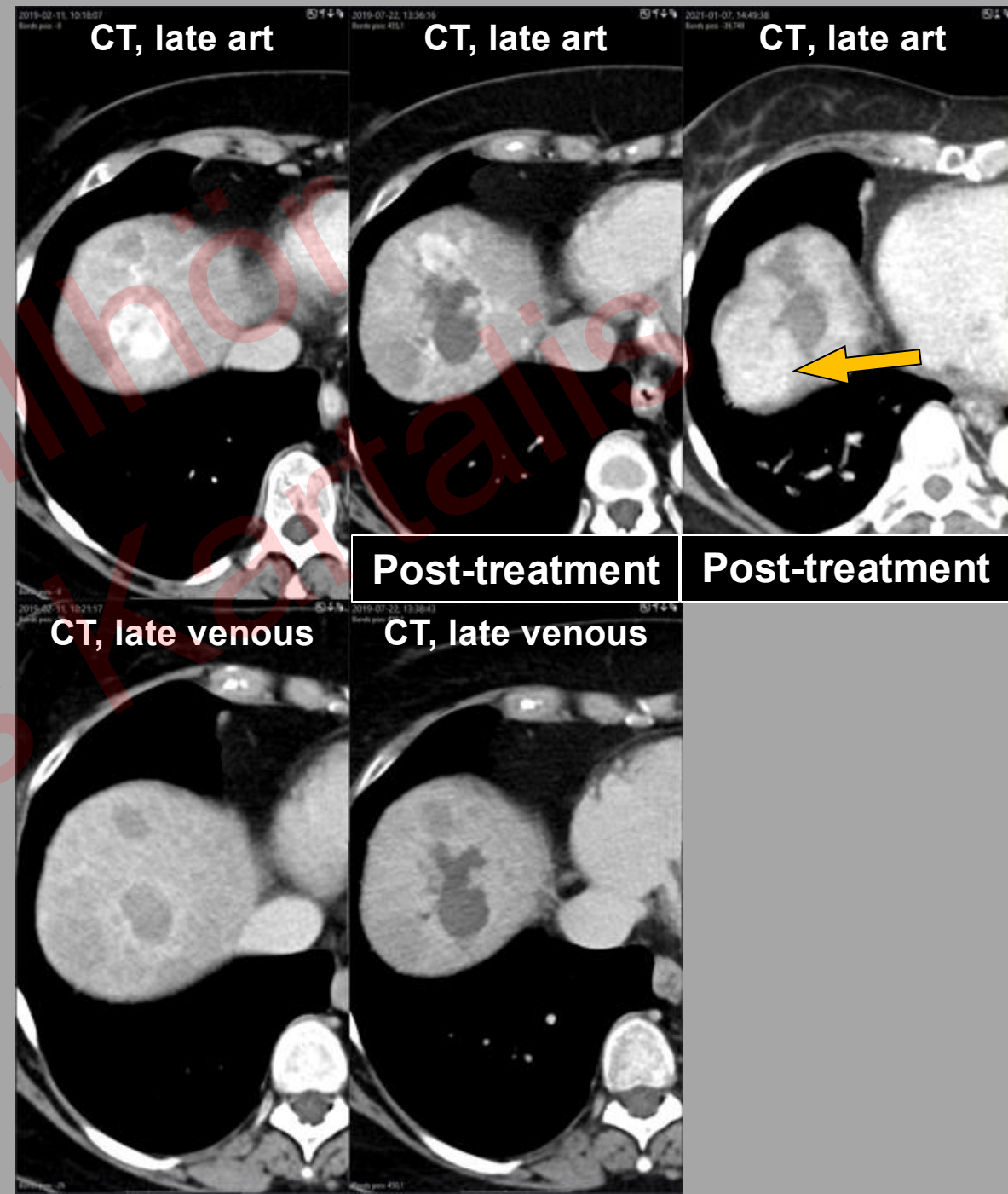
- 66 y.o.♀, HBV-cirrhosis



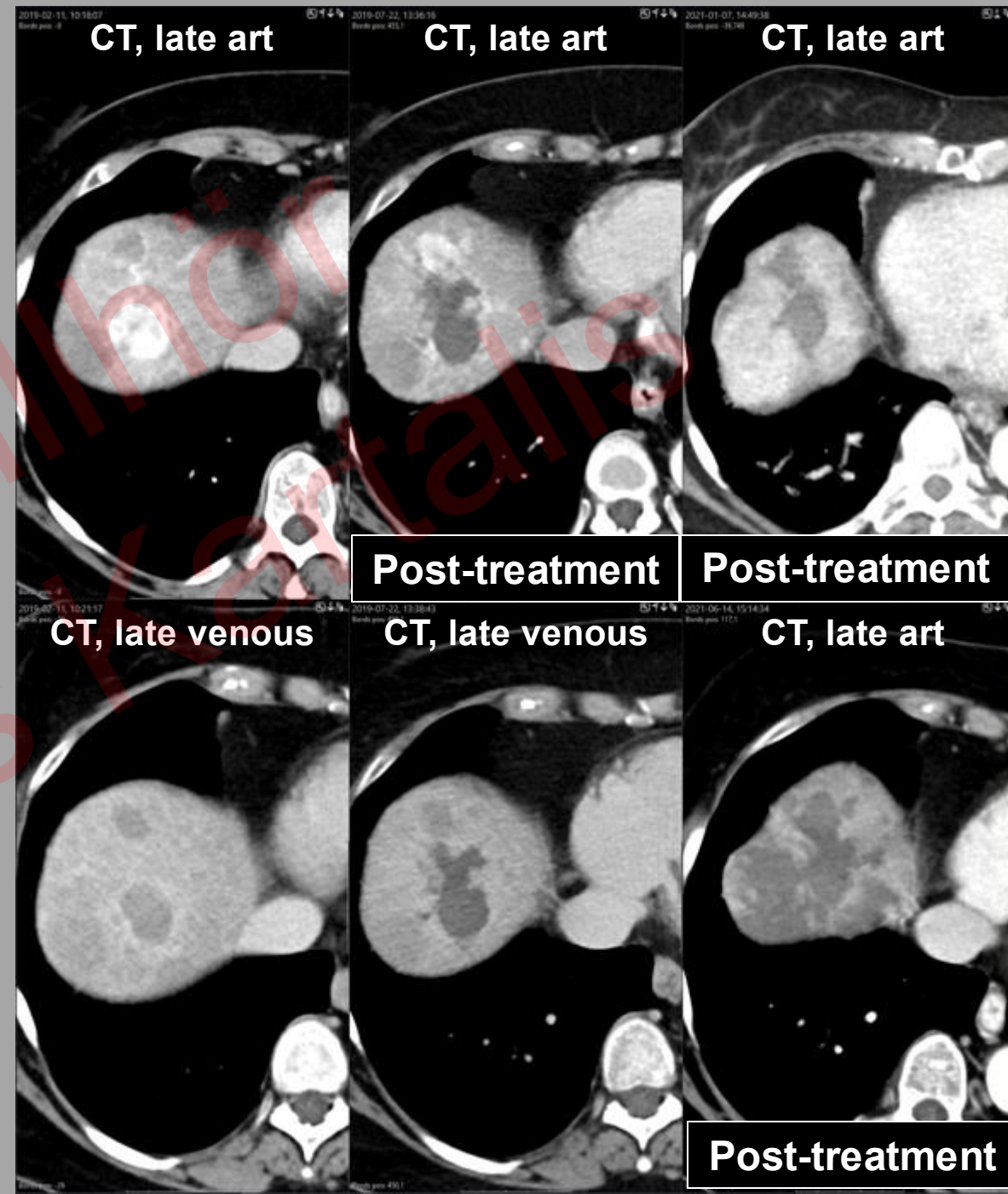
- 66 y.o.♀, HBV-cirrhosis
- TACE for 1:a HCC in dx liver lobe



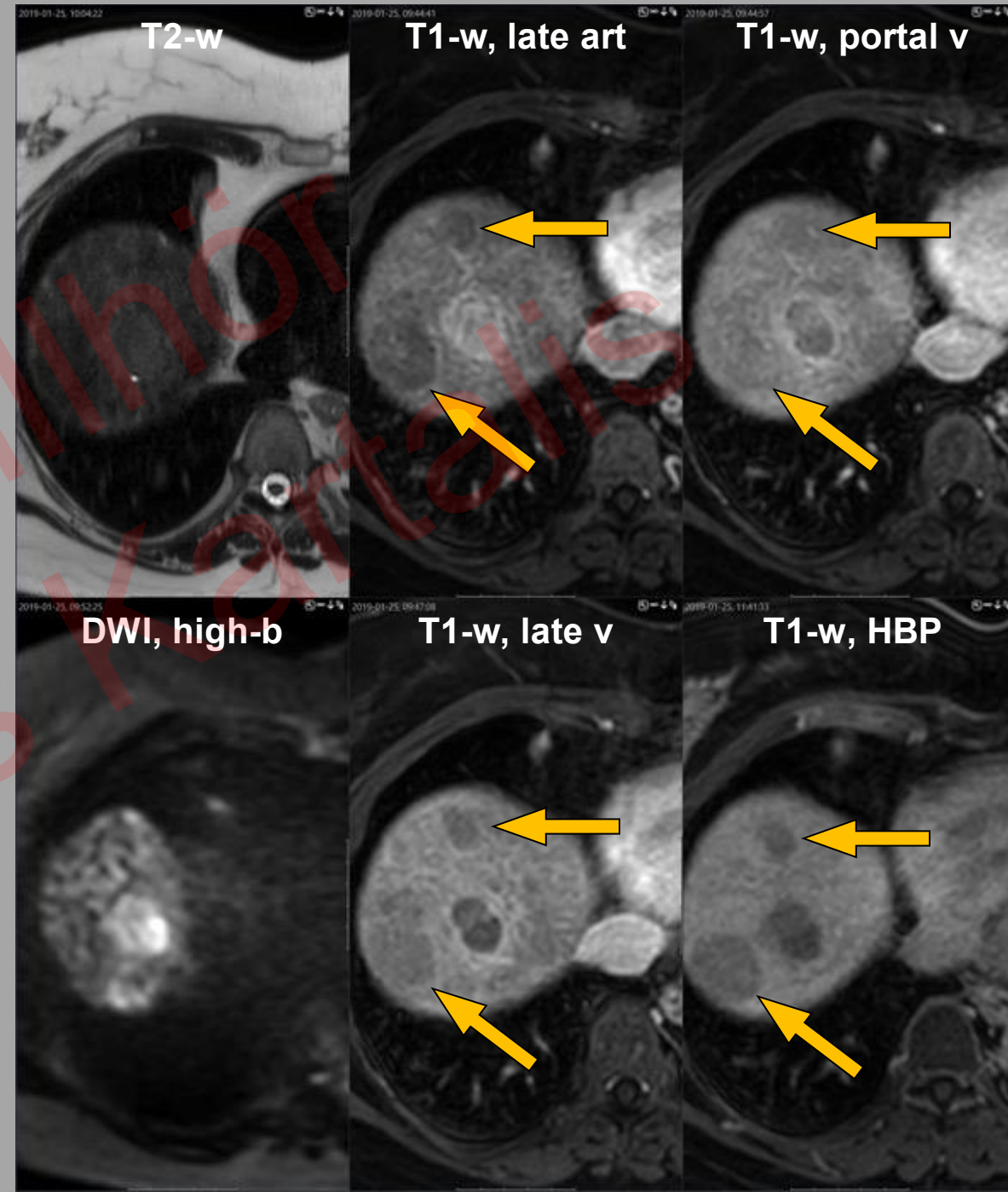
- 66 y.o.♀, HBV-cirrhosis
- TACE for 2:a HCC in dx liver lobe



- 66 y.o.♀, HBV-cirrhosis
- TACE for 3:a HCC in dx liver lobe



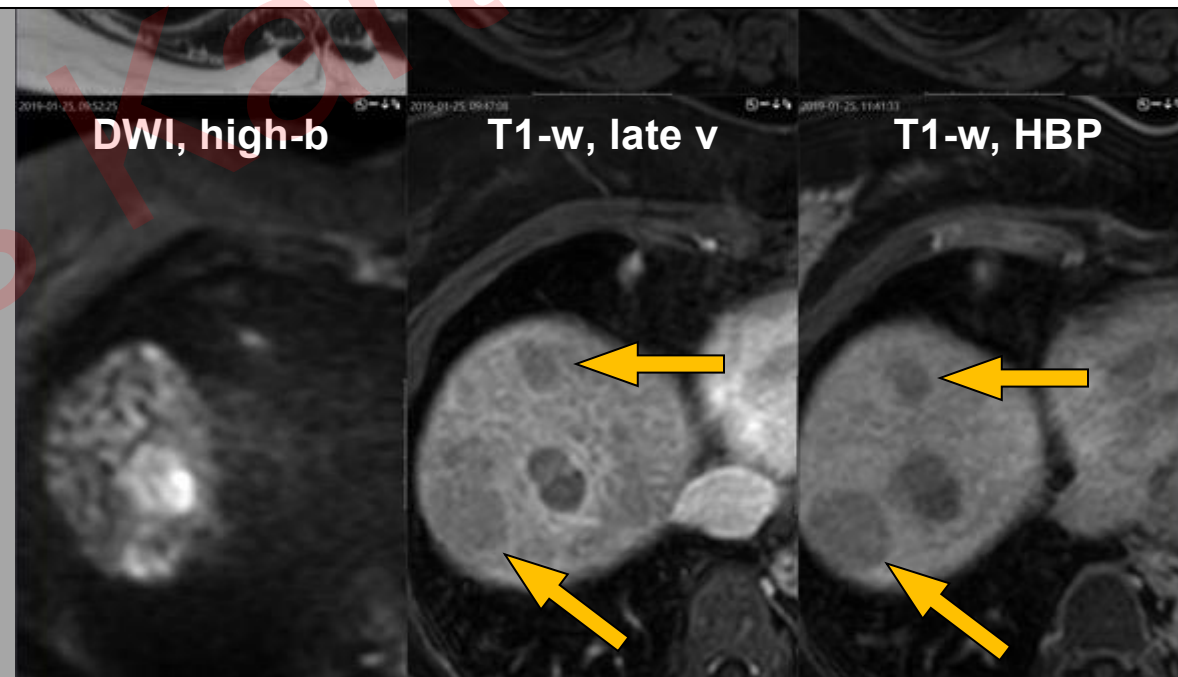
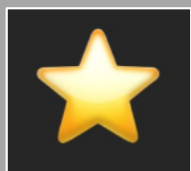
- 66 y.o.♀, HBV-cirrhosis
- FLL @ surveillance US



Radiologic-Pathologic Correlation of Hepatobiliary Phase Hypointense Nodules without Arterial Phase Hyperenhancement at Gadoteric Acid-enhanced MRI: A Multicenter Study

≈65% HCC
≈27% HG-DN
≈8% LG-DN

- 66 y.o. S
- FLL @ S



Utmaningar

- Teknik
- Låg sensitivitet HCC
- Prognostisering

- HCC mikrovaskulär invasion → recidiv

- HCC mikrovaskulär invasion → recidiv
- Transplantation

European Radiology

<https://doi.org/10.1007/s00330-019-06424-0>

GASTROINTESTINAL

Gadoxetic acid-enhanced MRI as a predictor of recurrence of HCC after liver transplantation

Sunyoung Lee^{1,2} • Kyoung Won Kim²  • Woo Kyoung Jeong³ • Myeong-Jin Kim¹ • Gi Hong Choi⁴ • Jin Sub Choi⁴ • Gi-Won Song⁵ • Sung-Gyu Lee⁵



- HCC mikrovaskulär invasion → recidiv
- Transplantation
- Resektion

European Radiology

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GASTROINTESTINAL

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Research Article

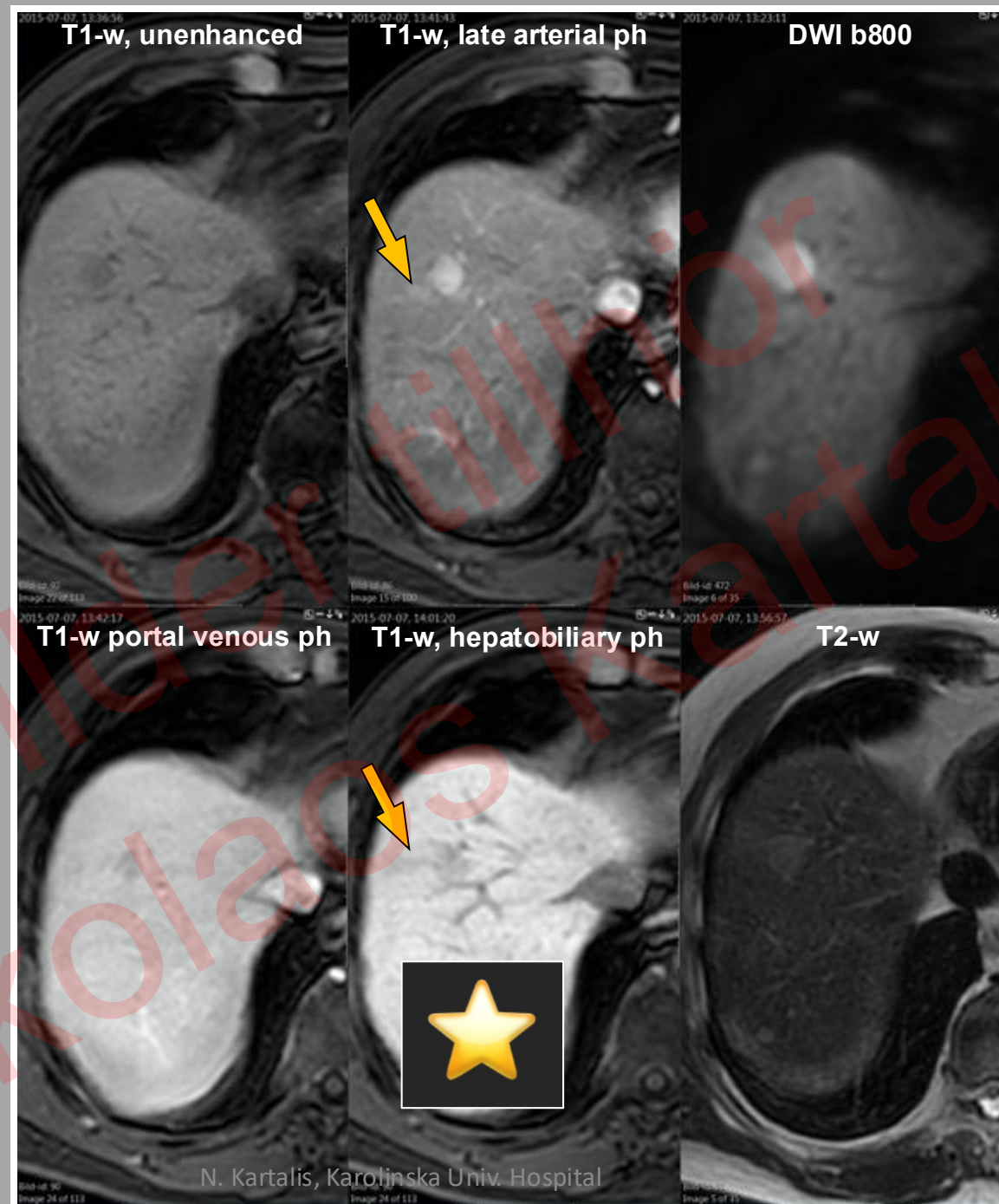


 **EASL** | JOURNAL OF HEPATOLOGY

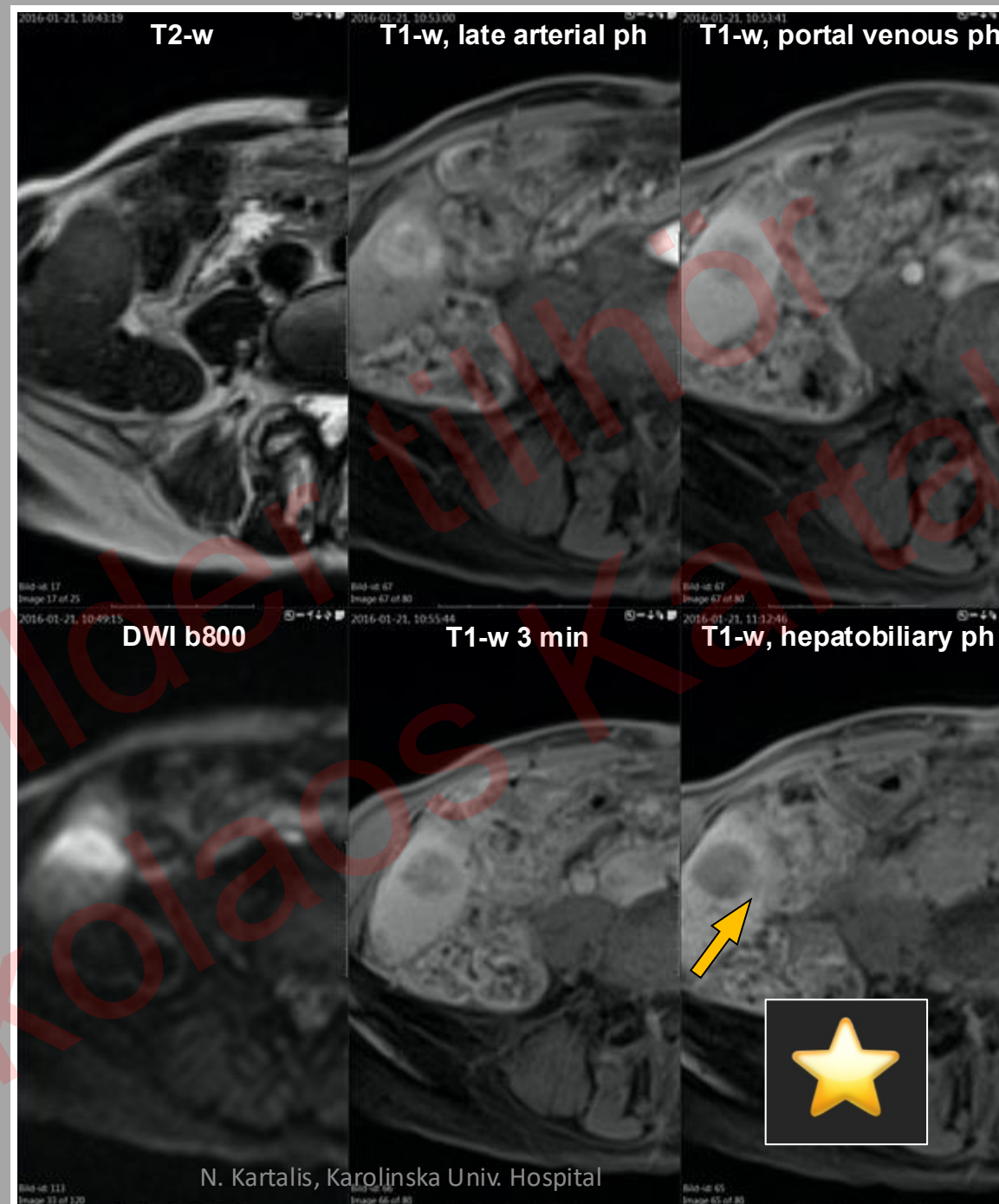
Preoperative gadoxetic acid-enhanced MRI for predicting microvascular invasion in patients with single hepatocellular carcinoma

Sunyoung Lee¹, Seong Hyun Kim^{1,*}, Ji Eun Lee¹, Dong Hyun Sinn², Cheol Keun Park³

- HCC mikrovaskulär invasion → recidiv
 - Transplantation
 - Resektion



- HCC mikrovaskulär invasion → recidiv
- Transplantation
- Resektion



Upplägg



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- Hur gör vi?
- Utmaningar
- **Frågor**
- Take-home

Upplägg



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- Hur gör vi?
- Utmaningar
- Frågor
- ***Take-home***

Take-home



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- Riktlinjer
- Teknik
- Levespificika kontrastmedel
 - Sensitivitet
 - Prognostisering

Stort tack!

nikolaos.kartalis@ki.se



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