

Imaging and Hepatology

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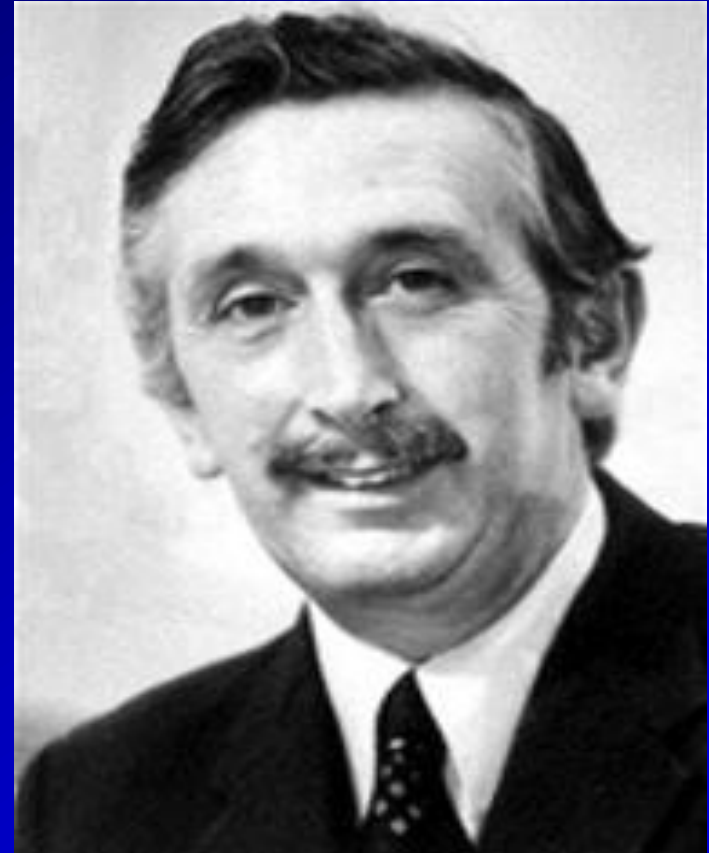
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The Invention of Computed Tomography



Allan M. Cormack



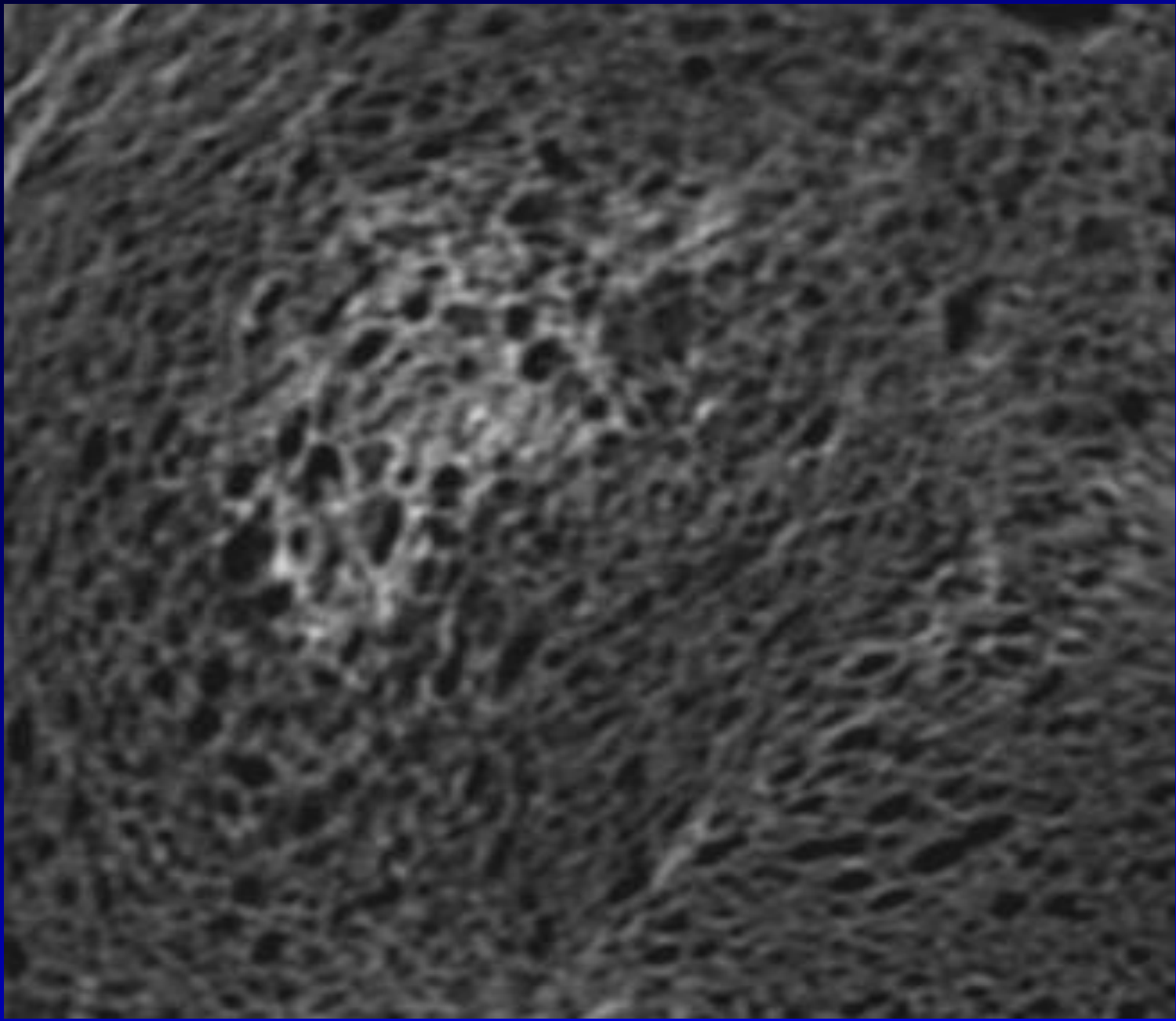
Godfrey N. Hounsfield

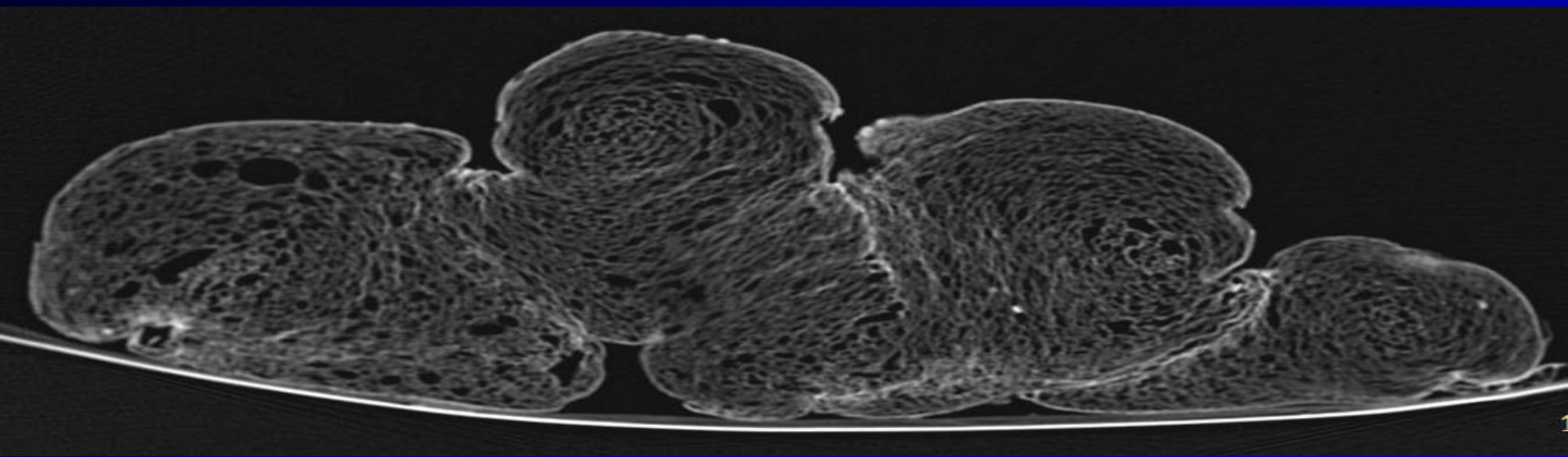
Nobel Prize in Physiology and Medicine, 1979













The Invention of Magnetic Resonance Imaging

Nobel Prize in Physiology
or Medicine, 2003

Paul C. Lauterbur and Peter Mansfield



MRI





From Structure to Function

Anatomical Imaging

US

X-ray

CT

MRI

System Functional Imaging

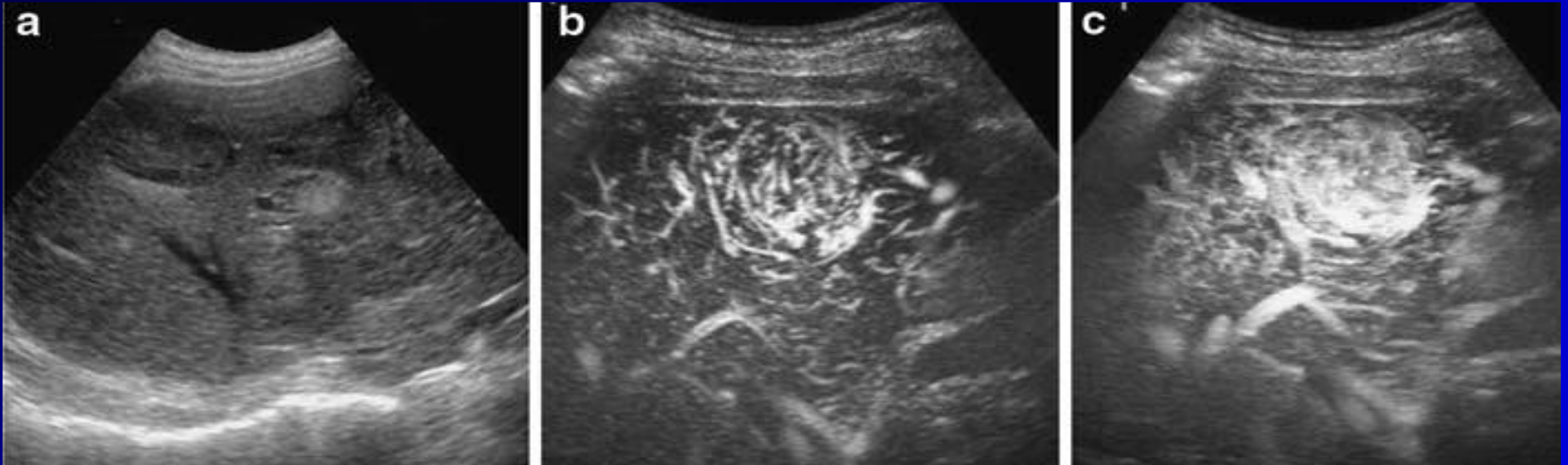
PET – Blood flow, radioactively tagged water

fMRI – Blood flow, intrinsic contrast, Blood volume, injected contrast agents, biologically inert

US – Perfusion, ultrasound contrast agents



CEUS

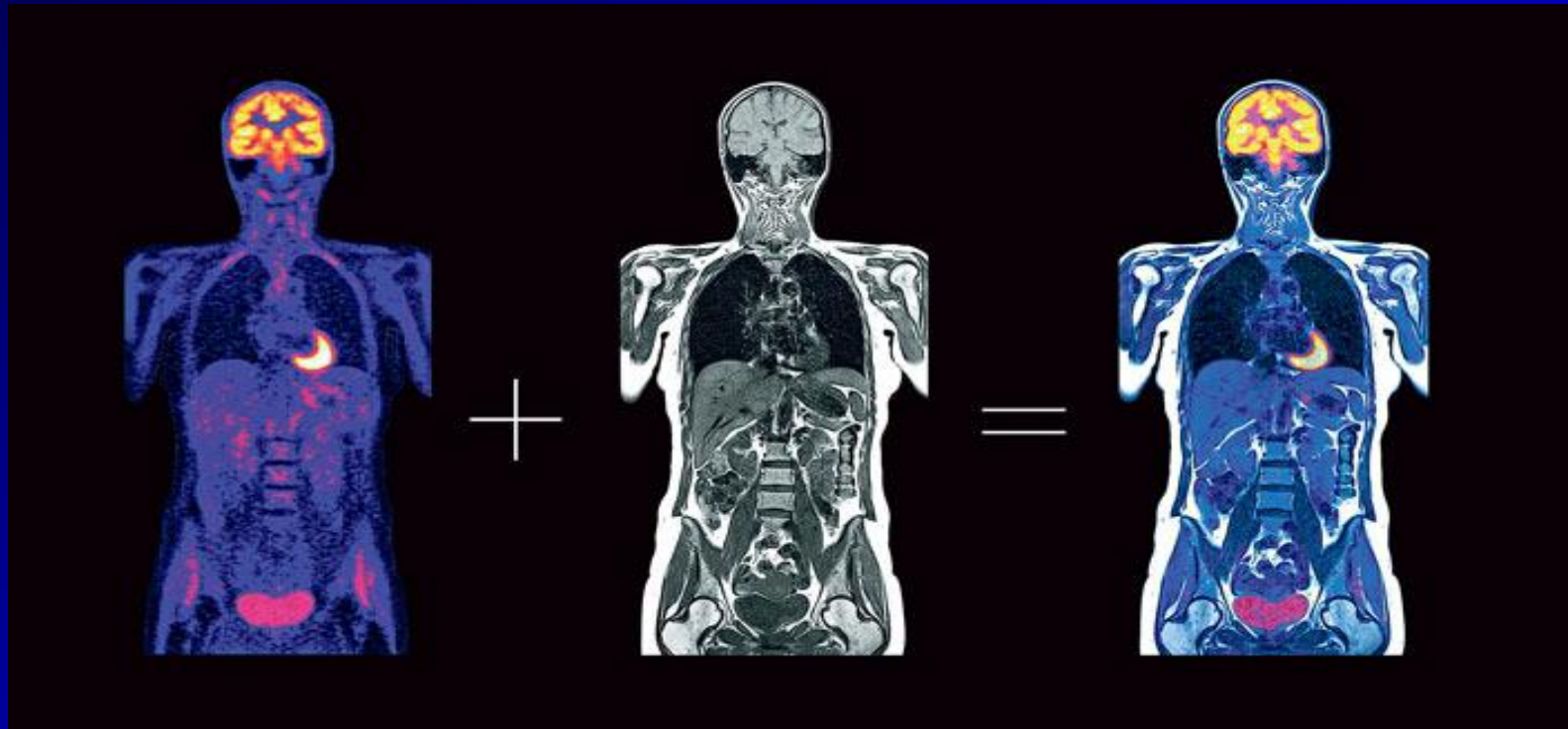


Baseline

Early arterial
phase

Peak arterial
phase

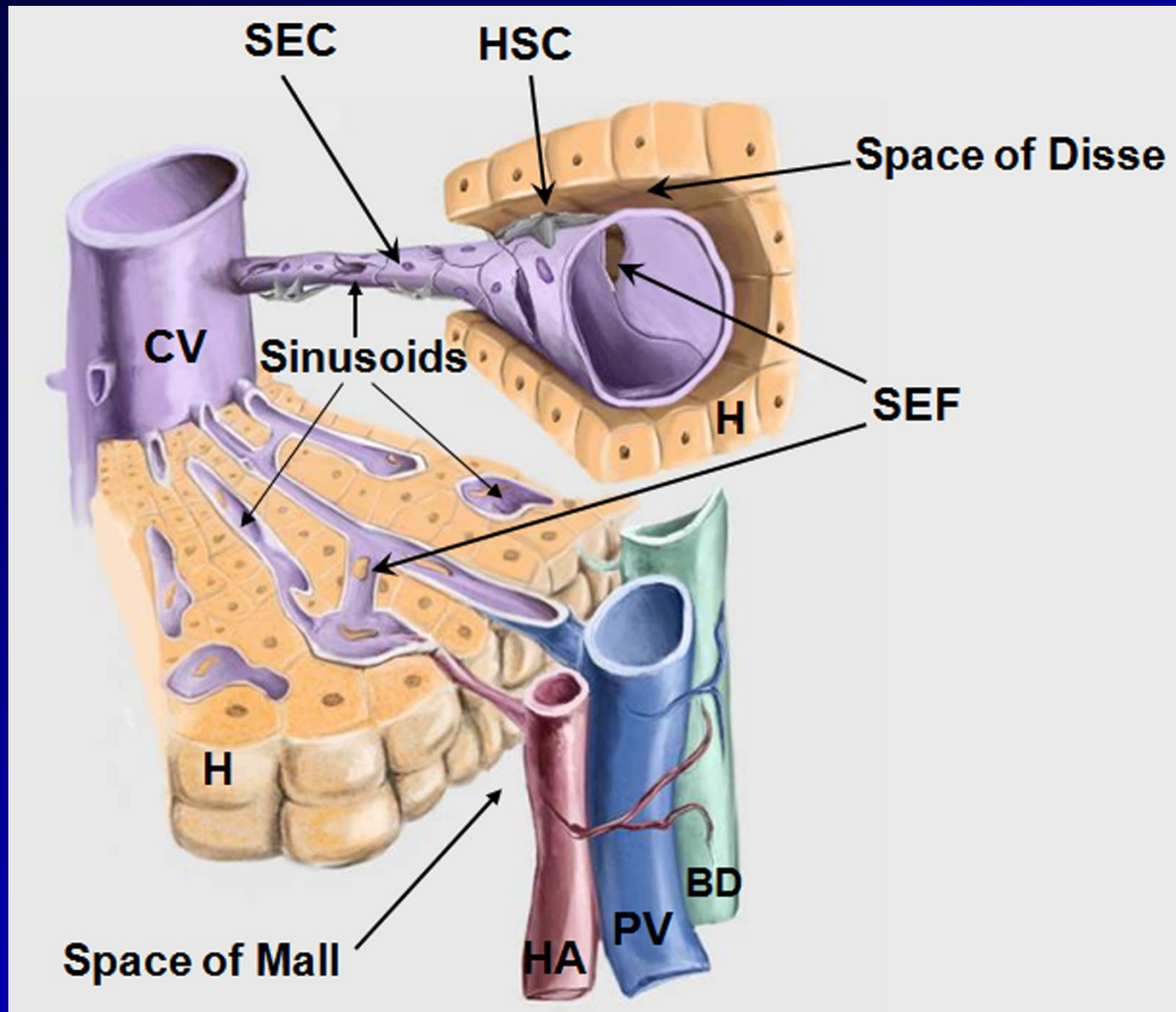
PET/MR



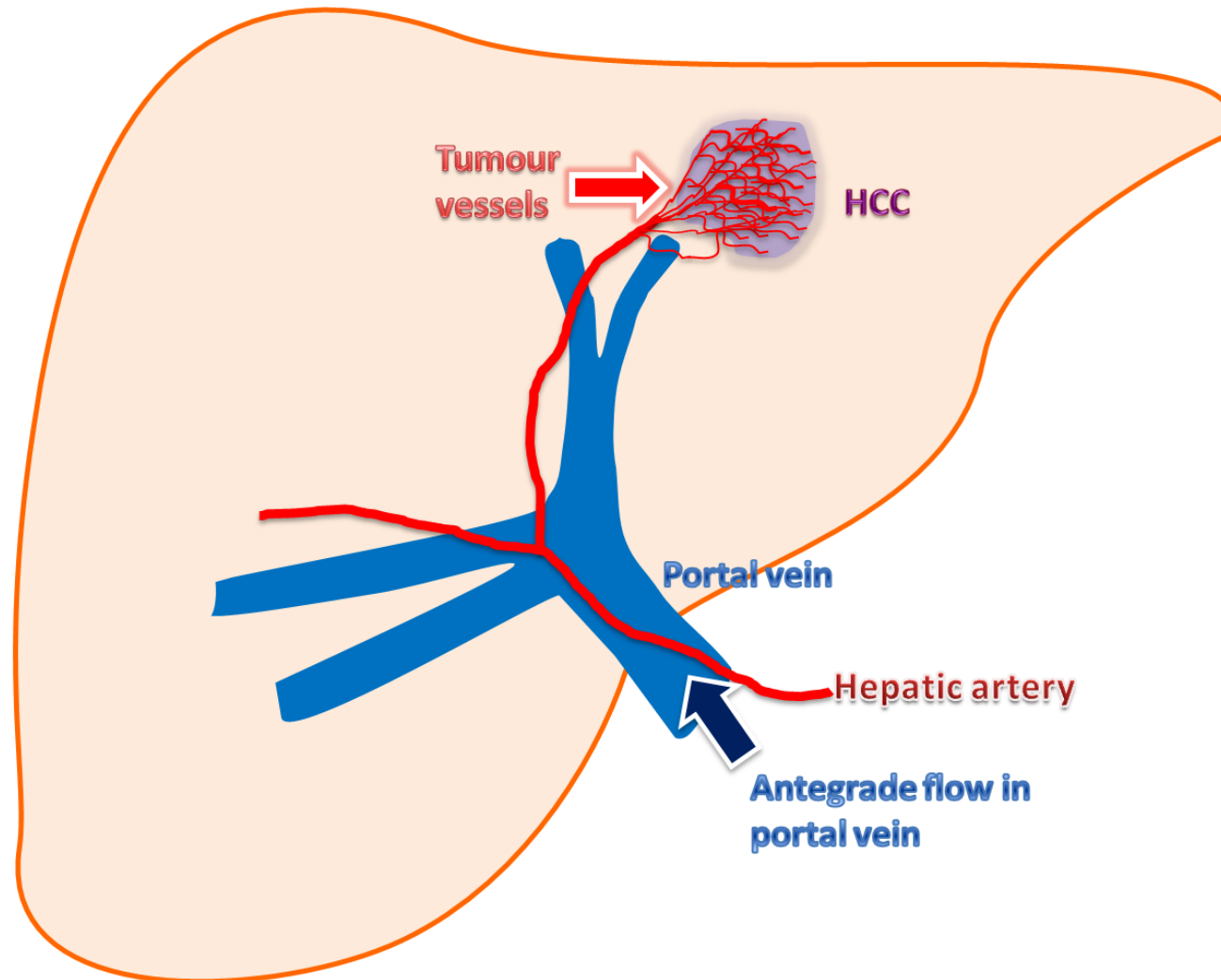
Imaging Principles

- Dual blood supply
- Changes in blood flow in diseased liver
- Contrast between lesion and background
- Diffuse vs. focal pathology





Nodular HCC



CT Technique

- Contrast 60-180 cc/sec (40 grl)
- Rate 3-6 cc/sec
- Timing
- Thin slices (0.625-1.5 mm)
- Overlap - enables reconstructions



CT Technique

- *Non enhanced*
- *Early arterial*
 - (for vessel demonstration): 25 sec
- *Late arterial*
 - (hypervascular masses): 35 sec
- *Portal phase*
 - 70 sec
- *Delayed*
 - 3 min in HCC
 - 10 minutes for Cholangiocarcinoma

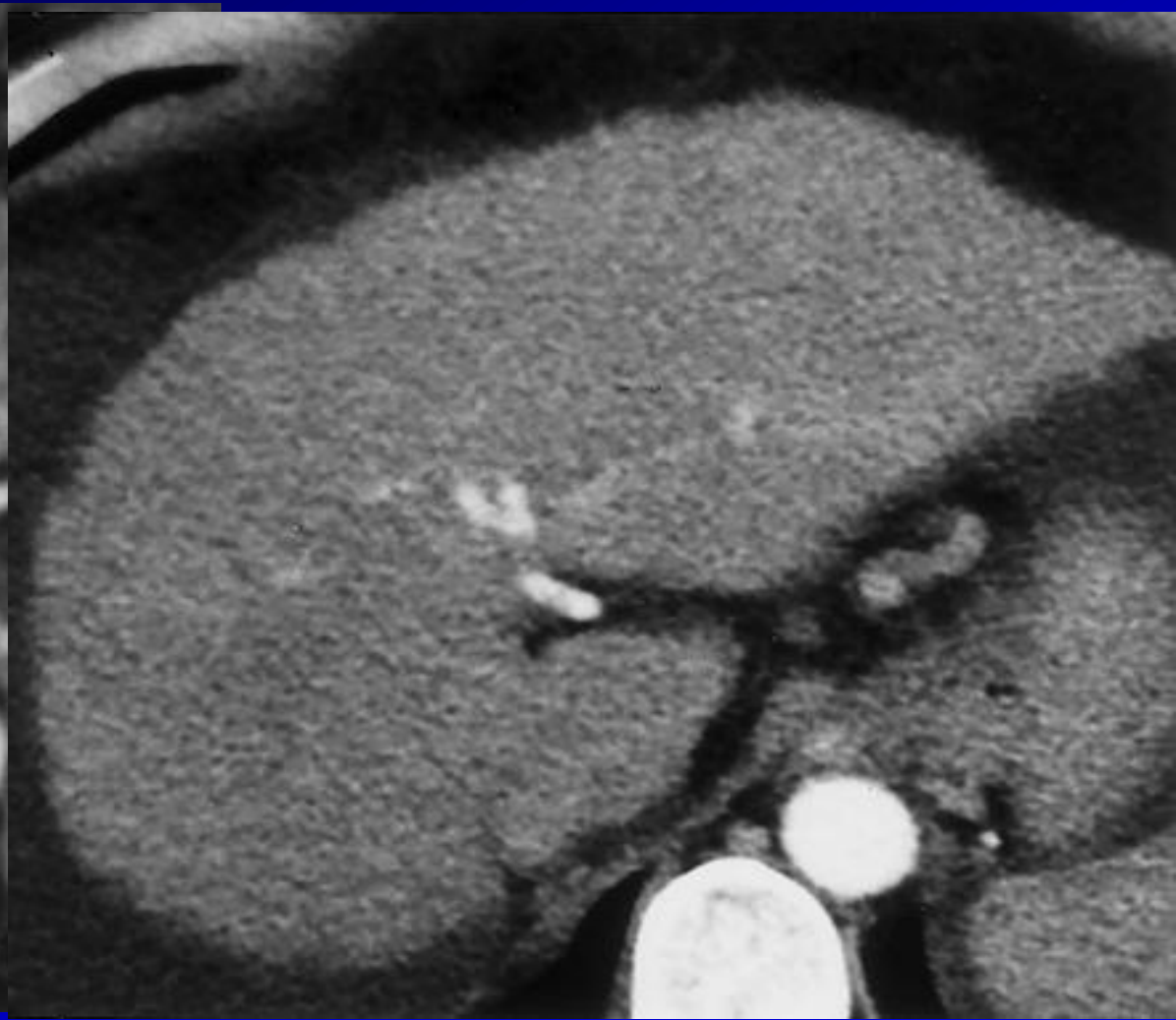




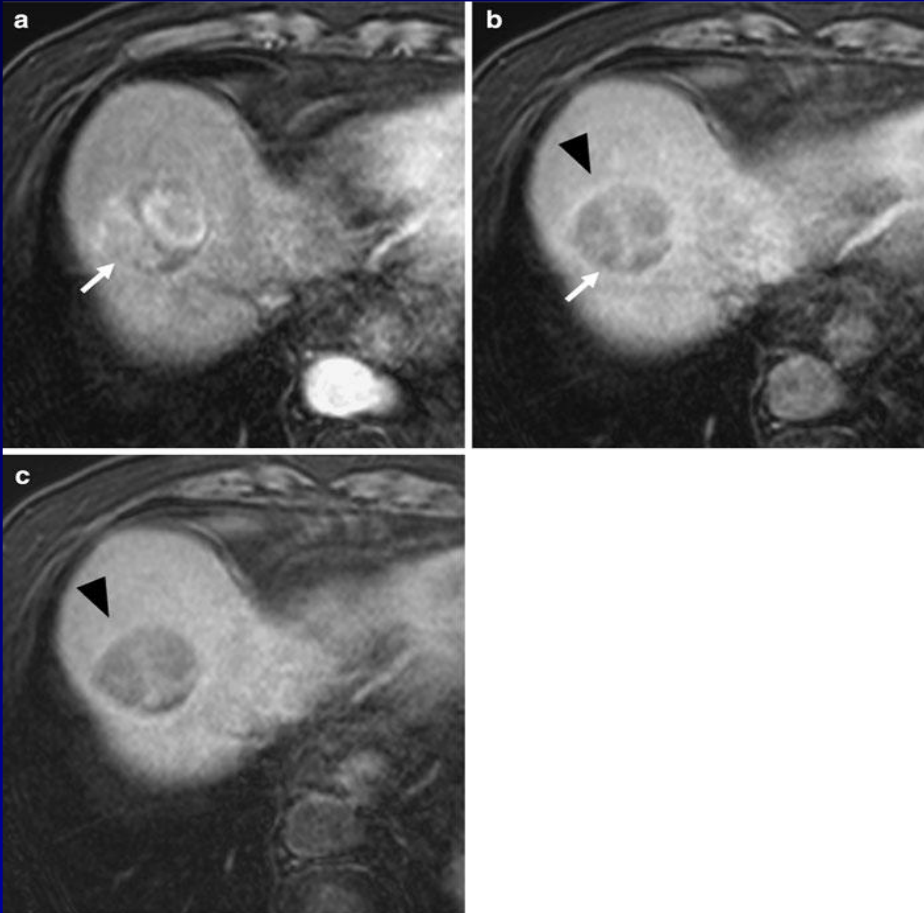
MR Imaging

- T1
- T2
- Diffusion
- Gadolinium injection
- Liver specific agents
- Dynamic series
 - » Late arterial, portovenous, delayed (3, 10 min)



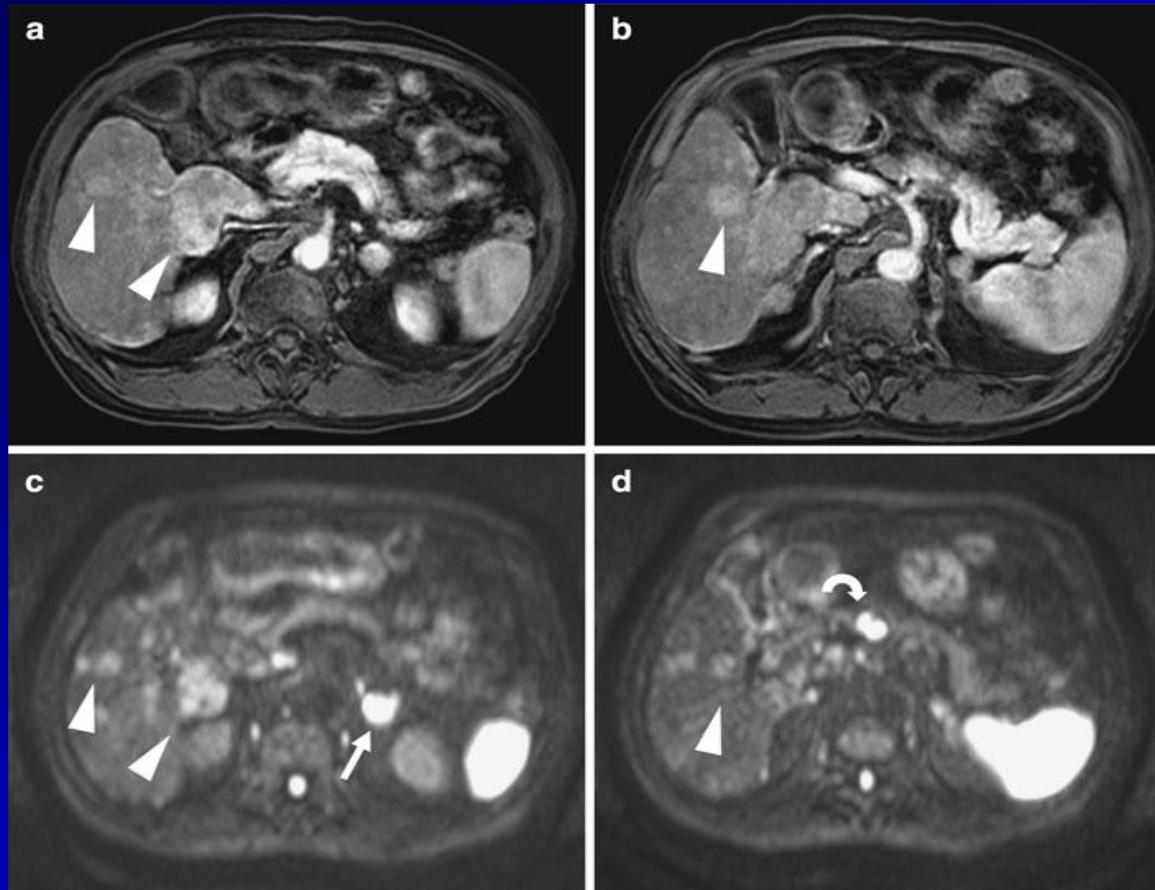


Assessment of Vascularity:



- Arterial heterogeneous enhancement
- Portal phase- wash-out
- “Pseudocapsule”
- Equilibrium phase-further washout

Assessment of tumor cellularity: Diffusion-weighted imaging (DWI)



Multi-step Approach

- Underlying liver
- Portal hypertension
- Lesion/s
- Pitfalls and mimickers



Target Lesion Evaluation

- Size
- Location
- Possibility of resection, RF, Chemoembolization



State of the Art

- Imaging: gets better all the time!
- Visualization: commercial
- Multimodality registration: progressing fast.

BUT...

Still a wide gap between what is developed in the research lab and what goes into commercial systems



Enjoy This Conference

