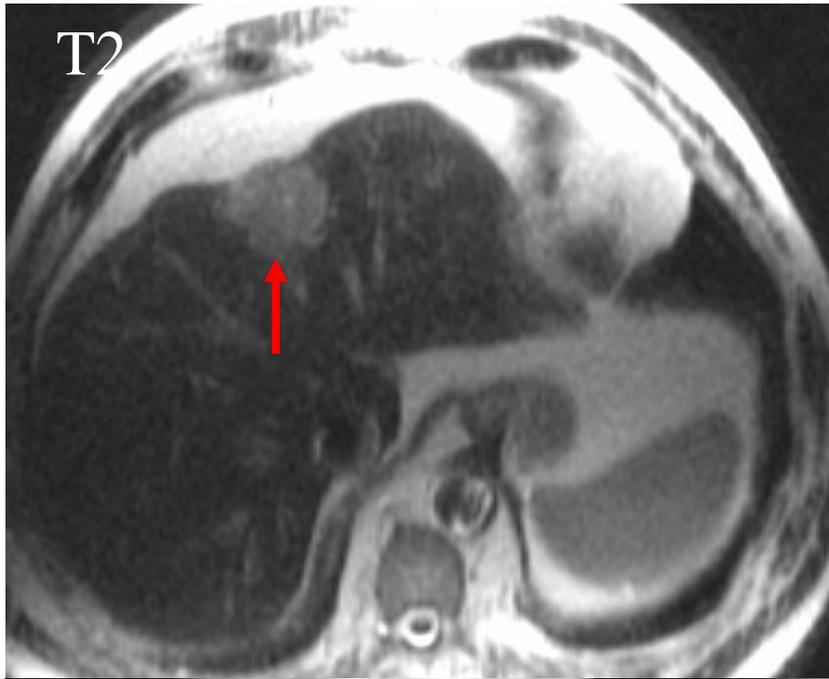
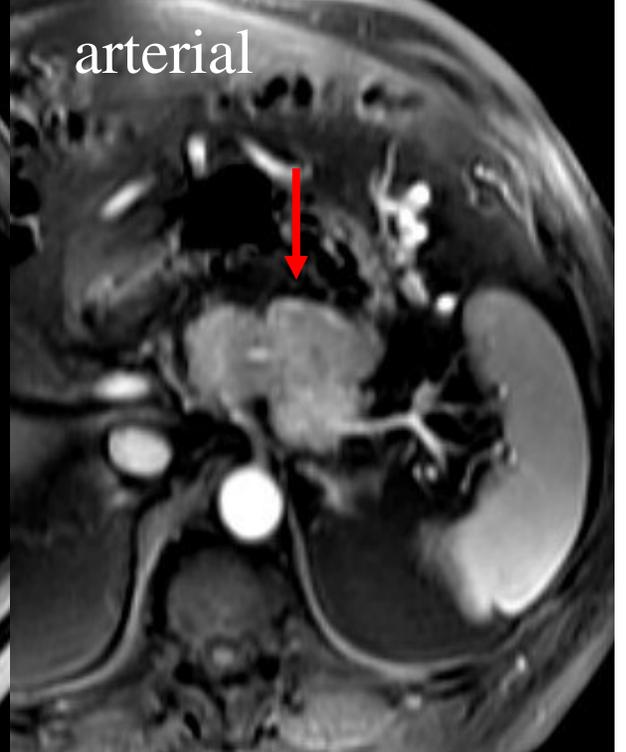
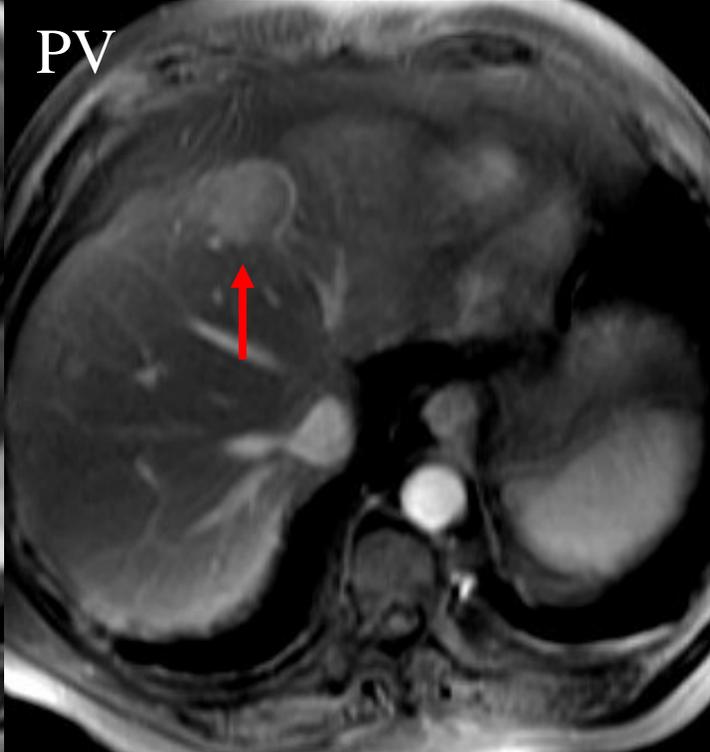
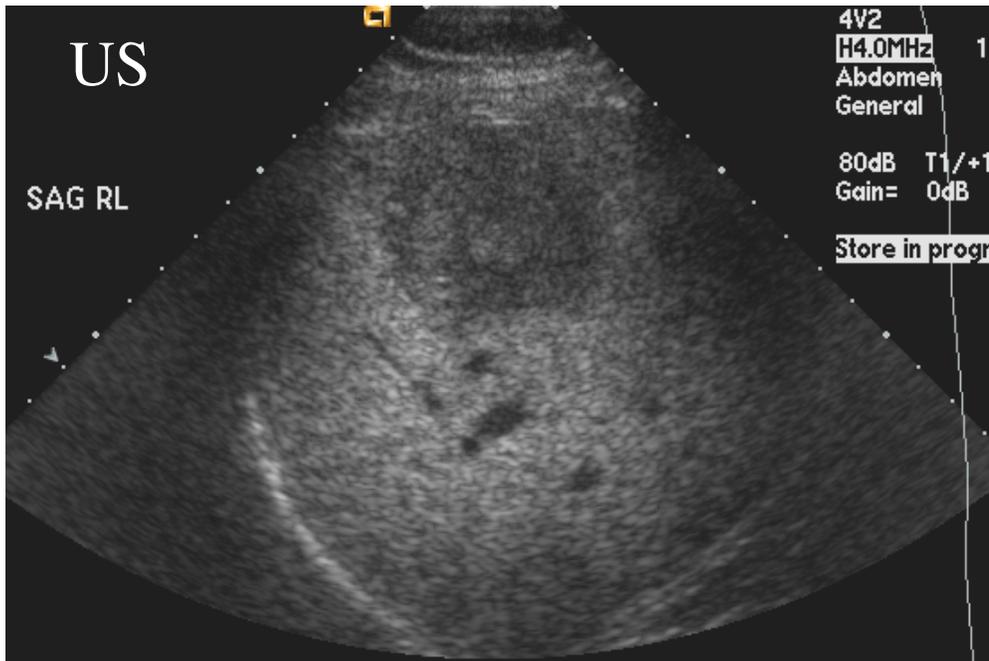


Hypervascular liver metastasis from pancreatic neuroendocrine tumor.



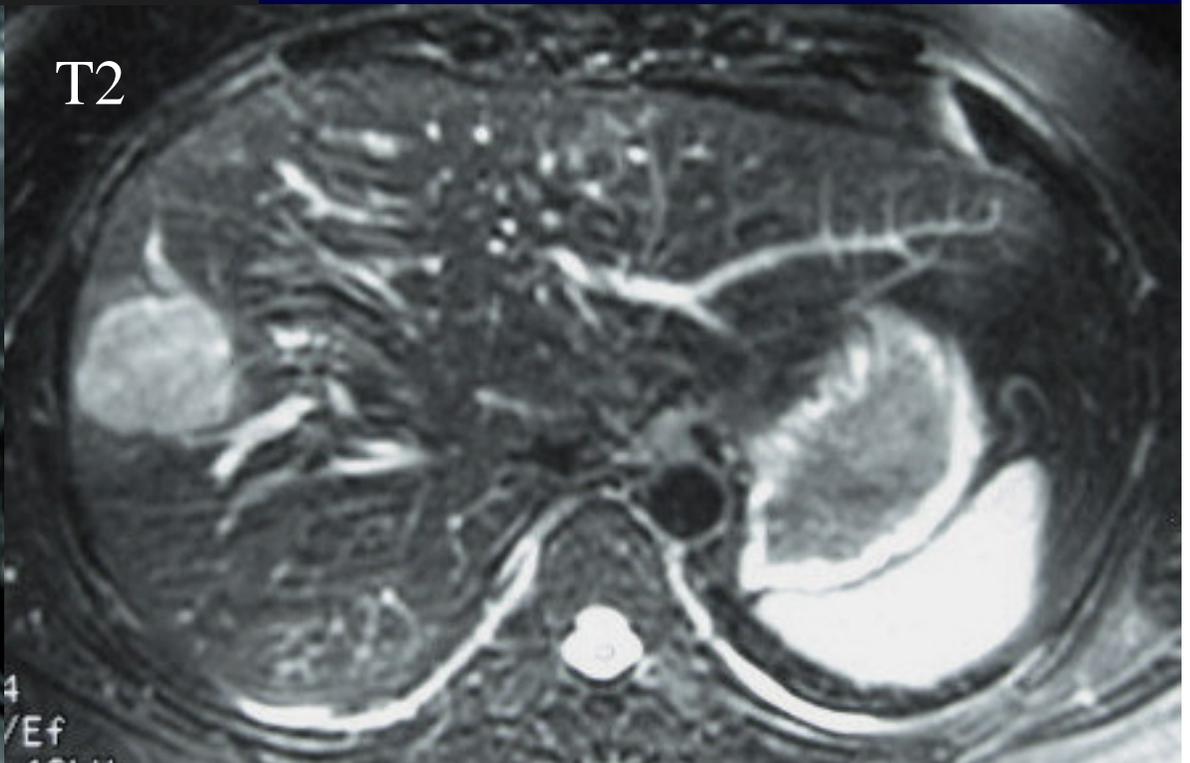
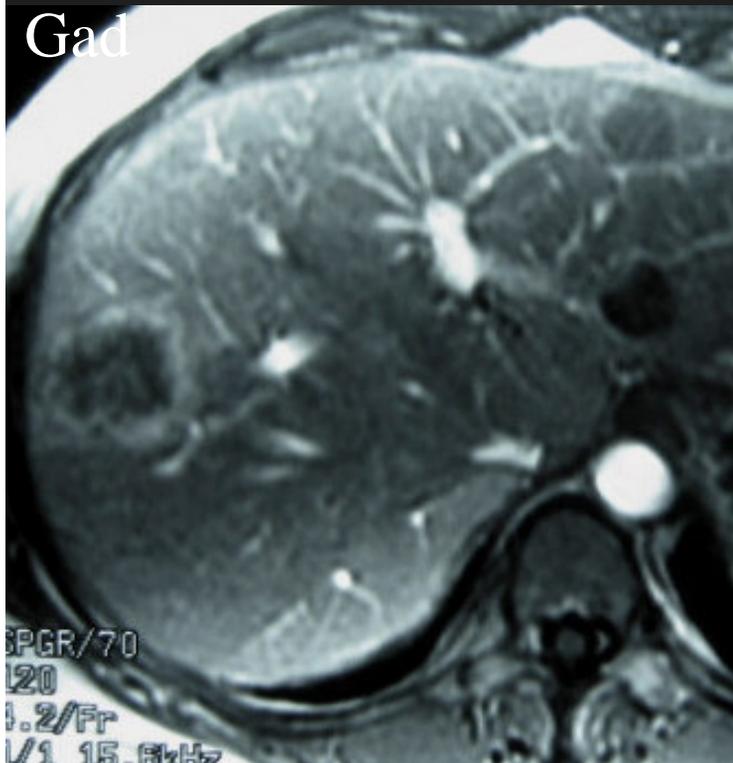
Hypervascular hepatic metastases from neuroendocrine pancreatic primary





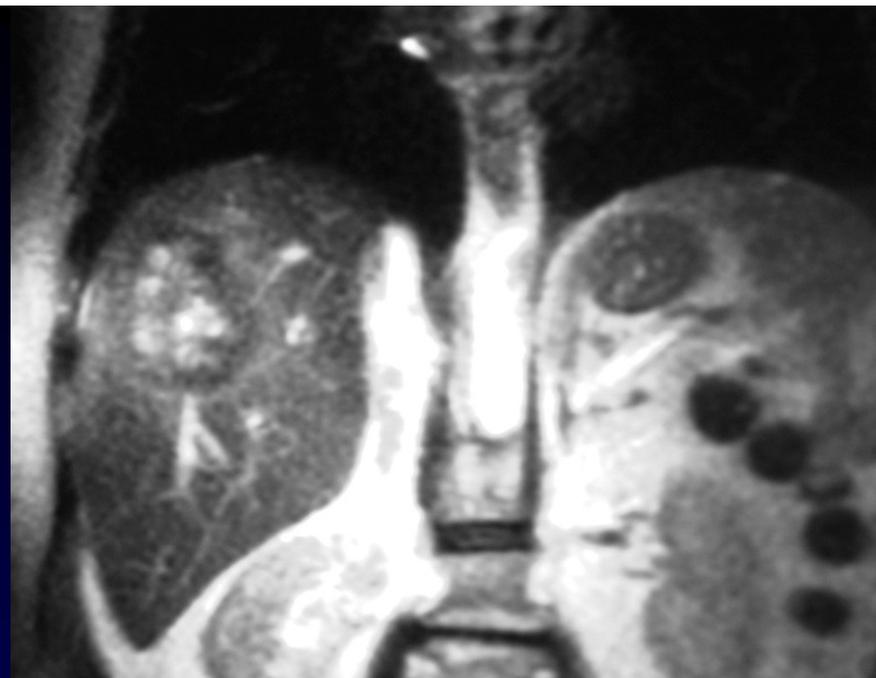
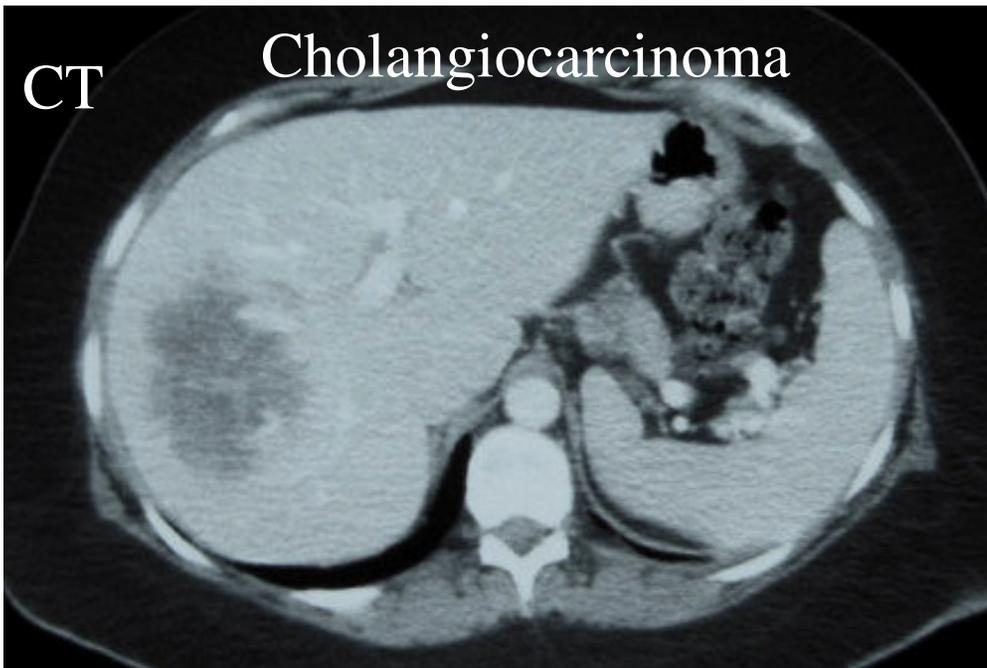
Cholangiocarcinoma

- T2 hyperintense
- T1 hypointense
- Hypovascular
- Capsular retraction
- Biliary duct dilatation

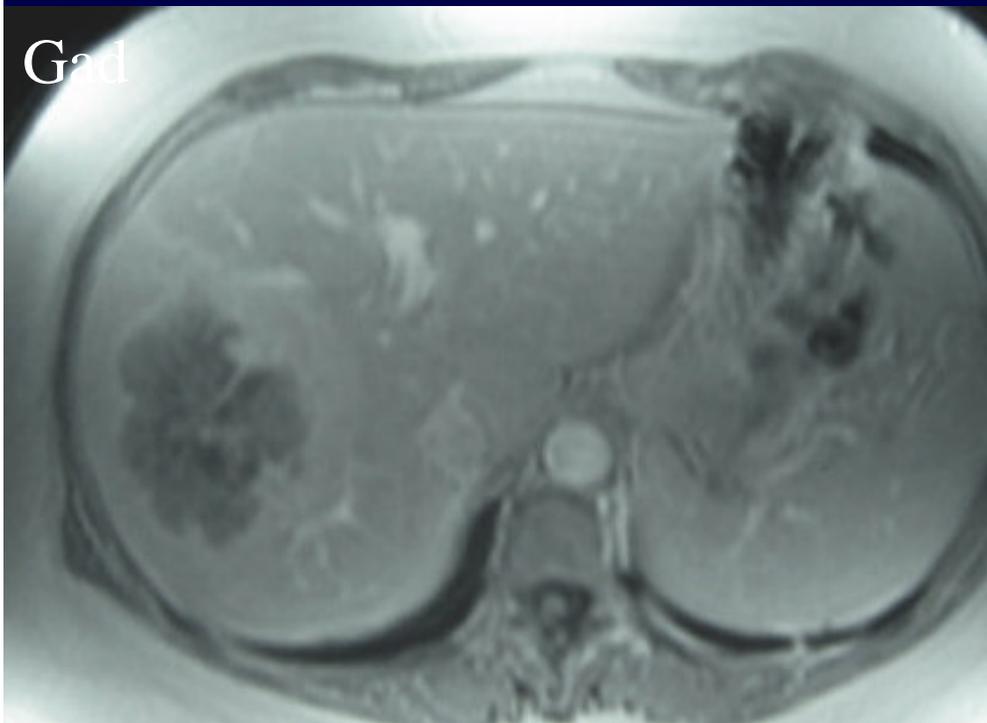


CT

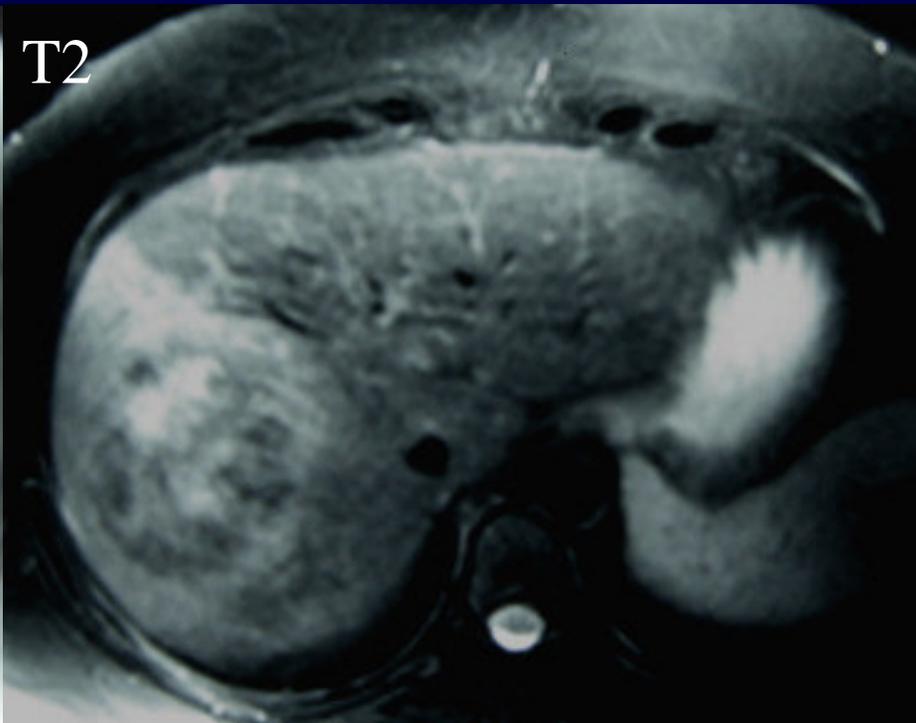
Cholangiocarcinoma



Gad



T2



Regenerative Nodules

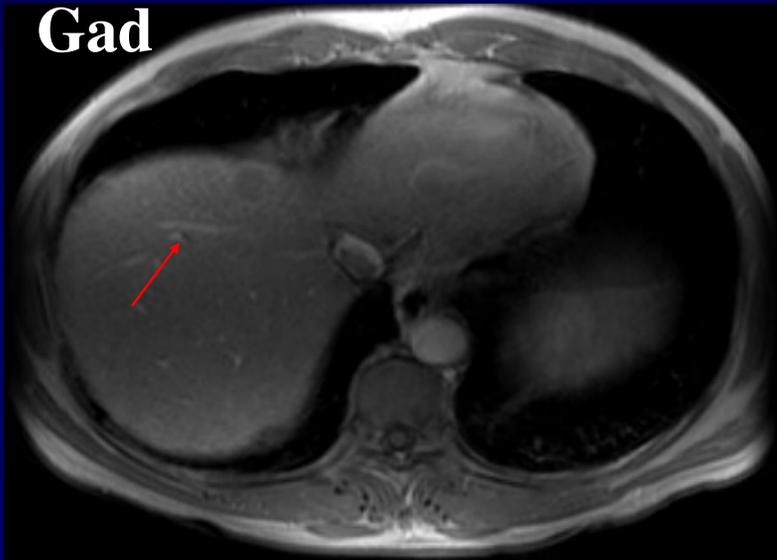
T1: hypointense

T2: hypointense

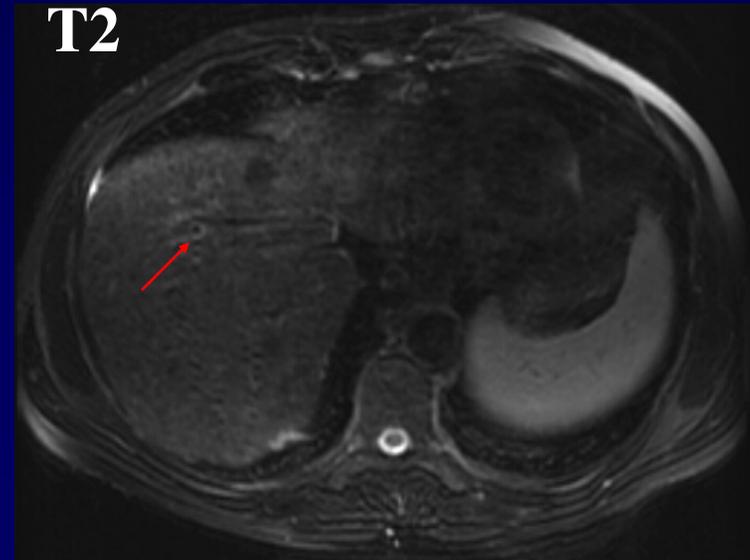
T1



Gad

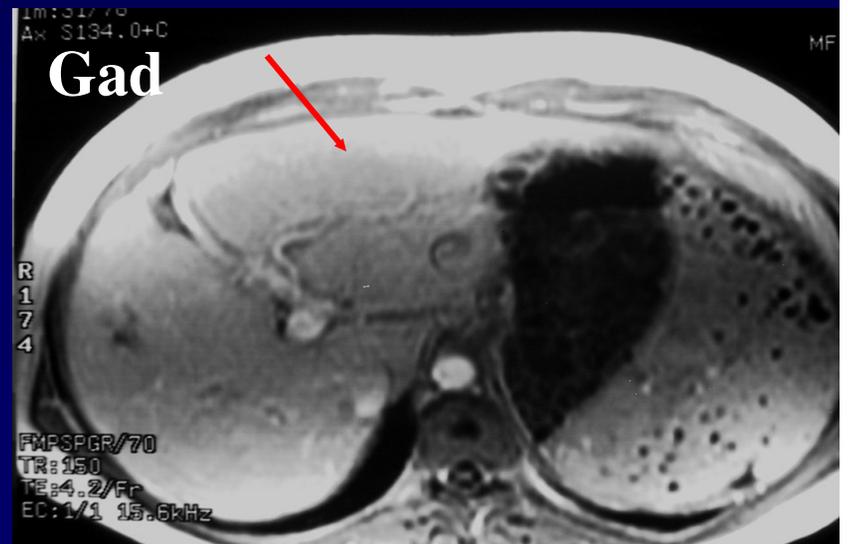
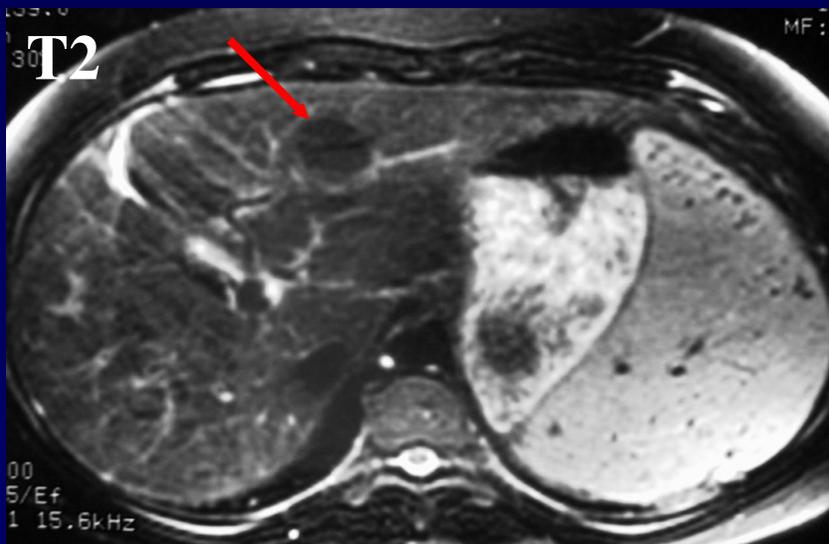
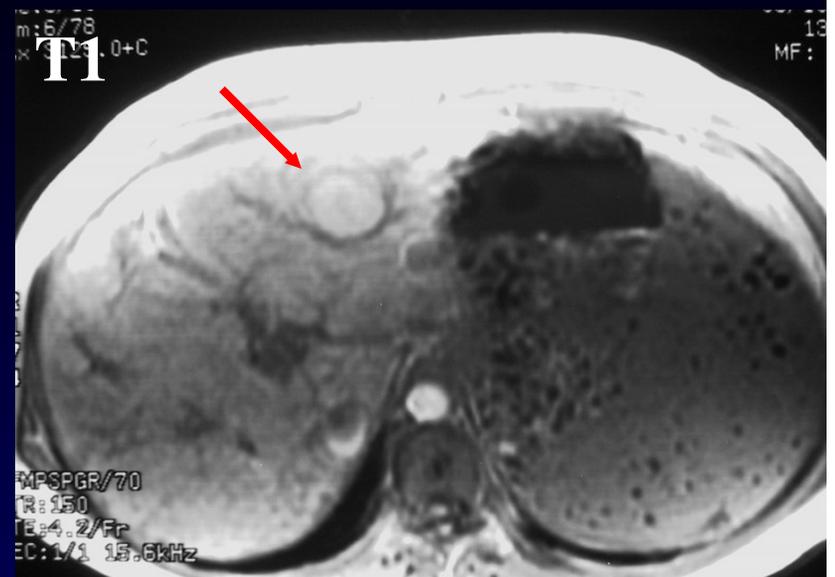


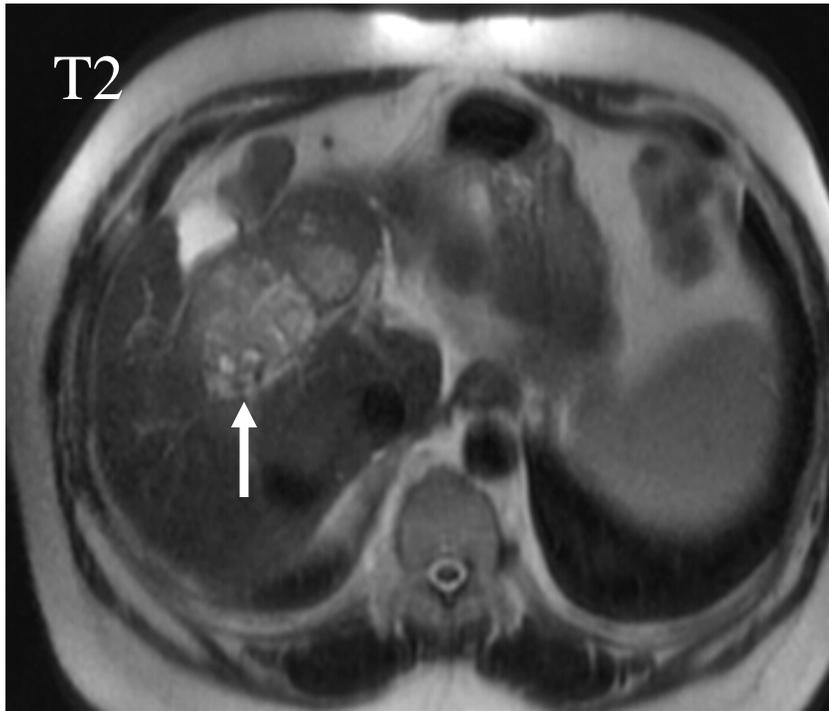
T2



Dysplastic Nodules

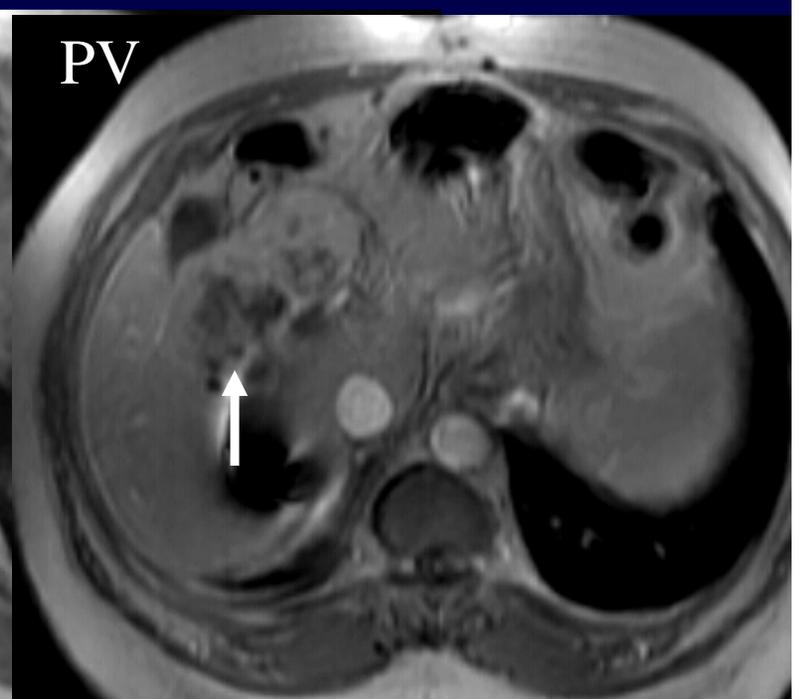
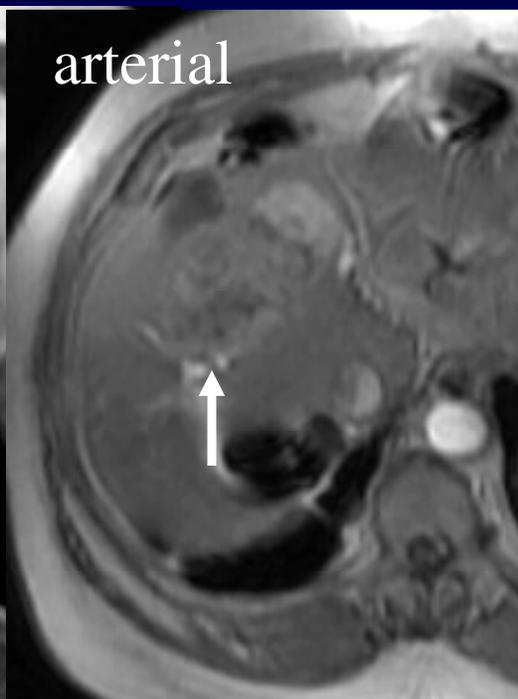
- Pathologically show abnormal tissue development but lack definite histopathologic findings of malignancy
- Classified as low grade or high grade
- T1: hyperintense
- T2: hypointense
- Post gad: hypovascular



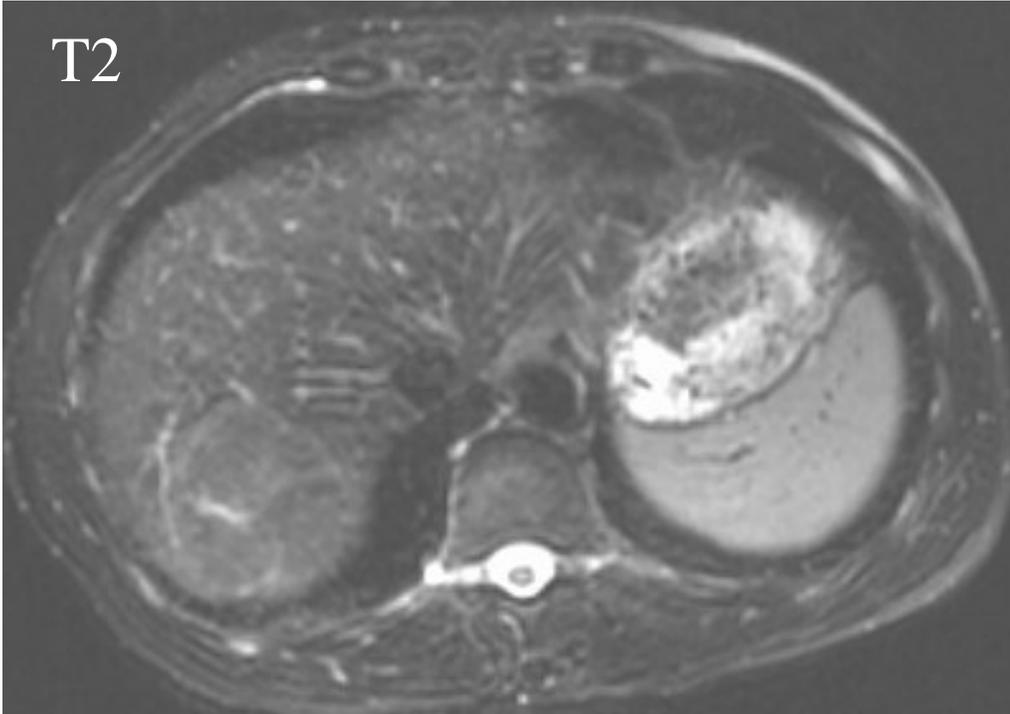


HCC

- T2 hyperintense
- T1 hypointense
- Hypervascular with washout

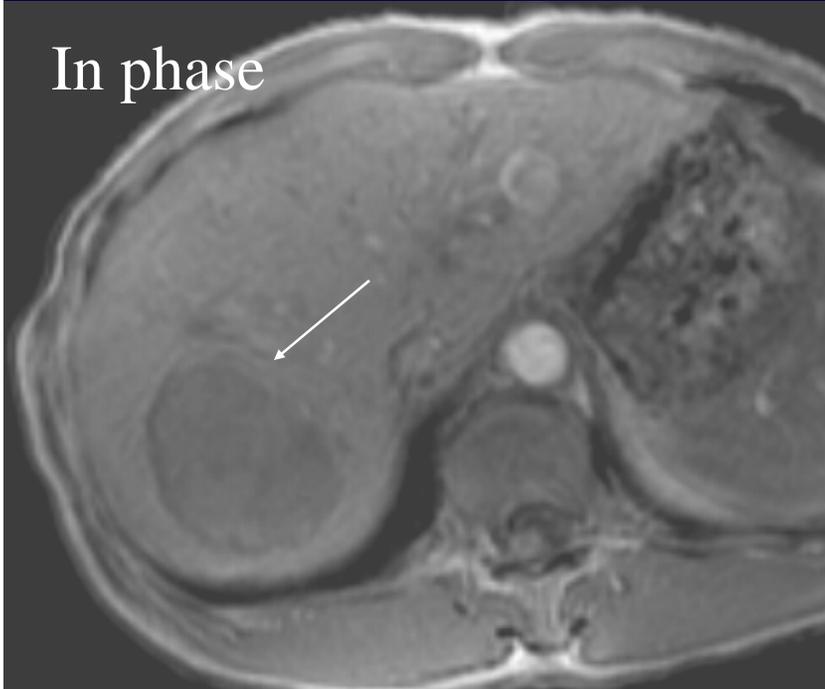


T2

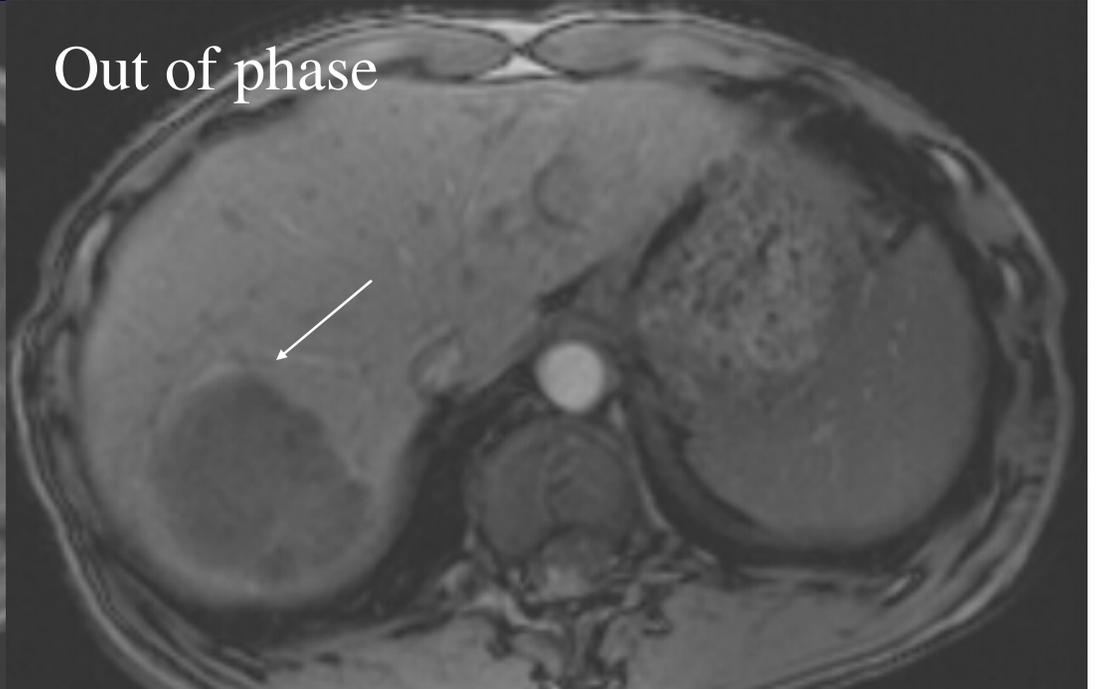


HCC with microscopic fat
(signal drop out on out of phase)

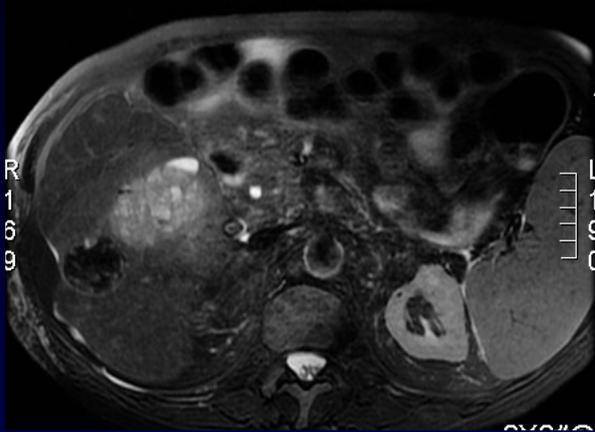
In phase



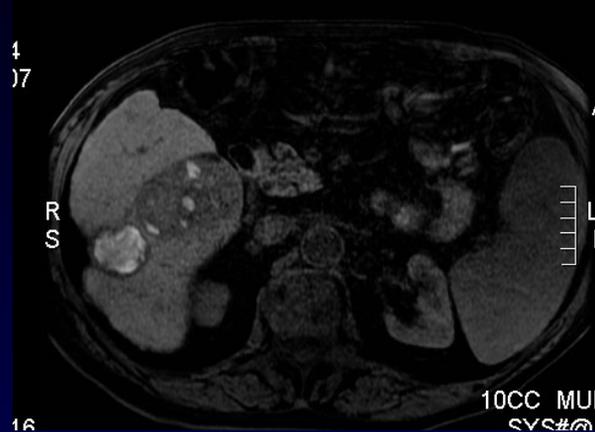
Out of phase



HCC – ablated & new lesion



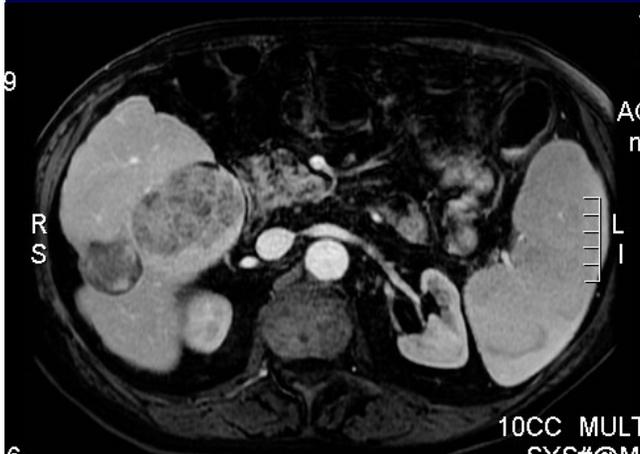
T2



LAVA pre-gad



Arterial phase



PV phase



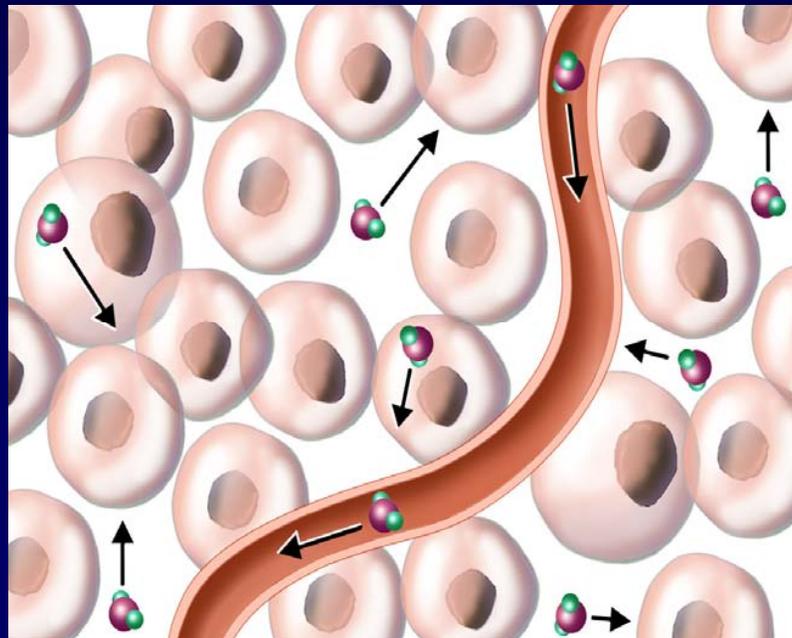
substraction



Rt PV thrombosis

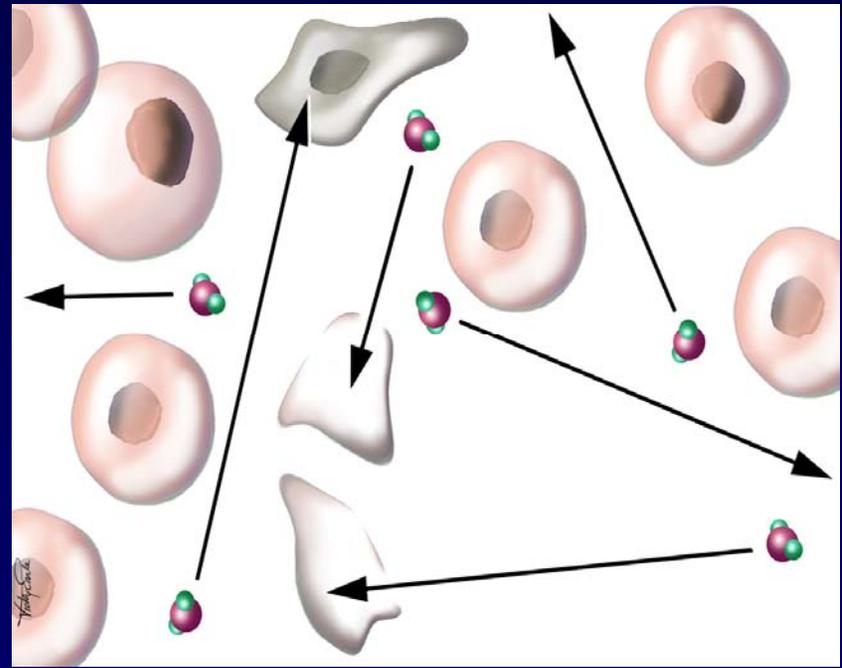
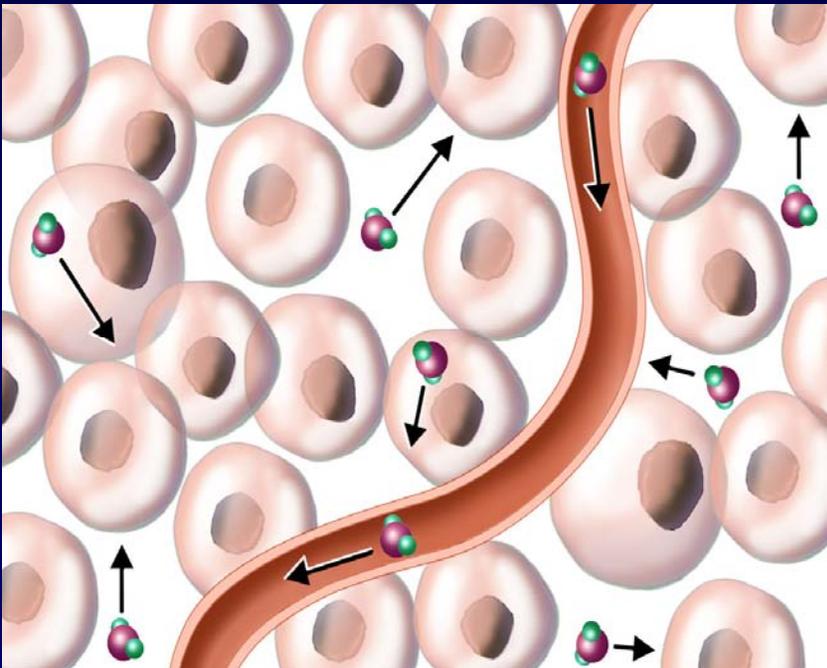
Diffusion Weighted Imaging

- Diffusion Weighted Imaging (DWI): Random motion of water molecules (Brownian motion) within extracellular, intracellular and intravascular spaces.



DWI

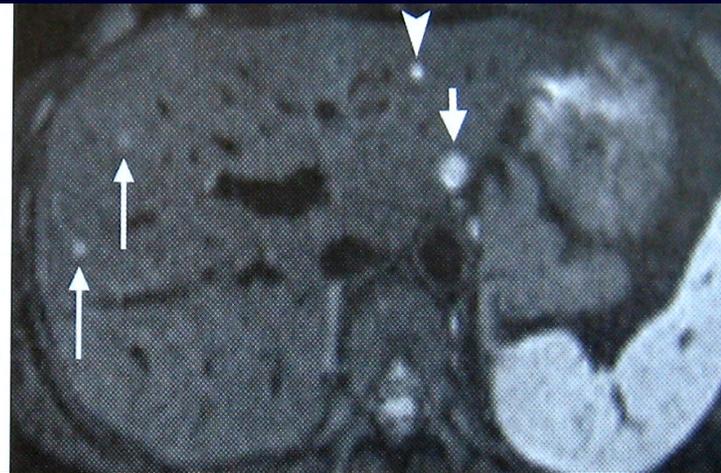
- Restricted diffusion:
 - Malignancy (increased number of cells)
 - Ischemia (cytotoxic edema)
 - Abscess (increased viscosity)



54 yo woman with neuroendocrine carcinoma of small bowel



T2



DWI
More mets detected

Focal Hepatic Lesions

Hemangioma	T2 bright, peripheral enhancement with fill in
FNH	Homogeneous, hypervascular -> isointense. Central scar T2 bright & delayed enhancement.
Adenoma	Similar to FNH unless contains hemorrhage, fat Central scar does not enhance
Mets	Heterogeneous/peripheral enhancement
CholangioCA	Heterogeneous/peripheral enhancement, may show delayed enhancement, capsular retraction, peripheral duct dilatation
RN	dark on all sequences
DN/well diff HCC	bright on T1, dark on T2, not vascular
HCC	Hypervasc, washout, +/- fat, edema, vascular invasion

Clinical Features

- Asymptomatic/symptomatic
- Age
- Gender
- Oral contraceptives, anabolic steroids, glycogen storage disease
- Risk factors for chronic liver disease
- History of primary malignancy
- Travel history

- Lab tests, including tumor markers
- Imaging studies

- Majority of lesions characterized without biopsy.
- 156/160 (98%) correct pre-op diagnosis.

Fine Needle Aspiration Biopsy

- “Think first, then don’t do it”
- Commonly non-diagnostic for hepatic adenomas and focal nodular hyperplasia
- HCC > 1cm diagnosed with imaging⁺
- Risks:
 1. Bleeding: hemangiomas and adenomas
 2. Seeding: meta-analysis -> 2.7 % risk for HCC*

+AASLD July 2010 update

*Silva et al. Gut 2008;57:1592

Fine Needle Aspiration Biopsy

- Unresectable lesion
- Problematic case

- US-guided biopsy preferred
- CT-guided biopsy, if US not feasible
- Contrast-enhanced US, if available

FNA or Core Liver Biopsy

- INR \leq 1.5
- PTT \leq 50
- Platelets $>$ 50

Radiologic Intervention

- Radiofrequency Ablation (RFA)
- Transcatheter Arterial Chemoembolization (TACE)
- Selective Internal Radiation (SIR)

Radiologic Intervention

- **Radiofrequency Ablation (RFA)**
 - Thermal injury (500C) -> coagulative necrosis
 - 4 or fewer 5 cm or smaller
 - Ideal: 1 cm deep to capsule, surrounded by normal parenchyma, 2 cm from major vessels (avoid heat sink)
- **Embolization**
 - Yttrium 90 for neuroendocrine mets
 - Bland embolization

Radiologic Intervention

- **Radiofrequency Ablation (RFA)**
 - Thermal injury (500C) -> coagulative necrosis
 - **4 or fewer and 5 cm or smaller**
 - Ideal: 1 cm deep to capsule, surrounded by normal parenchyma, 2 cm from major vessels (avoid heat sink)
 - Ablate tumor + 5-10 mm rim of normal tissue
 - 15 minutes per ablation
 - Larger lesions may needed multiple overlapping ablations
 - US guidance > US contrast guidance > CT guidance
 - Conscious sedation or GA
 - Complications: infection, bile duct injury, tumour tract seeding, non-target ablation (ie diaphragm)

Radiologic Intervention

- **Transcatheter Arterial Chemoembolization (TACE)**
 - Bland embolization
 - Gelfoam: temporary, recanalization in 2-6 wks
 - Polyvinyl alcohol: permanent
 - Lipiodol: oily contrast with affinity for HCC (drug vehicle)
 - Chemotherapeutic agents
 - fluorodeoxyuridine, doxorubicin, cisplatin, mitomycin
 - Chemoembolization
 - ischemia and prolonged contact of the chemotherapeutic agent with the tumor
 - dramatically increase the local concentration of the chemotherapeutic agent

Radiologic Intervention

- **Selective Internal Radiation**

- Yttrium 90 resin microspheres for neuroendocrine mets*
- Phase III trials for CRC and HCC

*King J, et al. *Cancer*. Jul 10 2008

Conclusion

- Most solitary liver lesions can be characterized with CT and /or MR imaging
- Role of biopsy has decreased
- Imaging work-up depends on local expertise and resources
- Radiologic interventions: RFA, TACE, SIR

Thank You