Focal Nodular Hyperplasia

- Benign tumor of liver caused by hyperplastic response to localized vascular abnormality
- **Best diagnostic clue**
  - Bright, homogeneously enhancing mass on arterial phase CT or MR with delayed enhancement of central scar
    - » Hyperintense enhancement on hepatobiliary phase of gadoxetate-enhanced MR
- **Location**
  - Usually subcapsular and rarely pedunculated
- **Size**
  - Majority are < 5 cm unless symptomatic
- **Morphology**
  - Spherical nonencapsulated mass
- Key concepts
  - 2nd most common benign tumor of liver
  - Benign congenital hamartomatous malformation
  - Accounts for 8% of primary hepatic tumors in autopsy series
  - Usually solitary lesion (80%); multiple (20%)
  - Multiple FNHs are associated with multiorgan vascular malformations and certain brain neoplasms

Etiology

- Ischemia caused by occult occlusion of intrahepatic vessels
  - Followed by hyperplastic response
- Localized arteriovenous shunting caused by anomalous arterial supply
- Oral contraceptives do not cause FNH but have trophic effect on growth

Associated abnormalities

- FNH is more common in any liver with vascular abnormalities
- Hepatic hemangioma (23% coexistence)
- Hepatic adenoma
- Multiple lesions of FNH are associated with
  - Brain neoplasms: Meningioma, astrocytoma
  - Vascular malformations of various organs

Demographics

- **Age**
  - Common in young to middle-aged women (uncommon in men)
    - » 3rd-4th decades of life
  - Range: 7 months to 75 years
- **Gender**
  - M:F = 1:8
- **Epidemiology**
  - 4% of all primary hepatic tumors in children and adults

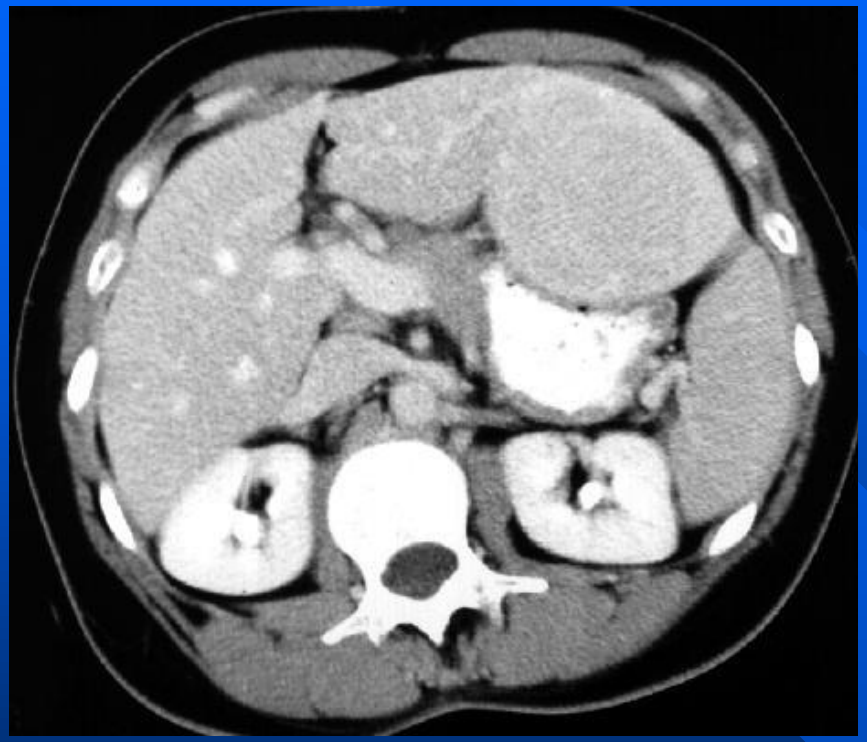
FNH

- Uniform arterial enhancement
- Central core will not enhance, enhances on delayed images
- Imaging is more reliable than histology in establishing diagnosis of FNH.
- Immediate, intense, homogeneously enhancing lesion on arterial phase followed rapidly by isodensity on venous phase with delayed enhancement of scar
  - Gadoxetate-enhanced MR is most specific diagnostic study
- Classic FNH resembles cross section of an orange (central "scar," radiating septa)

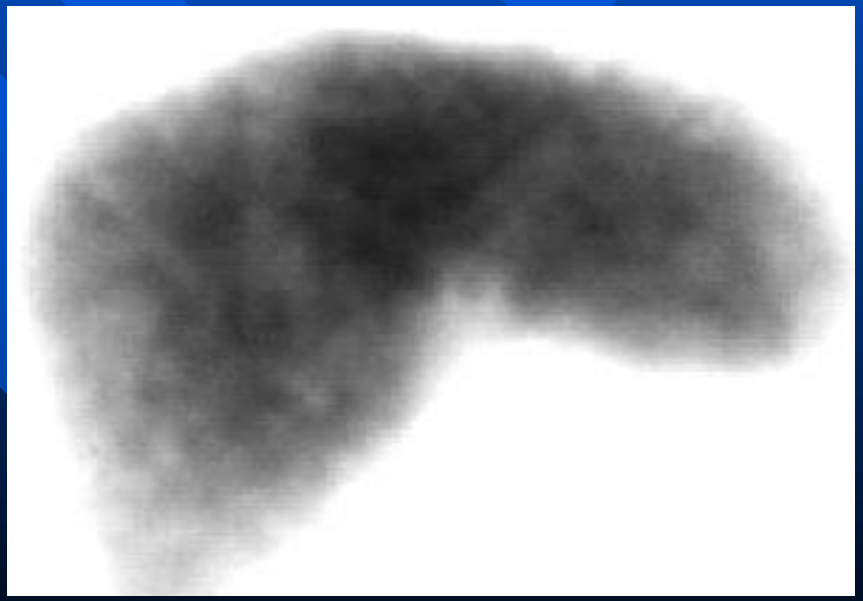
MRI

- **T1WI**
  - Mass: Isointense to slightly hypointense
  - Central scar: Hypointense
- **T2WI**
  - Mass: Slightly hyperintense to isointense
  - Central scar: Hyperintense
- **T1WI C+**
  - Arterial phase: Hyperintense (homogeneous)
  - Portal venous: Isointense to liver
  - Delayed phase
    - » Mass: Isointense
    - » Scar: Hyperintense
- Specific hepatobiliary MR contrast agents
  - Gadoxetate (Eovist or Primovist)
    - » Bright, homogeneous enhancement of FNH on arterial phase
    - » Prolonged enhancement of entire FNH on hepatobiliary phase (delayed, ~ 20 minutes)
      - Intensity of FNH > liver
      - Most specific test to distinguish from all other hepatic masses
      - Due to functioning hepatocytes, malformed bile ductules

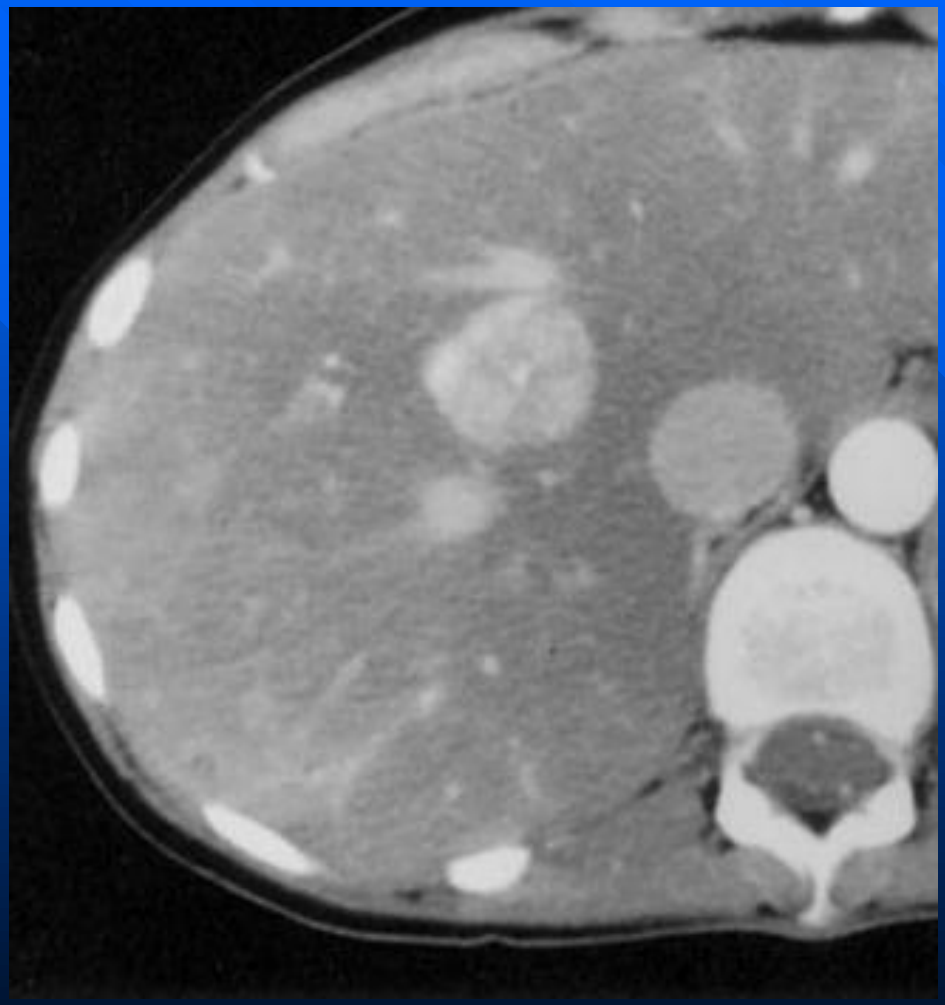
FNH



FNH, Sulfer Colloid



FNH



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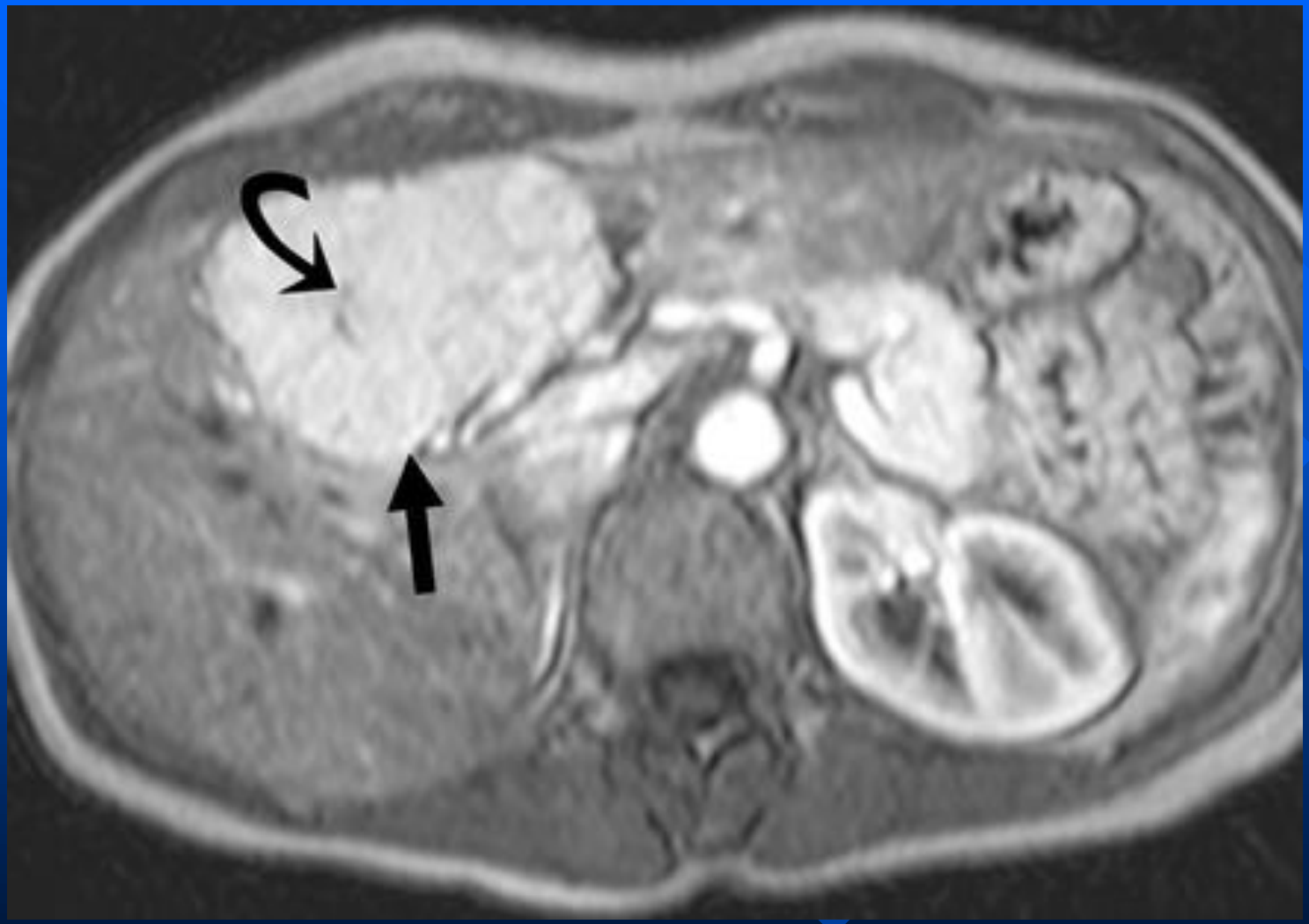

Focal Nodular Hyperplasia

T2W Single Shot
Bright Scar

T2W with Gad Arterial Phase
No Scar enhancement yet

T2W with Gad Portal Phase
Scar enhancement

Multiple focal nodular hyperplasia