Nodular Regenerative Hyperplasia

- Diffuse micro- or macronodular transformation of hepatic parenchyma without fibrous septa between nodules
- Larger focal lesions are called multiacinar (large) regenerative nodules (LRNs)
- Benign lesions: No potential for malignant transformation.
- Etiology
  - Unknown etiology of diffuse NRH; various theories
    - » Hyperplastic response of hepatocytes, probably due to chronic ischemia
  - LRNs are caused by vascular derangement of liver due to decreased portovenous or hepatovenous flow
    - » Explains common occurrence in Budd-Chiari syndrome + portal vein thrombosis

Imaging

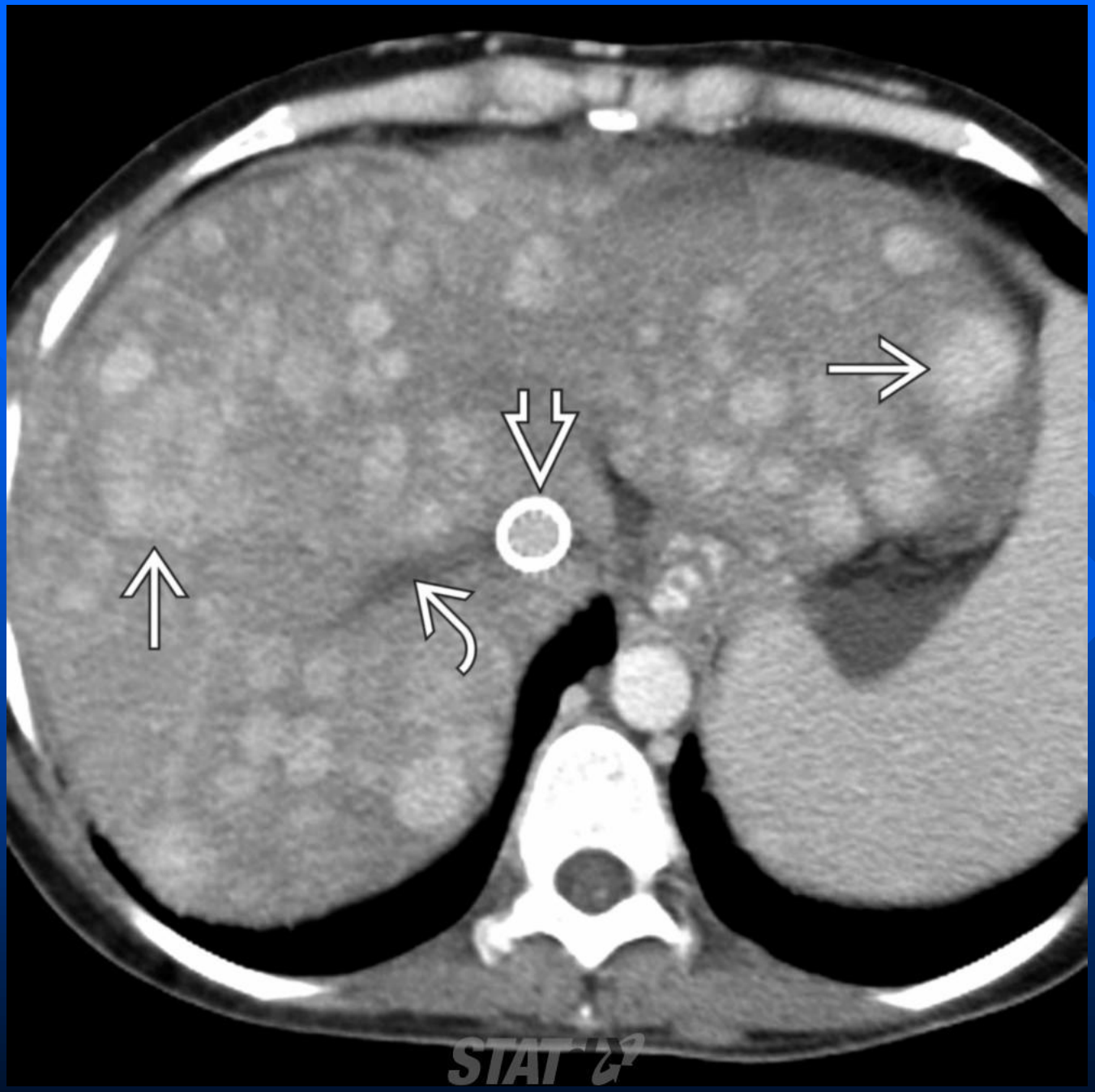
- Diffuse nodular regenerative hyperplasia (NRH) and focal LRNs have different predisposing conditions and different imaging features
- Diffuse NRH
  - Associated with other diseases and drugs (e.g., myeloproliferative; immunosuppressives)
  - Signs of portal hypertension are common (> 50%)
- LRNs
  - Multiple focal liver masses or nodules 0.5-5 cm in size with persistent enhancement on hepatobiliary-enhanced MR
  - Hyperintense on T1WI (75%); iso- to hyperintense on T2WI
  - Hypervascular on arterial, portal venous and delayed phase imaging (**no washout**)
  - May have central scar ± perinodular "halo"
  - MR with hepatobiliary agents: Uptake and prolonged enhancement
    - » Confirms benign hepatocellular nature of lesions
  - With signs of underlying disease (e.g., Budd-Chiari; thrombosed hepatic veins + IVC)
- LRNs: Multiple hypervascular nodules up to 5 cm with persistent delayed enhancement on hepatobiliary-enhanced MR

Demographics

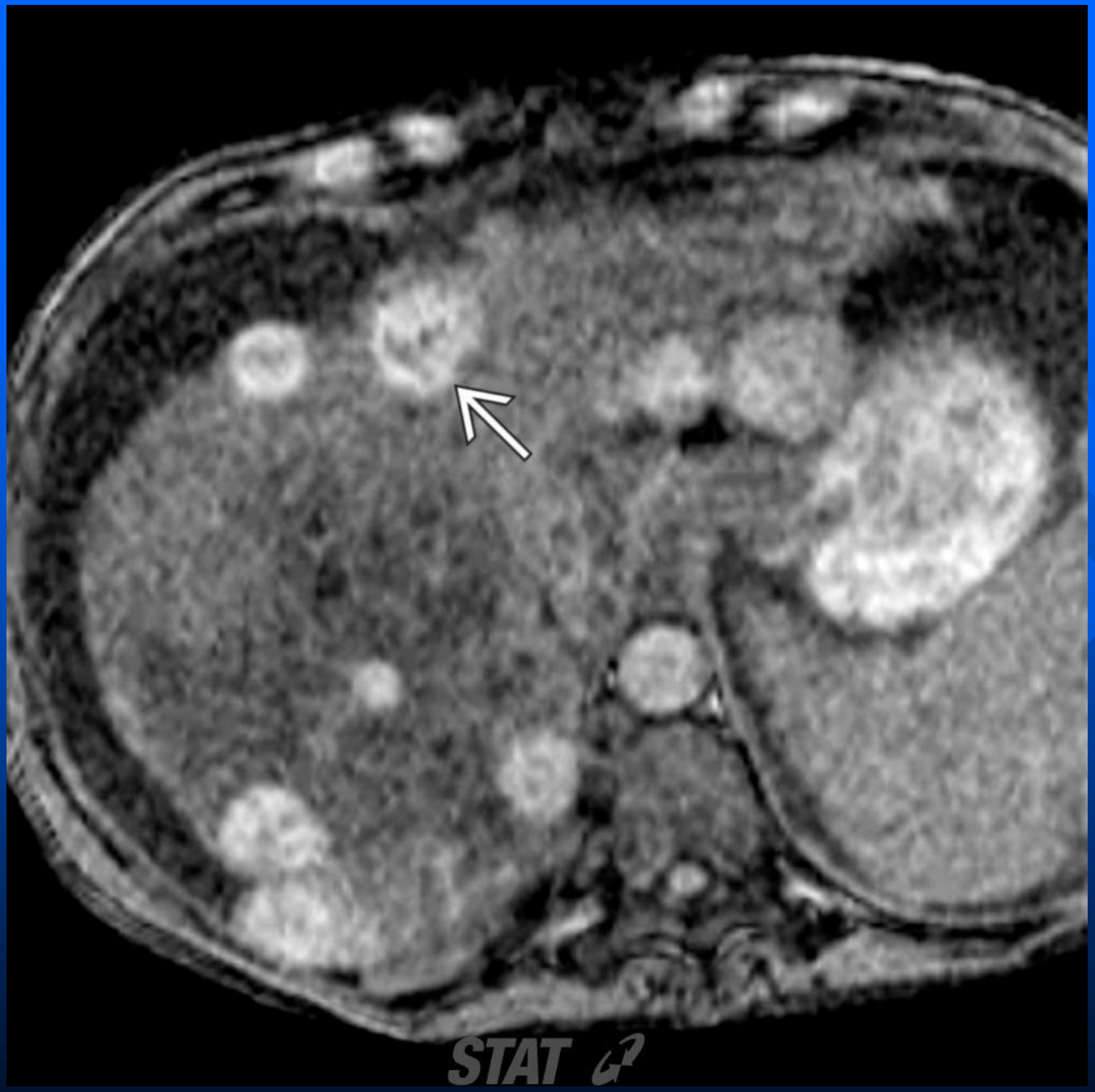
- **Age**
  - Onset between ages 30-65 years
    - » Typical onset of symptoms in 40- to 50-year-old women
    - » Takes ~ 7-10 years to progress to liver failure
- **Gender**
  - ~ 95% of patients are female
- **Epidemiology**
  - Accounts for 0.6-2.0% of deaths from cirrhosis
  - 3rd most common indication for liver transplantation in adults
  - Prevalence: 19-151 cases per million people
  - Incidence: 3.9-15 cases per million people each year

DDx:

- **Multifocal Hepatocellular Carcinoma (HCC)**
  - Heterogeneously hyperdense on arterial phase with **rapid washout** (CT and MR)
  - Commonly invades portal or hepatic veins; may have capsule
  - Hypointense on T1WI, hyperintense on T2WI
    - » LRNs are hyperintense on T1WI; iso- or hypointense on T2WI
  - Usually **no uptake or retention of hepatobiliary MR contrast agents**
    - » Heterogeneous retention in some well-differentiated HCC
- **Focal Nodular Hyperplasia (Multiple)**
  - Imaging and histology may be identical to LRNs
  - Different clinical setting
    - » FNH is usually an isolated lesion in healthy young woman with otherwise normal liver



Axial CECT shows classic findings of Budd-Chiari and multiacinar LRNs. Note the IVC stent (white open arrow), an occluded right hepatic vein (white curved arrow), and innumerable LRNs (white solid arrow) that are persistently hyperdense on this portal venous phase image



Axial T1WI MR in a 43-year-old woman with Budd-Chiari syndrome and multiple LRNs shows multiple hypervascular nodules, at least 1 of which has a central scar (white solid arrow).