Transient Hepatic Attenuation or Intensity Difference

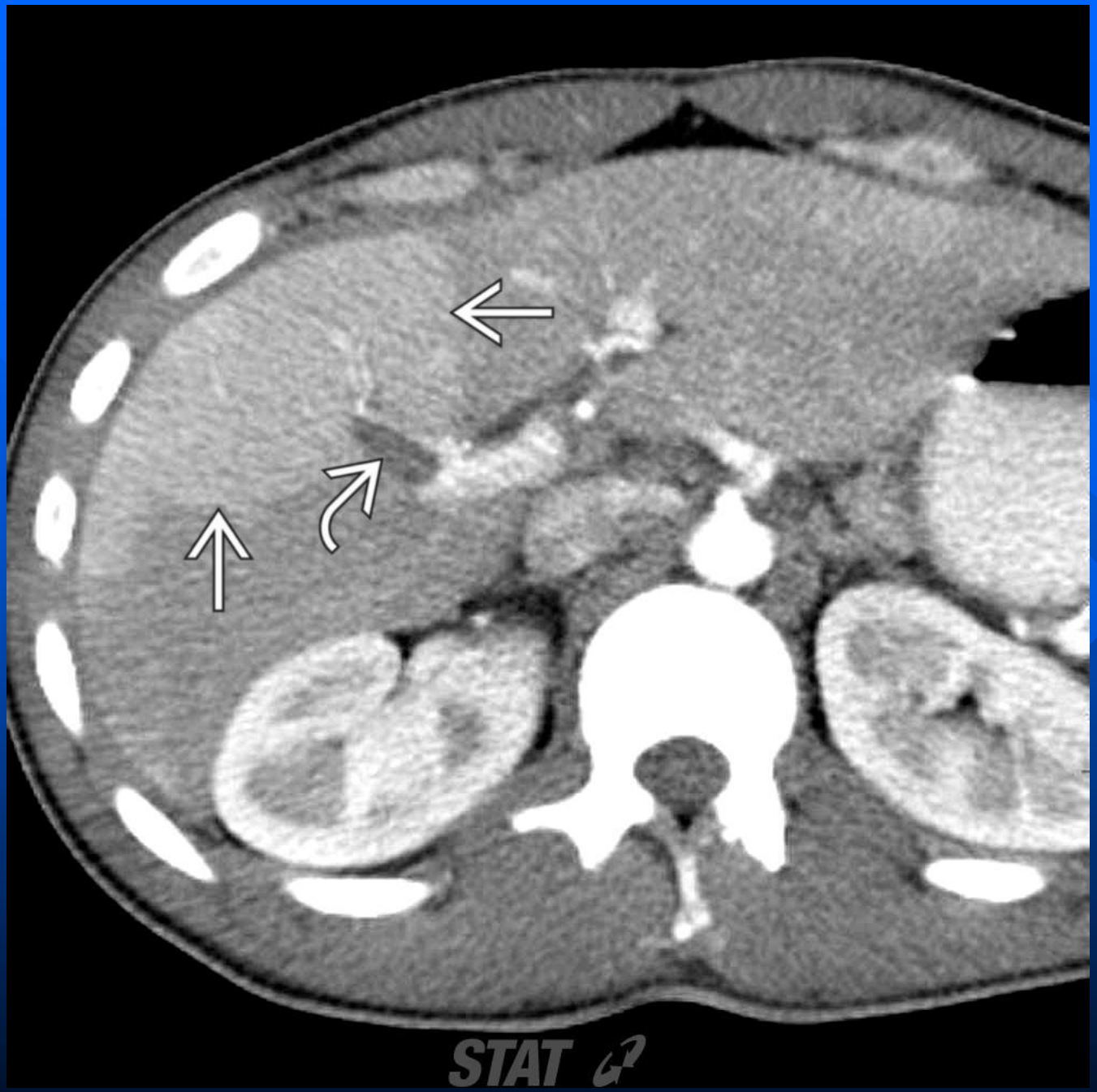
- Transient increase in hepatic attenuation (THAD) or
- Transient increase in hepatic intensity (THID)
- During arterial phase CT (or MR) due to regional variations in balance between hepatic arterial and portal venous blood flow,

Pathology

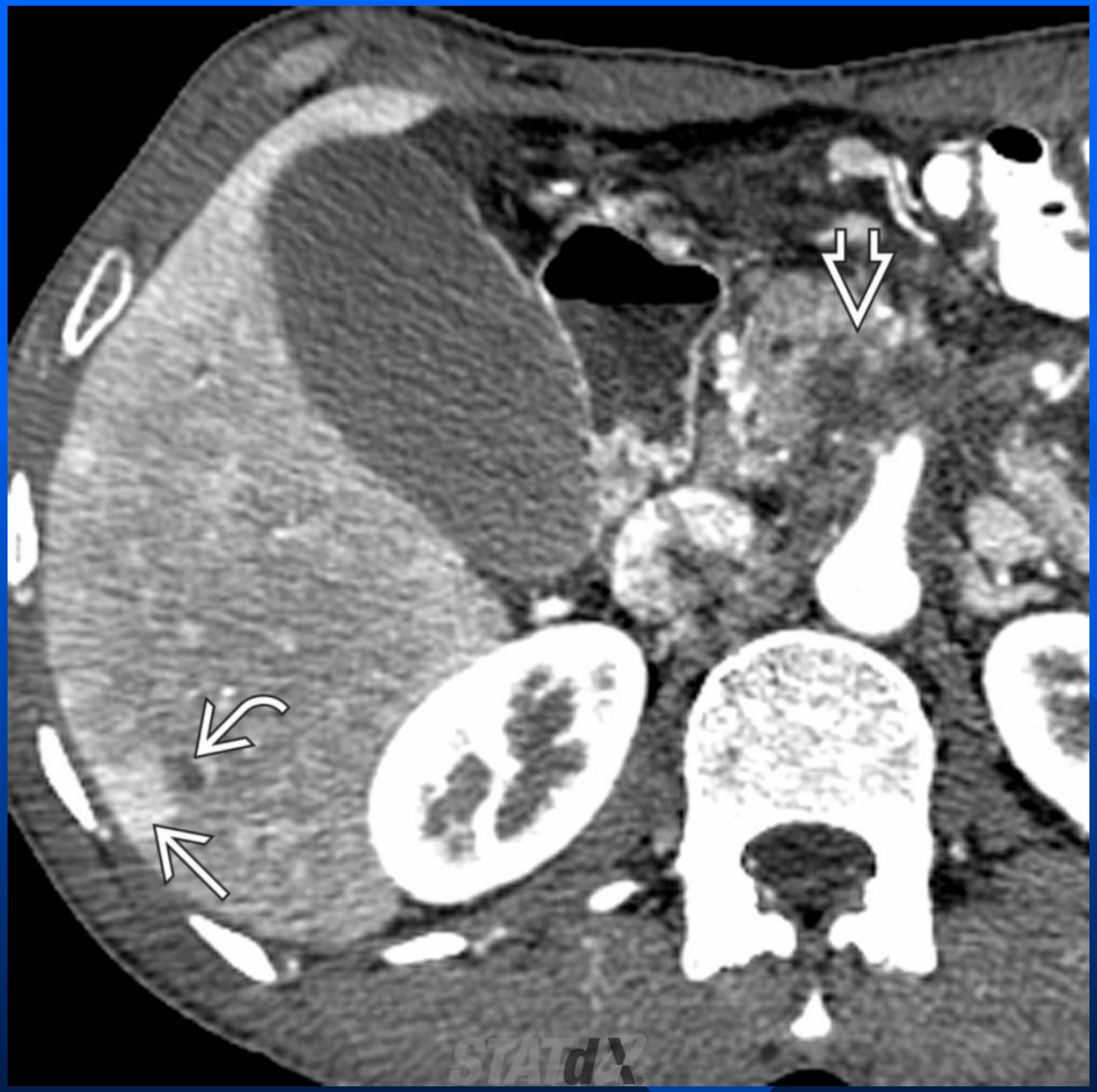
- **THAD due to decreased portal flow**
  - Segmental, peripheral portal vein thrombosis
  - Direct compression or occlusion of portal vein by mass
  - Elevated sinusoidal pressure (e.g., due to biliary obstruction)
- **THAD due to increased arterial inflow**
  - Peripheral AP shunts in cirrhosis
  - Hypervascular masses may draw ↑ flow (siphon effect)
  - Post-traumatic or congenital AV fistula
- 3rd inflow **alternative or additional source of venous flow to liver** (e.g., SVC occlusion)

Demographics

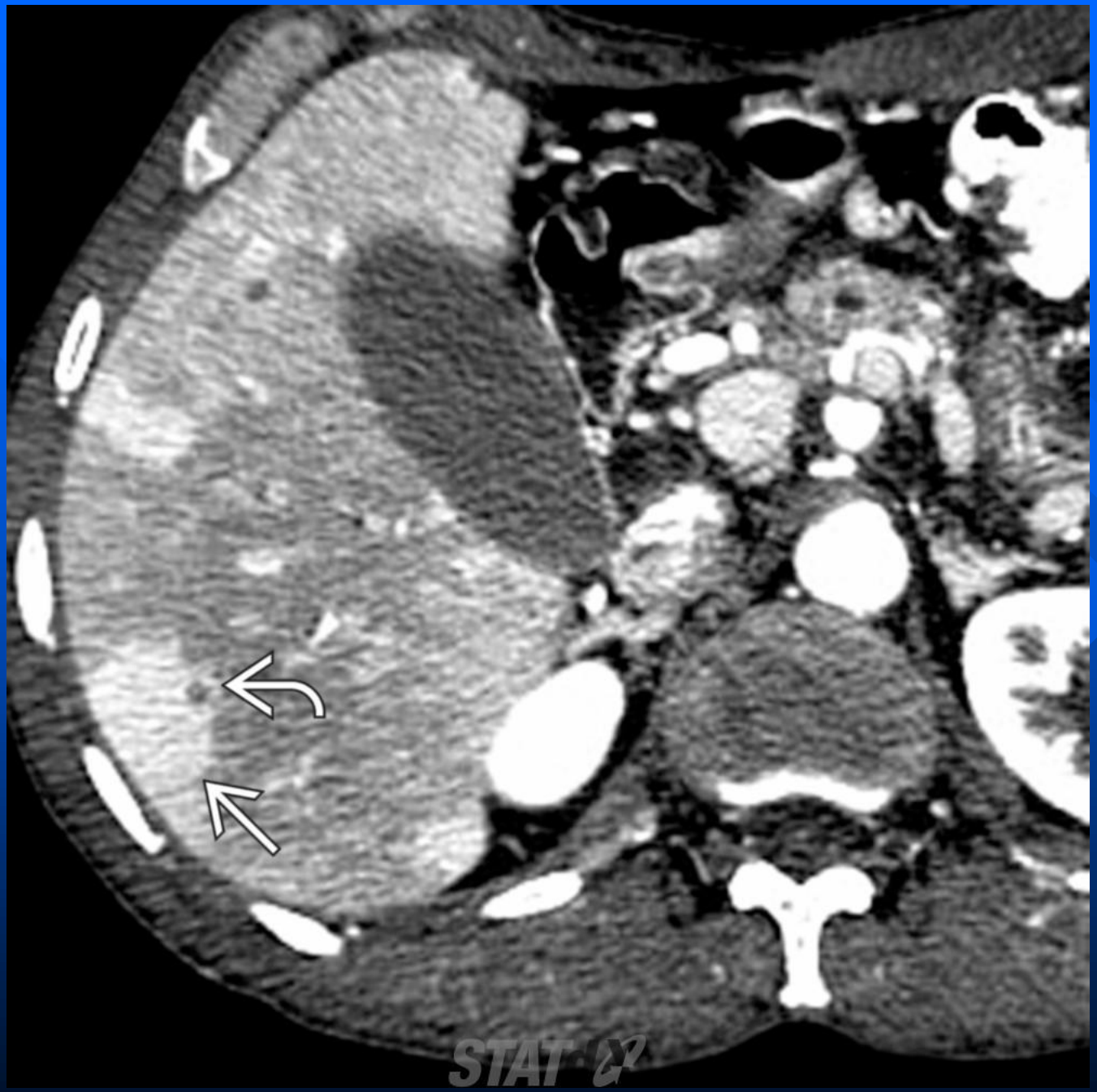
- **Age**
  - Any
- **Epidemiology**
  - Increased incidence in cirrhotic patients
  - Relatively common in metastases from tumors of gastrointestinal tract
    - » Spread to liver via portal vein
      - Metastases may occlude portal vein branch
- **Natural History & Prognosis**
  - Poor prognosis related to portal venous invasion
    - » Hepatocellular carcinoma, cholangiocarcinoma, metastases
  - Hypercoagulable (prothrombotic) conditions must be recognized and treated
    - » Imaging may provide 1st clue to these conditions
  - Underlying source of septic emboli must be identified
    - » Usually "smoldering" diverticulitis or appendicitis
- **Treatment**
  - Treat underlying disease (e.g., infection or tumor)
- Look carefully for small hepatic tumor at apex of THAD



Arterial phase CECT in a man recovering from abdominal gunshot wounds shows hyperenhancement of the anterior right lobe segments of the liver (white solid arrow) due to septic thrombosis of the anterior branch of the right portal vein (white curved arrow).



Axial CECT during arterial phase imaging in a 67-year-old man presenting with midepigastric pain, weight loss, and mildly elevated liver function tests shows a wedge-shaped THAD (white solid arrow) distal to a small hypoattenuating liver metastasis (white curved arrow) from pancreatic carcinoma. Note the low-attenuation pancreatic mass (white open arrow) involving the pancreatic head.



Axial arterial phase CECT in the same patient reveals a very small metastasis (white curved arrow) at the apex of the triangular THAD (white solid arrow).

Axial CECT in a 57-year-old woman presenting with weight loss, vague abdominal pain, and jaundice shows a dilated left main bile duct (black curved arrow) with a left lobar THAD (black solid arrow).

Arterial phase CECT in the same patient shows multiple hypervascular tumor foci (white curved arrow). The THAD (white solid arrow) distal to the largest tumor mass is due to the HCC obstructing the portal venous radicle to this segment of liver.