**Body MRA/MRV: Approaches and Strategies**

- Contrast enhanced methods
  - Basic sequence
  - Injection method and timing
  - Blood pool agents
- Non-contrast methods
  - General concepts
  - Pitfalls

**Pulse sequence**

- 3D SPGR
- Fat suppression in the abdomen/pelvis, not in the chest
- Fractional echo to minimize dephasing from moving spins
- High flip angle: 20 - 30 degrees versus 12-15 for dynamic liver

**Power Injection Method**

- Rate: Usually 1 cc/sec suffices. Faster rates when using view sharing or fluoroscopic triggering
- Volume: single dose (0.1 mL/kg except gadofosveset which is 0.12 mL/kg)
- Delay types: none, scan, injector
- Saline chaser pitfalls
  - Observe residual volume before injection
  - Line bleeding

**Timing approaches**

- Timing Bolus
  - Slightly complex
  - Best with sequential k-space acquisition
- Fluoroscopic triggering
  - Needs centric k-space acquisition
  - Challenge to suspend respiration quickly
- View-sharing
  - Can use with bolus timing, educated guessing, or fluoroscopic triggering

**Sequential Scan Delay**

**Goal:** Take data at center of k-space when contrast fills in the region of interest.

\[
\text{Scan Delay} = \text{Contrast Arrival Time} + \frac{1}{2} \text{Injection Time} - \frac{1}{2} \text{Scan Time}
\]

**Common non-contrast approach**

- Pitfalls
  - Metal
  - Turbulence
    - Normal study is normal
    - Abnormal study may be a false positive