



### Ultrasound Quick Reference for Peripheral Nerve Blocks

- Ultrasound technology is based on (ultra)sound waves. The basic mechanism involves the ultrasound probe (transducer) sending waves into tissue. These waves bounce back off different structures in tissue, and as they return to the probe, an image forms.
- Frequency and wavelength are inversely proportional
- Frequency and penetration (ie available depth) are also inversely proportional
  - e.g. a 15 MHz probe has low penetration compared to a 7.5 MHz probe
- Use of ultrasound requires contact gel to conduct waves into tissue and back to transducer
- Reflection and refraction of ultrasound waves result in differential imaging:
  - “Hyperechoic” – refers to more dense structures, show up as white on screen
  - “Hypoechoic” – refers to less dense structures, show up as black on screen
- Most commonly used modes:
  - B-Mode
    - 2D
  - Doppler
    - 2D with motion direction
    - red = toward transducer
    - blue = away from transducer
- “Knob-ology”
  - Frequency – choose the correct probe. Everything else depends on this.
    - The 6-15 MHz probe is usually adequate for most blocks except subgluteal sciatic and neuraxial techniques
  - Depth – try to make the depth sufficient so that the target is in middle of screen
  - Focus – should also be in middle of screen
    - Note: many ultrasound machines do this automatically now, so this may not be a knob on the machine
  - Gain – think of this as brightness. One wants the screen bright enough to see target tissue well, but not so bright so that many structures look white