



## Professional Ultrasound Services

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### Ultrasound – Clinical Applications

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#### 1. General Categories

- a. Abdomen
- b. Obstetrics/Gynecology
- c. Vascular
- d. Cardiac: Adult and Pediatric
- e. Ophthalmology
- f. Breast

#### 2. Review: Sound

- a. Vibrational (mechanical) energy
- b. Travels at known speeds
- c. Vibrates at different rates (frequency)
  - i. High pitch (porpoise)
  - ii. Low pitch (pipe organ)
- d. Reflects off “boundaries”

#### 3. Review: Sound/Images

- a. Reflected sound = echo
- b. Loudness of echo results from degree of difference in boundary characteristics
- c. Echoes plotted on IMAGE as gray or white “dots”

#### 4. Sound/Images = SONOGRAM

- a. A collection of “dots” displayed on a screen representing physics interaction between sound and human soft tissue
- b. “Dot” location and shade of gray related to distance and intensity of reflection
- c. Millions of “dots” placed together in sequential images = REAL-TIME

#### 5. Physical Principles

- a. Sound: frequency, velocity
- b. Reflection: caused by difference in media characteristics (Z) at boundaries
- c. B-mode: brightness mode; intensity of “dot” relative to intensity of reflection
- d. Echo Ranging:  $D = vt$
- e. Real-time: flicker fusion rate

#### 6. Abdominal Applications include:

- a. Genitourinary
- b. Liver, gallbladder, biliary, pancreas
- c. Vascular structures
- d. Gastrointestinal

- e. Prostate
- f. Small Parts

**7. Obstetric Applications include:**

- a. First trimester applications
- b. Ectopic pregnancy
- c. Routine screening 2<sup>nd</sup> trimester
- d. R/O fetal anomalies
- e. Many, others

**8. Gynecologic applications include:**

- a. Pelvic masses
- b. Post-menopausal indications
- c. Pediatric indications
- d. Infertility
- e. Cancer screening
- f. Vaginal bleeding
- g. Pelvic pain, infections
- h. Others

**9. Vascular Applications include:**

- a. Strokes, TIAs
- b. Aortic aneurysms
- c. Venous thrombosis
- d. Peripheral arterial disease
- e. Abdominal vasculature
- f. Transcranial Doppler

**10. Other Applications include**

- a. Cardiac
- b. Ophthalmology
- c. Breast