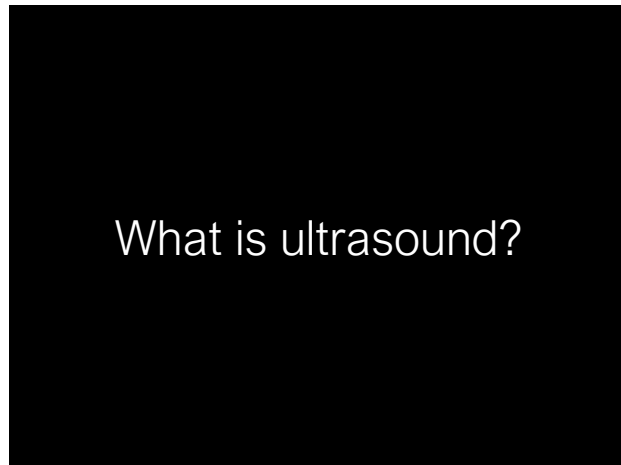
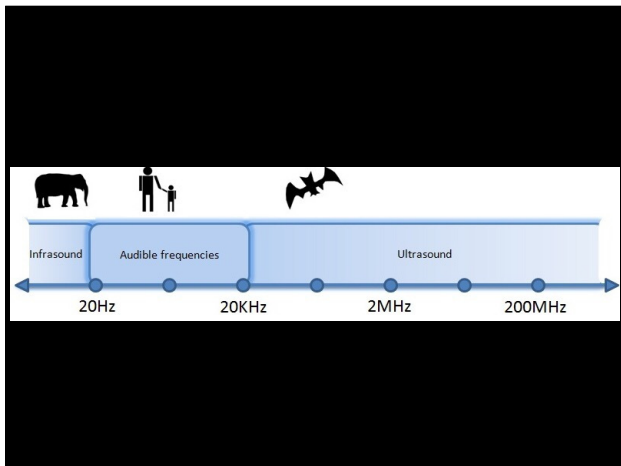




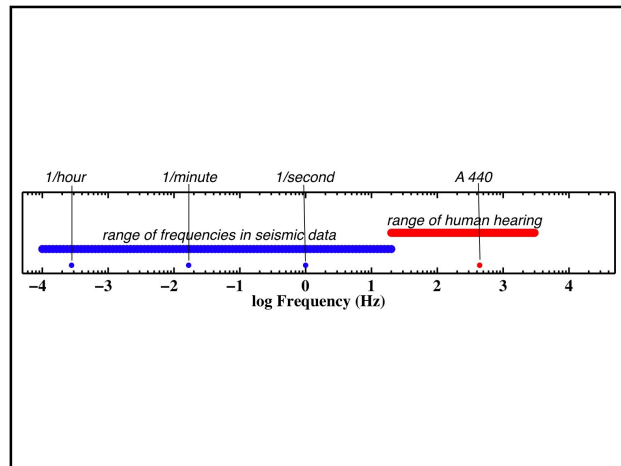
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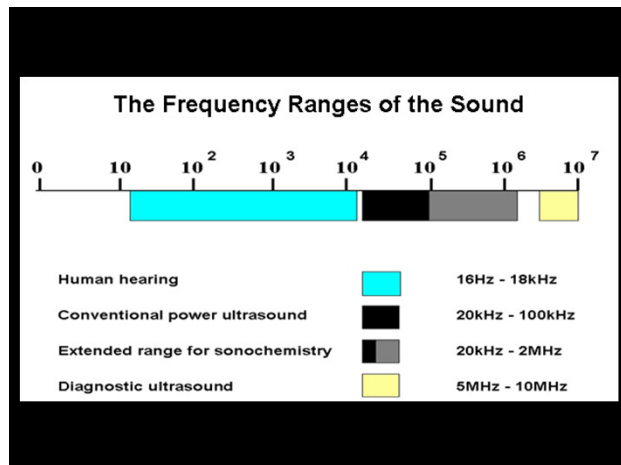
BBC News

- It is known that elephants generate vibrations through normal movements and vocalisations, known as "rumbles".
- These can be measured by techniques used for studying earthquakes.

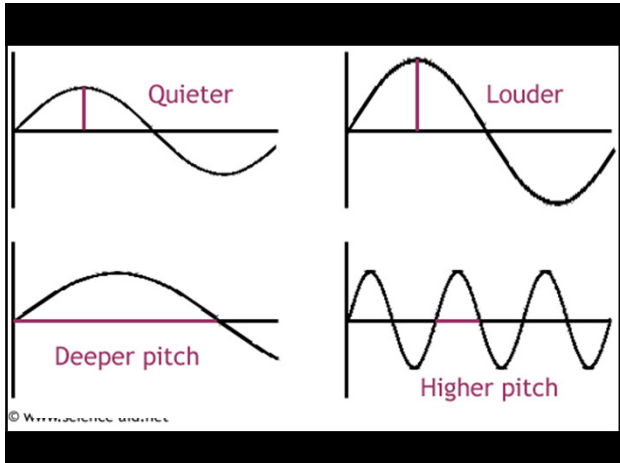


TEDWomen: Vibrations offer new way to track elephants

5



6



7

How did this start?

8

Step by step

- Sinking of Titanic and start of WW I catalysts for development of sonar
- Dussik attempted to visualize cerebral ventricles and tumors using primitive ultrasound in 1942
- Immersion-tank ultrasound systems , "the Somascope" in 1954

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Step by step

- Ian Donald (Glasgow) - obstetrics, 1960's
- Satumoro - doppler ultrasound to study cardiac valve motion
- 1965, Siemens - "Vidoson" first realtime ultrasound (15 frames/sec)
- In 70's and 80's adopters included radiology, cardiology, obstetrics/gynecology and ER

Ian Donald with the NE 4102

10

Step by step

- 1980's - Father of pulmonary ultrasound in clinical practice, Daniel Lichtenstein, French nocturnist

11

Personal involvement

- Observation by accident
- Limited baby steps
- Later realization of impact on clinical decision making
- Conversion to believer

12

OK! You got me!
What do I need?

13

This

- Main Unit
- Transducers
 - Shape
 - Frequency in MHz
 - Higher frequency - better resolution but less penetration
 - Lower frequency - more penetration but loss of resolution

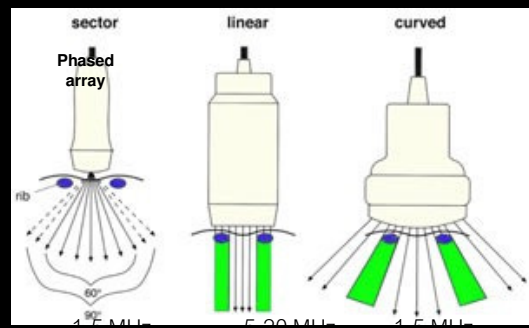
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A Machine



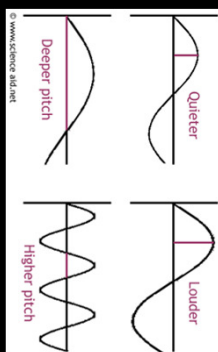
15

Some sort of transducer



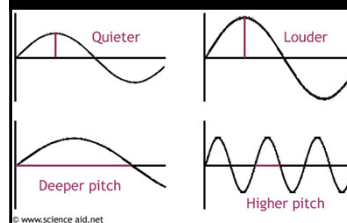
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Basic physics



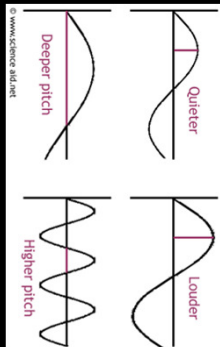
17

Basic physics



18

Basic physics



A curvilinear or sector transducer would be top left, and a linear transducer would be bottom left

The lower the frequency, the longer the wavelength, and the higher the frequency, the shorter the wavelength

19

Summary

- Main Unit
- Transducers
 - Shape
 - Frequency in MHz
 - Higher frequency - better resolution but less penetration
 - Lower frequency - more penetration but loss of resolution

20

Technique

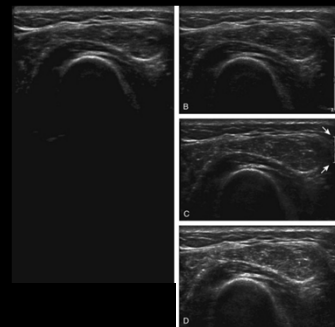
4 Basic Steps

1. Optimize image
2. Image in short and long axis
 - Use landmarks to orient
3. Eliminate artifact, specifically anisotropy
4. Characterize pathology

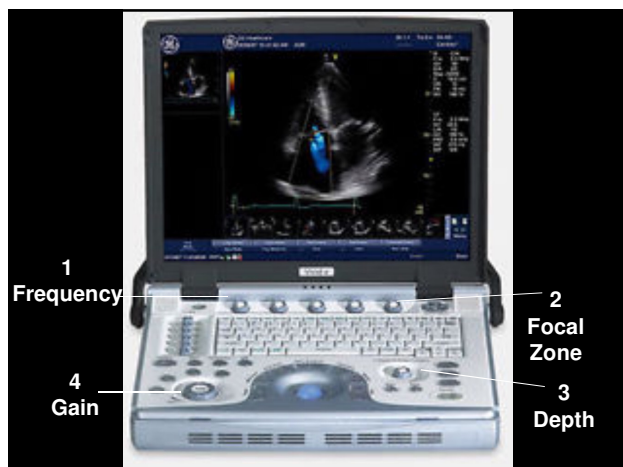
21

The 'optimized' image

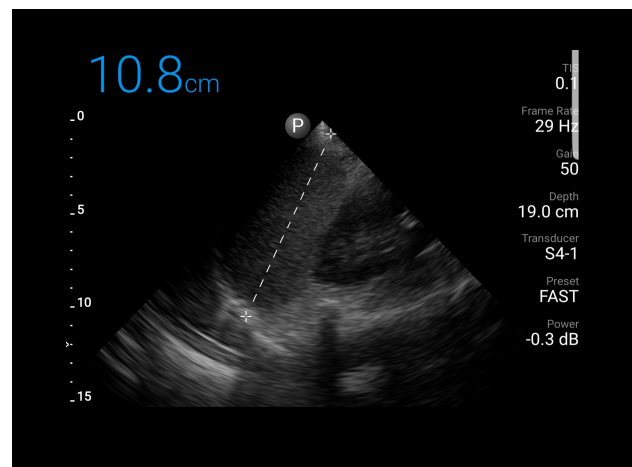
- A to B - depth adjusted
- B to C - focal zone adjusted
- C to D - gain increased



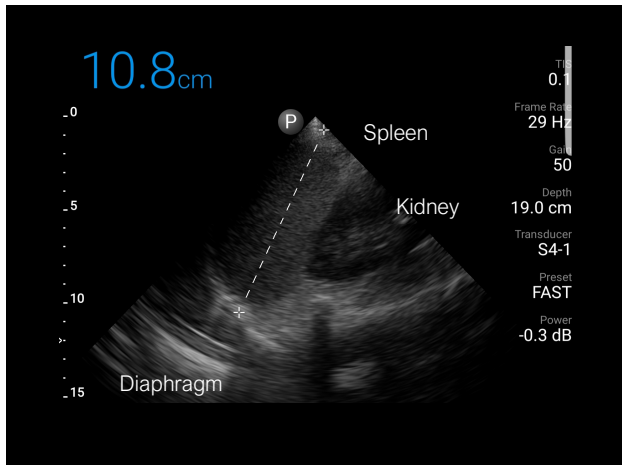
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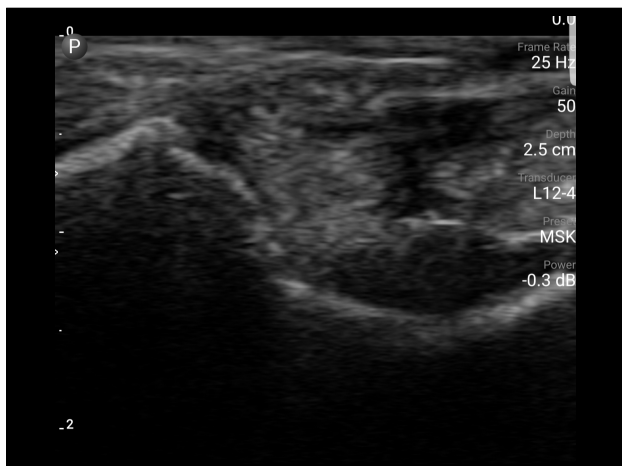
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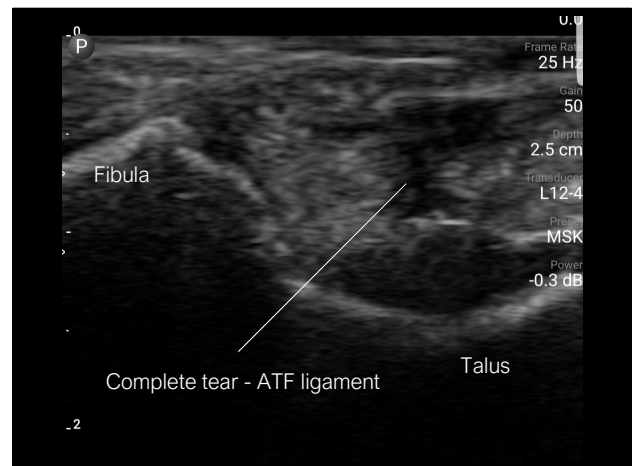
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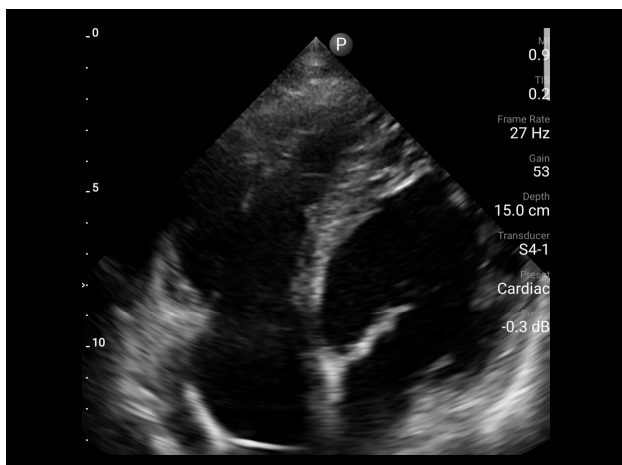
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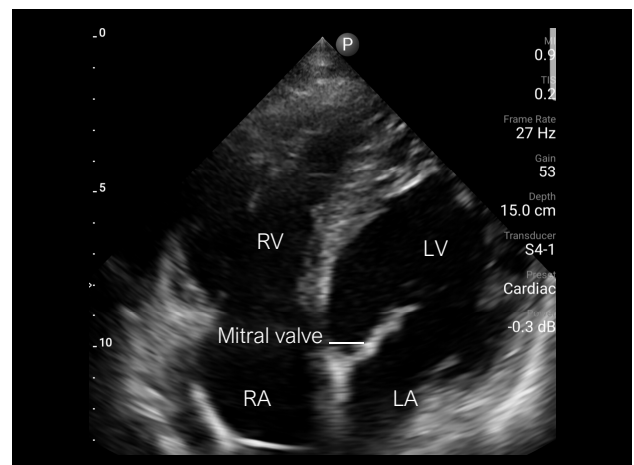
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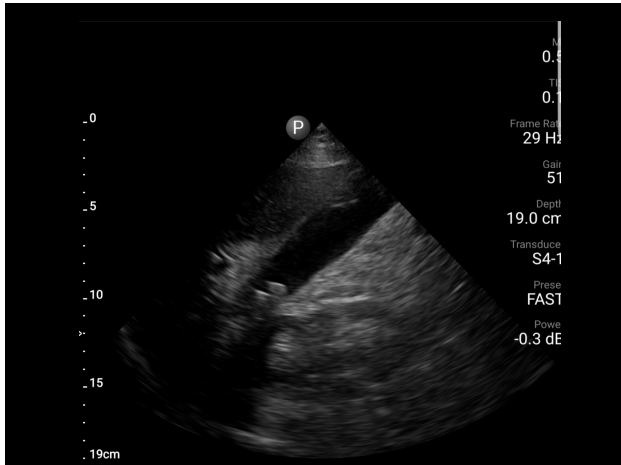
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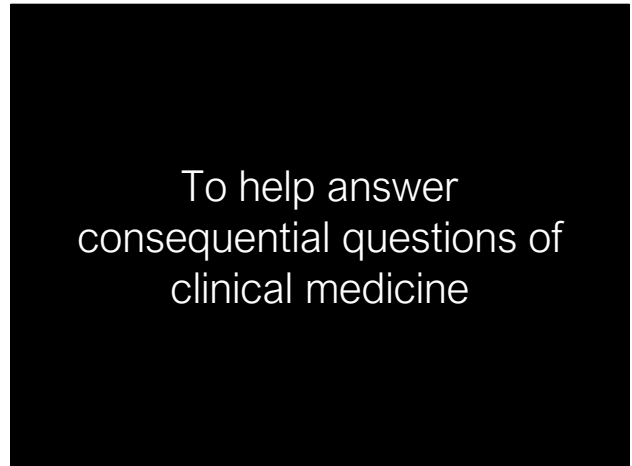
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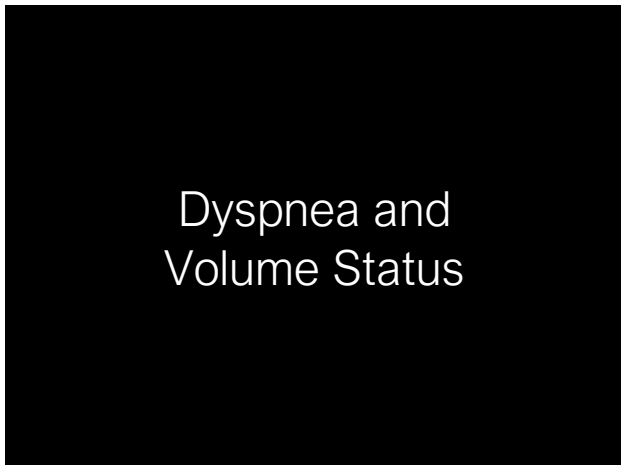
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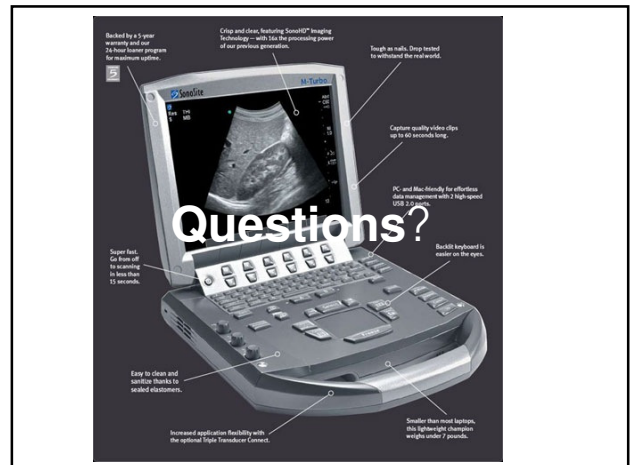
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