College of Health and Medical Techniques
Department of Radiology Techniques

ULTRASOUND EQUIPMENT TECHNIQUES

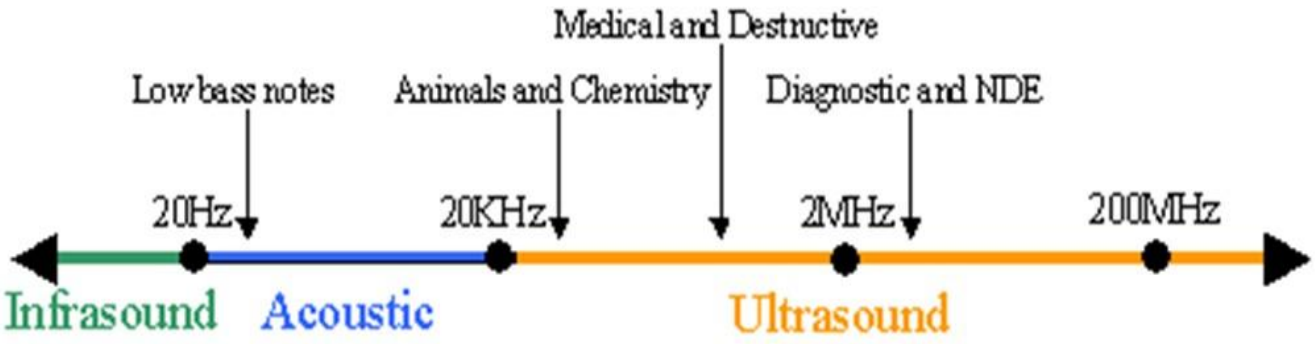
(Ultrasound waves)

LECTURE [2]

3RD STAGE / 1 ST SEMESTER

Ultrasound waves

Ultrasound waves have frequencies higher than the human hearing range. In positions of frequency between 20 and 20,000 Hz. Ultrasound frequency is more than 20000 Hz. They make use of ultrasound from bats and dolphins, some other animals that can hear frequencies above ..



Definition Ultrasound:

Physical Definition; Ultrasound (ultrasonic) is the term used to describe sound of frequencies above 20 000 Hertz (Hz), beyond the range of human hearing.

Medical Definition; Diagnostic Medical Ultrasound is the use of high frequency sound to aid in the diagnosis and treatment of patients and the frequency ranges used in medical ultrasound imaging are 2 - 15 MHz.

- A megabyte is exactly equal to 1024 kilobytes, whereas a kilobyte is equal to 1024 bytes by 1024 bytes.
- A gigabyte equals 1024 megabytes, which is equal to 1024 bytes by 1024 bytes by 1024 bytes.

Diagnostic Ultrasound:

Today, ultrasound is one of the most commonly used imaging technologies in medicine. Sounds in the range 2 and 18 megahertz (MHz) are typically used for diagnostic ultrasound. The accuracy of ultrasound diagnosis based on computerized analysis of reflected ultrasound waves, which non-invasively build up fine images of internal body structures. The best resolution can be achieved is by using shorter wavelengths, with a wavelength that is inversely proportional to the frequency.

However, the use of high frequencies is limited due to the increased attenuation (loss of signal strength) in various tissues and so easily absorbed and thus shorter than the depth of penetration.

- 3–5 MHz for abdominal areas
- 5–10 MHz for small and superficial parts
- 10–30 MHz for the skin or the eyes

Bones absorb ultrasound much more than soft tissue, so that, in general, ultrasound is suitable for examining only the surfaces of the bone. For this reason, ultrasound images show a black zone behind the bones due to the inability of ultrasound energy to reach those areas. If the high frequencies used, called acoustic shadow.

Detection of Ultrasound:

An ultrasonic transducer (generally, a transducer is any device to convert energy from one form to another, usually to or from electrical energy.

Ultrasound gel is a type of conductive medium that is used in ultrasound diagnostic techniques. It is placed on the patient's skin . The transducer, which is the device used to send and receive sound waves, is then placed on top of it.

It works by passing sound waves into a person's body. Once there, they don't remain for long. Instead, they bounce off the organ or other part of the body. The sound waves then move back through the transducer, and they are ultimately analyzed by a computer.

Ultrasound Imaging Systems:

Modern ultrasound systems use digital computer electronics to control most of the functions in the imaging process or echo to form an image.