

Physics of Ultrasound

First lecture

The Nature of Ultrasound

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Third Stage

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1. Introduction

- As in other areas of medical imaging, physics plays a leading role as the foundation for ultrasonic imaging. Ultrasonic imaging is a technique of generating images using a very high frequency sound. Sound is a mechanical, vibration form of energy.

How is ultrasound produced for medical imaging purposes?

- Ultrasound for medical imaging is generated in special crystalline materials which, when electrically excited, are capable of vibrating at frequencies of millions of vibrations per second.
- The devices in which ultrasound is produced, and also detected, are called transducers.
- The ultrasonic energy is suitably focused into a narrow beam, which is then directed into the tissues in selected areas of the patient.
- The beam when interacts with the tissues suffering a reduction in its intensity, or attenuation.
- Beam interacts with the tissues through various processes include reflection, refraction ,absorption, and scattering of the beam energy.

What are factors affected on the interaction processes?

- 1- The parameters of the ultrasound beam, especially the frequency.
- 2- The physical properties of the medium through which the beam passes such as density, elasticity, and viscosity.