



Sawa University

College of health and medical techniques

Department of Radiology Tech.

Third Stage

Radiological Equipment techniques

محاضرة

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Lecturer:

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Diagnostic ultrasound

- **Today, ultrasound (US) 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.**

Diagnostic ultrasound

-The best resolution can be achieved 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.

Diagnostic ultrasound

-For this reason, specific probes are used for different frequency ranges to examine different parts of the body:

A- 3–5 MHz for abdominal areas.

B- 5–10 MHz for small and superficial parts.

C- 10–30 MHz for the skin or the eyes.

Diagnostic ultrasound

-Because of the heterogeneity of the different tissues within the body with different densities, the ultrasonic waves penetrate varies accordingly. 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.

Ultrasound Imaging Systems

- **The main components of an ultrasound imaging system are as follows:**
 - 1 Ultrasound transducer.**
 - 2 Display screen.**
 - 3 Transducer pulse controls.**
 - 4 CPU and software.**
 - 5 Keyboard.**
 - 6 Printer.**

Ultrasound Imaging Systems

- **Ultrasound Transducers:** In general, a transducer is a device that converts energy from one form to another, in the case of Ultrasound transducers; the conversion is from electrical to mechanical energy (or vice versa. (
- **Display screen:** displays the image from the ultrasound data processed by the central processing unit.

Ultrasound Imaging Systems

- **Transducer pulse controls:** changes the amplitude, frequency and duration of the pulses emitted from the transducer probe.
- **CPU And Software:** Behind the scenes, the ultrasound machine is powered by a robust central processing unit (CPU) and specialized software.

Ultrasound Imaging Systems

-The CPU is responsible for processing the incoming data from the transducer and converting it into visual images displayed on the screen. The software, on the other hand, plays a critical role in image enhancement and manipulation. In the case of 3D/4D images, it may apply filters, modify contrast, and even generate three-dimensional reconstructions.

Ultrasound Imaging Systems

- **Keyboard:** inputs data and takes measurements from the display.
- **Printer:** prints the image from the displayed data.



Main monitor

Transducer

Optimized for each examination area



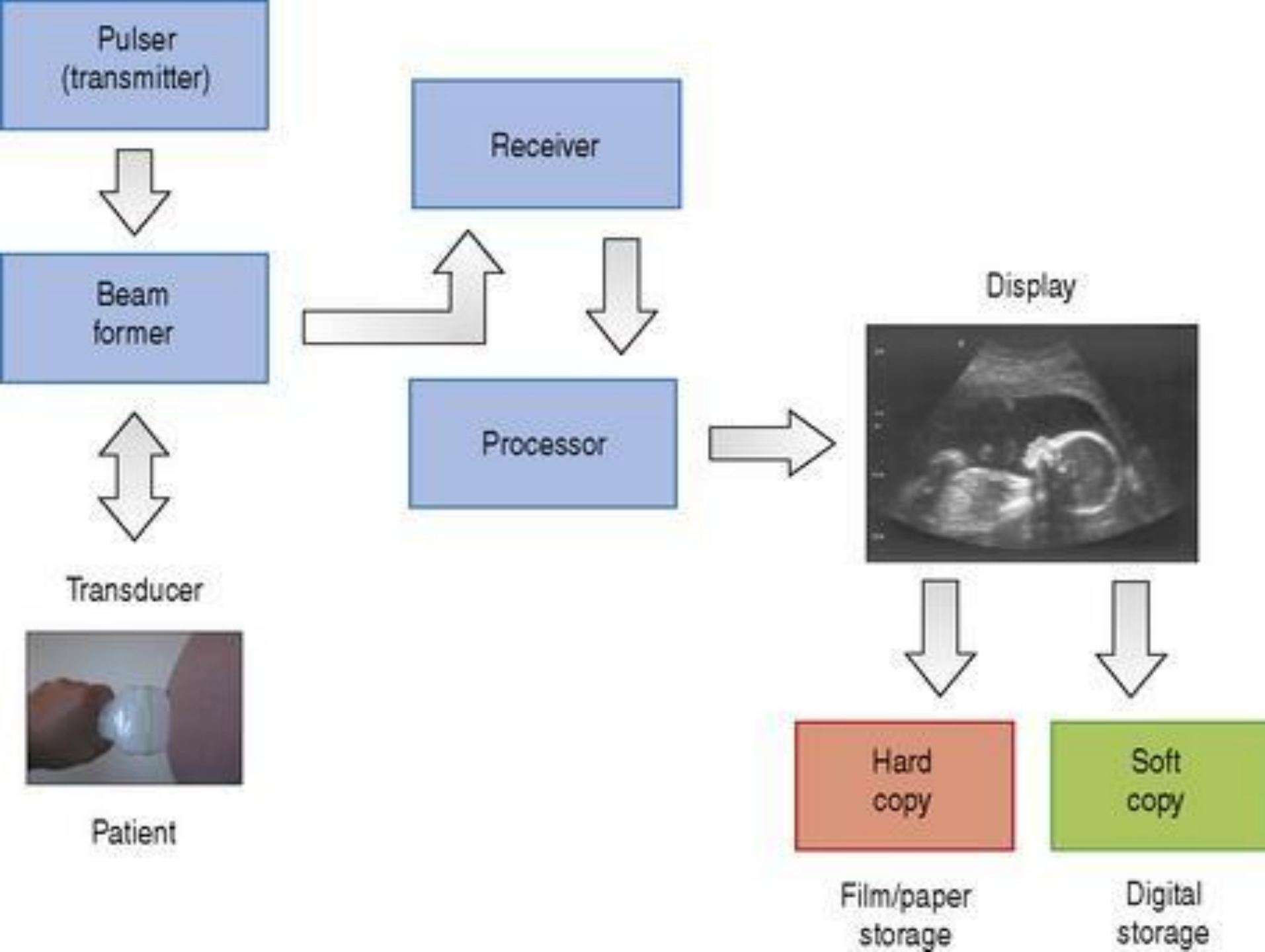
Operating panel unit

Operated with buttons or trackball



Processing unit







THANK
YOU!

This is a vibrant, stylized illustration. Two hands, rendered in a flat, orange-brown color, are shown from the wrists up, holding a dark navy blue rectangular sign. The sign features the words 'THANK YOU!' in a bold, light green, sans-serif font. The background is a lively composition of various shades of green (from light mint to deep forest green) and white. It is decorated with numerous circles of different sizes and colors (yellow, orange, white, black), some of which have smaller circles inside them, creating a bubbly or confetti-like effect. The overall style is modern and cheerful.