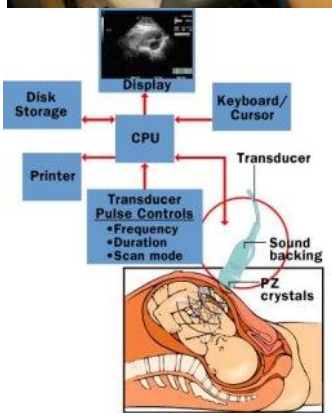
# Sequence n° 9: measuring thanks to ultrasound waves

## ACTIVITY 1 : How ultrasound works

**Document 1: the ultrasound machine**

- **Transducer probe** - probe that sends and receives the sound waves
- **Central processing unit (CPU)** - computer that does all of the calculations and contains the electrical power supplies for itself and the transducer probe
- **Transducer pulse controls** - changes the amplitude, frequency and duration of the pulses emitted from the transducer probe
- **Display** - displays the image from the ultrasound data processed by the CPU
- **Keyboard/cursor** - inputs data and takes measurements from the display

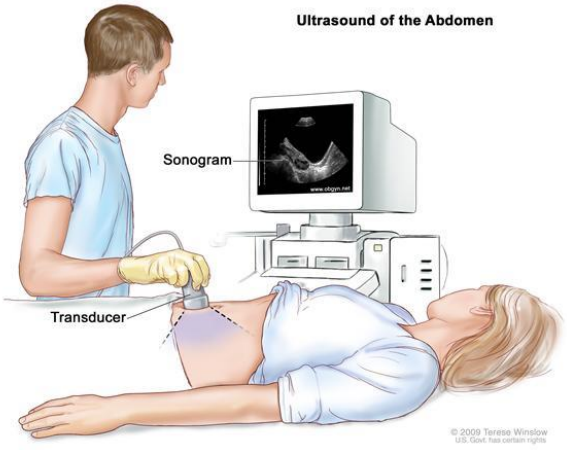



Ultrasound of the Abdomen

**Source**: wikipedia

**Document 2: the transducer probe**

The **transducer probe** is the main part of the ultrasound machine. The transducer probe makes the sound waves and receives the echoes. It is, so to speak, the mouth and ears of the ultrasound machine. The transducer probe generates and receives sound waves using a principle called the **piezoelectric** (**pressure electricity**) **effect**, which was discovered by Pierre and Jacques Curie in 1880. In the probe, there are one or



more quartz crystals called **piezoelectric crystals**. When an electric current is applied to these crystals, they change shape rapidly. The rapid shape changes, or vibrations, of the crystals produce sound waves that travel outward. Conversely, when sound or pressure waves hit the crystals, they emit electrical currents. Therefore, the same crystals can be used to send and receive sound waves.

Figure: the transducer probe

**Source**: wikipedia

Figure: 3D-ultrasound

**Source**: wikimedia commons

**Document 3: how ultrasound works (video)**


**Source: https://www.youtube.com/watch?v=I1Bdp2tMFsYhttps://www.youtube.com/watch?v=I1Bdp2tMFsY**

## Understanding ultrasound

List the main elements of an ultrasound machine.

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What is the role of the transducer probe?

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Which type of waves are emitted?

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## Explaining how ultrasound works

Give a short presentation on how ultra sound works.

# Activity summary

What you must remember:
**- ultrasound waves**
**- probe**

Skills linked to the curriculum**:**

| Compétences | Capacités à maitriser |
|---|---|
| – APP | – **Comprendre et mobiliser** des connaissances en lien avec le problème posé<br>– **Extraire** une information jugée pertinente<br>– **Identifier et utiliser** la complémentarité d'informations |
| – ANA | **Relier les informations présentées dans les documents** concernant l'échographie **aux connaissances** sur les phénomènes de réflexion, transmission et absorption. |
| – COM | Formuler et argumenter des réponses structurées<br>Formuler et présenter une conclusion<br>Effectuer une courte présentation orale |