

## MEDICAL PHILATELY

## History of Ultrasound in Medicine

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**Paul Langevin**  
France, 1948

**L**azzaro Spillanzani (1729-1799), an Italian biologist, can be called the originator of Ultrasound. He determined that bats were using their ears and not their eyes to navigate in darkness to locate their prey. Only after 1920s it became known that bats emitted very high frequency sounds above the limit of human hearing, and the echoes determined precise location of objects (echolocation or "bio-sonar"). The real breakthrough in the evolution of high frequency echo sounding technique came when **Pierre (1859-1906) and Jacques Curie** observed that an electrical potential was produced when mechanical pressure was exerted on certain quartz crystals in 1880. The technique came to be known as Piezoelectric (pressure electricity) effect. Conversely if a rapidly changing electric potential is applied to such crystal, its face can be made to vibrate rapidly. In this way crystal can be used to set up beams of ultrasonic sounds waves with frequencies far too high to hear. Curie's discovery gave birth to transducer used in ultrasonography for generating and receiving Ultrasound echoes. USG became an industrial tool and also found use in detecting objects beneath water and ocean surface. French physicist **Paul Langevin (1872-1946)** developed powerful high frequency ultrasonic echo sounding device, a 'hydrophone'. It was extensively deployed in the surveillance of German submarines during WW-I. Langevin's



**Ship with Sonar**  
Yugoslavia, 1958

use of ultrasound to detect submarines led to great advance in **SONAR (Sound Navigation and Ranging)** during WW-II.

Ultrasound was used in medicine therapeutically long before it became a diagnostic tool. The destructive ability of high intensity ultrasound was recognized in 1920 when Langevin noted destruction of group of fishes in sea by high intensity ultrasound. It was used in Parkinsonism combined with craniotomy, to destroy parts of basal ganglia. 1940s saw exuberant claims of ultrasound effectiveness in many diseases without any scientific evidence.

First use of ultrasound in diagnostic medicine was made by Austrian neurologist **Karl Dussik (1908-1968)** and his brother in 1946. They attempted to locate brain tumors and cerebral ventricles by measuring transmission of ultrasound beam through the skull. However, first definitive use of ultrasound was shown by George Ludwig in USA (1949) when he visualized gall stones.

In today's practice, sound waves are pulsed into the patient and returned



**Ultrasound imaging in pregnancy**  
Australia, 1976

as echoes from targeted structures by means of a transducer. Echo returns are converted to signals and recorded on a CRT monitor. The number of times the sound wave is repeated per second is measured in megahertz and is referred to as frequency. There are various display modes like A-mode referring to amplitude, B-mode to brightness, Dynamic M modes to motion in real time 2D and 3D modes. Ultrasound is used to visualize urinary tract (KUB), liver, gall bladder, heart, eyes, fetus or any other organ; it is very useful in USG guided procedures. Obstetrical imaging has become a routine in antenatal examinations for observing fetal development.

Ultrasound was employed in experimental cardiac investigations by **Inge Edler and Hertz** in Lund Sweden. They described use of ultrasound for assessing mitral valve disease in 1953. Clinical use of M mode echocardiography for assessment of mitral valve and left ventricular dimensions was standardized in the 1960s. The advent of 2D Echo (1970s), pulsed Doppler (1970s) and color Doppler (1980s) introduced new methods for routine assessment of cardiac anatomy and hemodynamics at bedside.