

# Fetal Dopplerometry

**Fetal doppler** was developed by Dr. Edward H. Hon in 1958. A Fetal Doppler is a hand-held ultrasound transducer, which is used to record the fetal heartbeat during prenatal care. It uses Doppler effect to provide an audio simulation of a heartbeat. Some models can display heart rate in beats per minute (bpm - *beats per minute*).

## Physical principle and use

**Fetal doppler consists of two parts:**

1. hand-held probe which contains one or more ultrasonic transducers or transducer field for the generation and detection of ultrasonic waves;
2. an electronic base unit capable of converting electronic signals from the probe into an audible response that can be perceived by the human ear.

In practice, a hand-held probe is placed against the abdomen of a pregnant woman with the probe end pointing towards the place, where the fetus is believed to be. After the probe activates, an ultrasonic signal is emitted through the wall of the abdomen. Part of this wave is reflected to the probe. If the fetus is present, the movements of its heart along with the movement of blood through the cardiac atria and ventricles will be manifested in the frequency shift ("Doppler shift") of the waves reflected from the given area. The magnitude and sign (direction) of the Doppler shift changes with the instantaneous velocity of the wall reflecting the sound waves. Therefore, if this given wall is also the wall of the fetal heart, the Doppler shift reflects the movement of the cardiac atria and ventricles. The Doppler shift, is as the base unit converted into an audible signal. The base unit can also provide a visual image (such as a digital display) of fetal heart sounds.

Nowadays, continuous radiation of the ultrasound waves is not used anymore. It was replaced by the pulse radiation of the ultrasound waves, which is more considerate to both the mother and the fetus. Generally, frequencies of 1 MHz, 1,5 MHz, 2 MHz a 2,5 MHz are used for fetal monitoring. Usually, the Fetal doppler is capable to reliably detect the fetal heartbeat from approximately the twelfth week of pregnancy. It is mainly caused due to the low level of ultrasonic waves reflected from the heart of the fetus in the first trimester, but also to the high degree of the waves subdued by the mother's abdominal wall. Nevertheless, even in this period (approx. from the 9th week), it is still possible to use the Fetal doppler with a probe that is emitting pulses with a frequency of 3 MHz.

## Fetal heart rate

Heart rate of the fetus begins at the 5th week and increases by 3,3 bpm per day during the following months. The heart of the fetus begins to beat at the same rate as the mother's heart, which is usually 80–85 bpm. Amid the 9th week, the heart rate increases up to 155–195 bpm. At this point, the heart rate of the fetus commences to decrease, and by the 12tw week settles down to 120–160 bpm.<sup>[1]</sup>

Illustrational examination of a 16-week-old fetus with Fetal Doppler:



Fetal doppler.

## Usage

Fetal doppler was originally developed for professional care however, this device is nowadays becoming very popular within the household and on the market, it is possible to find this device of different brands and in different price ranges. There are different types of Fetal Dopplers for both home and hospital use, with slight variations in individual types. Probes may or may not be waterproof. Waterproof probes are used as a mean of water birth delivery. However, use of the Fetal Doppler at home is not recommended, precisely due to the possibility of harming the developing fetus. Fetal doppler also requires professional experience to distinguish the fetal heart rate from other sounds, because various movements in the woman's body (kicking of fetus, intestine movements, blood flow in the arteries) are also evaluated, and so they have to be distinguished from the heart rate of fetus. <sup>[2]</sup>

## Links

### Related articles

- Doppler ultrasonography in medicine
- Doppler ultrasonography
- Doppler mapping
- Doppler phenomenon

## References

1. FetalSure. Fetal Heart and Heartbeat Facts. Available at <http://www.fetalsure.com/fetal-heart.html>. Retrieved 9 August 2010.
2. Is it safe to use a fetal Doppler to listen to my baby's heartbeat at home? Available at [http://www.babycenter.com/404\\_is-it-safe-to-use-a-fetal-doppler-to-listen-to-my-babys-hear\\_10349809.bc](http://www.babycenter.com/404_is-it-safe-to-use-a-fetal-doppler-to-listen-to-my-babys-hear_10349809.bc). Retrieved 31 March 2013.

## Used literature

- Wikipedia, the free encyclopedia. *Doppler Fetal Monitor* [online]. The last revision 2013-08-19, [cit. 2013-11-17]. <[https://en.wikipedia.org/wiki/Doppler\\_fetal\\_monitor](https://en.wikipedia.org/wiki/Doppler_fetal_monitor)>.
- OrangeKidz.nl. *Fetal Doppler* [online]. [cit. 2013-11-17]. <<http://www.orangekidz.nl/pages/Fetal-Doppler.html>>.