

Sequence n° 8: measuring speed with the Doppler effect

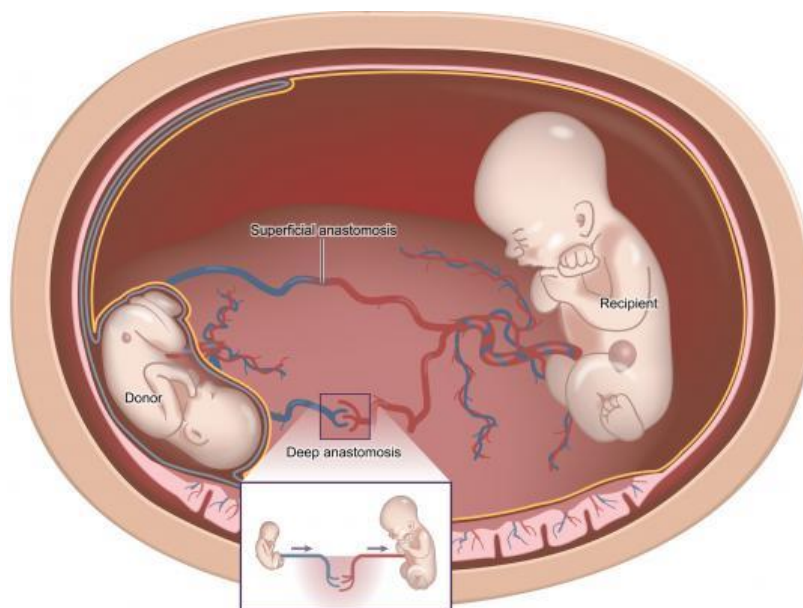
ACTIVITY 1 : Doppler ultrasound used in twin pregnancies

Document 1: twin-to-twin transfusion syndrome

In twin pregnancies, the risk of delivering **growth-restricted** babies is about ten times higher than in singleton pregnancies.

In some twin pregnancies, a difference in size between the fetuses may be a consequence of an **imbalance** in fetal nutrition as a result of “twin-to-twin transfusion syndrome”. This means that one of the babies is getting more nutrients than the other, nutrients are transferred from the “donor” to the receiver.

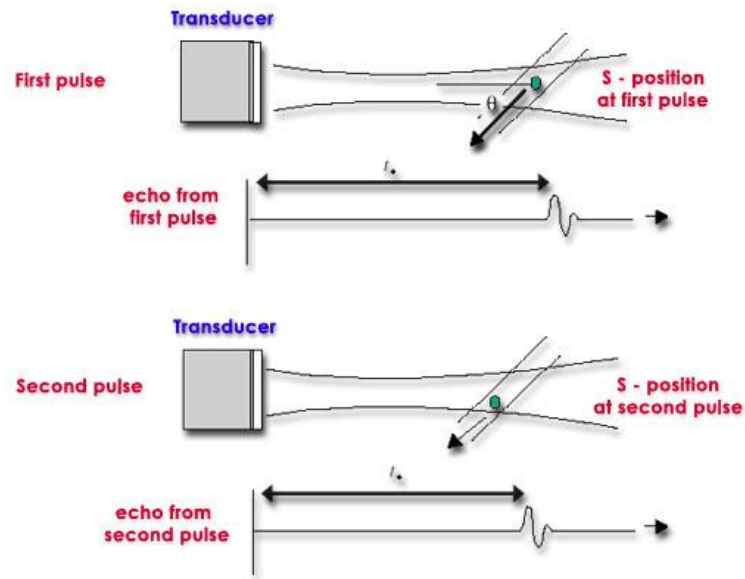
One way to detect this disease is Doppler ultrasound: in twin-to-twin transfusion syndrome the net **flow of blood** across the placental venous communications from one fetus, the donor, to the other, the recipient, is **increased**.



Source: sonoworld.com

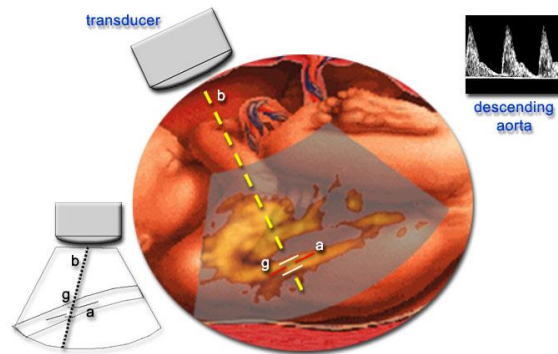
Document 2: ultrasound velocity measurement

The diagram shows a scatterer S moving at velocity V with a beam/flow angle θ . The velocity can be calculated using the difference in transmit-to-receive time from the first pulse to the second (t_2), as the scatterer moves through the beam.

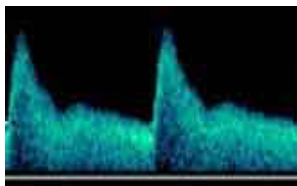


Source: sonoworld.com

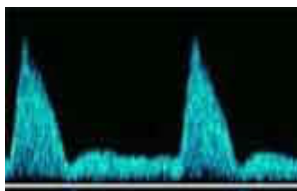
Document 3: abnormal development of the uterine artery



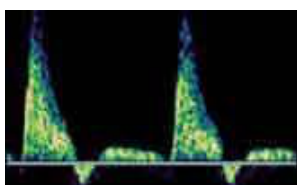
Abnormal Development of the uterine artery



Normal impedance to flow in the uterine arteries (with the characteristic waveform of early diastolic notching)



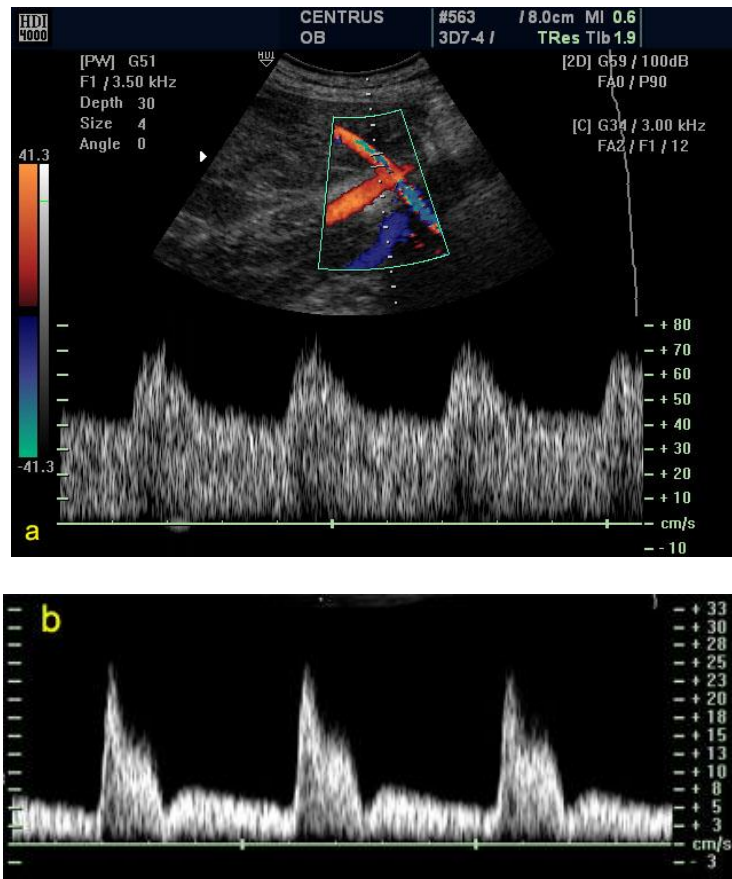
Increased impedance to flow in the uterine arteries (with the characteristic waveform of early diastolic notching)



Very high resistance to flow in the uterine arteries (with reverse diastolic flow)

Source: fetalmedicine.org

Document 4: Doppler spectra of uterine artery flow



- (a) The sonogram shows high velocities throughout the cardiac cycle, indicating low resistance.
- (b) The sonogram shows a pulsatile flow waveform with low velocities. This is indicative of high resistance

Source: sonoworld.com

■ Problem: detecting a disease

In document 4, two sonograms are given (a and b), which one corresponds to twins who start experiencing twin transfusion syndrome?

Activity summary

What you must remember:

- **doppler ultrasound**

- **velocity**

Skills linked to the curriculum:

Compétences	Capacités à maîtriser
APP	<p>Extraire les informations jugées pertinentes concernant la mesure de la vitesse du sang dans une artère</p> <p>Comprendre la notion de résistance</p> <p>Justifier qualitativement le décalage entre les fréquences d'émission et de réception.</p> <p>Exploiter l'expression du décalage Doppler de la fréquence pour déterminer une vitesse de déplacement, à partir de résultats expérimentaux.</p>
COM	<p>Utiliser un vocabulaire scientifique adapté</p> <p>Présenter des résultats</p>