Ritmo Fetale

Agata Privitera

AOU Policlinico Catania

Cardiologia Pediatrica

Presidio San Marco

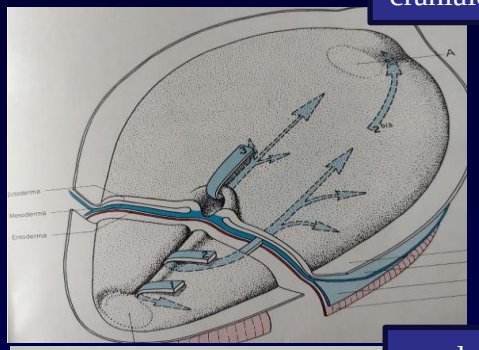
www.cardiologiapediatricact.com

Padova 30/01/2026

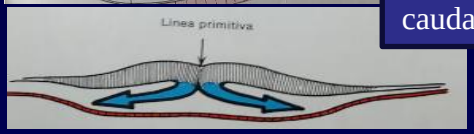
Embriologia Cuore

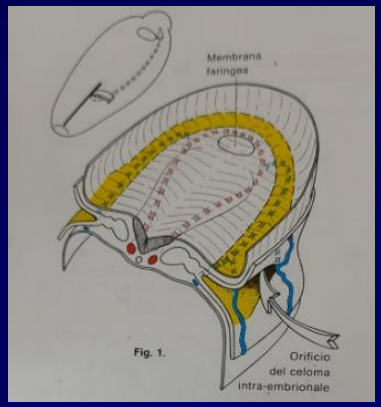
Gastrulazione: formazione del terzo foglietto embrionale il cordo-mesoderma per scivolamento dell'ectoderma a livello della linea primitiva (15°giorno)

craniale



caudale





Sviluppo Cardiovascolare

Inizia con la formazione di **precursori mesodermici precardiaci** durante il processo della gastrulazione 3° settimana

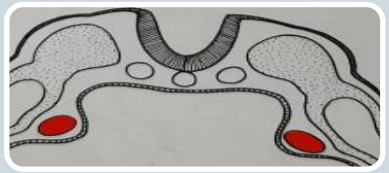
Formazione dell'Abbozzo Cardiaco

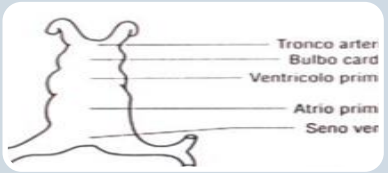
parte del mesoderma laterale migra dalla linea primitiva fino al davanti della membrana faringea e si unisce con la parte omologa del lato opposto

dalla delaminazione di questa porzione originano le pareti della futura cavita pericardica

Splancopleura | Somatopleura

Nella splancopleura al 20° giorno compaiono prima delle isole e poi per confluenza dei tubi endocardiaci



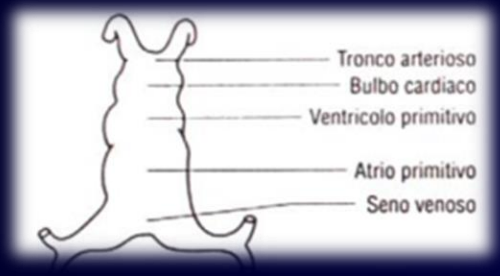


Tubi Cardiaci 21 giorni

Confluenza centrale

Tubo cardiaco 22° giorno

Sviluppo Cardiovascolare e Identità Regionale



Battito Cardiaco a 23 giorni (4 settimana) FC 80-90 bpm

dal miocardio primitivo o tubo cardiaco caratterizzato da conduzione lenta e depolarizzazione spontanea (FC 80-90 bpm)

Dal 24° giorno il tubo cardiaco va incontro a ripiegamenti e differenziazione nelle varie componenti all'interno della cavità pericardica che cresce meno

5ª-6ª **SETTIMANA** (FC 90-110 bpm)

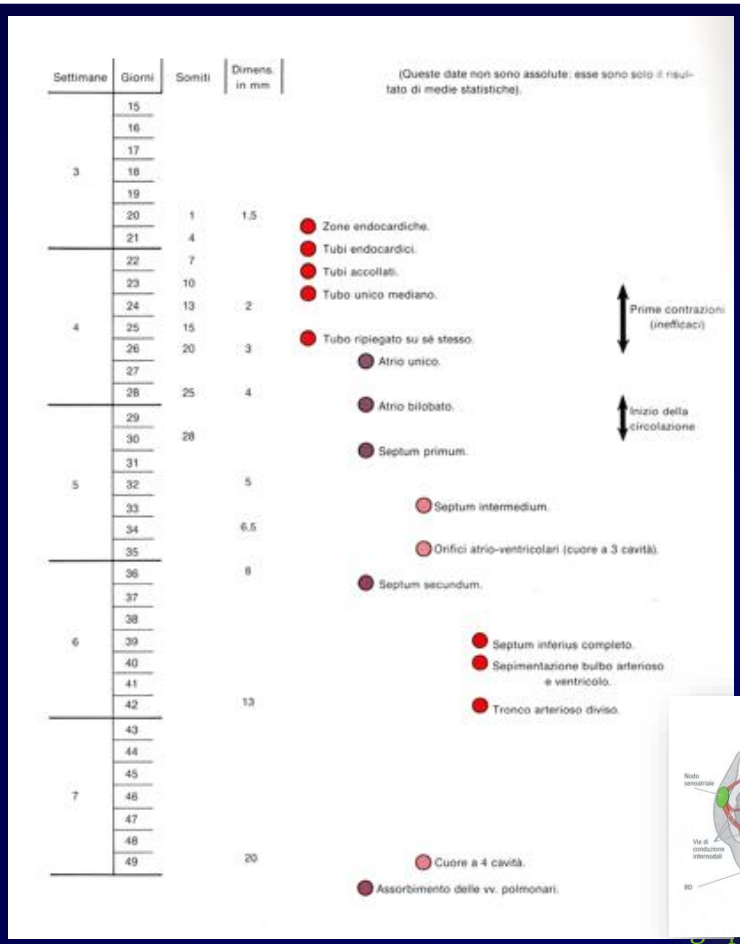
- Divisione atri
- Divisione Ventricoli
- **Formazione Nodo Seno Atriale e conduzione** (sfarfallio alla transvaginale)

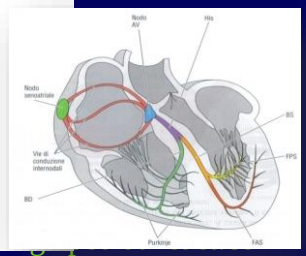
7ª-9ª settimana (FC max 140-170 bpm)

- Il battito diventa visibile e misurabile (m-Mode

>10ª settimana (FC 110-160 bpm)

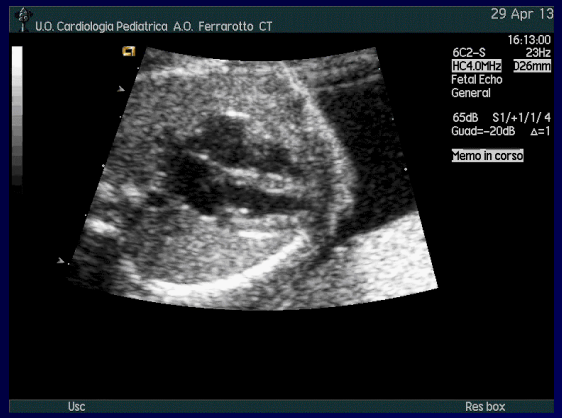
- Il battito è misurabile con la funzione M-mode e Doppler pulsato





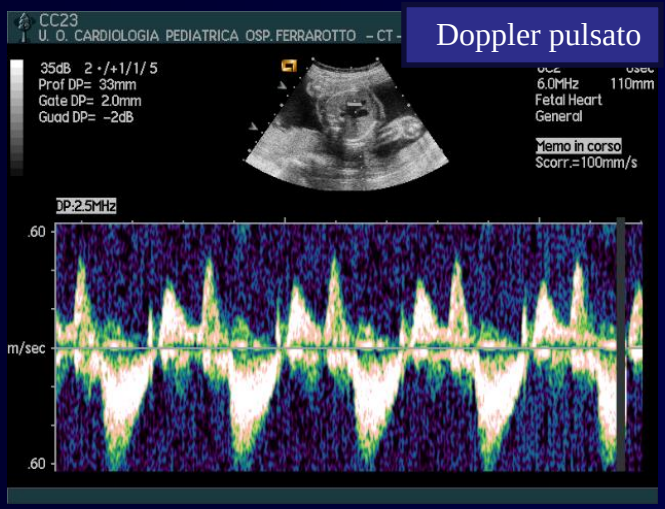
Ecocardiografia Fetale
Valutazione Ritmo Cardiaco

Per l'alto potere di risoluzione temporale l'M-Mode ed il Doppler Pulsato vengono usati per lo studio del ritmo cardiaco

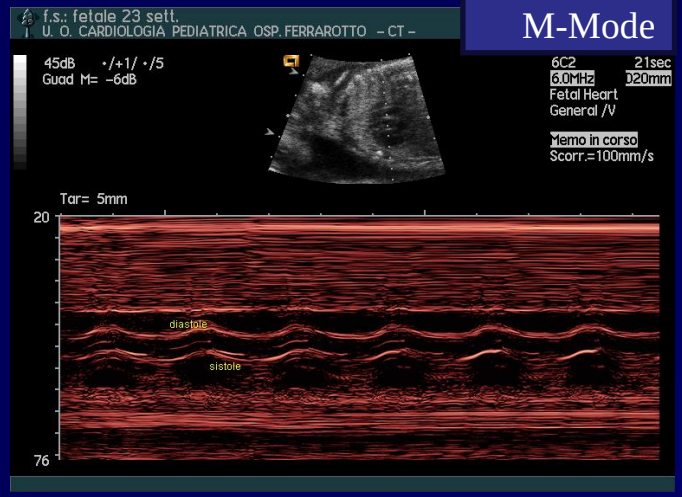


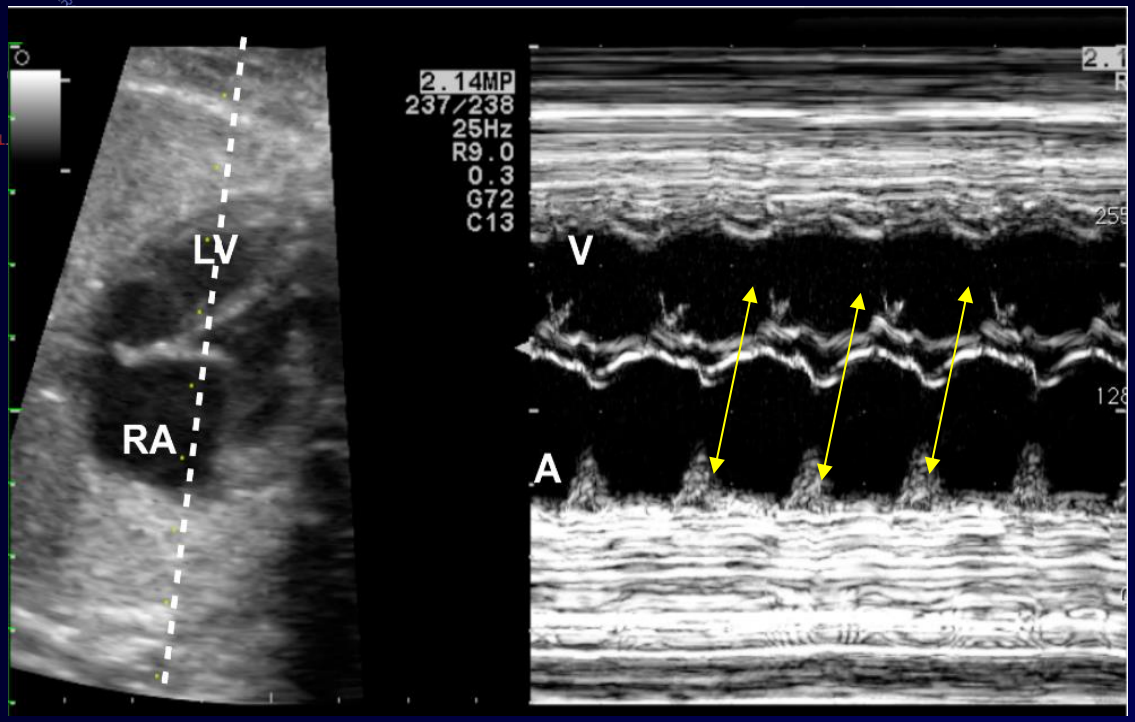
Frequenza cardiaca fetale normale 100-180 bpm

Doppler pulsato



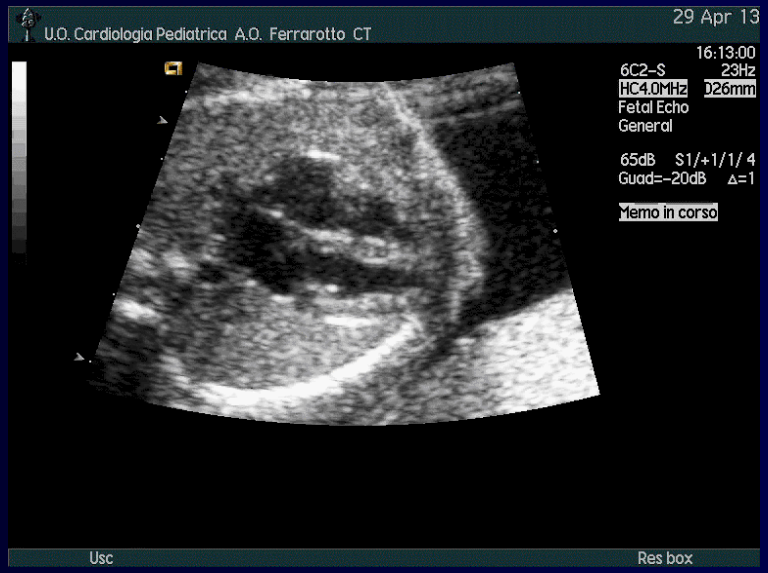
M-Mode



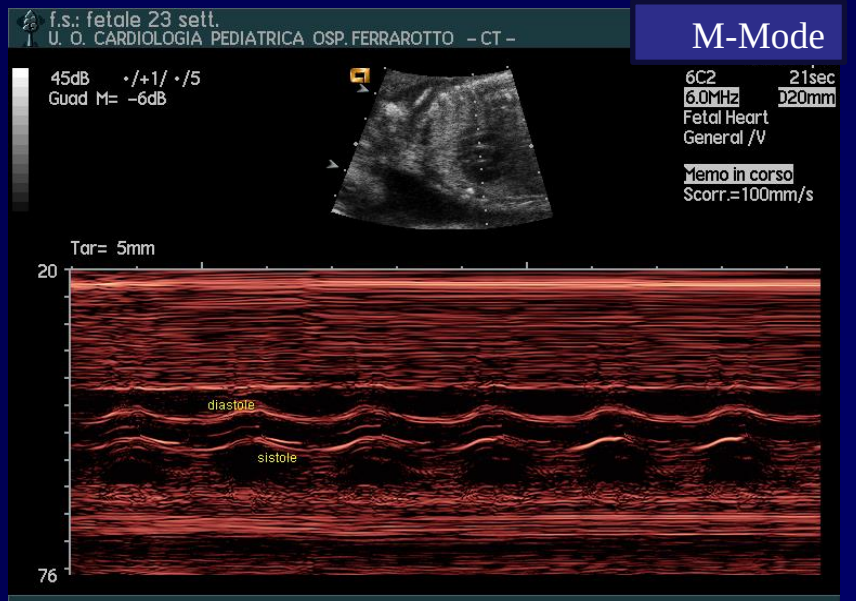


Frequenza cardiaca fetale normale 100-180 bpm

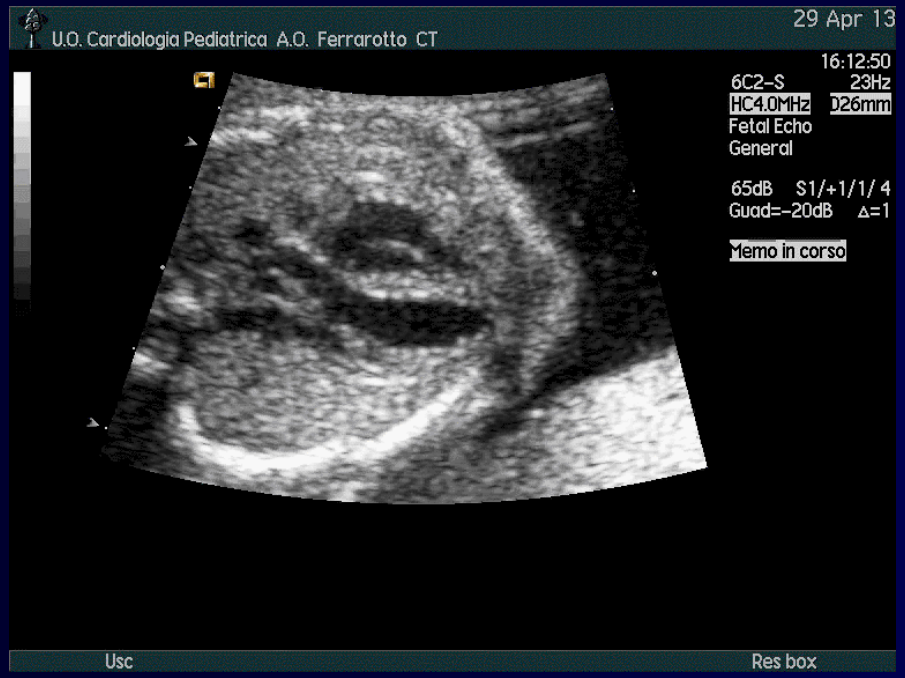
con rapporto atrio A:V 1:1



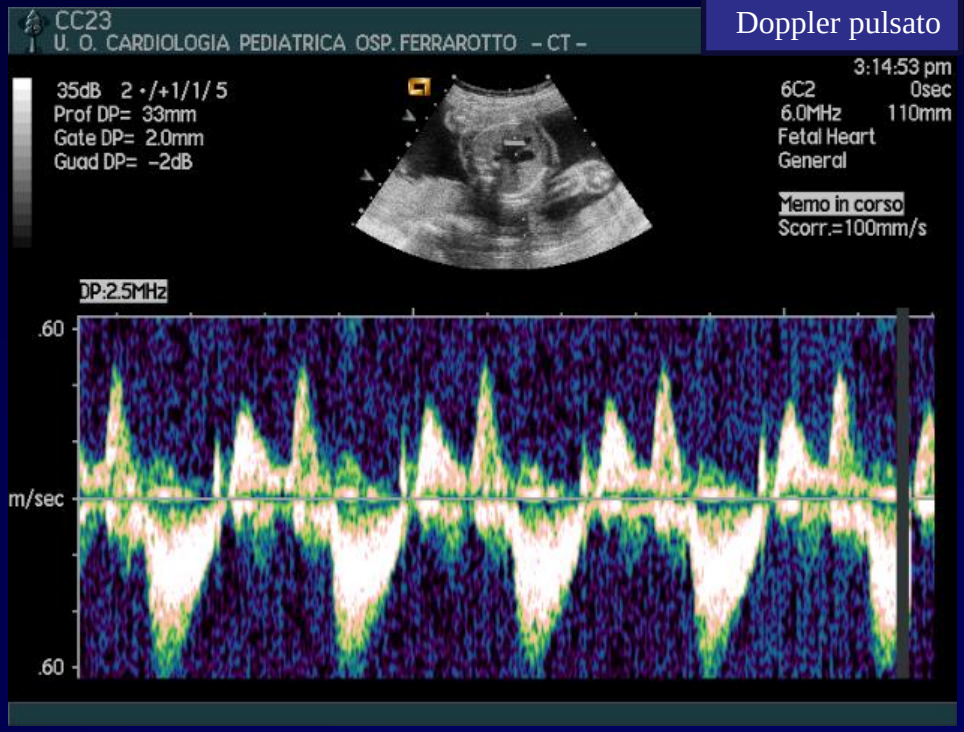
M-Mode



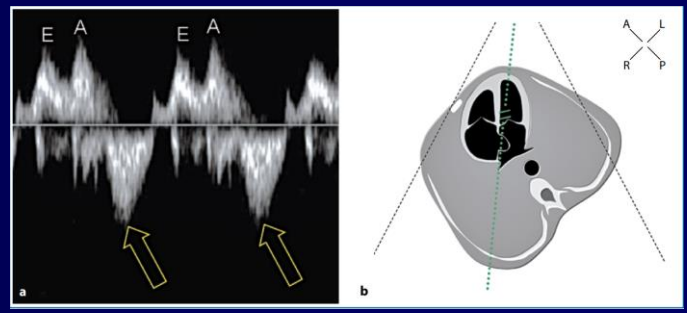
Frequenza cardiaca fetale normale
100-180 bpm con A:V 1:1

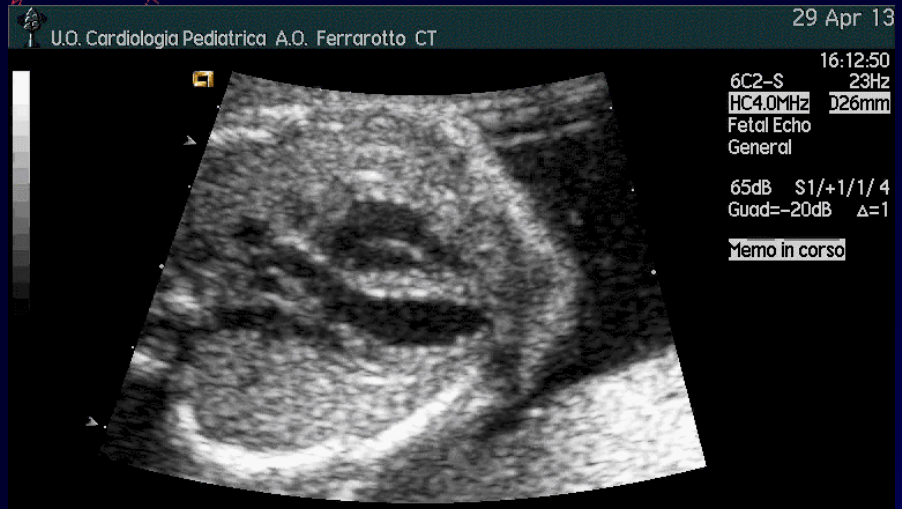


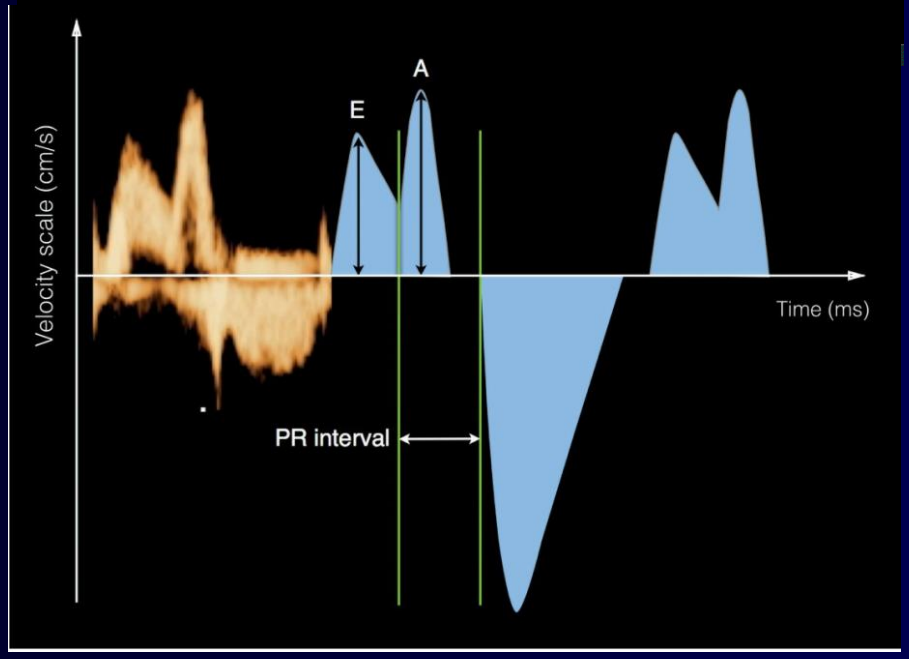
Doppler pulsato



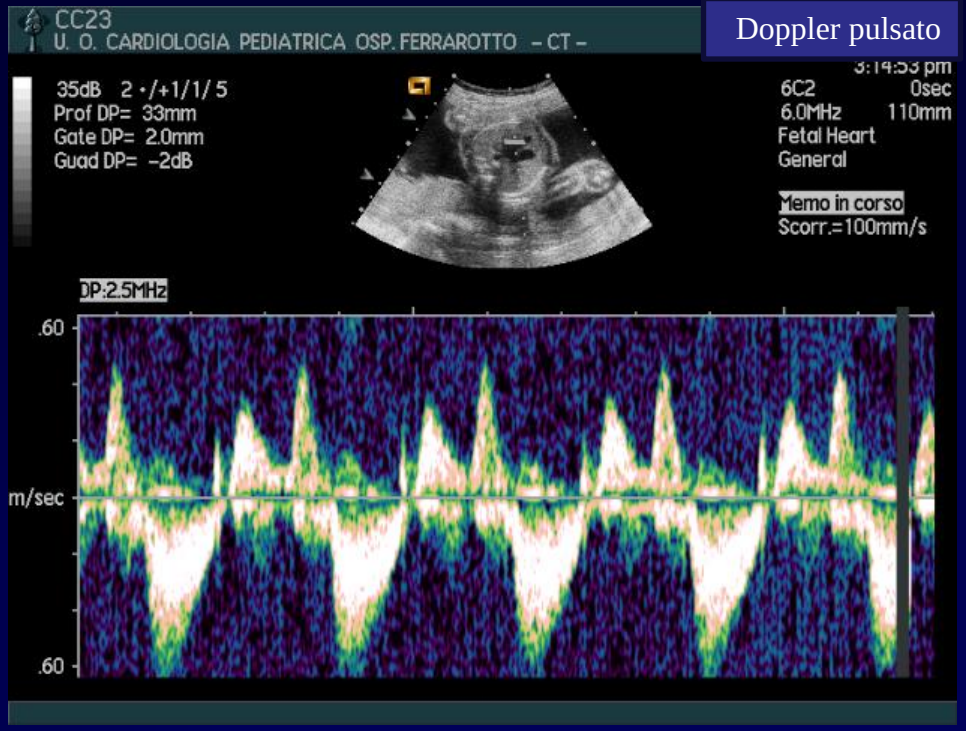
Frequenza cardiaca fetale normale
140±20 bpm dalla 10 settimana
130±-20 bpm vicino a temine gravidanza







Doppler pulsato

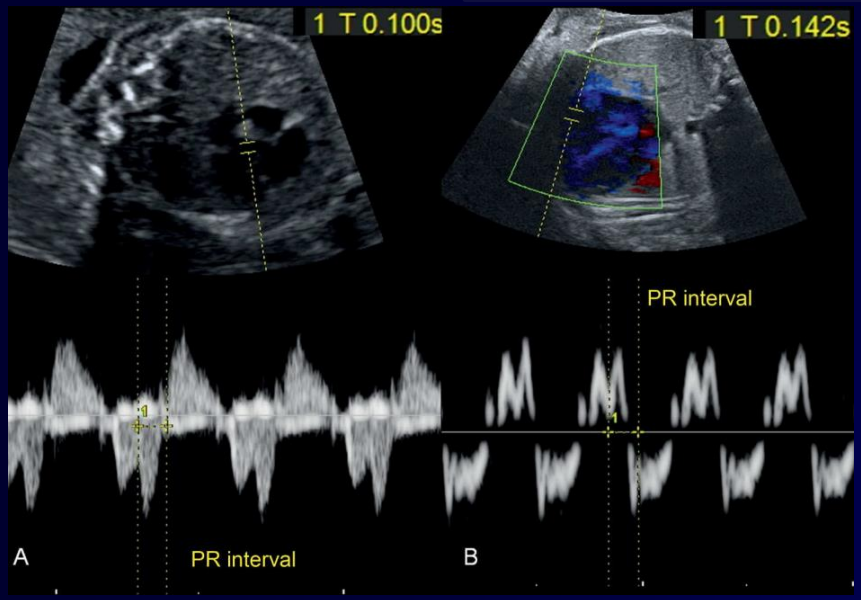


PR 15a Settimana 90 msec

PR a termine 100 msec

Ecocardiografia Fetale

Ritmo Cardiaco Tratto PR



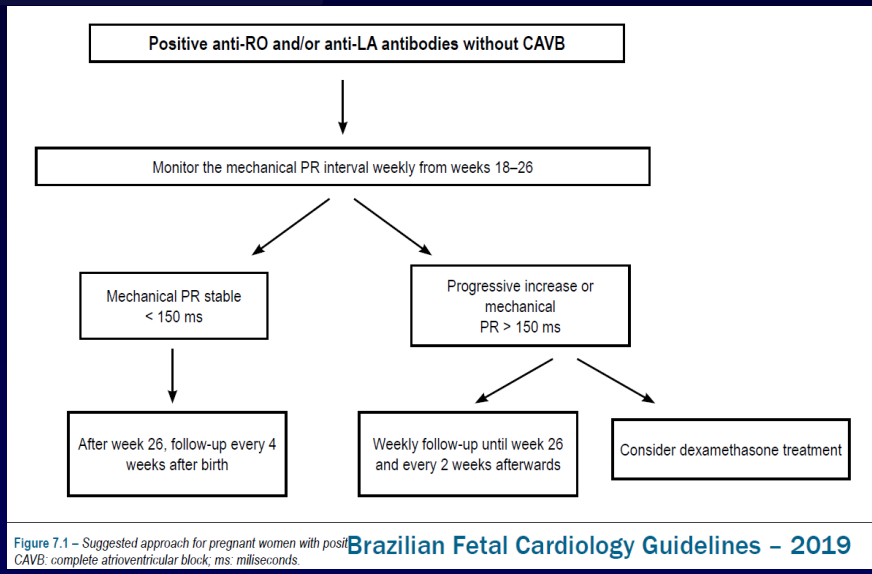
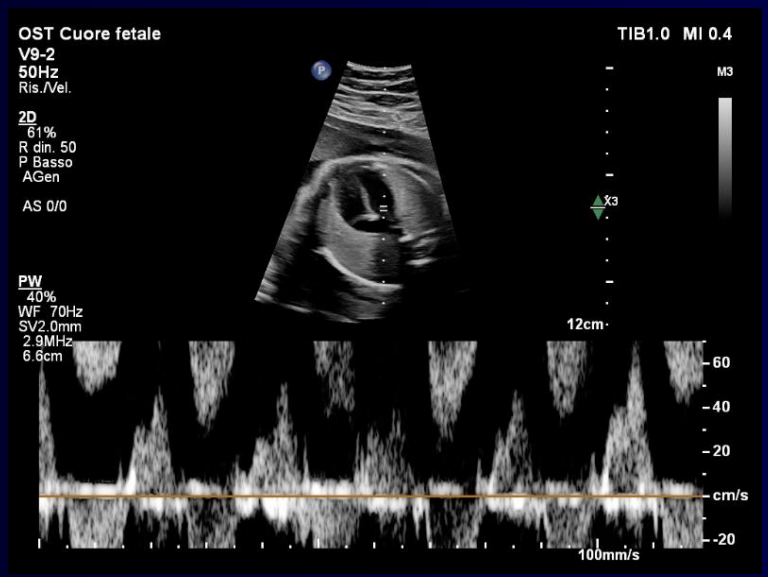
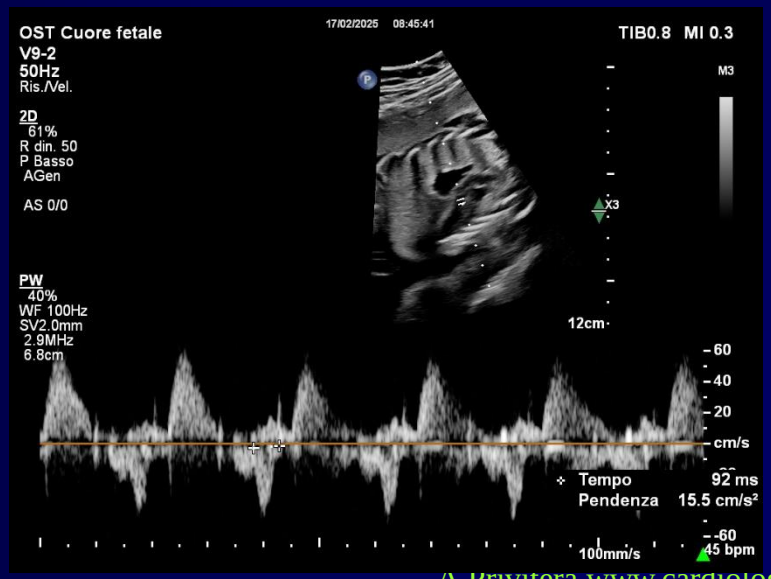


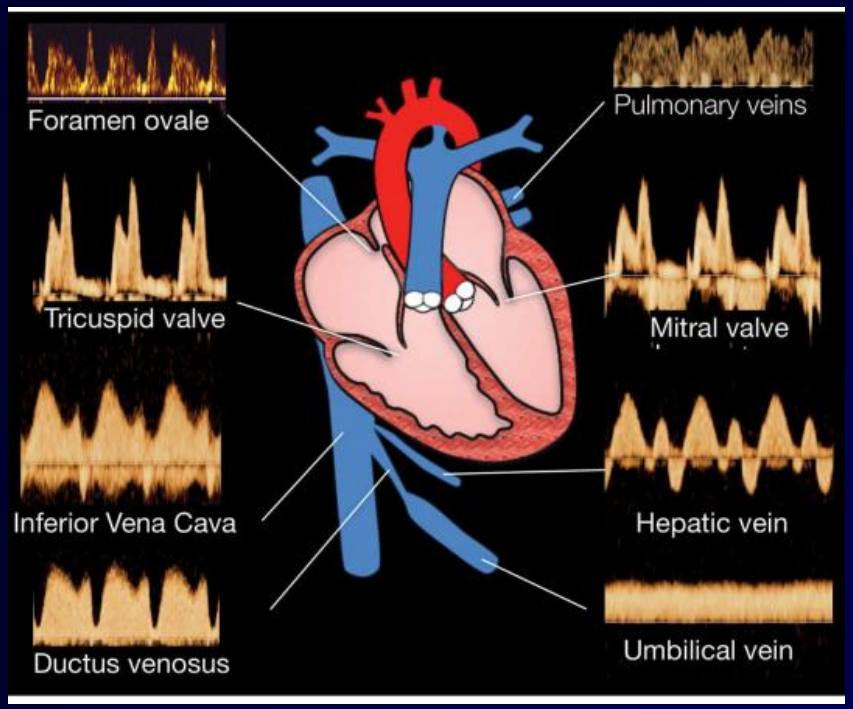
Figure 7.1 – *Suggested approach for pregnant women with posit*
CAVB: complete atrioventricular block; ms: miliseconds.

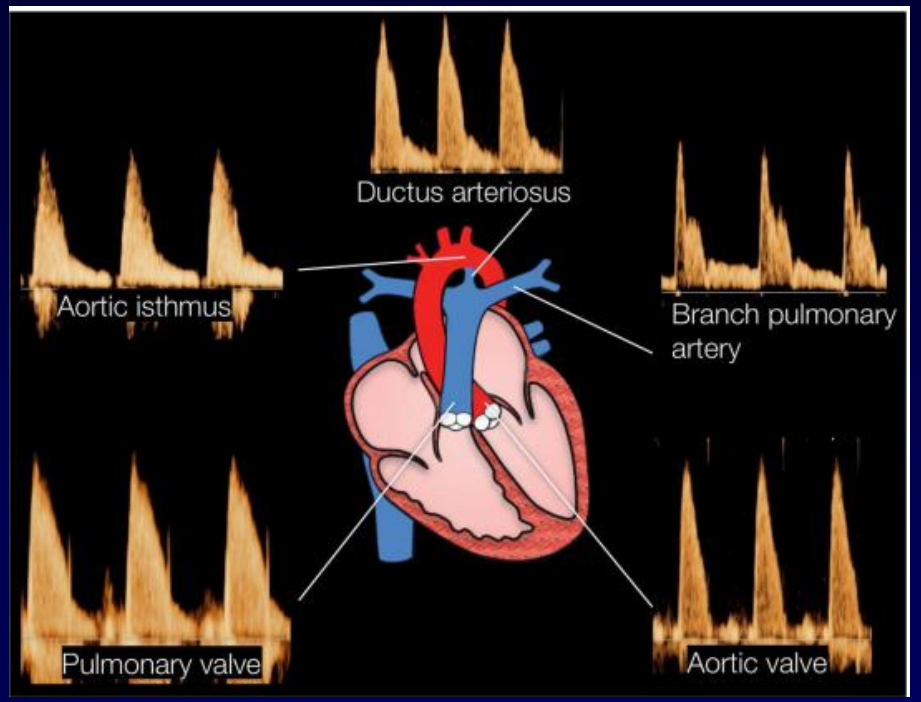
Brazilian Fetal Cardiology Guidelines – 2019



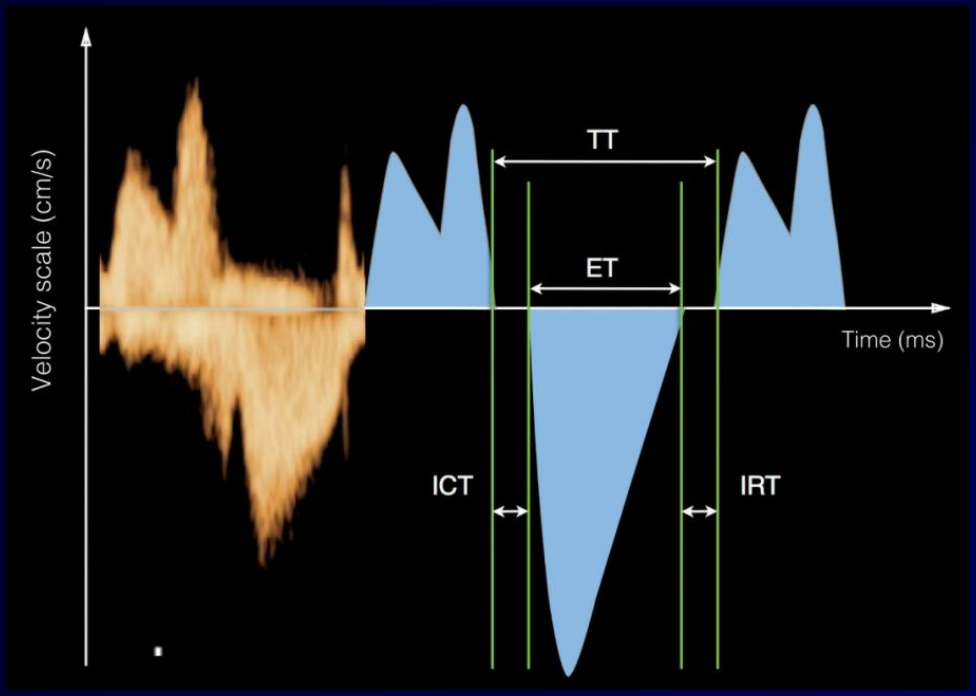


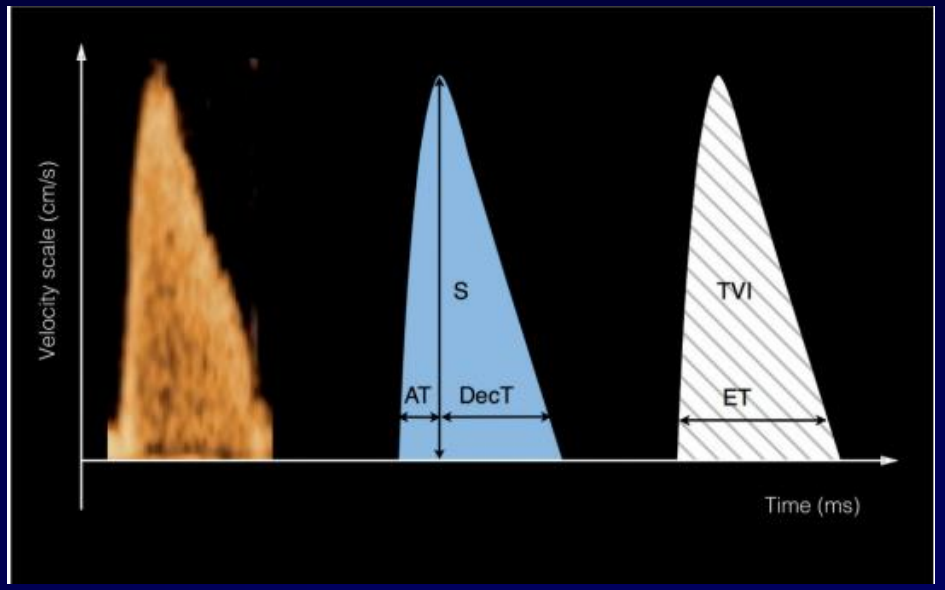
Valutazione Velocità





Indici di funzione sulla valvola mitrale ed efflusso sinistro

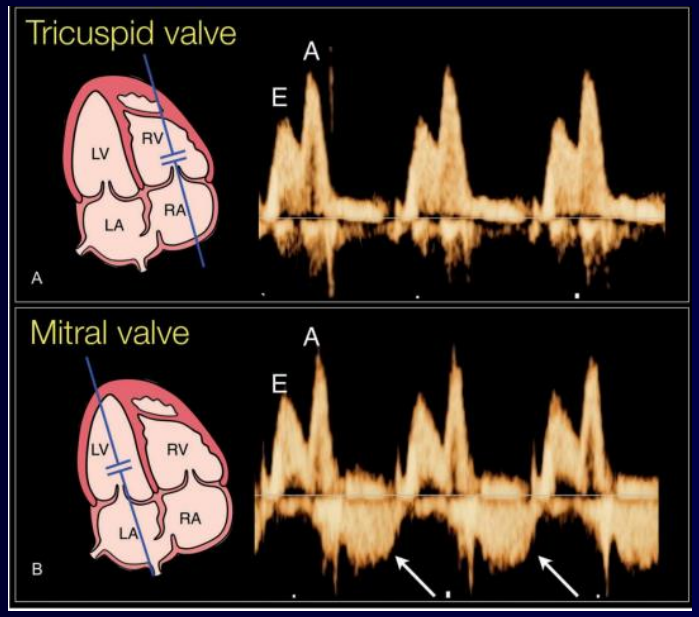




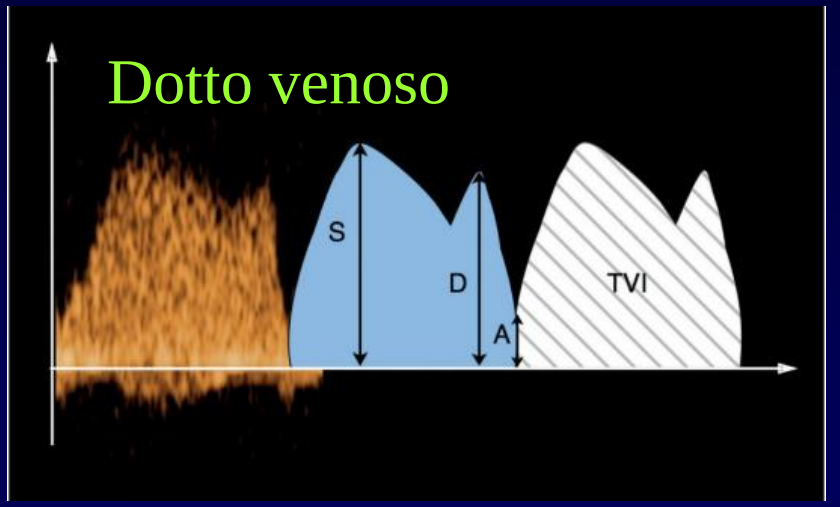
ET: tempo di eiezione sistolica, ICT: tempo di contrazione isovolumetrica, IRT: tempo di rilassamento isovolumetrico e TT è il tempo totale. TT = ET+ICT+IRT.

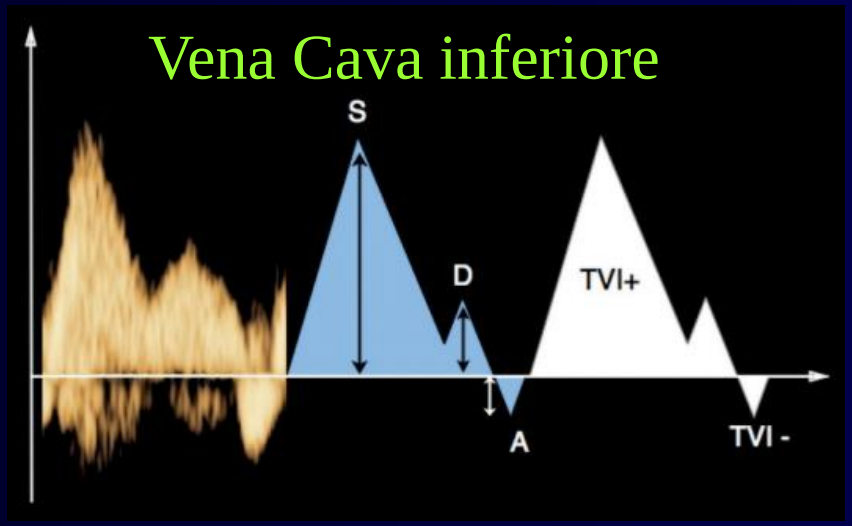
AT: tempo di accelerazione o velocità di picco, DecT: tempo di decelerazione. S è la velocità sistolica di picco. ET: tempo di eiezione sistolica. TVI: integrale tempo-velocità (area sotto la curva)

Indici di funzione diastolica



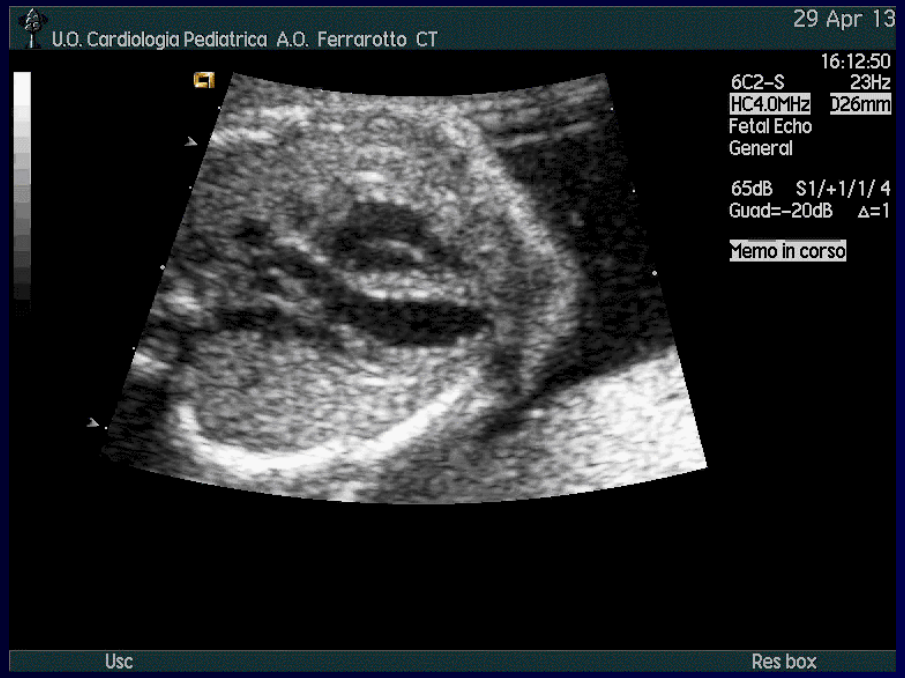
Dotto venoso S: velocità sistolica, D: velocità diastolica, A: velocità nadir durante la contrazione atriale, TVI integrale tempo-velocità (area sotto la curva).



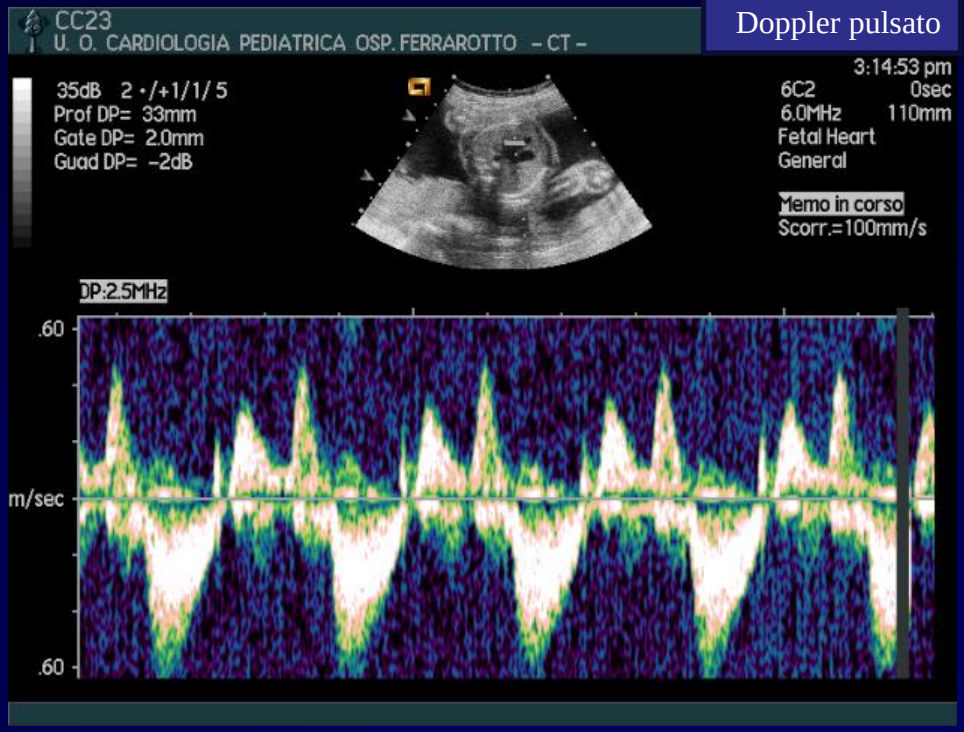


Flusso vena caca S:velocità massima sistolica, D: velocità massima diastolica, A: flusso di inversione atriale durante la contrazione atriale, TVI: integrale tempo-velocità (area sotto la curva).

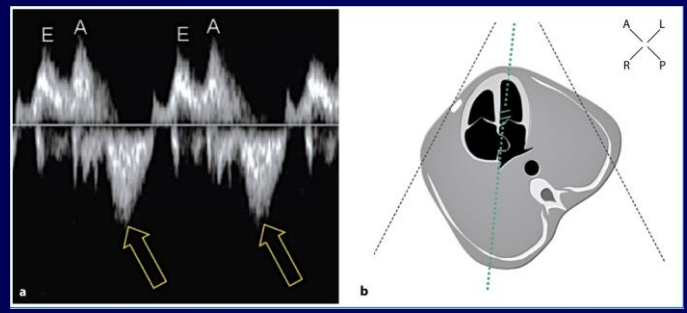
Frequenza cardiaca fetale normale
100-180 bpm con A:V 1:1



Doppler pulsato



Frequenza cardiaca fetale normale
140+-20 bpm sino all 20° Settimana
130+-20bpm vicino a temine gravidanza



Irregolarità del Ritmo

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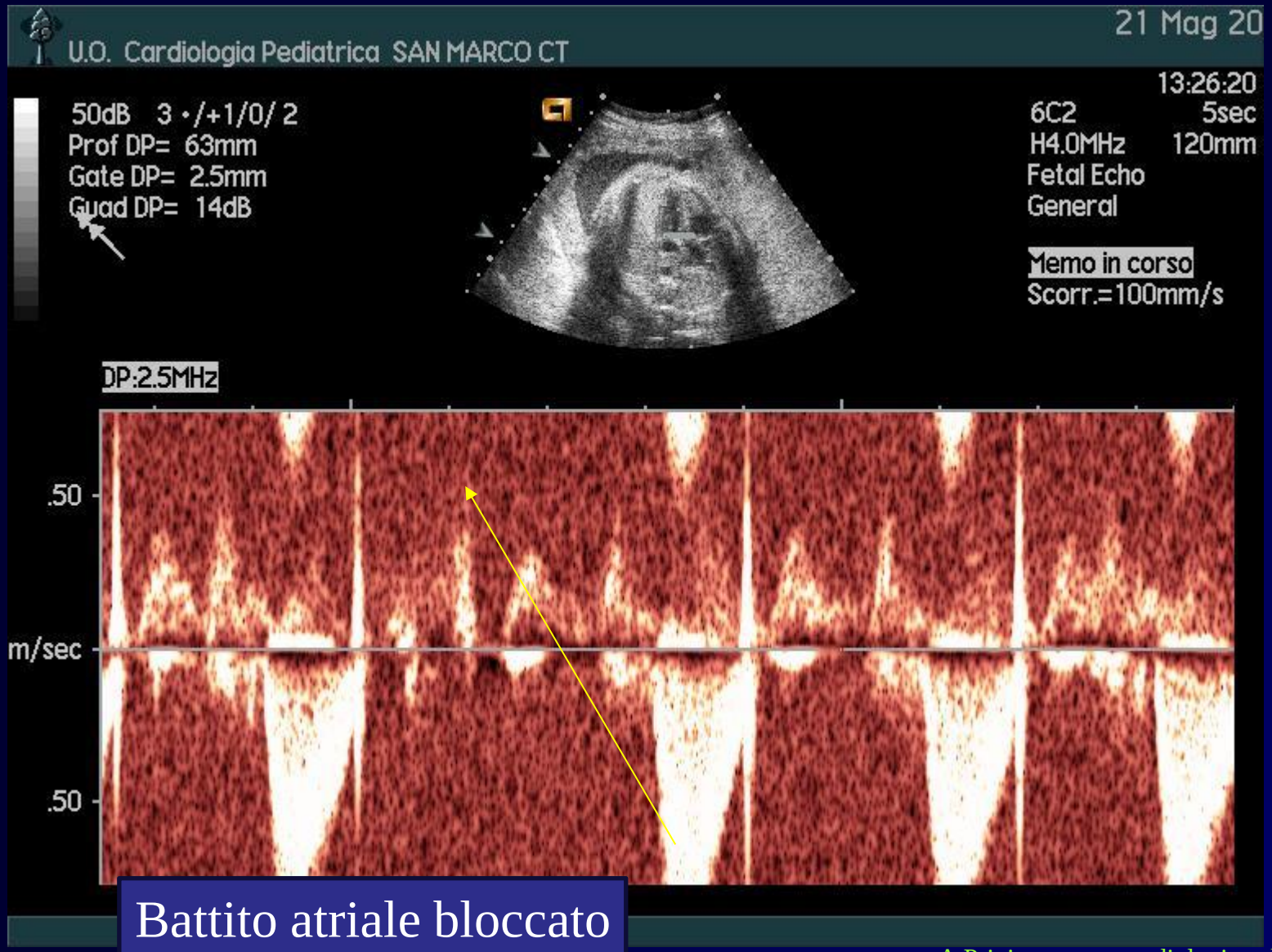
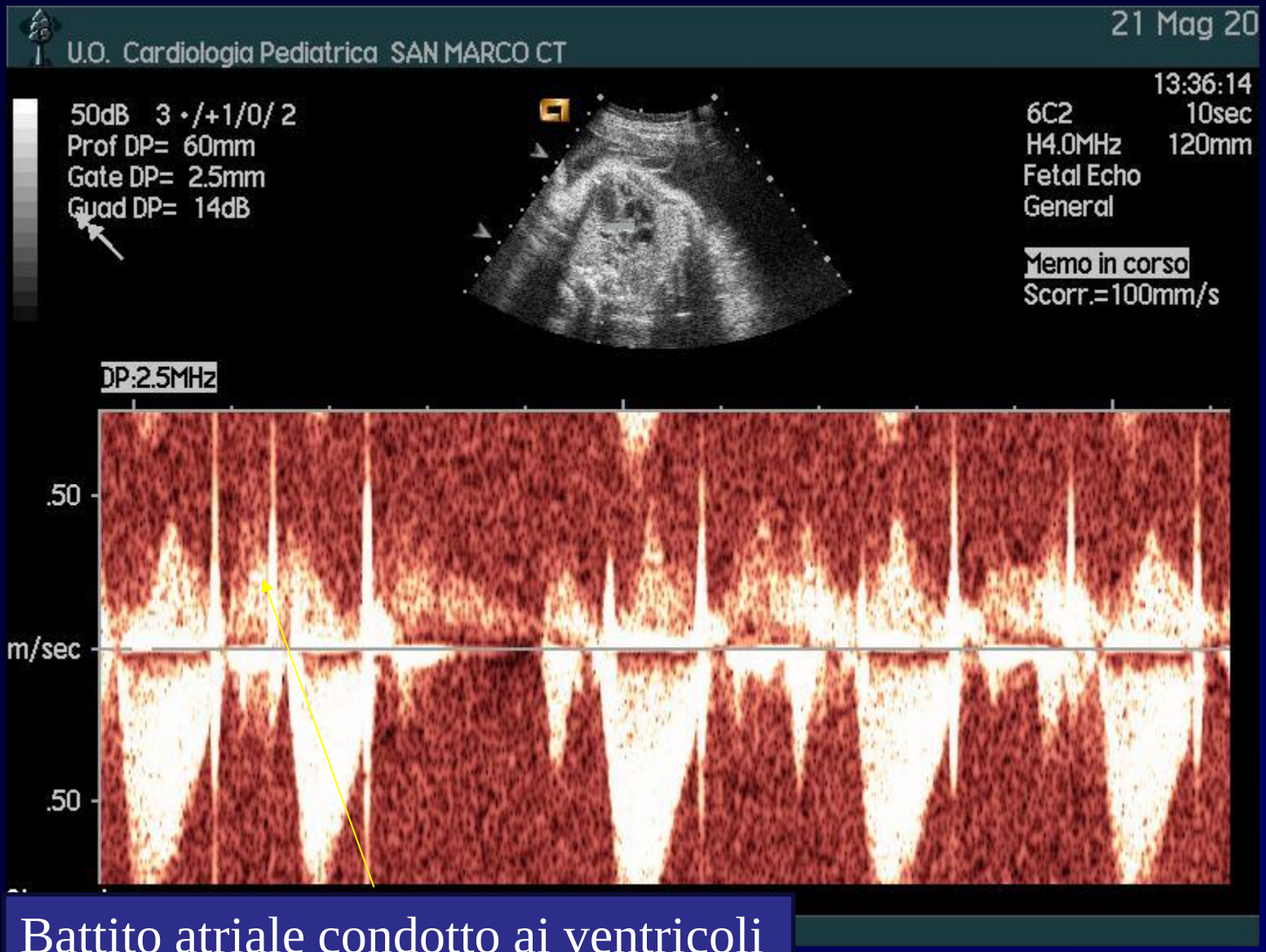


Battito atriale bloccato

Irregolarità del Ritmo

Battito atriale interpolato

Irregolarità del Ritmo



Battito atriale condotto ai ventricoli

Ritmo Bradicardico

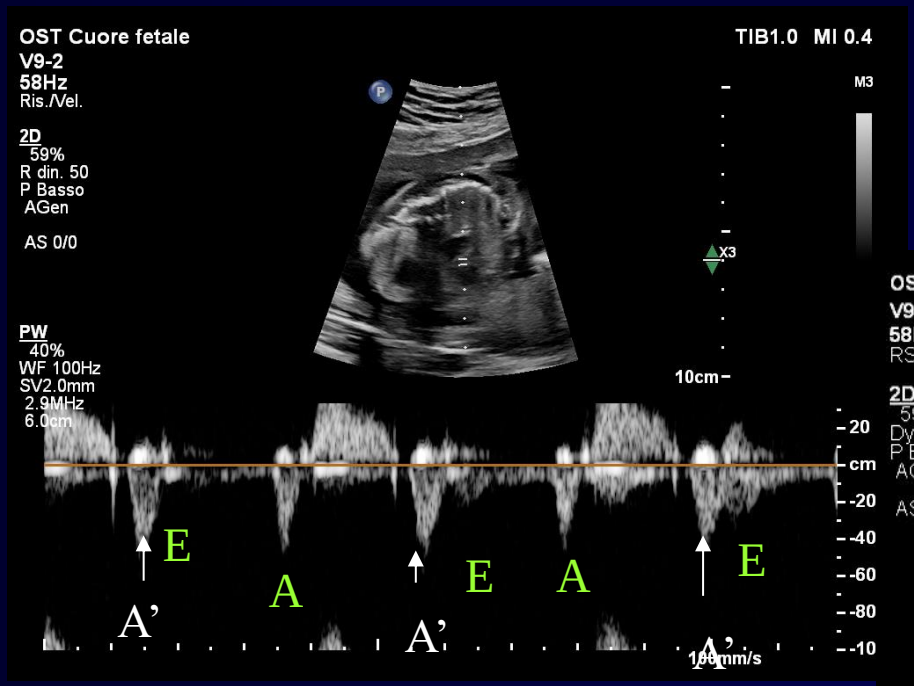
Si definisce ritmo Bradicardico quando la Frequenza Cardiaca è sotto 110-120 battiti al minuto (bpm) per un periodo prolungato, generalmente superiore a 10 minuti.

Fetal medical therapy with sympathomimetics is reasonable to consider for fetuses with AV block with ventricular rates <55 bpm or AV block at a higher ventricular rate with associated severe CHD or signs of fetal heart failure or hydrops fetalis (*Class IIa; Level of Evidence B*).

Table 32.1 Fetal bradydysrhythmia – possible causes

Sinus bradycardia
short episodes: vagal tone
Sustained sinus bradycardia
sinus node dysfunction
maternal hypothermia
long-QT syndrome
Frequently occurring blocked premature atrial contractions
Familial idiopathic atrial fibrillation with slow ventricular response
Second-degree atrioventricular block
Third-degree (complete) atrioventricular block

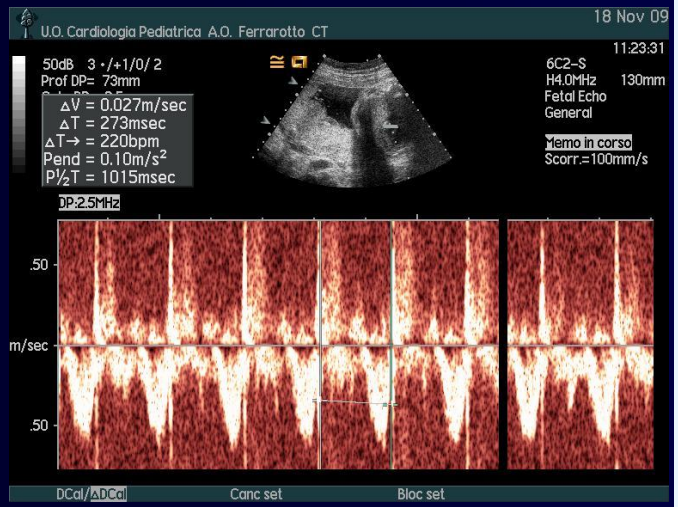
Ritmo Bradicardico



Battiti atriali bloccati tipo 2:1

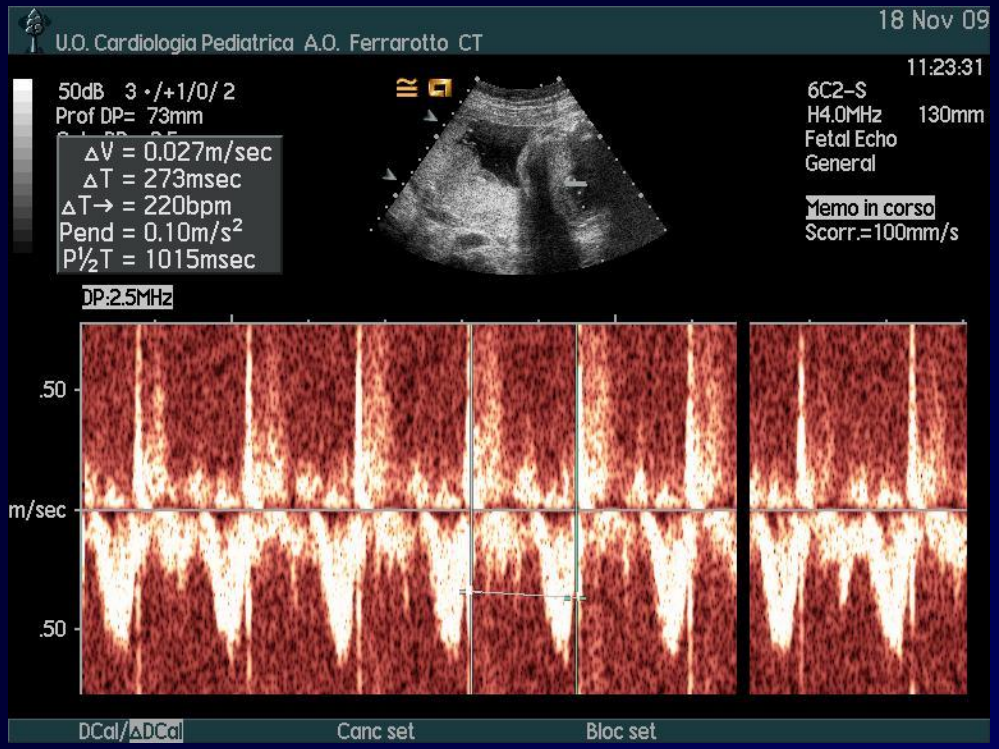
Ritmo Tachicardico

–Si Definisce Ritmo Tachicardico quando la Frequenza Cardiaca basale del feto è superiore a 180 battiti al minuto (bpm), per un periodo prolungato



- Fetal tachycardia is defined by a sustained fetal ventricular heart rate of greater than 180 beats/min.
- Sinus tachycardia is characterized by equal atrial and ventricular rates in the range of 180 to 200 beats/min, one-to-one AV conduction, normal AV interval duration, and variability in the heart rate.
- SVT is the most common cause of fetal tachycardia and accounts for about 66% to 90% of all cases.
- In SVT, the tachycardia range is typically around 220 to 240 beats/min, there is 1:1 ratio of AV conduction, and the fetal heart rate is monotonous with lack of atrial or ventricular rate variability.
- Atrial flutter in the fetus is defined by a rapid regular atrial rate of 300 to 600 beats/min, accompanied by variable degrees of AV conduction block, resulting in a slower ventricular rate, typically around 220 to 240 beats/min.
- Ventricular tachycardia is rare and presents with ventricular rates of more than 180 beats/min in the setting of AV dissociation.
- Atrial fibrillation is a rare form of fetal tachycardia that involves a rapid and irregular atrial rate with a blocked AV conduction.

Ritmo Tachicardico



Aritmie Fetali persistenti che possono evolvere in scompenso

Fetal medical therapy should be offered for fetuses with sustained SVT or VT or sustained tachycardias including multifocal atrial tachycardia, atrial ectopic tachycardia, persistent junctional reciprocating tachycardia, or junctional ectopic tachycardia with average heart rates >200 bpm if the fetus is not near term, and hydropic fetuses with an arrhythmia believed to be the cause of the fetal compromise (*Class I; Level of Evidence A*).

Fetal medical therapy is reasonable to consider for fetuses with intermittent VT at rates >200 bpm (*Class IIa; Level of Evidence B*).

Fetal medical therapy is of no benefit for fetuses with sinus bradycardia, irregular rhythms caused by extrasystolic beats (*Class III; Level of Evidence A*), intermittent SVT without fetal compromise or hydrops, or intermittent VT < 200 bpm (accelerated ventricular rhythm) without fetal compromise or hydrops fetalis (*Class III; Level of Evidence B/C*).

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GRAZIE!

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Padova 30/01/2026