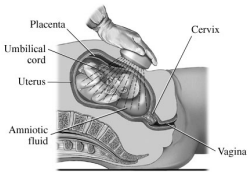
ULTRASOUND IN OBSTETRICS

prof. dr. Damir Roje

What is ultrasound:

Bat hears US!

- Ultrasound is SOUND!
- frequencies above what we hear
- mechanical energy



Ultrasound in ppregnancy

- 6 – 7 weeks
- *11 - 14 weeks*
- 16 – 18(21) weeks
- *28 weeks*
- 32 (33) weeks
- *38 weeks*

In Croatia three ultrasound exams!?!

What can we expact?

- pregnancy yes/no?
- to determine the expected birth date
- to recognize ectopic pregnancy before clinical signs
- to monitor fetal growth
- to identify fetal anomalies
- to identify disorders of fetal growth

What more can we expact?

- to recognize twins, triplets, …
- to identify position of placenta
- to identify disorders of amniotic fluid volume
- to monitor the movements of the fetus
- invasive methods of antenatal care
- psychological factor of the pregnant woman
- sex determination

What we can not ecpect?

- perfection in everything
- definitive answer to the question:
  "Is everything all right?"

Whan we can see?

- 5 weeks– gestational sac (GS)
- 5/6 weeks – yolk sac (JS)
- 6 weeks – embrio (crown- rump lenght CRL)
- 7 weeks – heart beats
- .....

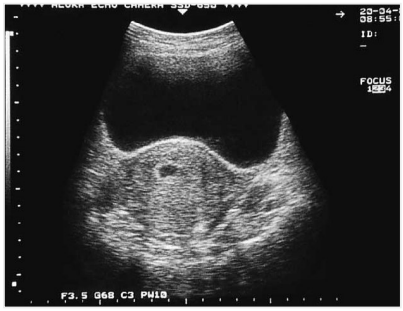
Gestational age

- CRL 5mm = 6+2/7 tj. (~ 6tj.)
- CRL 10mm = 7+2/7 tj. (~7 tj.)
- CRL 20mm = 8+6/7 tj. (~9 tj.)
- CRL 30mm = 10 tj (~10 tj.)
- CRL 54 mm = 12 tj. (~12 tj.)

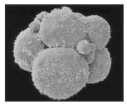
CRL=2x!
in one week

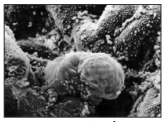
First trimester
(to 13 weeks)

5. weeks – abdominal probe



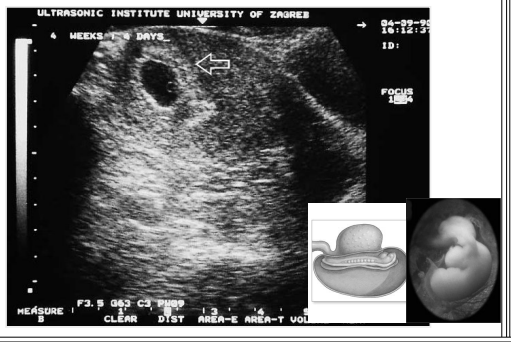
5. weeks – whre is embrio?



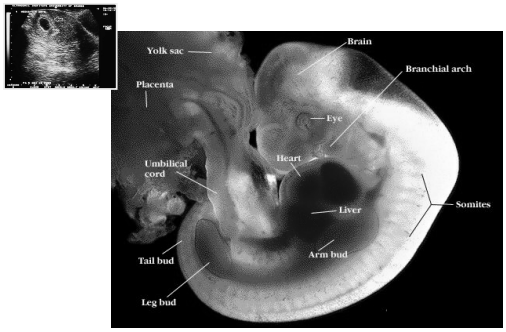


6 dana

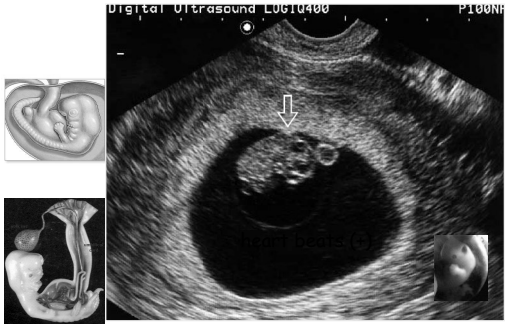
5/6 weeks



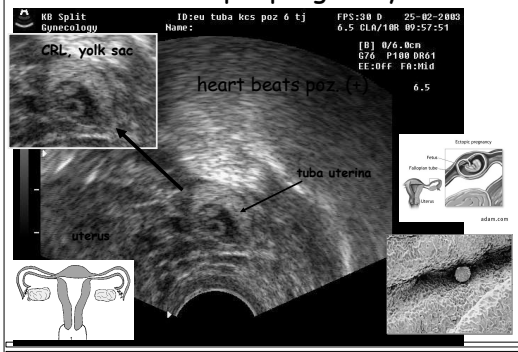
5 weeks



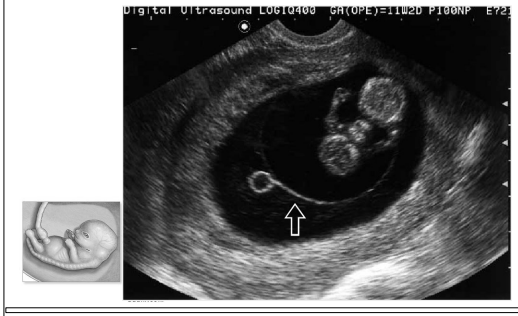
7/8 weeks



6/7 weeks- ectopic pregnancy

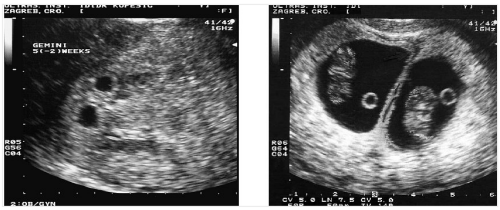


8 weeks



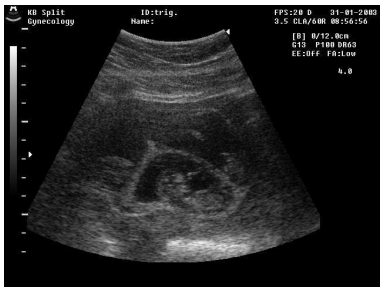
Twins (5/6 weeks)

twins (Gemini)



Biamniati, bichoriati

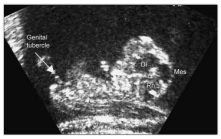
Trigemini

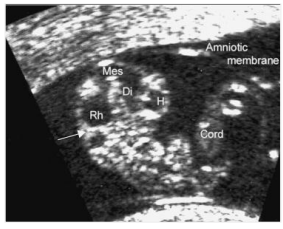


Quadrigemini (quatriplets)

8. weeks

8. weeks

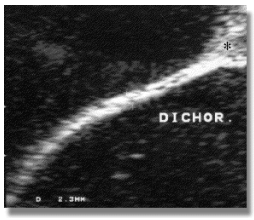


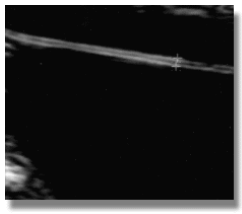


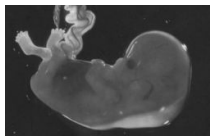
9. weeks

Twins 9. weeks

Membranes, twins







nuchal translucence

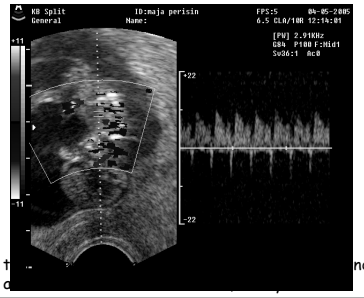
nuchal translucence

Pathological findings> 3mm - between 11 and 14 weeks.
The best ultrasound marker of chromosomal abnormalities.

Nasal bone

The nasal bone - in relation to the CRL. However, it is enough to show it.
After nuchal translucency, the best ultrasound marker of fetal chromosomal aberration.

Ductus venosus 12 weeks.



After nuchal t… …nd chromosomal a…

First trimester - biometry

- CRL (crown rump lenght)– to 12. weeks
- BPD (biparijetalni dijametar) –12. weeks onward
- FL (femur lenght)– 12. weeks onward

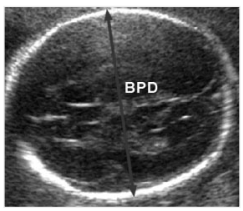
II. TIRMESTER (14.-26. weeks)

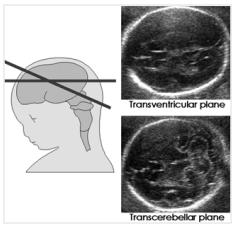
Second and third trimester – biometry:

- BPD
- FL
- Cerebellum ⇨ mm = weeks (16 to 24 weeks)
- AC (abdominal circumference)
- OCD- okcipito frontal diameter
- Humerus, tibia, radius, ...
- ....

15. weeks

Fetal head

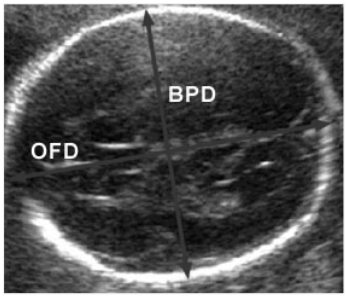


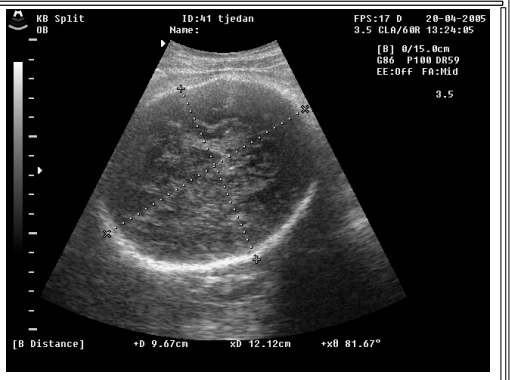


Fetal head shape

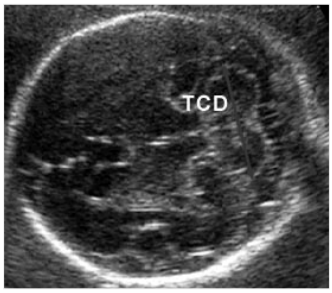
brachicephalus

dolichocephalus

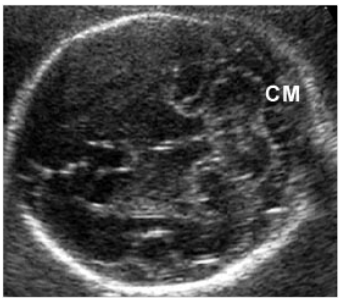




cerebellum



Cisterna magna

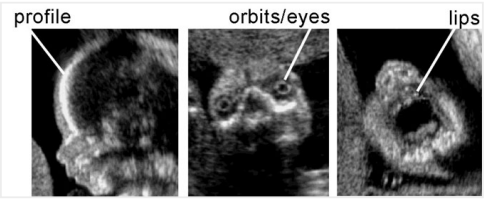


Hydrocephalus

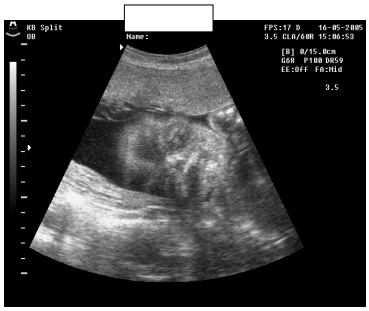
Fetal face - profile

Fetal face - profile

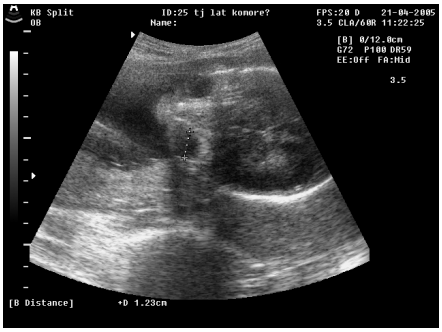
Fetal face - profile



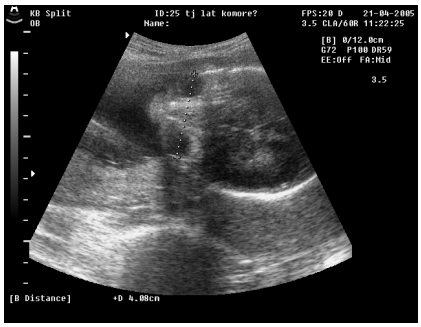
Fetal face – pseudo 3D, pseudo *an face*



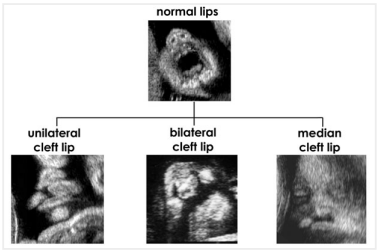
Fetal face



Fetal face



Fetal face, mouth, …

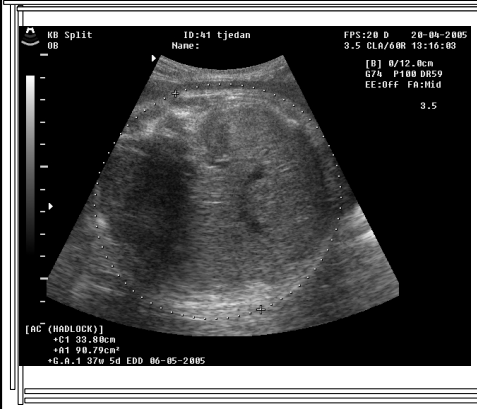


Mouth, tongue and nostrils

Fetal abdomen

AC

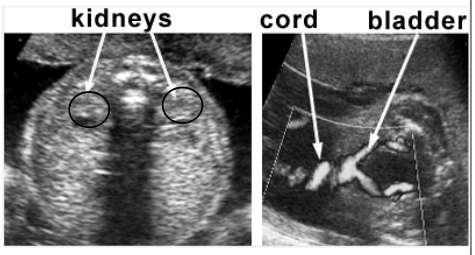
- in early pregnancy (up to approx. 20 weeks) a good indicator of gestational age
- in late pregnancy the most important factor in the assessment of fetal weight
- depending on the size of the liver (glycogen stored)
- dependent on the thickness of the subcutaneous adipose tissue

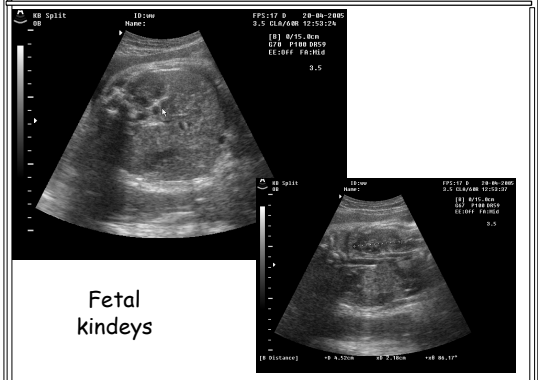


Ascites fetus

Diilated intestine

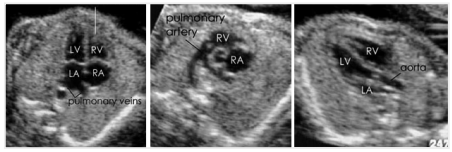
Fetus – kidneys and bladder





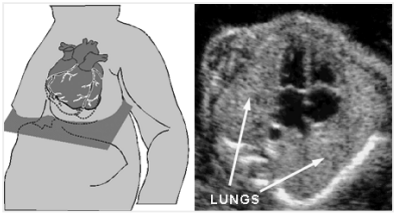
Fetal kindeys

Fetal heart



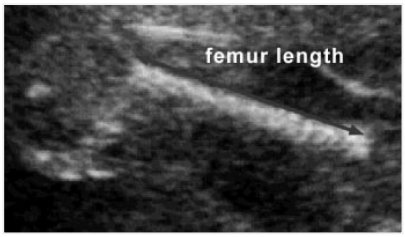
- fetal echocardiography
- four chambers view
- 1% of all infants were born with congenital heart failure

Fetus -lungs



GENDER

Femur



FL

- "long bones" representative
- a good indicator of gestational age
- an important factor in the biometric relationships for evaluating disorders of fetal growth (FL: AC)

femur

"Anomaly scan"

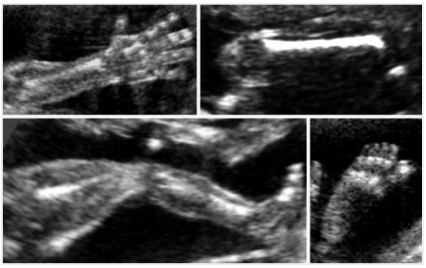
- CAREFUL: the difference between fetal anomalies and chromosomopathies
- "Anomaly scan" 18-23 (22) weeks
- demanding ultrasound examination in obstetrics
- conceived as a screening (~ all pregnant !!!)
- PROBLEM: unrealistic expectations and realitiy
- PROBLEM: training, time, ultrasound devices
- PROBLEM: Usual question: "It's 100% OK"

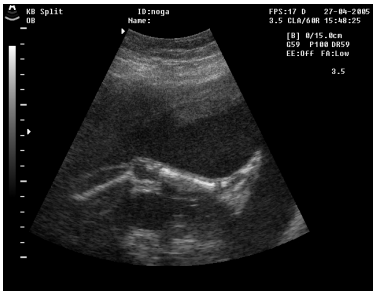
Estimated fetal weight

EFW – estimated fetal weight

- BPD
- AC
- FL

- *good estimation: +/- 10%*
- *1000g +/- 100g ⇨Σ=200g*
- *4000g +/- 400g ⇨ Σ=800g*



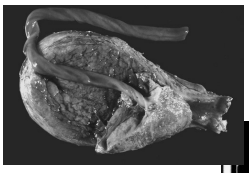


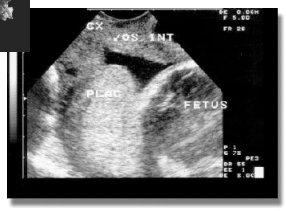
HUMERUS

Radius 21 weeks

Tibia 21 weeks

placenta previja





CERVIKS – cervicometry

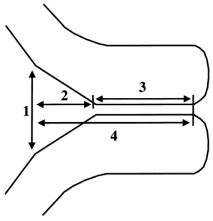


Fig 2. Cervical measurement (in centimeters) obtained before and after cerclage placement: *1*, width of dilation of internal os; *2*, depth of membrane prolapse into endocervical canal; *3*, distal cervical length; and *4*, total cervical length.

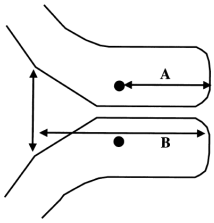


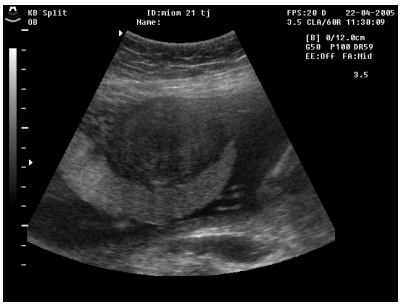
Fig 3. Cervical measurements (in centimeters) obtained after cerclage placement used to derive cerclage/cervical length ratio (A/B): *A*, Instance from cerclage to external os; *B*, total cervical length.

ultrasound- ACZ

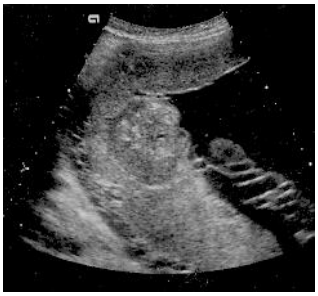
placental tumor (lipoma)

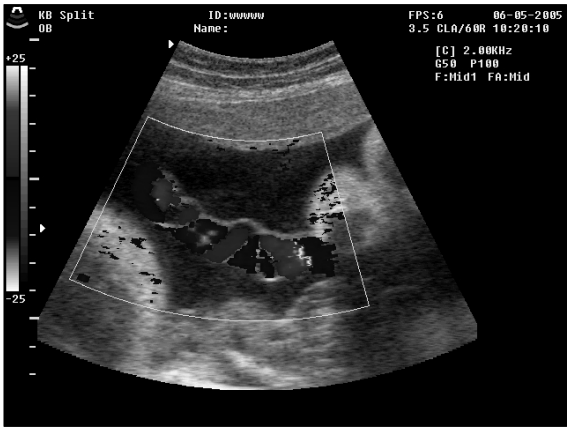
Placental tumor (chorioangioma)

myoma uteri in preganancy



Umbilical cord



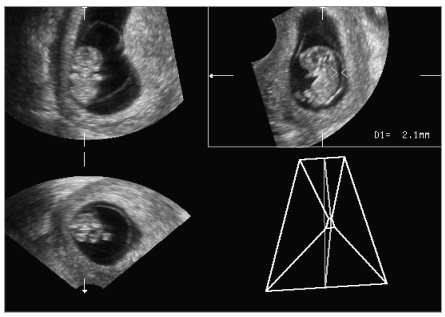


"Haemathoma"

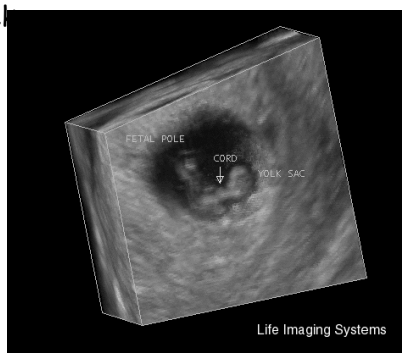
3D ULTRASUK

"The problem with 3D & 4D is to good 2D!"

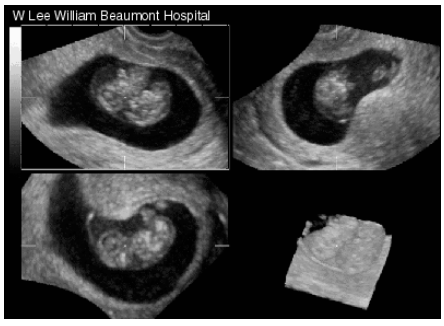
European Congress of Perinatal Medicine, 2010; Granada

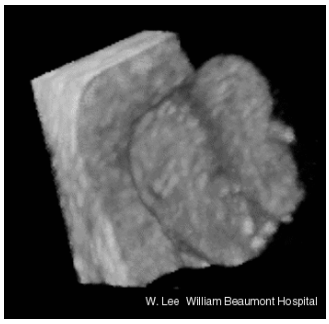


9. week



Twins 9. weeks 3D





16. weeks

16. weeks

27. weeks

30. weeks- breach

40. weeks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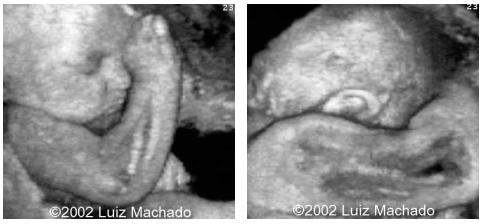
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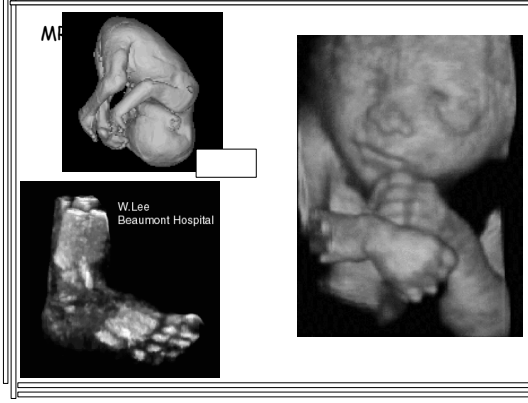
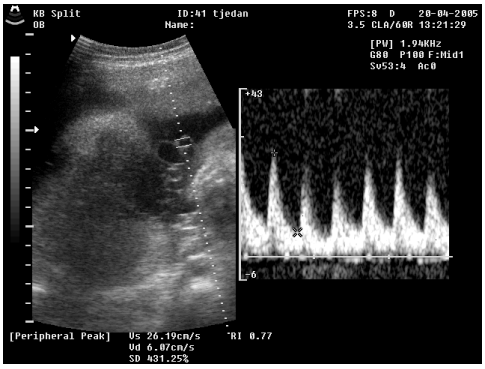

W.Lee
Beaumont Hospital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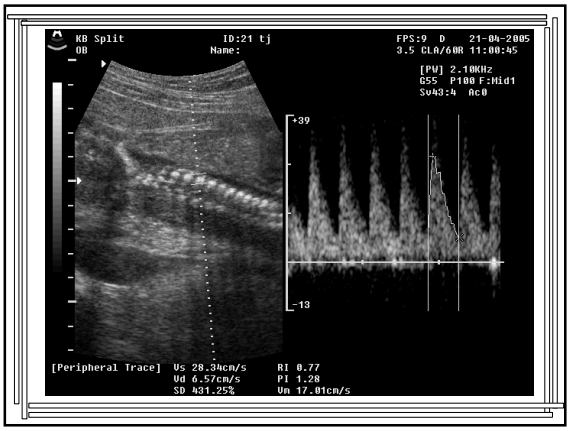
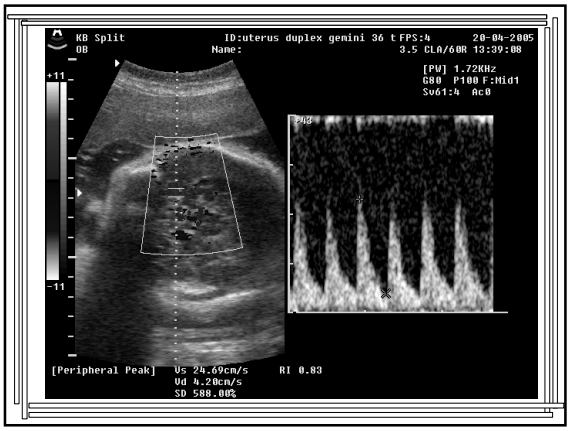
Name:
FPS:8 D 20-04-2005
3.5 CLA/60R 13:21:29
[PW] 1.9NKHz
G80 P100 F:Mid1
Sv53:4 Ac0
+43
-6
[Peripheral Peak] Vs 26.19cm/s RI 0.77
Vd 6.07cm/s
SD 431.25%





Σ

- *COCHRANE 2000: umbilical artery doppler (resistance) measurement in pregnancies with IUGR and/or preeclampsia can reduce perinatal mortality*
- *other measurements are not confirmed as useful by Cochrane meta-analysis*