The Fetal Medicine Foundation Belgium

CHU Brugmann UVC

Realitat assistencial de l'ecografia 3D-4D en obstetrícia

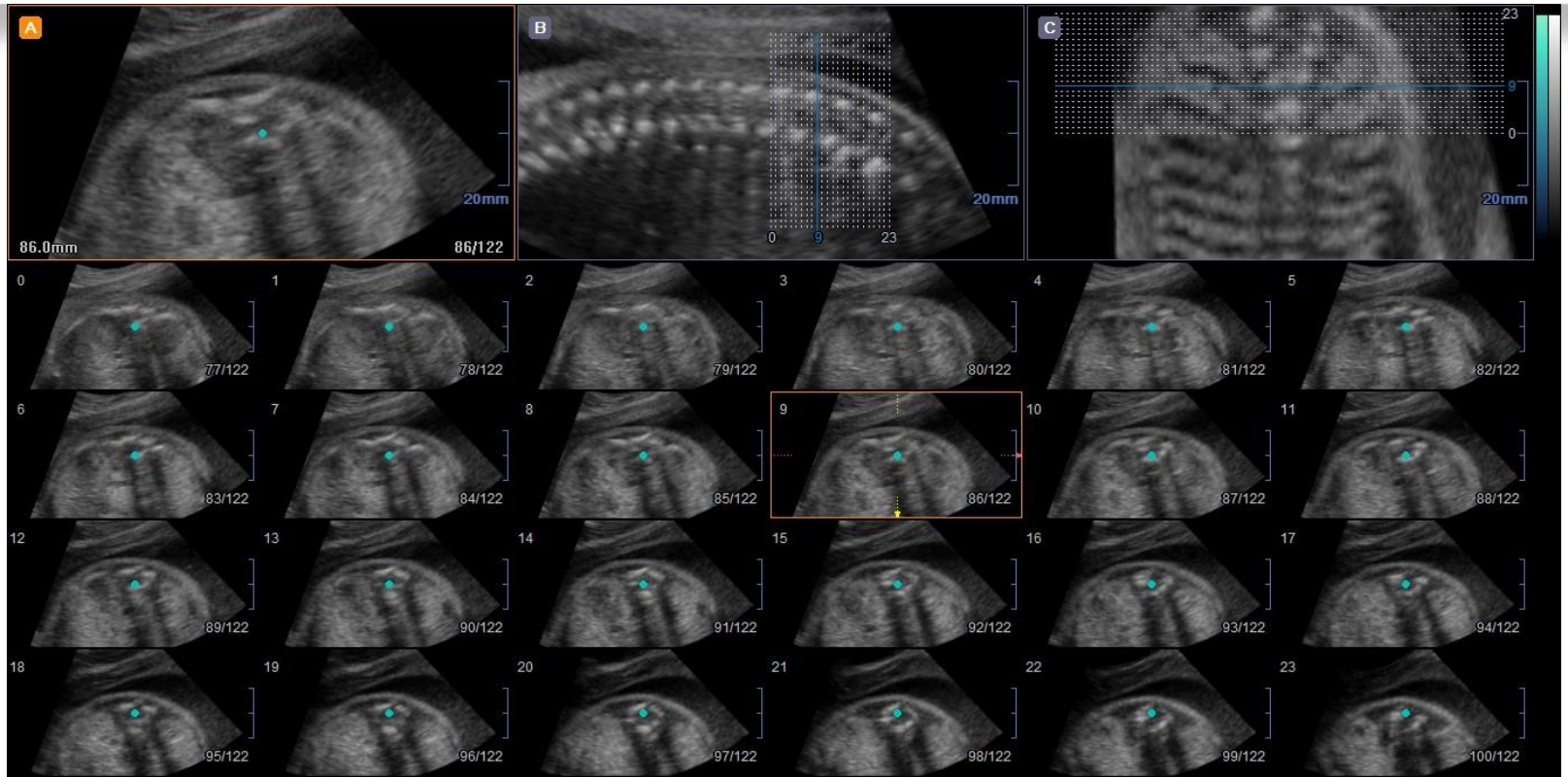
Dra Teresa Cos
Médicine fœtale
CHU Brugmann
Bruxelles.Belgium


Voluson
E8
RAB4-8-D/OB
MI 1.1
CHU BRUGMANN
AG=21w3d
10.1cm/1.4/20Hz
TIs 0.1
2009/10/14
10:27:16
Trimestre 2.
Har-high
Pwr 97 %
Gn 2
C5 / M4
P1 / E0
SRI II 4
Voluson
E8

Ecografia 3D/4D

Numerosos planos 2D

Imágenes 2D consecutivas que forman parte de un volumen



Ecografía 3D de despistaje

Ecografía 3D diagnostica


ANATOMÍA FETAL
1 er Trimestre
NUCA
BIOMETRÍAS

Valoración de la nuca y de la anatomía fetal a través de un volumen 3D

- **Is 3-dimensional volume sonography an effective alternative method to the standard 2-dimensional technique of measuring the nuchal translucency?** Shipp TD, Bromley B, Benacerraf B. J Clin Ultrasound. 2006 Mar
- **Effect of deviation from the mid-sagittal plane on the measurement of fetal nuchal translucency.** Ultrasound Obst Gybnecol 2010 Abele H, Wagner N, Hoopmann M, Grischke EM, Wallwiener D, Kagan KO
- **Comparison of nuchal translucency measurements obtained using Volume NTTM and two- and three-dimensional ultrasound** Ultrasound Obstet Gynecol. 2012 Feb;39(2):175-80. H. Y. Cho[1], J.-Y. Kwon[1,*], Y. H. Kim[1],K. H. Lee[2], J. Kim[2], S. Y. Kim[2], Y. W. Park[1]
- **What information on fetal anatomy can be provided by a single first-trimester transabdominal three-dimensional sweep?** *Ultrasound Obstet Gynecol 2008* Fauchon DE, Benzie RJ, Wye DA, Cairns DR
- **Assessment of nuchal translucency thickness and the fetal anatomy in the first trimester of pregnancy by two- and three-dimensional ultrasonography: a pilot study** J Perinat Med. 2011 Mar;39(2):185-93 Antsaklis A, Daskalakis G, Theodora M, Hiridis P, Komita O, Blanas K, Anastasakis E.
- **Is the starting section for 3D volume acquisition in the first trimester relevant in the post hoc analysis of aneuploidy screening markers and fetal anatomy?** Prenat Diagn. 2011 Dec;31(13):1305-10. Borrell A, Santolaya-Forgas J, Horbaczewski C, Henry RD, Dunn-Albanese L, Robinson JN.
- **Three-dimensional ultrasound is an accurate and reproducible technique for fetal crown-rump length measurement.** Youssef A, Salsi G, Bellussi F, Arcangeli T, Farina A, Contro E, Maroni E, Pilu G, Rizzo N, Ghi T. Prenat Diagn. 2012

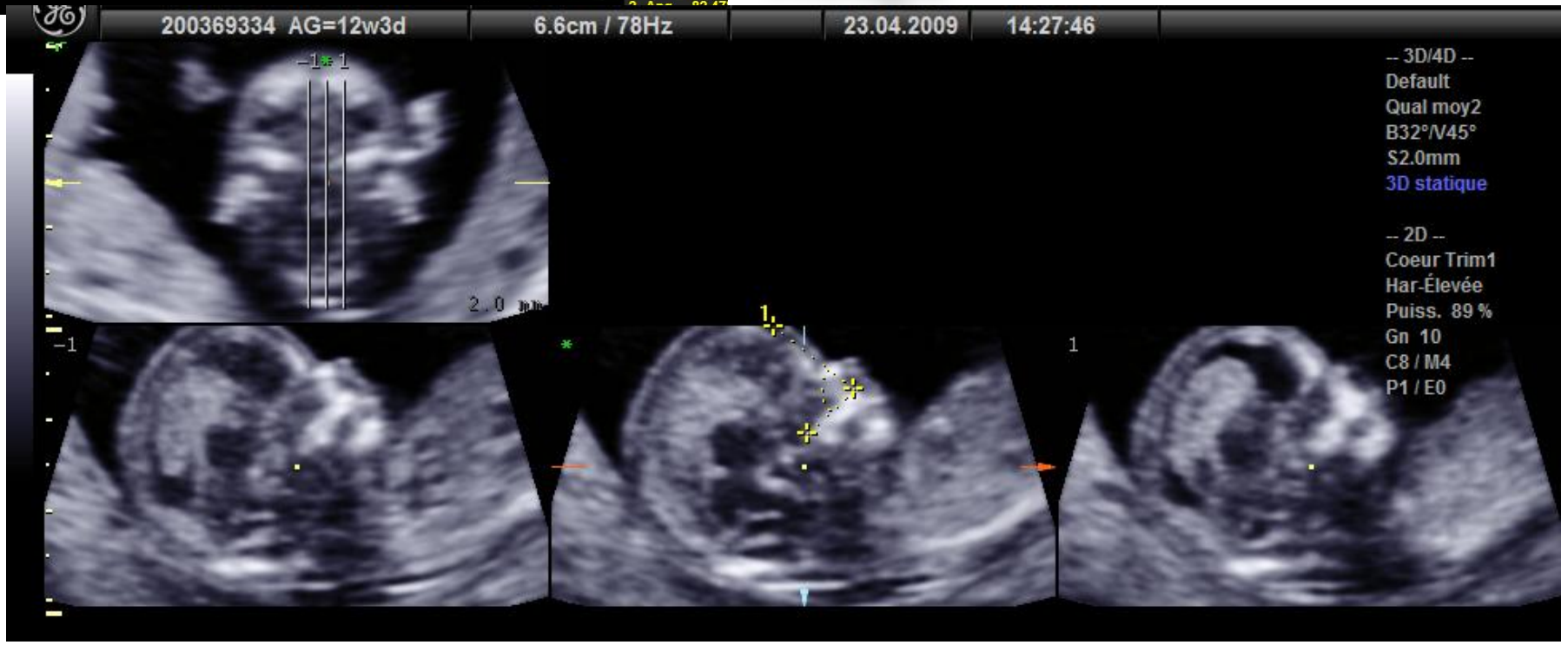
Requisitos de un volumen en el 1 er T:

Adquisición y manipulación

- Para obtener un plano sagital correcto del LCC y de la nuca:
  - Adquisición a partir de un plano sagital 2D
  - *Adquisición de un plano axial
- Para la cara, HPN y miembros:
  - Adquisición a partir de un plano frontal en 2D
- Para el calculo de las biometrías del feto
  - el plano no es importante pero si la calidad de la imagen inicial 2D
- Para el examen de la anatomía fetal
  - se requiere agrandar la imagen y la adquisición del feto completo o por zonas

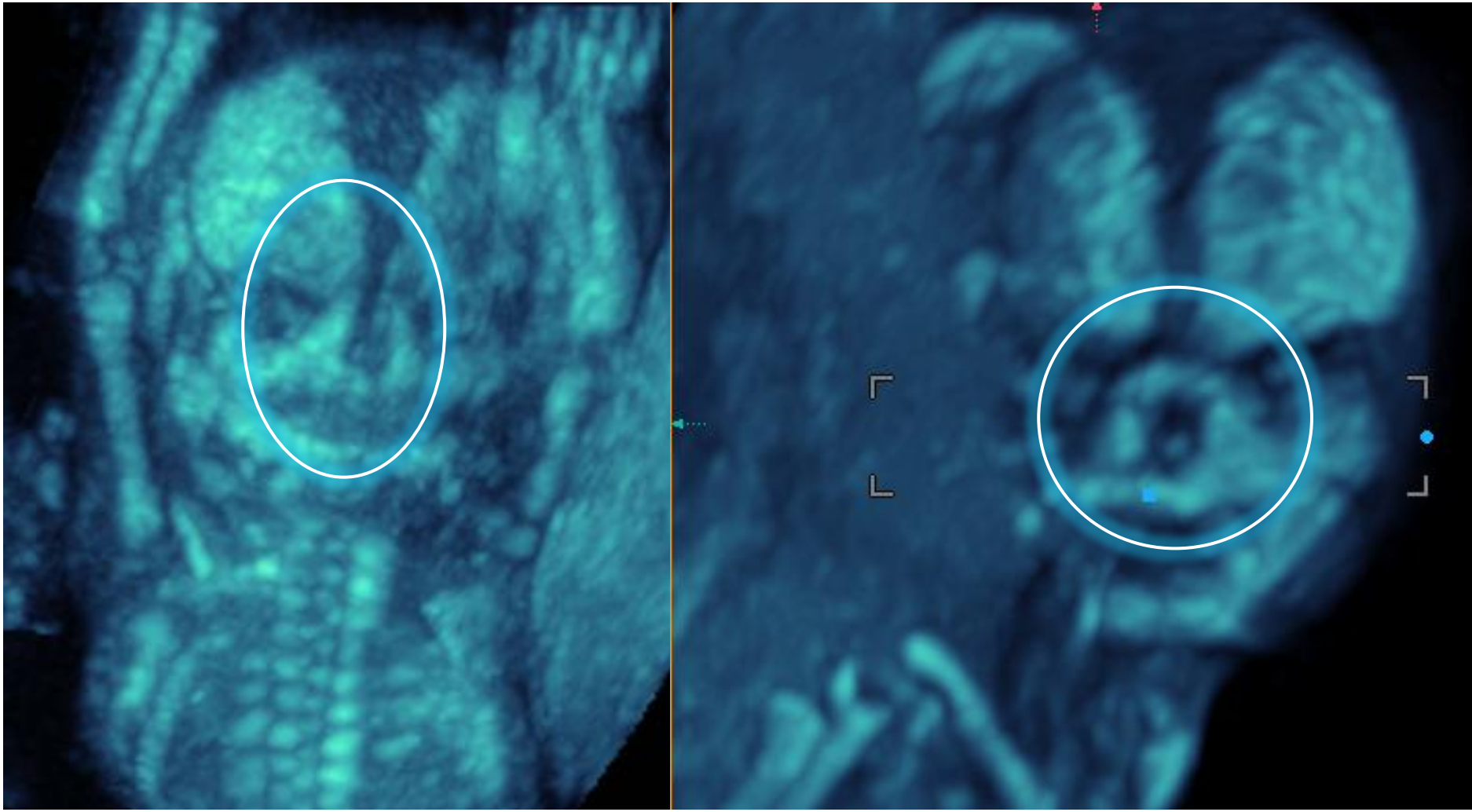
3D:

Mejora el plano sagital, pero no tiene impacto sobre el calculo de riesgo

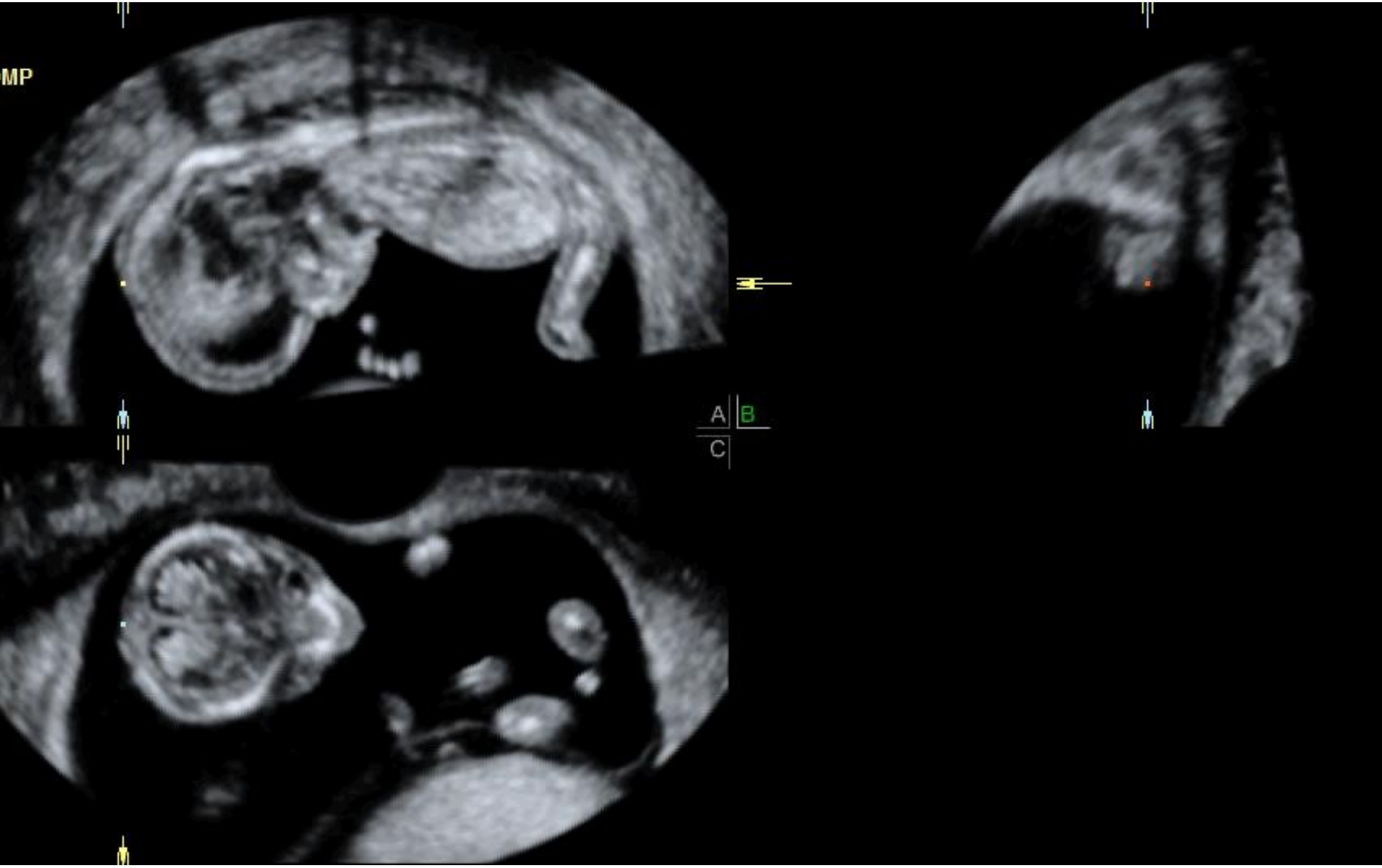


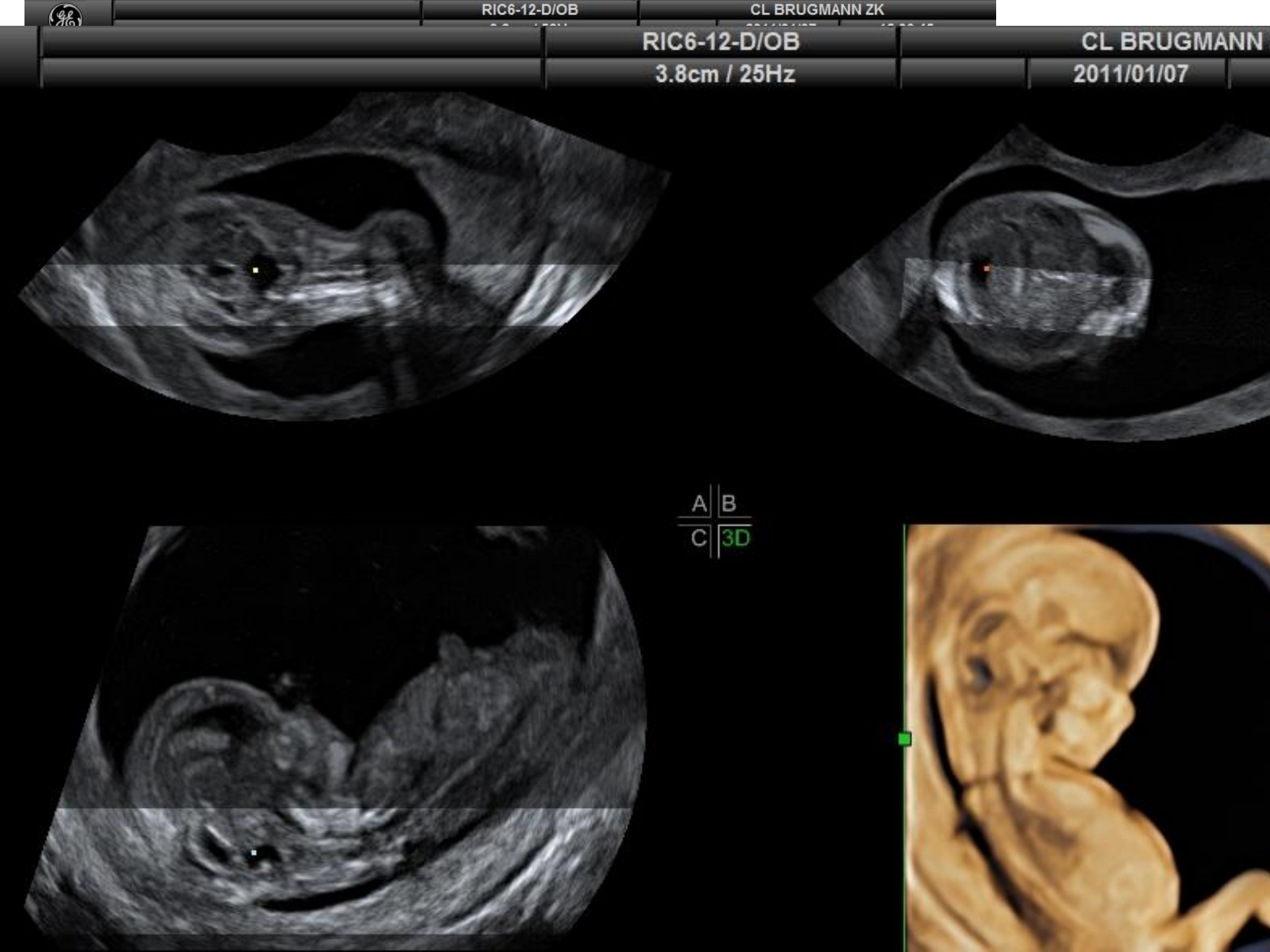
Ausencia de huesos propios de la nariz

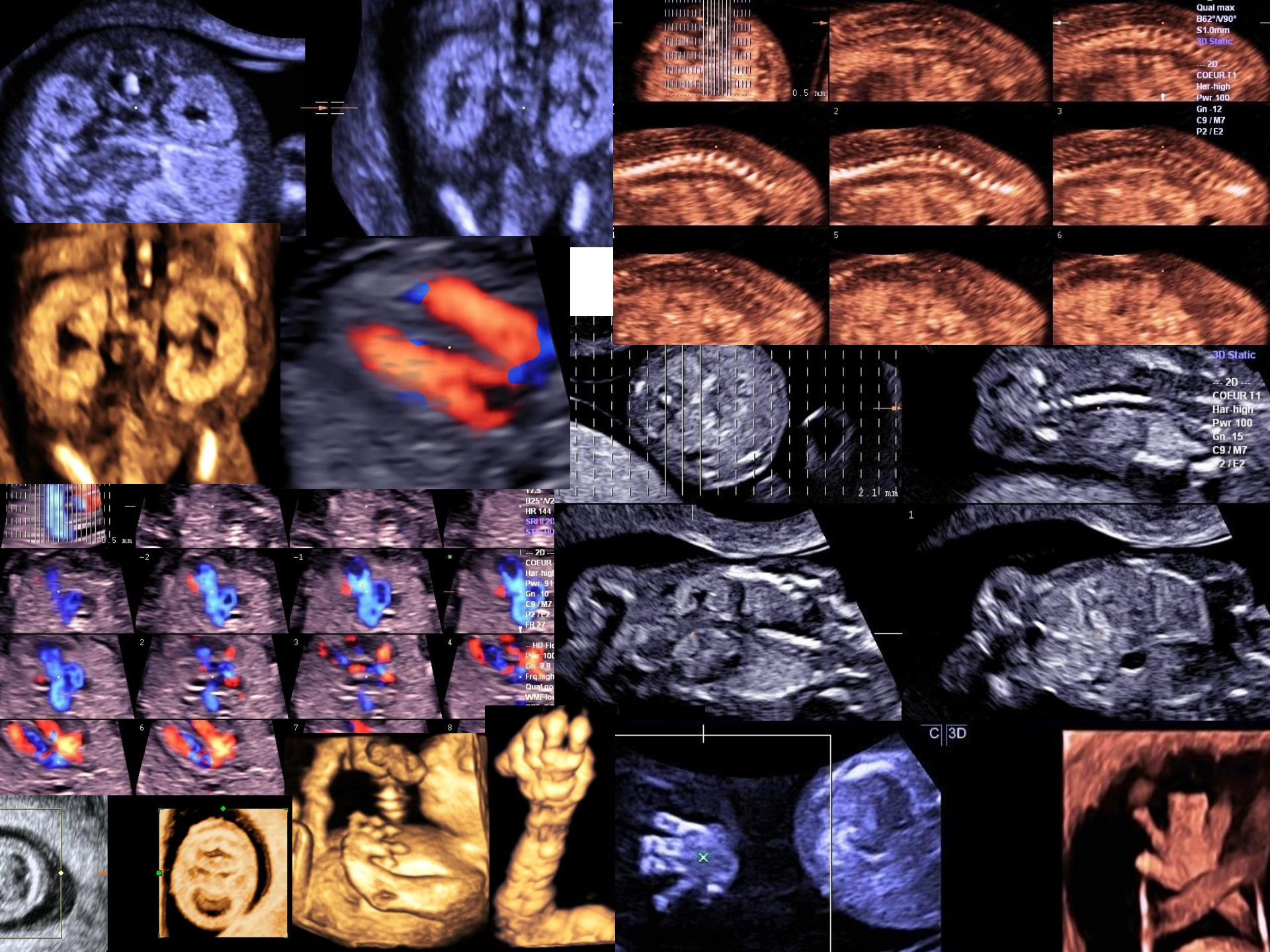
Triangulo premaxilar



Anatomía :
Barridos de – de 1 min
Manipulación: 8 mn


MP
A
B
C


RIC6-12-D/OB
CL BRUGMANN ZK
RIC6-12-D/OB
CL BRUGMANN
3.8cm / 25Hz
2011/01/07
A
B
C
3D


Qual max
B62°/V90°
S1.0mm
3D Static
--- 2D ---
COEUR T1
Har-high
Pwr 100
Gn -12
C9 / M7
P2 / E2
0.5 mm
2.1 mm
3D Static
--- 2D ---
COEUR T1
Har-high
Pwr 100
Gn -15
C9 / M7
2 / E2
C 3D

Del depistaje al Diagnostico

Ecografía morfológica 3D

- How sonographic tomography will change the face of obstetric sonography: a pilot study. Benacerraf BR, Shipp TD, Bromley B. J Ultrasound Med. 2005 Mar;24(3):371-8
- Three-dimensional US of the fetus: volume imaging. Benacerraf BR, Shipp TD, Bromley B Radiology. 2006 Mar;238(3):988-96. Epub 2006 Jan 19
- What does 2-dimensional imaging add to 3- and 4-dimensional obstetric ultrasonography? J Ultrasound Med. 2006 Jun Gonçalves LF, Nien JK, Espinoza J, Kusanovic JP, Lee W, Swope B, Soto E, Treadwell MC, Romero R.
- Can 3D volume sets alone be used to detect fetal malformations?B. R. Benacerraf, B. Bromley, T. S. Shipp, *Ultrasound Obstet Gynecol* 2006; 28: 359–411
- Assessment of the third-trimester fetus using 3-dimensional volumes: a pilot study. Bromley B, Shipp TD, Benacerraf B 1: J Clin Ultrasound. 2007 Jun;35(5):231-7
- Standardization of 3-dimensional volumes in obstetric sonography: a required step for training and automation. Abuhamad AZ.J.Ultrasound Med 2005

Standardization of 3D Volumes of the Fetal Head (Breech Presentations*)

Volume acquisition

1. Reference plane: obtain an axial view of the head at the plane of the level of the lateral ventricles.
2. Acquisition box: open the acquisition box wide enough to ensure that the fetal head is contained within the box; the box boundaries should be placed just outside the fetal skull.
3. Acquisition angle: use an acquisition angle that is wide enough to include the upper spine inferiorly and the top of the head superiorly.

Volume display

1. Rotate image in plane A (lateral ventricles) along the z-axis until the interhemispheric fissure is aligned horizontally and the frontal part of the fetal brain is to the right of the image, from an observer's viewpoint.
2. Rotate image in plane C (sagittal view) along the z-axis until the fetal face is in a military position (fetus with straight plane of sight).
3. Rotate image in plane B (coronal view) along the z-axis until the interhemispheric fissure is aligned horizontally.
4. Place the reference point in plane A at the midpoint ofthe interhemispheric fissure.

Standardization of 3D Volumes of the Fetal Abdomen (Cephalic Presentations*)

Volume acquisition

1. Reference plane: obtain an axial view of the abdomen at level of the plane of the abdominal circumference;ensure that you have 1 full rib on each side.
2. Acquisition box: open the acquisition box wide enough to ensure that the fetal abdomen is contained within the box; the box boundaries should be placed just outside the fetal skin.
3. Acquisition angle: use an acquisition angle that is wide enough to include the sacrum inferiorly and the diaphragm superiorly.

Volume display

1. Rotate image in plane A (abdominal circumference)along the z-axis until the spine is at the 6-o'clock position and the stomach is in the left abdomen.
2. Move the reference point in plane A to the spine (body of vertebra); this will bring a longitudinal view of the spine in planes B and C.
3. Rotate image in plane C (coronal view) along the z-until the section of the lumbar spine is aligned vertically.
4. Rotate image in plane B (sagittal view) along the z-axis until the section of the lumbar spine is aligned horizontally.
5. Place the reference point in plane A at the center of thefetal abdomen.

Standardization of 3D Volumes of the Fetal Chest (Cephalic Presentations*)

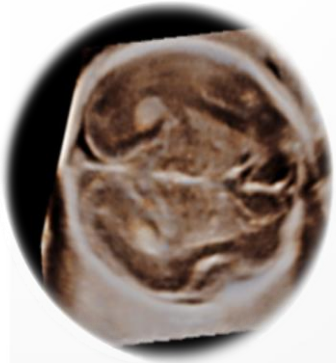
Volume acquisition

1. Reference plane: obtain an axial view of the chest at the level of the 4-chamber view; ensure that you have 1 full rib on each side.
2. Acquisition box: open the acquisition box wide enough to ensure that the fetal chest is contained within the box; the box boundaries should be placed just outside the fetal skin.
3. Acquisition angle: use an acquisition angle that is wide enough to include the stomach inferiorly and the lower neck superiorly.

Volume display

1. Rotate image in plane A (4-chamber view) along the z-axis until the spine is at the 6-o'clock position and the apex of the heart is in the left upper chest.
2. Move the reference point in plane A to the spine (body of vertebra); this will bring a longitudinal view of the spine in planes B and C.
3. Rotate image in plane C (coronal view) along the z-axis until the section of the midthoracic spine is aligned vertically.
4. Rotate image in plane B (sagittal view) along the z-axis until the section of the midthoracic spine (posterior to the heart) is aligned horizontally.
5. Place the reference point in plane A at the crux of the heart, at the level of the insertion of

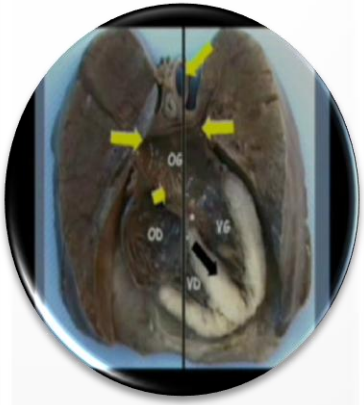
«Estandarización » de los volúmenes 3D en la ecografía morfológica



Vol

cefálico

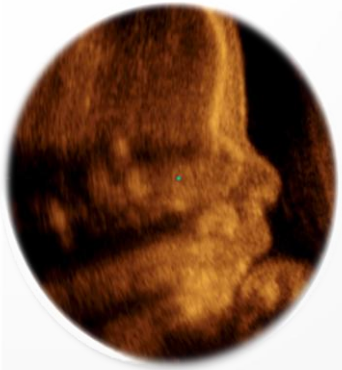
plano axial



Vol

Cardiaco

Plano axial STIC



Vol

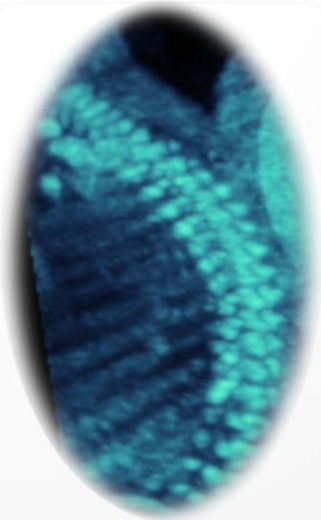
facial

plano sagital o frontal

Vol

abdominal

plano axial

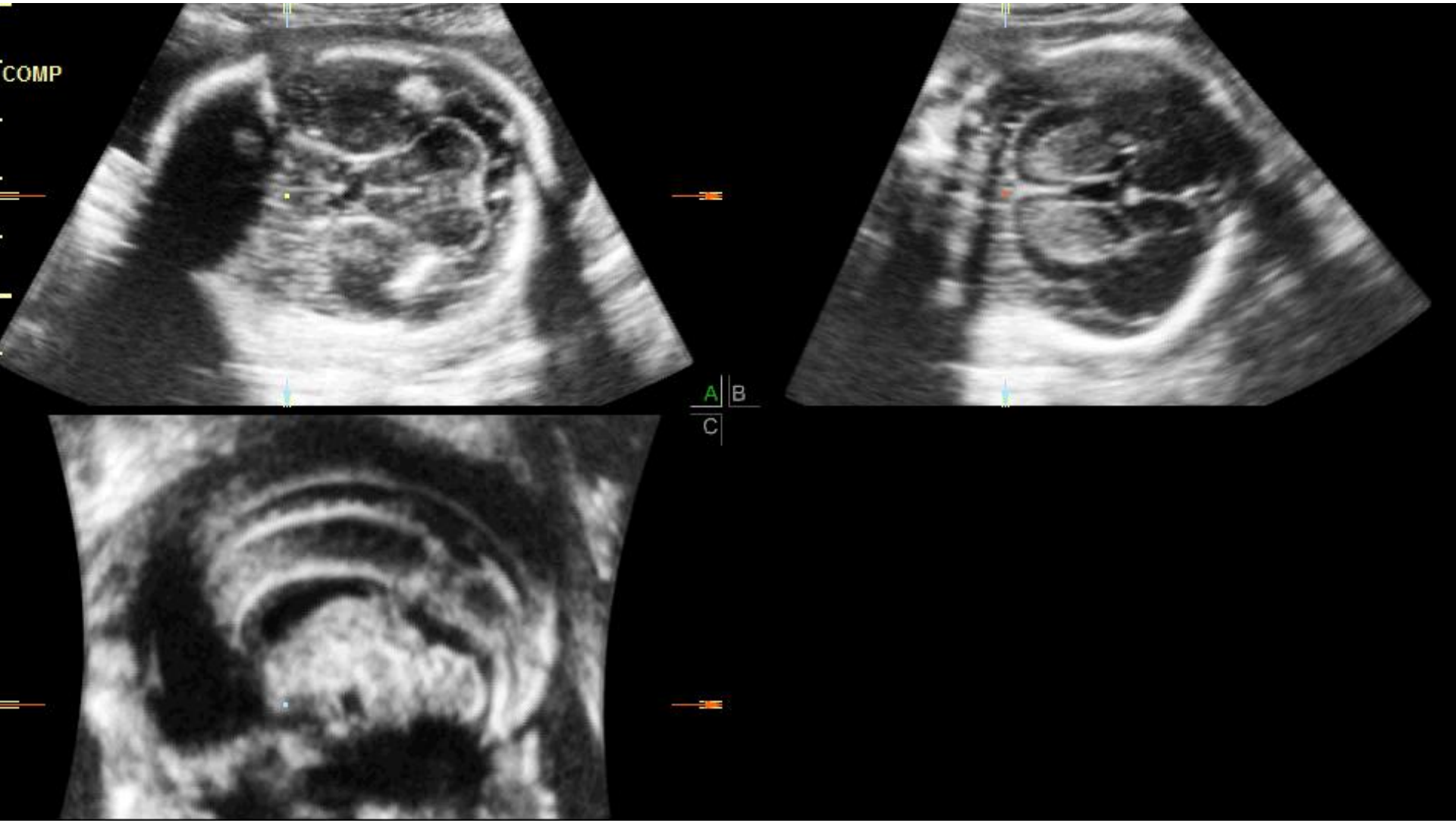


Vol

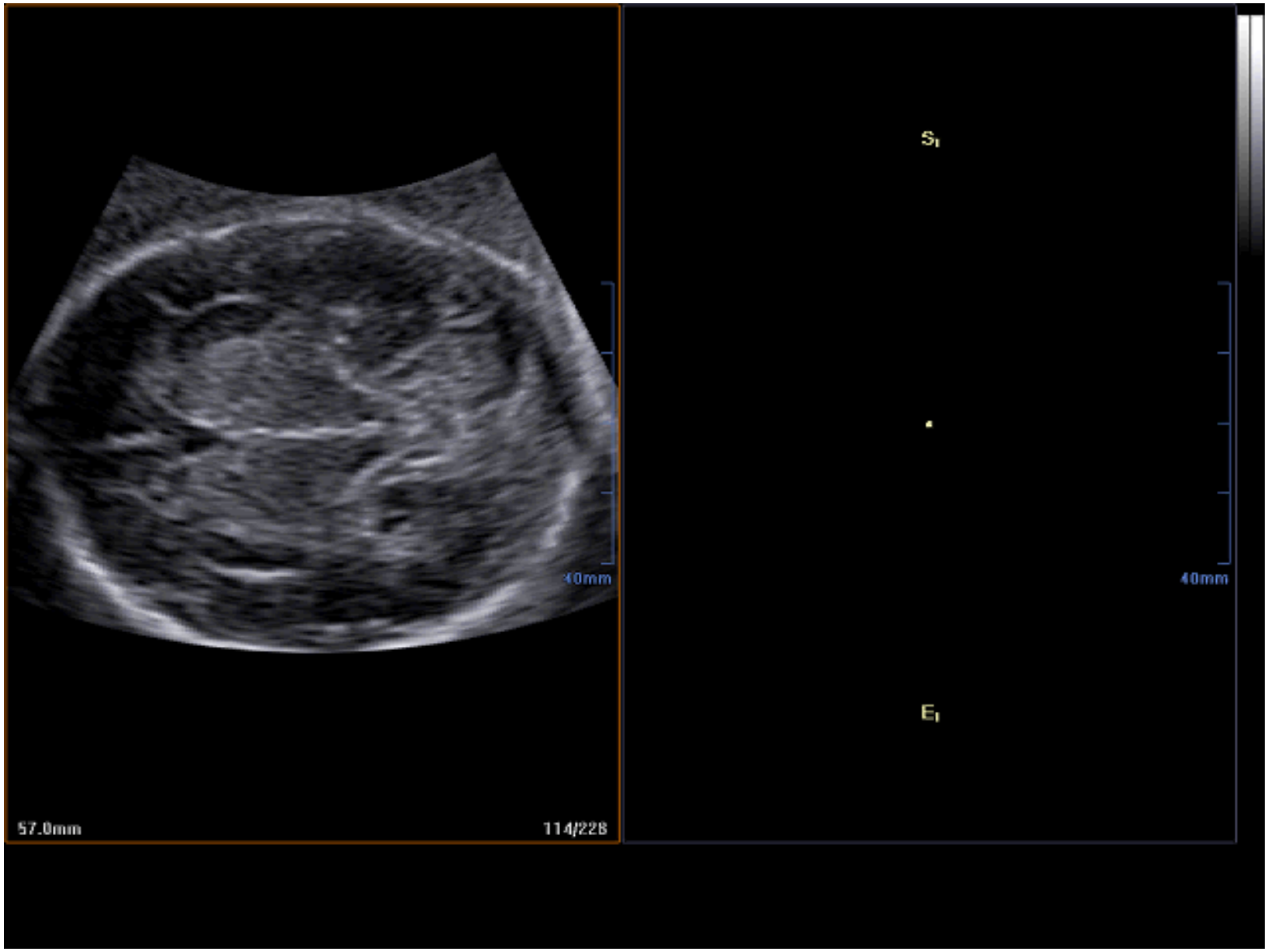
Columna vertebral

plano sagital

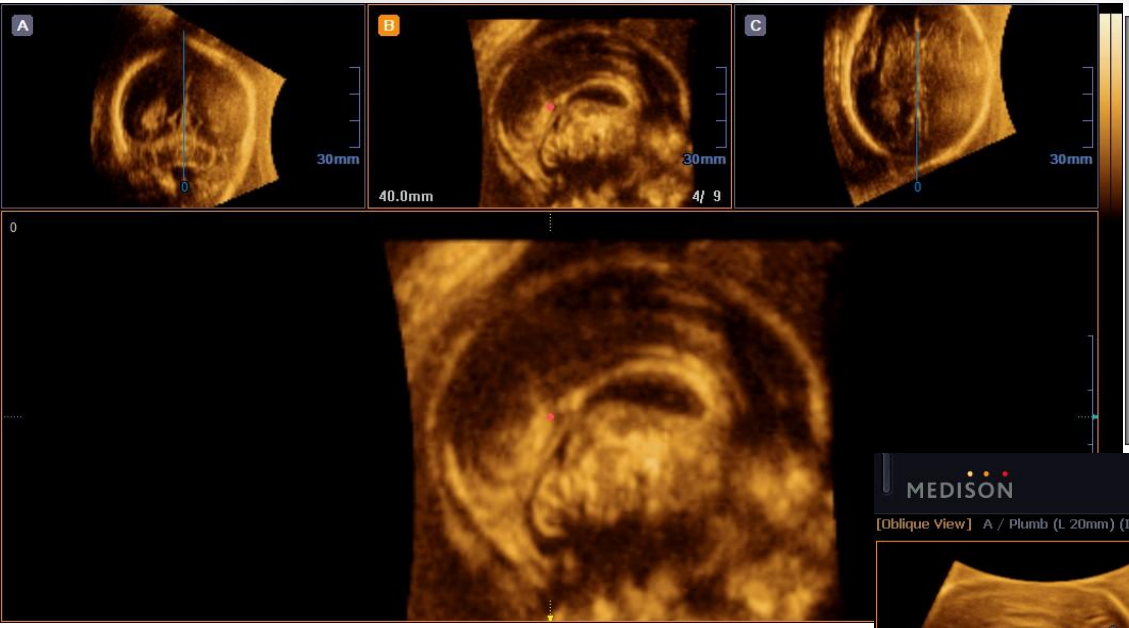
Vol cefálico



Plano axial ⟶ Plano sagital del CC



Evaluation of offline analysis of archived three-dimensional volume datasets in the diagnosis of fetal brain abnormalities Salman MM, Twining P, Mousa H, James D, Momtaz M, Aboulghar M, El-Sheikhah A, Bugg GJ. Ultrasound Obstet Gynecol. 2011 Aug;38(2):165-9.

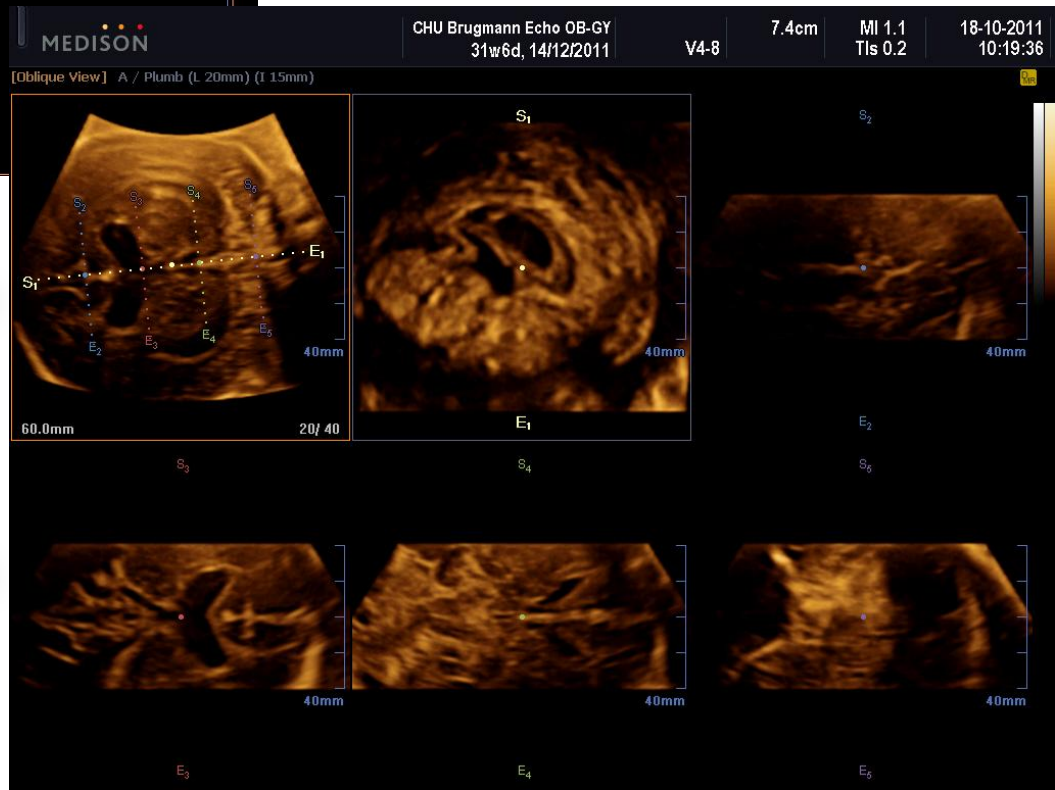


Neurosonografia 3D (17-30w):
27 Fetos cerebros N: 100%
52 fetos anomalías SNC (87): 88-92%
(82% 2D 80/87)
+ valor adicional al 2D
*La experiencia factor importante

Collaborative study on 3-dimensional sonography for the prenatal diagnosis of central nervous system defects

Rizzo G, Abuhamad AZ, Benacerraf BR, Chaoui R, Corral E, Addario VD, Espinoza J, Lee W, Mercé Alberto LT, Pooh R, Sepulveda W, Sinkovskaya E, Viñals F, Volpe P, Pietrolucci ME, Arduini D.

J Ultrasound Med. 2011 Jul;30(7):1003-8.



11 centros: 3D en 217 fetos con anomalías del SNC
Sensibilidad :93%, VPN 6,7% y VPP 3,5%

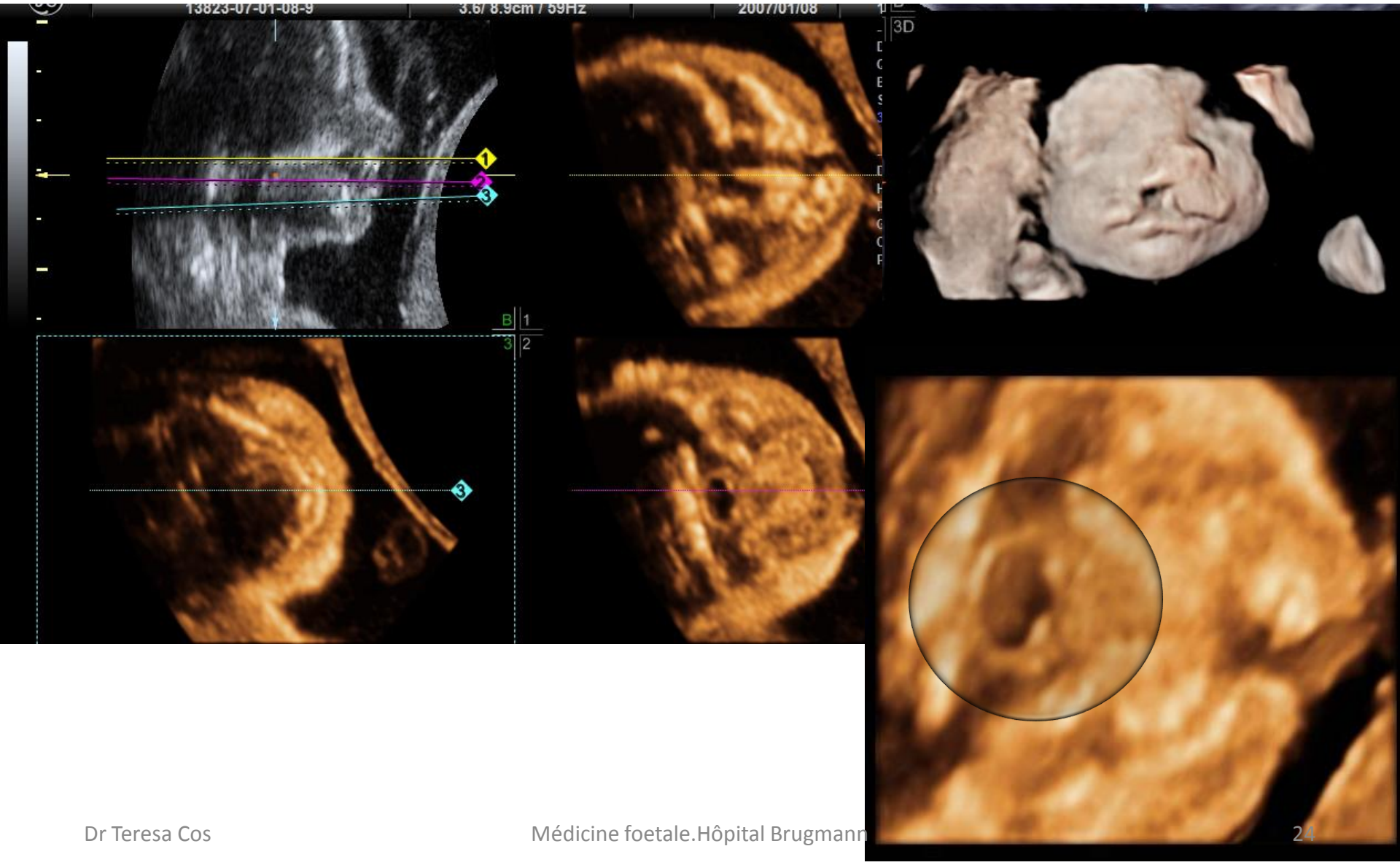
Benefits of a systematic approach in the evaluation of fetal facial 3-dimensional volumes

Ramos GA, Kfir M, Lee S, D'Agostini D, Wolfson T, Gamst A, Pretorius DH. J Ultrasound Med. 2011 Apr;30(4):473-9

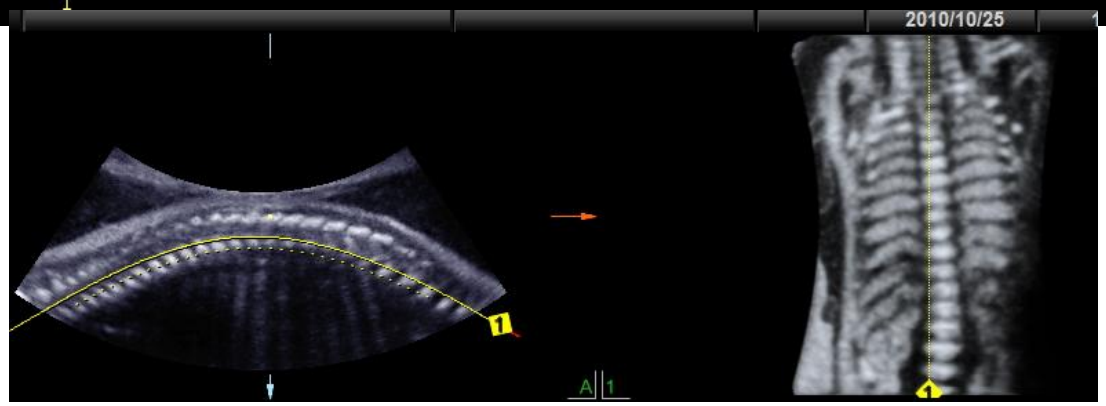
3D en plano axial: Perfil y paladar

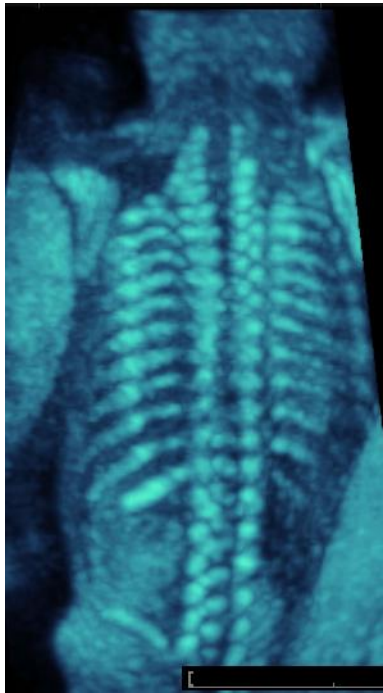
Pierre Robin

Hendidura labio palatina: velo del paladar (uvula)

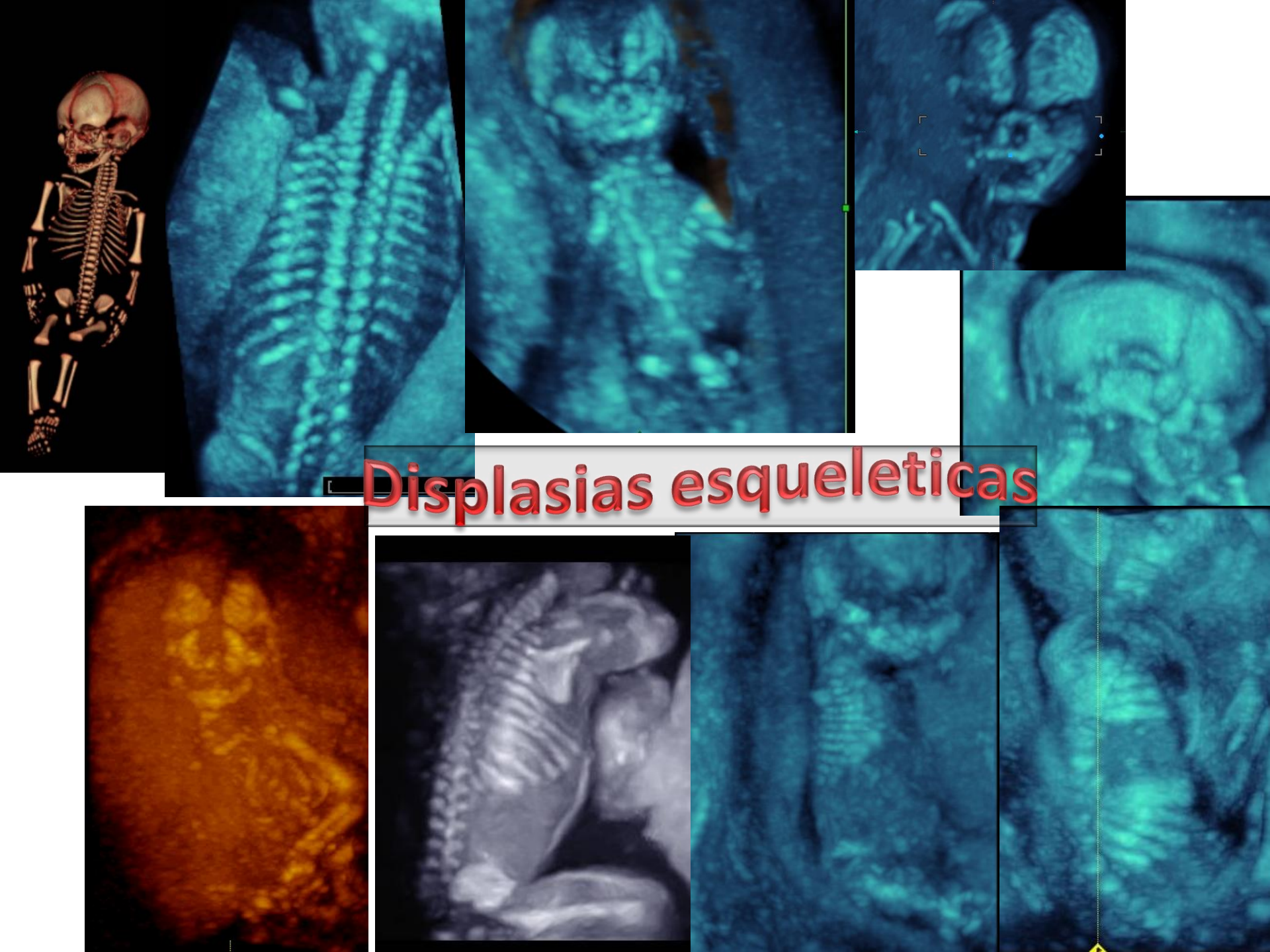


Columna vertebral

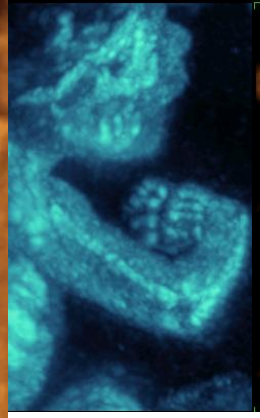




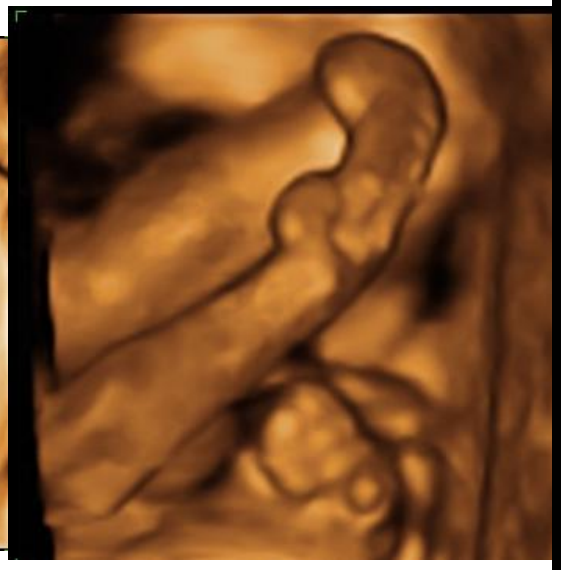
Espina bifida


Displasias esqueleticas








--- 3D/4D ---
profil
Th33/Qual mid
B56°/V70°
Mix100/0
S.txt/S.sm.
M50/50
S20.0mm
VCI C
--- 2D ---
Trimestre 2
Har-mid
Pwr 94 %
Gn 15
C6 / M4
P1 / E0

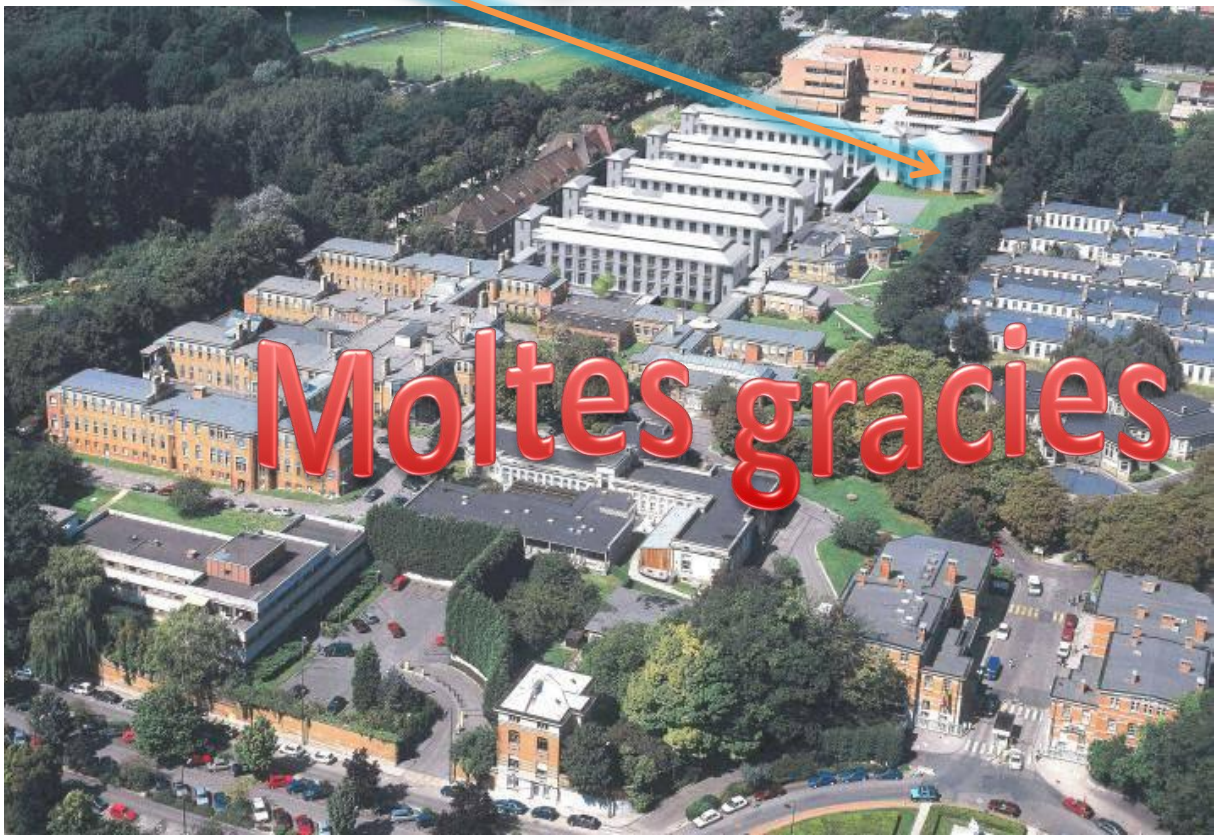
RENDU: TRIS 21

En la practica:

- En el 1 er T:
  - « realizable » y « reproductible »/ menos tiempo
  - Depende de la calidad , del plano 2D y de la visibilidad o no del amnios: nuca
- En el 2 y 3T:
  - Diferenciar entre estética e información
  - Formación para: adquisición y manipulación del 3D/4D
  - Limites: Doppler, LA, placenta y movimientos fetales
  - Supone un valor adicional en el despistaje y Diagnostico de anomalías fetales, “existe y se utiliza”
  - Útil en “telemedicina” para una segunda evaluación

The Fetal Medicine Foundation Belgium

CHU Brugmann UVC



Teresa.cossanchez@chu-brugmann.be