

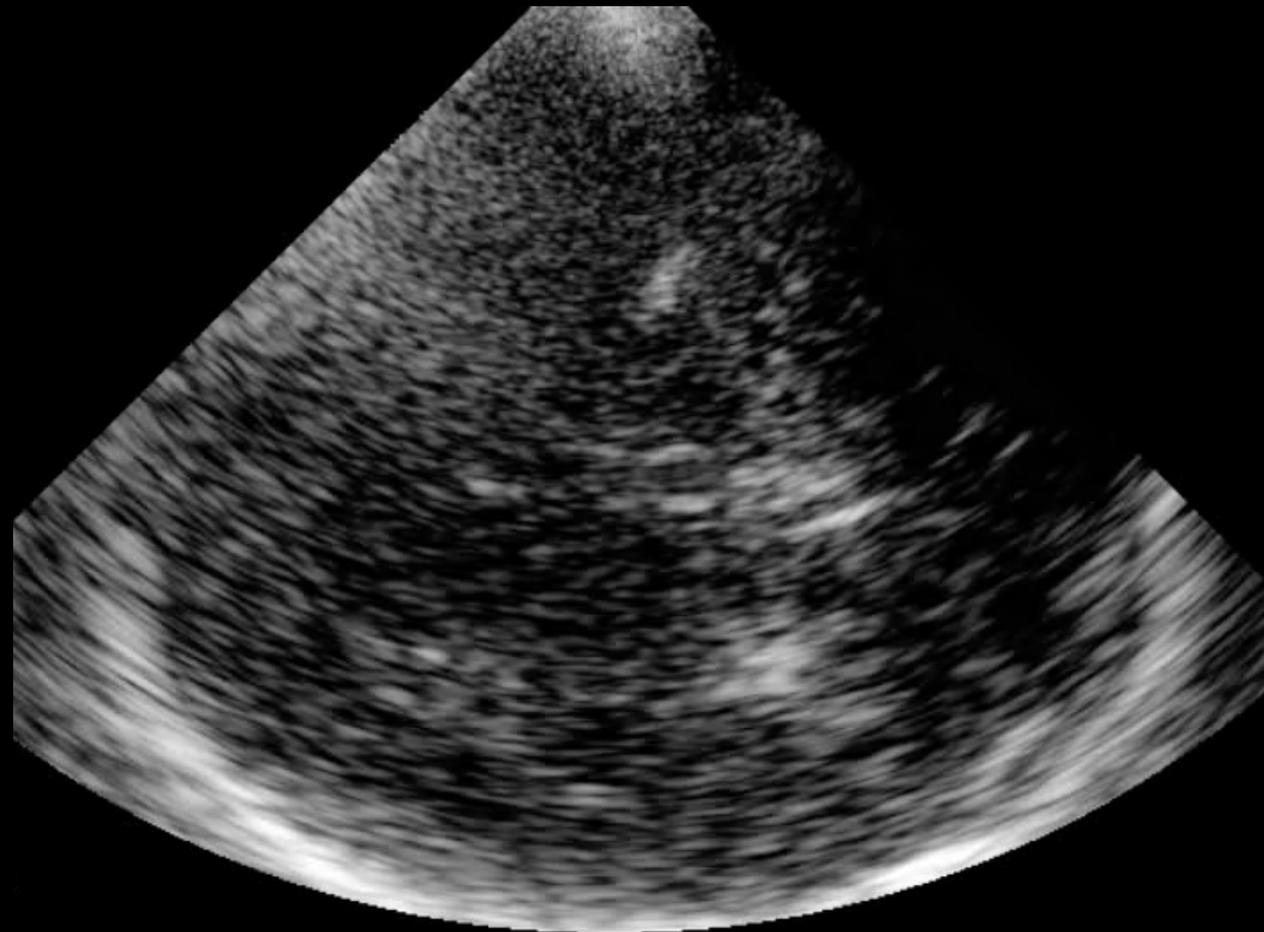


Échographie cérébrale

Dr S Grousson

Université Paris Saclay, AP-HP

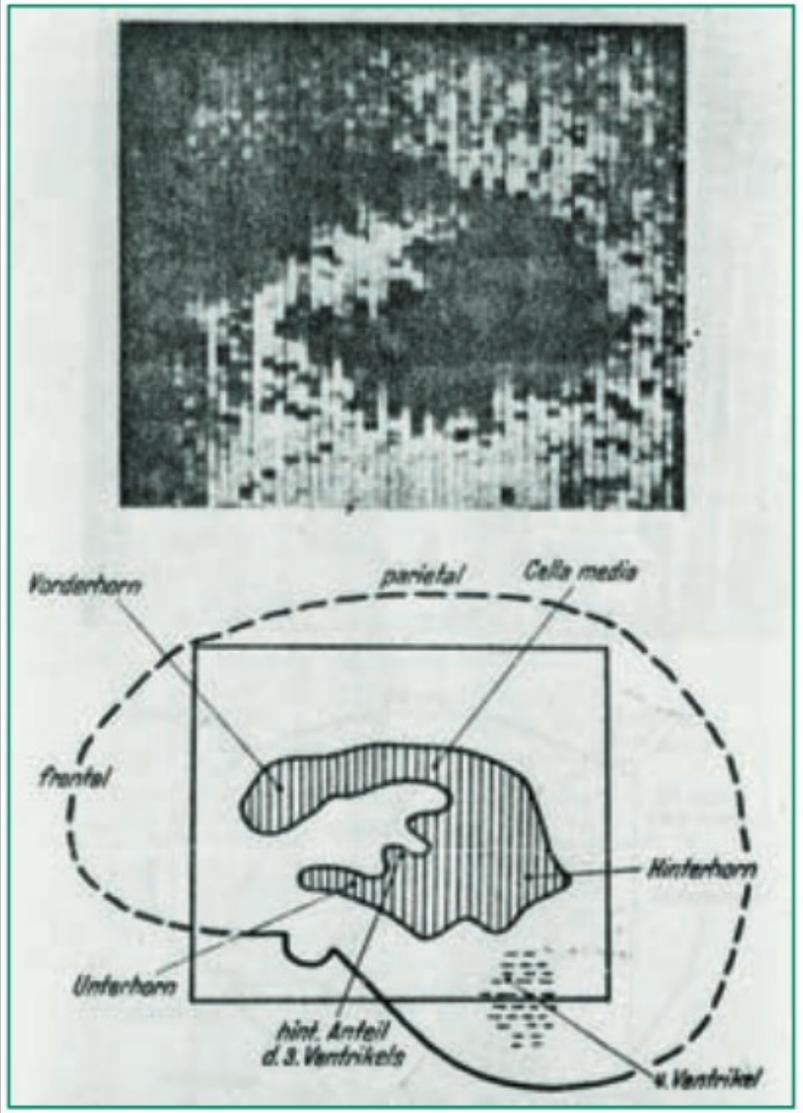
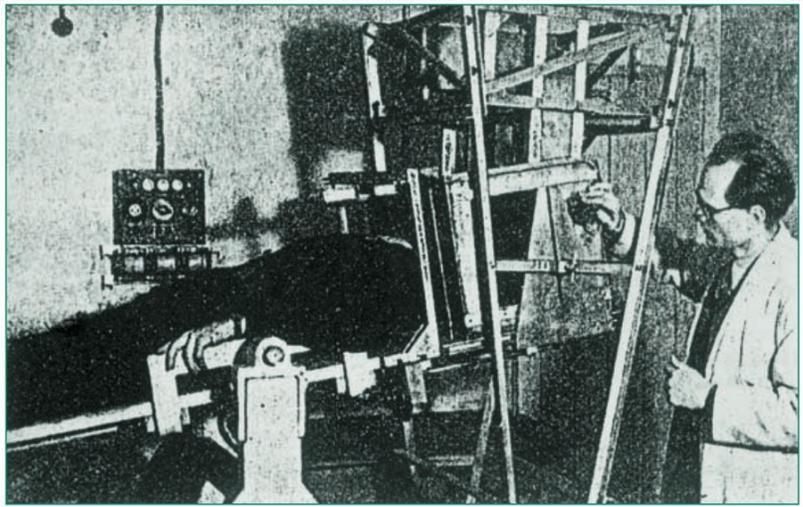
Hôpital Bicêtre - Le Kremlin Bicêtre

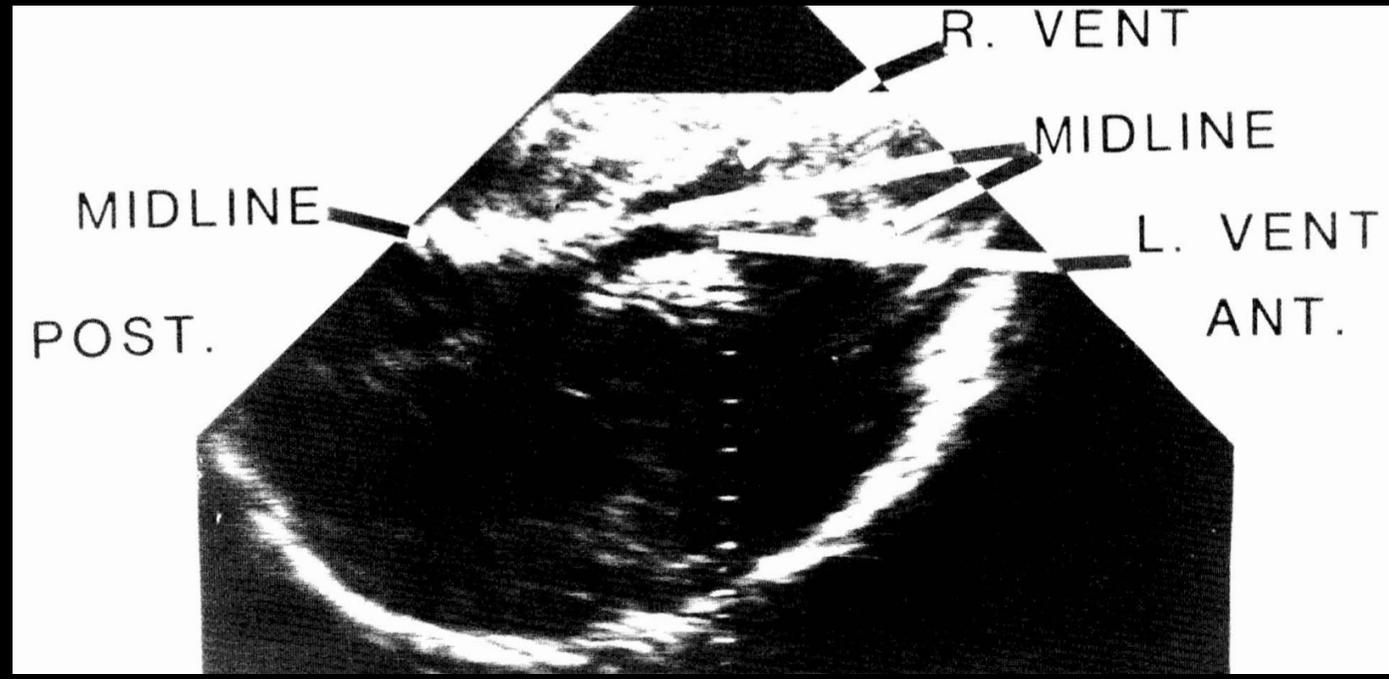
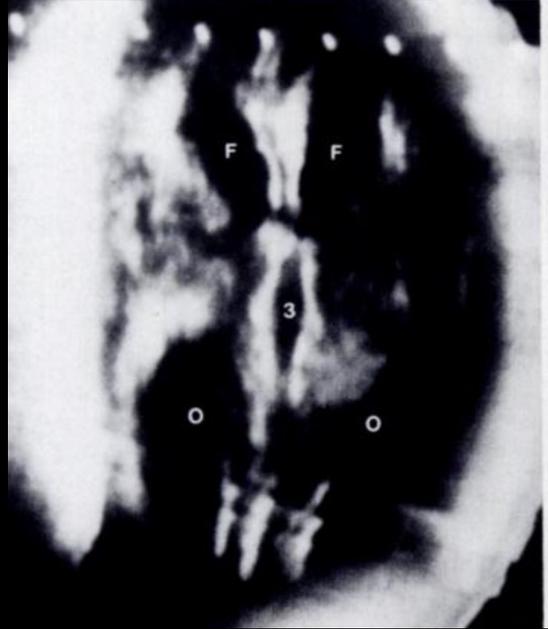


Aucun conflit d'intérêt à déclarer

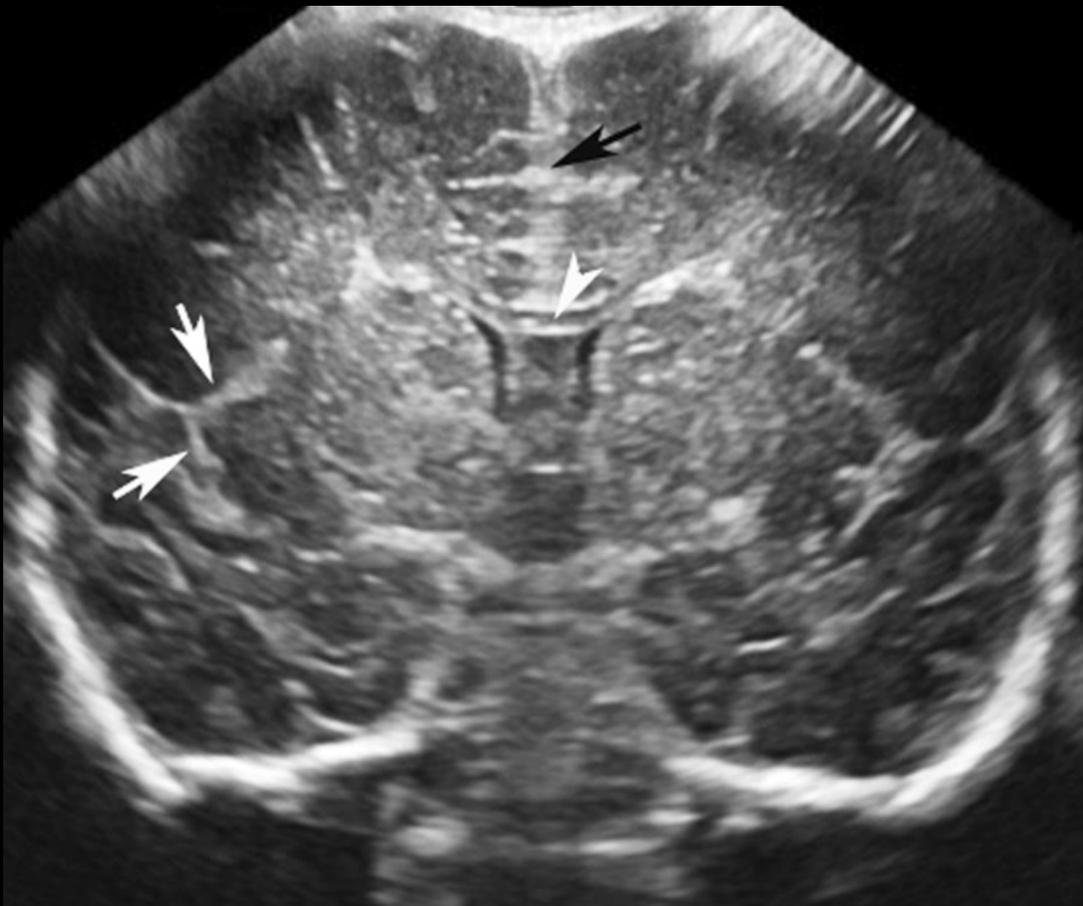


KT Dussik (1942)





Johnson et al. AJR 1979
Ostrup et al. Neurosurgery 1983



Que puis-je voir avec l'écho transcrânienne?

Hyperéchogènes:

- Os
- Septum pellucidum
- Faux, tente et sillons
- **Parois ventriculaires**

Échogènes:

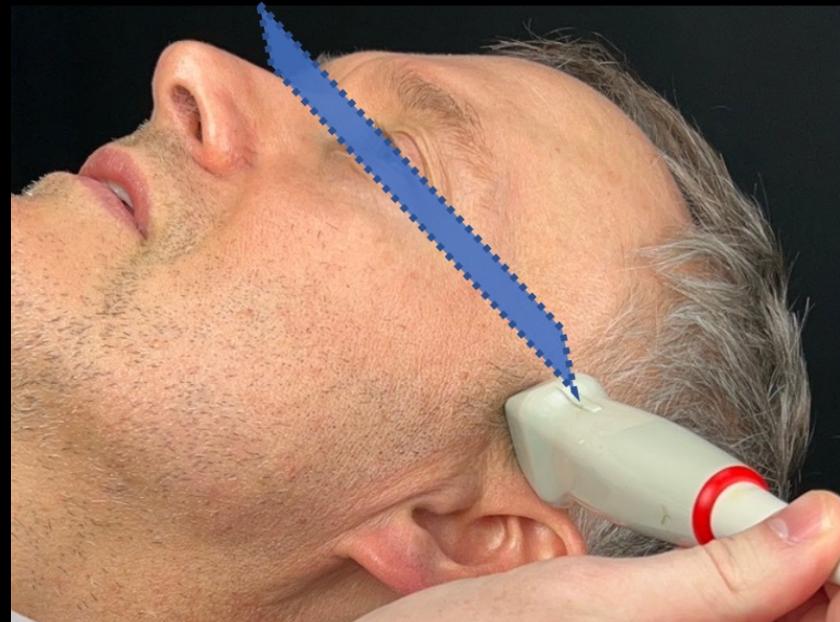
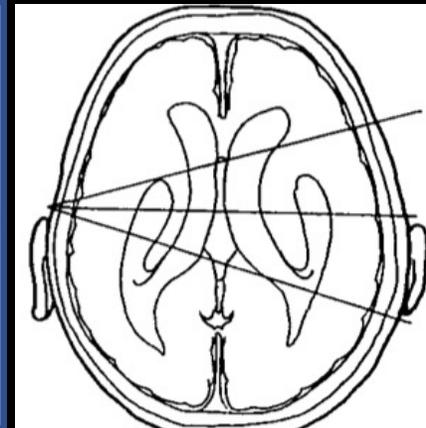
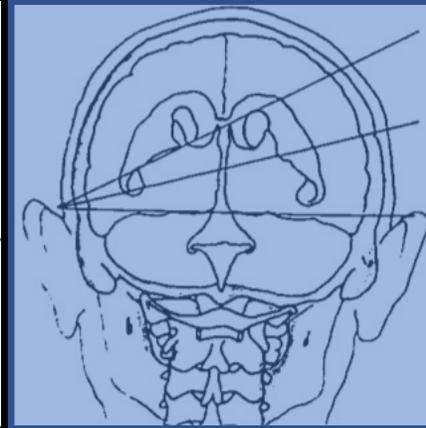
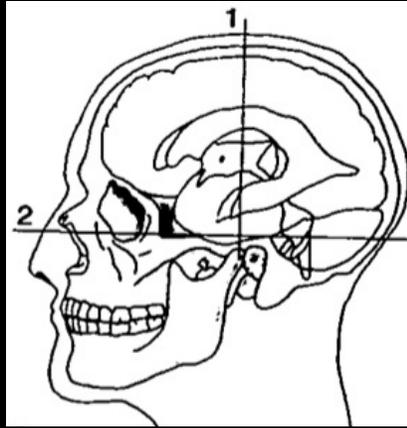
- Citernes basales
- **Glande pinéale**
- Plexus choroïdes

S T R U C T U R E S

Hypoéchogènes:

- **Tronc cérébral**
- Thalamus
- SB
frontale, temporale, pariétale
- Cervelet
- Noyaux gris
- **Lumière ventriculaire**
= anéchogène

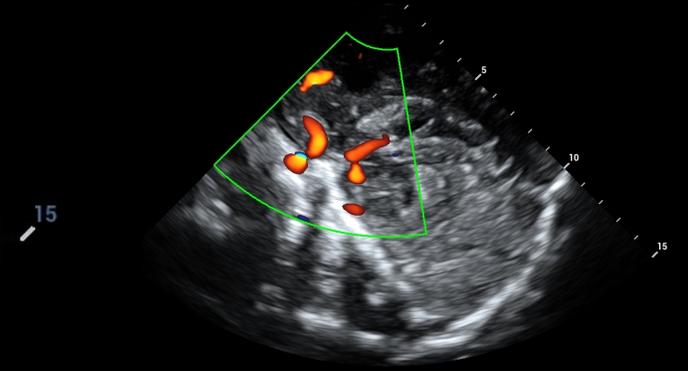
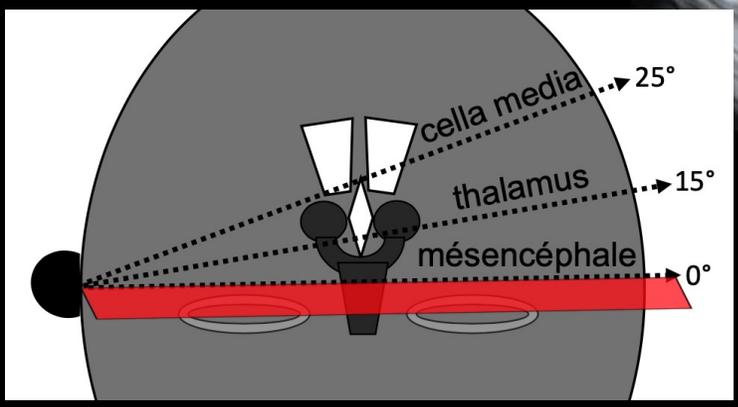
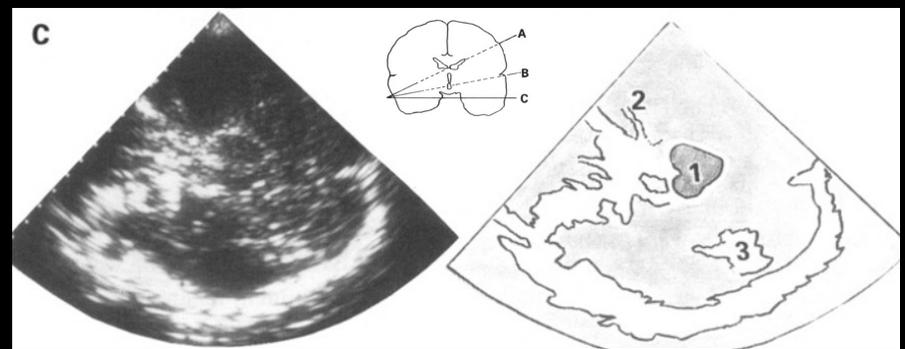
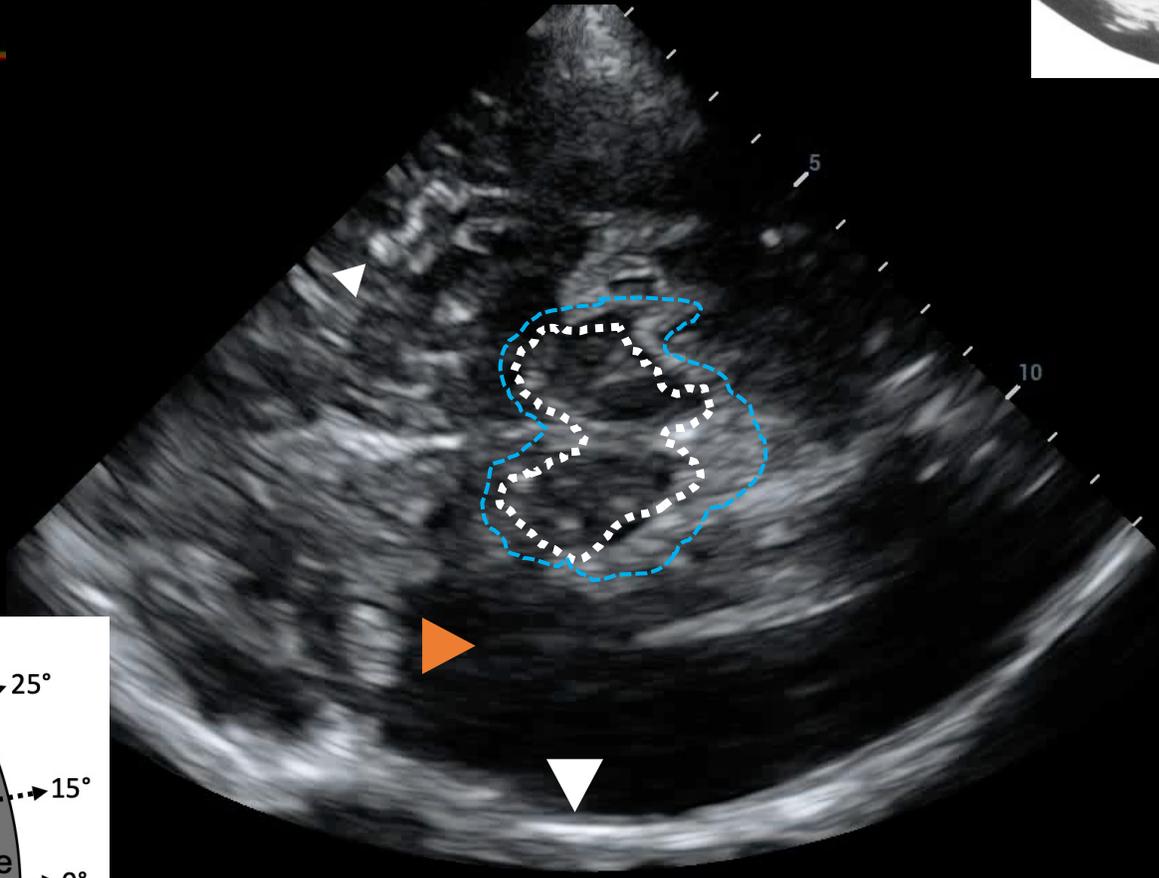
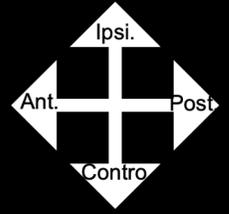
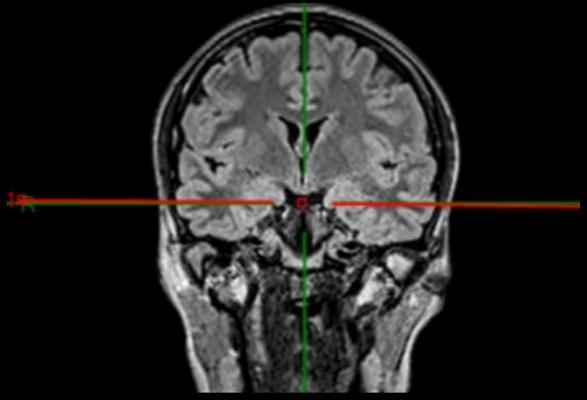
En pratique, comment je procède?



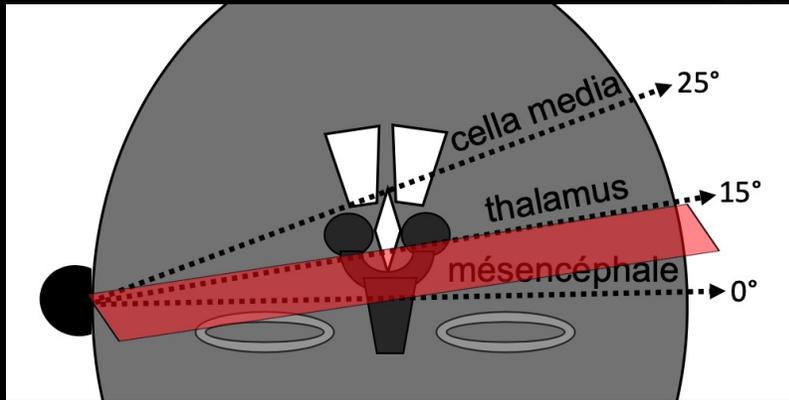
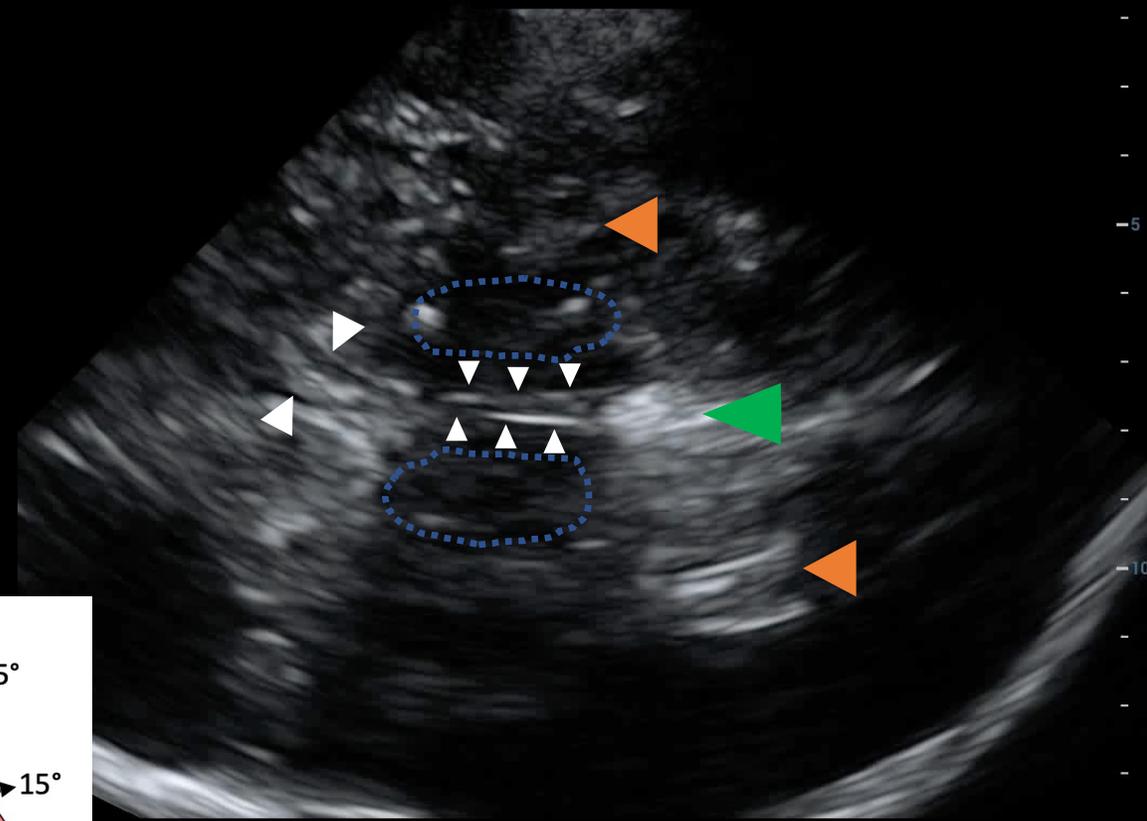
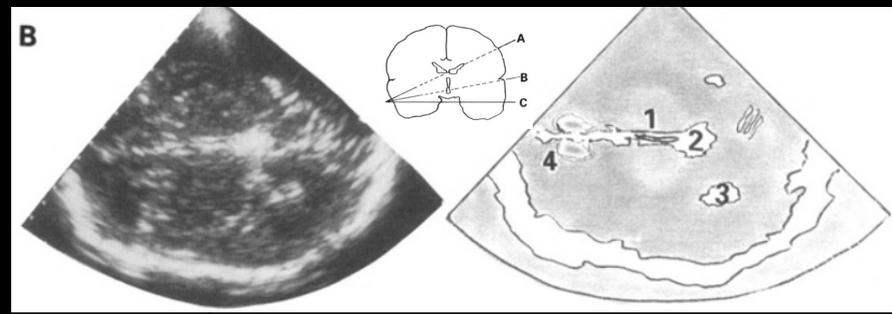
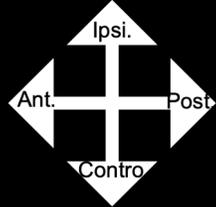
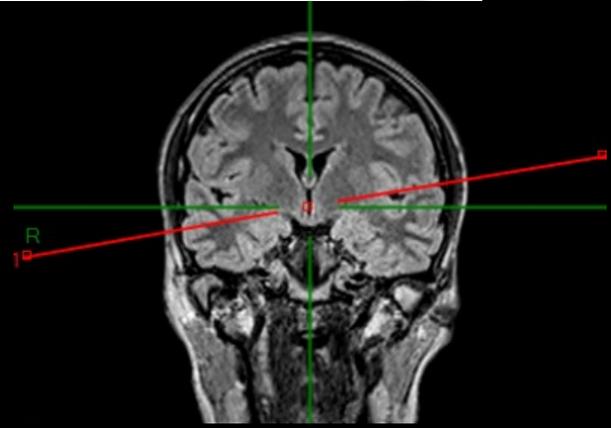
Paramètres	Réglages
Profondeur	15 cm
Gamme dynamique (gris)	45-55 dB
Compensation gain (TGC)	Automatique (<i>progr. TC</i>)
Gain (clarté)	Automatique (<i>progr. TC</i>)
Puissance (intensité)	La plus basse possible
Index IM/ ITC	< 1 (0.2 & 0 si <i>progr. TO</i>)
Fréquence insonation	2 - 3.5 MHz
Type sonde	« Cardio » (sectorielle, matricielle)



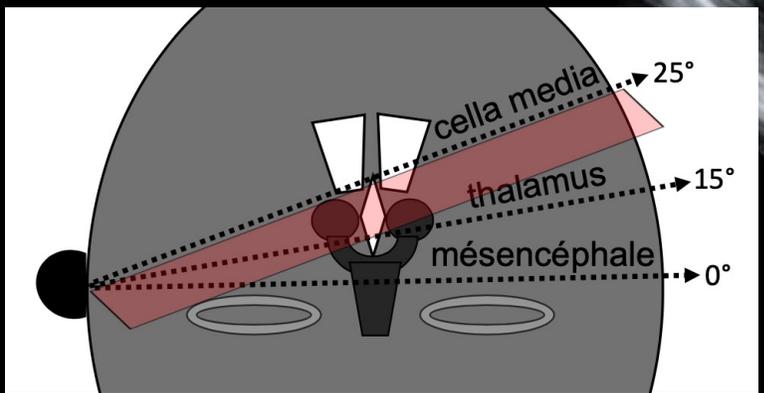
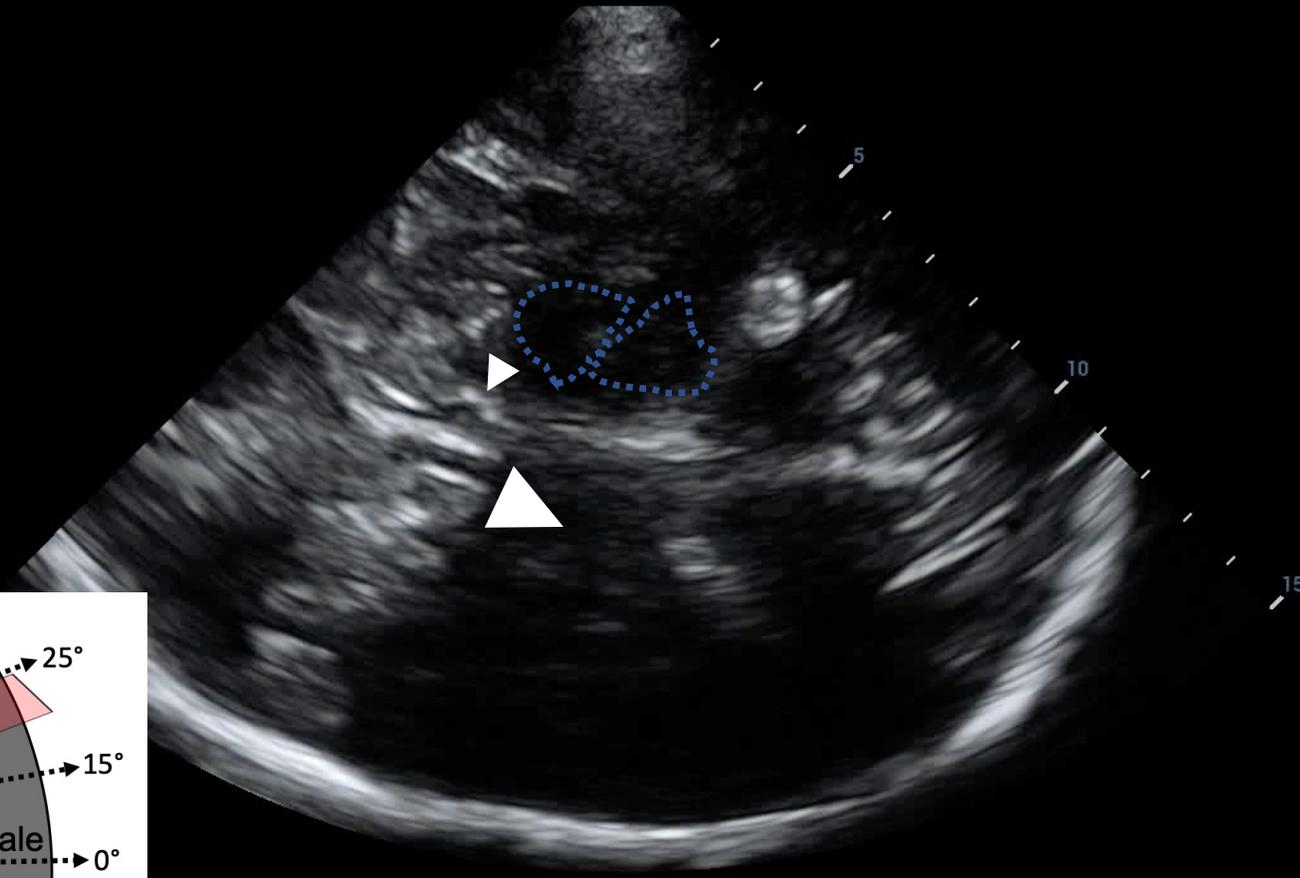
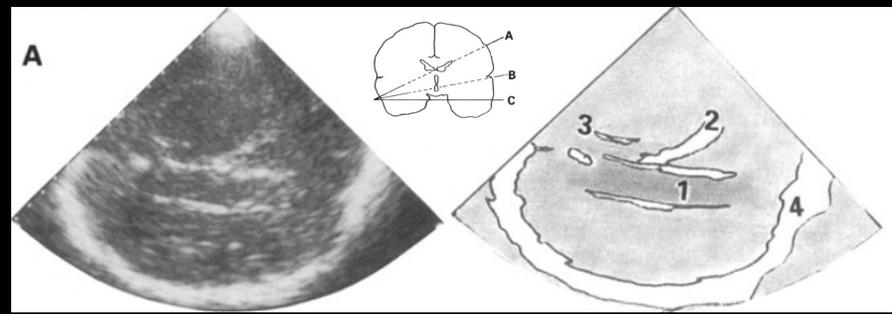
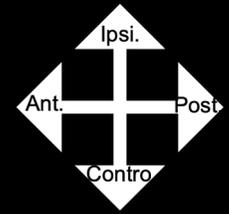
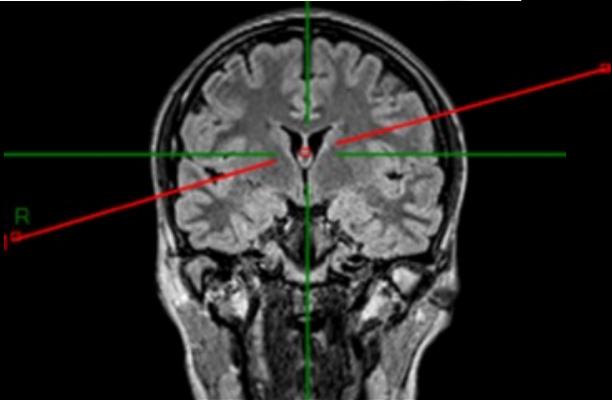
Résolution spatiale = 1.5 – 2.5 mm



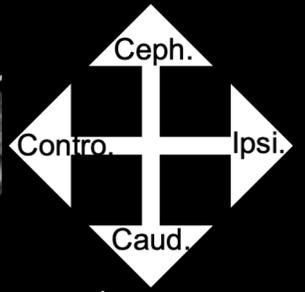
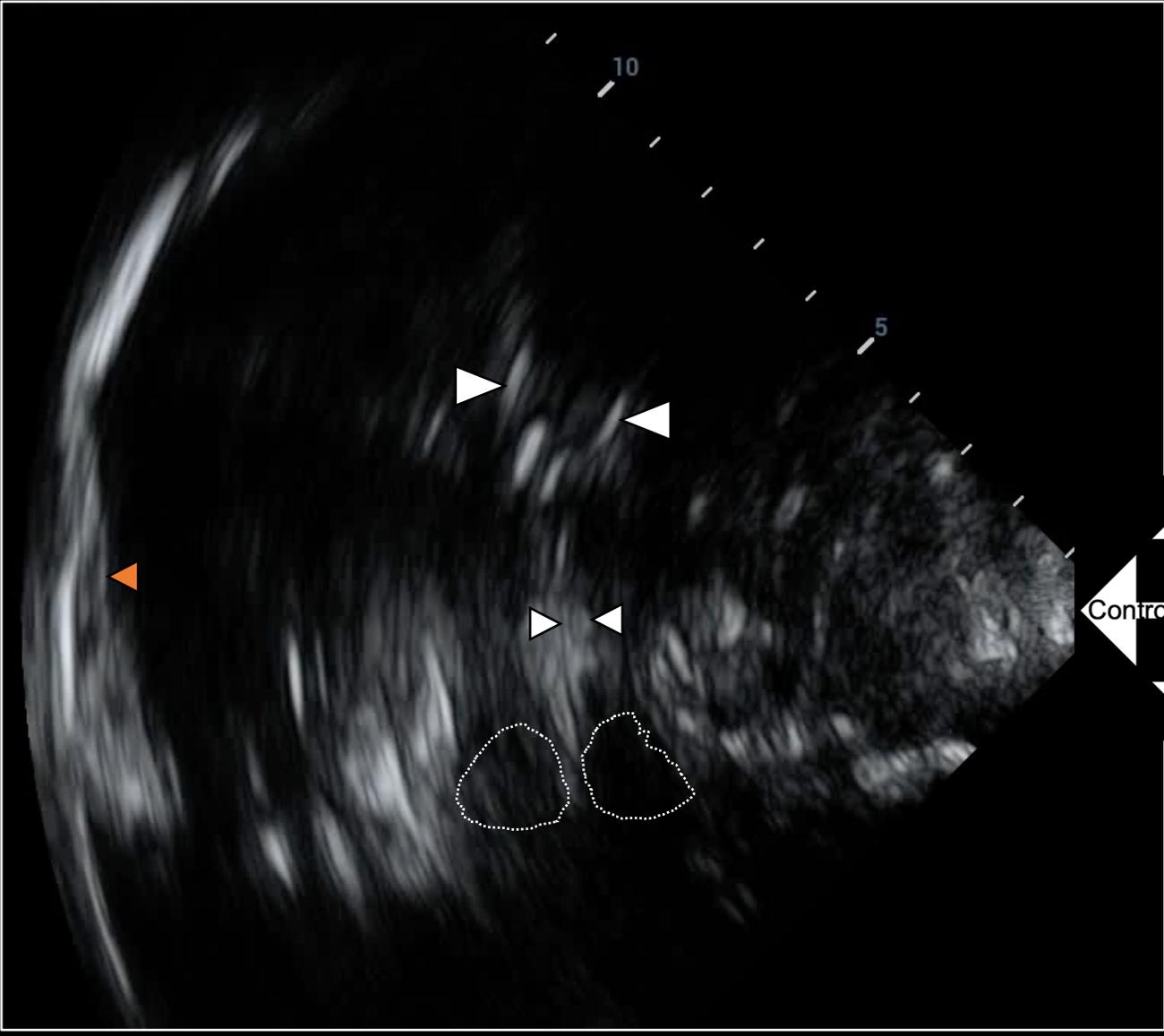
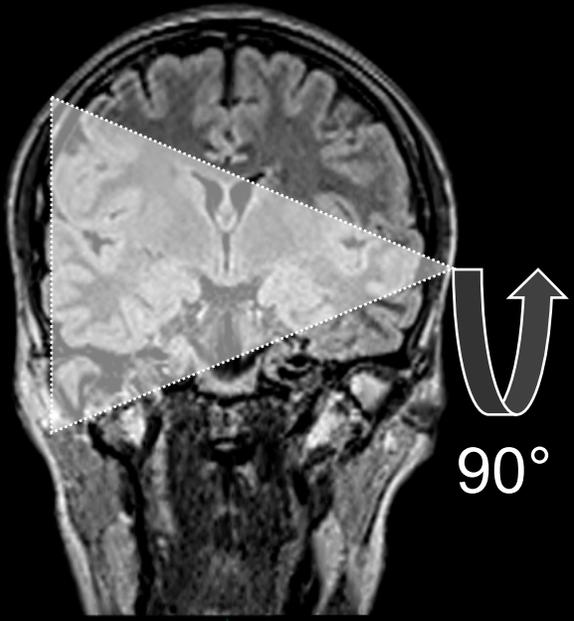
Bogdahn et al. Stroke 1990
Seidel et al. J Neuroimag 1995



Bogdahn et al. 1990
Seidel et al. 1995

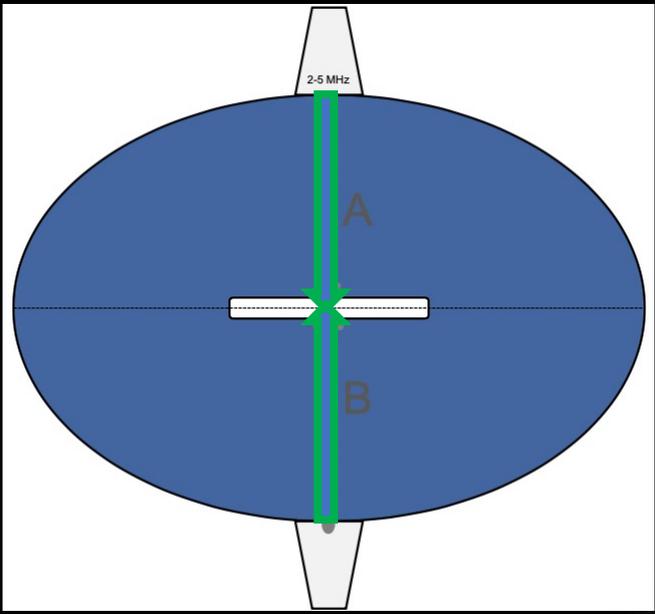


Bogdahn et al. 1990
 Seidel et al. 1995

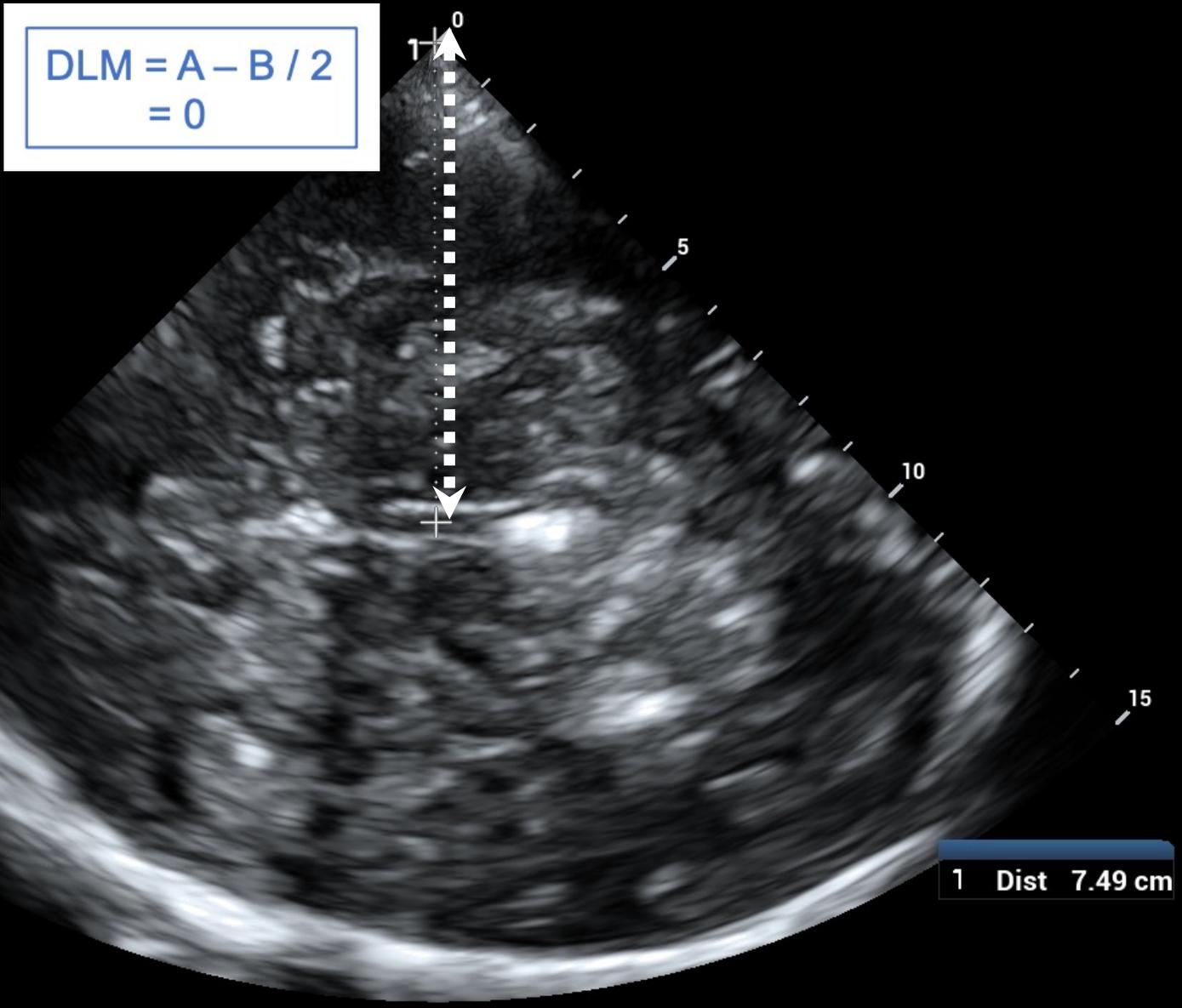


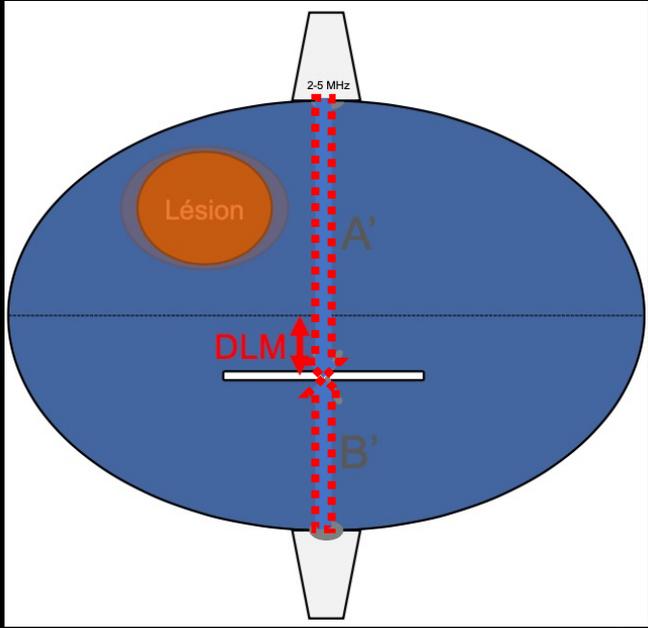
Pourquoi l'écho cérébrale pourrait m'être utile?
Que puis-je mesurer avec?

Applications	Mesures	Corrélation US/ méthode référence
Déviation Ligne Médiane	Seuil > 5 mm	Seidel 1996; Lhompert Pou 2004; Motuel 2014
Taille ventriculaire (V ₃ , VL) +/_ écho contraste	Seuils > 9; 19 mm? ↑ > 5.5 mm	Kiphuth 2011 Becker 2012
Volume lésionnel +/_ écho contraste	Formule ABC/2 et seuil > 25 mm ³	Tang 2006; Matsumoto 2011 Kern 2008
Estimation indirecte PIC _{NI} +/_ DTC +/_ écho trans orbitaire +/_ Doppler mode M	Effet de masse?, hydrocéphalie DENO > 5.8 mm Effacement citernes basales Ondulations septum pellucidum	Motuel 2014, Becker 1994 Geeraerts 2008 Oliveira 2017 Bolesch 2015
Visualisation lésion focale	Hématome intra-/péri-cérébral Autres: tumeur, abcès?	Seidel 1993 Becker 1994
FAST echo	<i>Idem supra</i>	Montrief 2019
Suivi thérapeutique: DVE Crâniectomie	Bonne position, sevrage <i>Idem supra</i> ...EN MIEUX	Kiphuth 2011 Caricato 2012; Bendella 2017; Robba 2019; De Bonis 2020

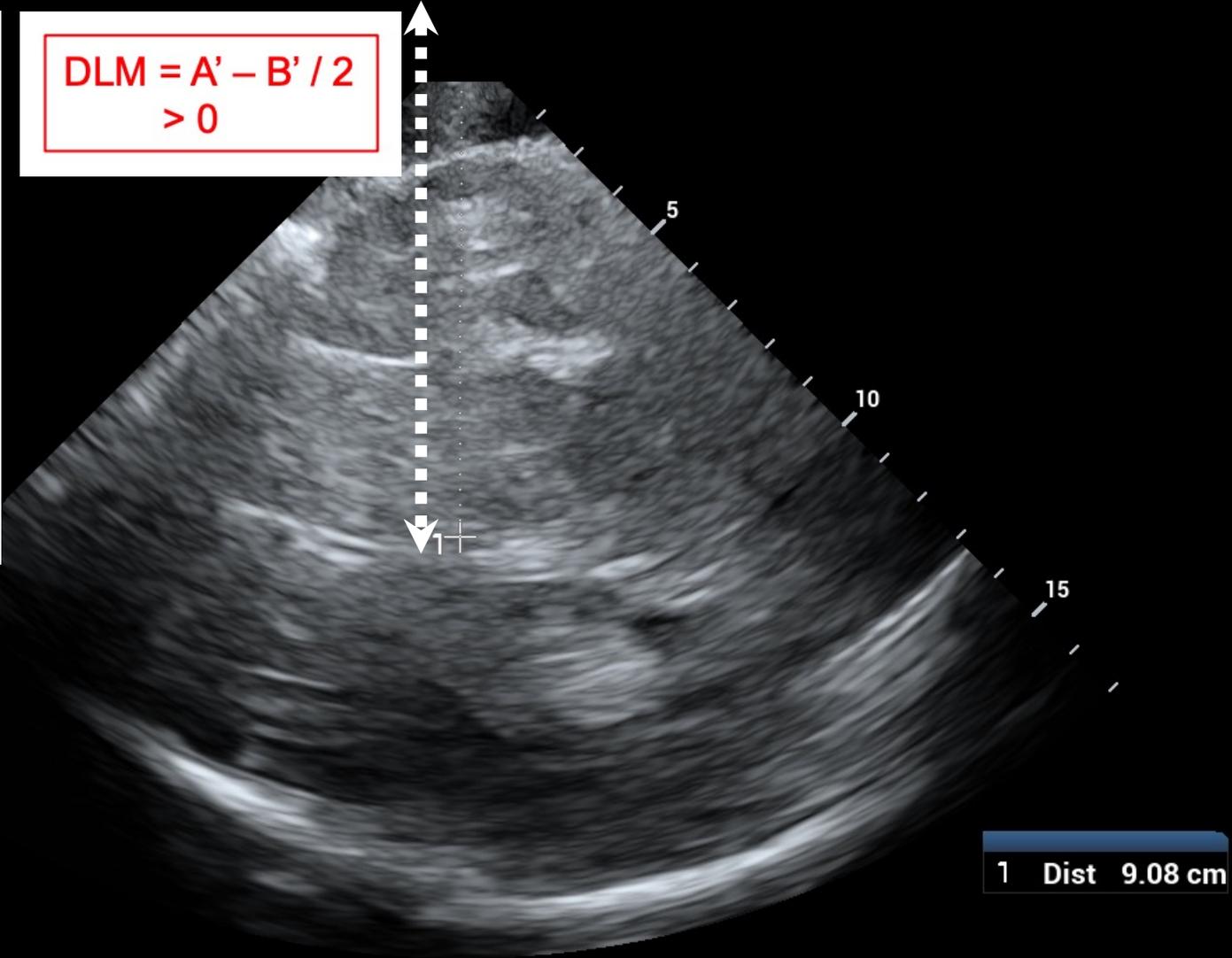


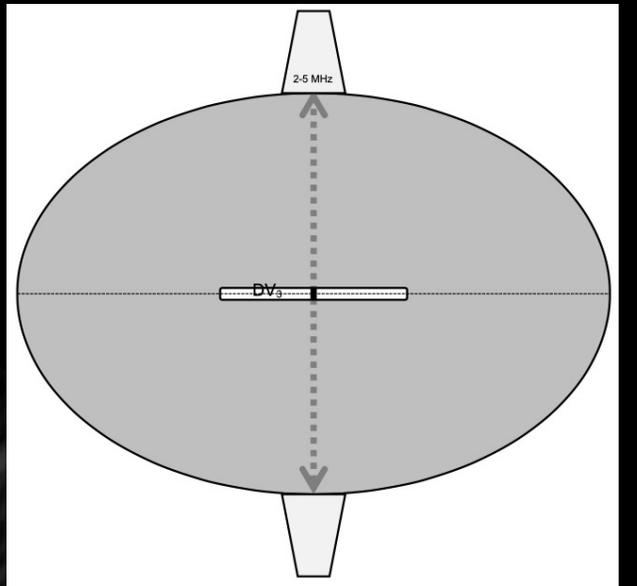
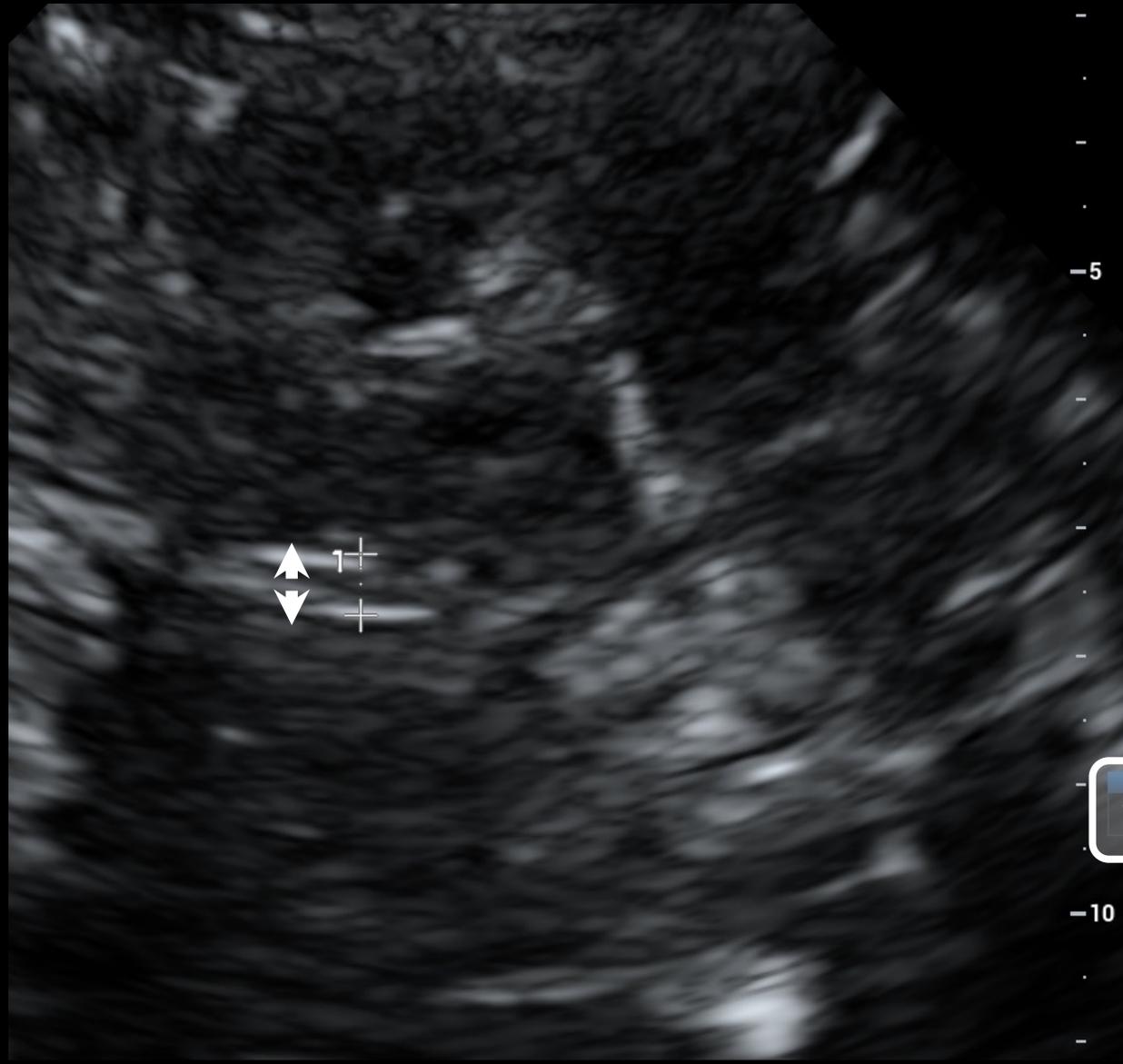
$$DLM = A - B / 2 = 0$$





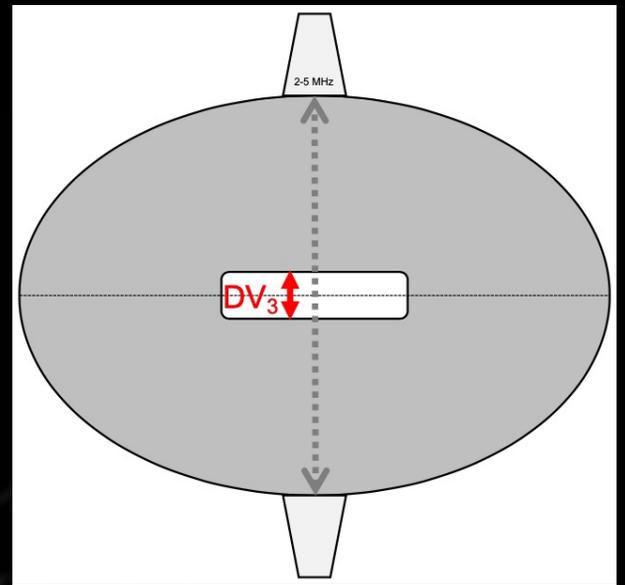
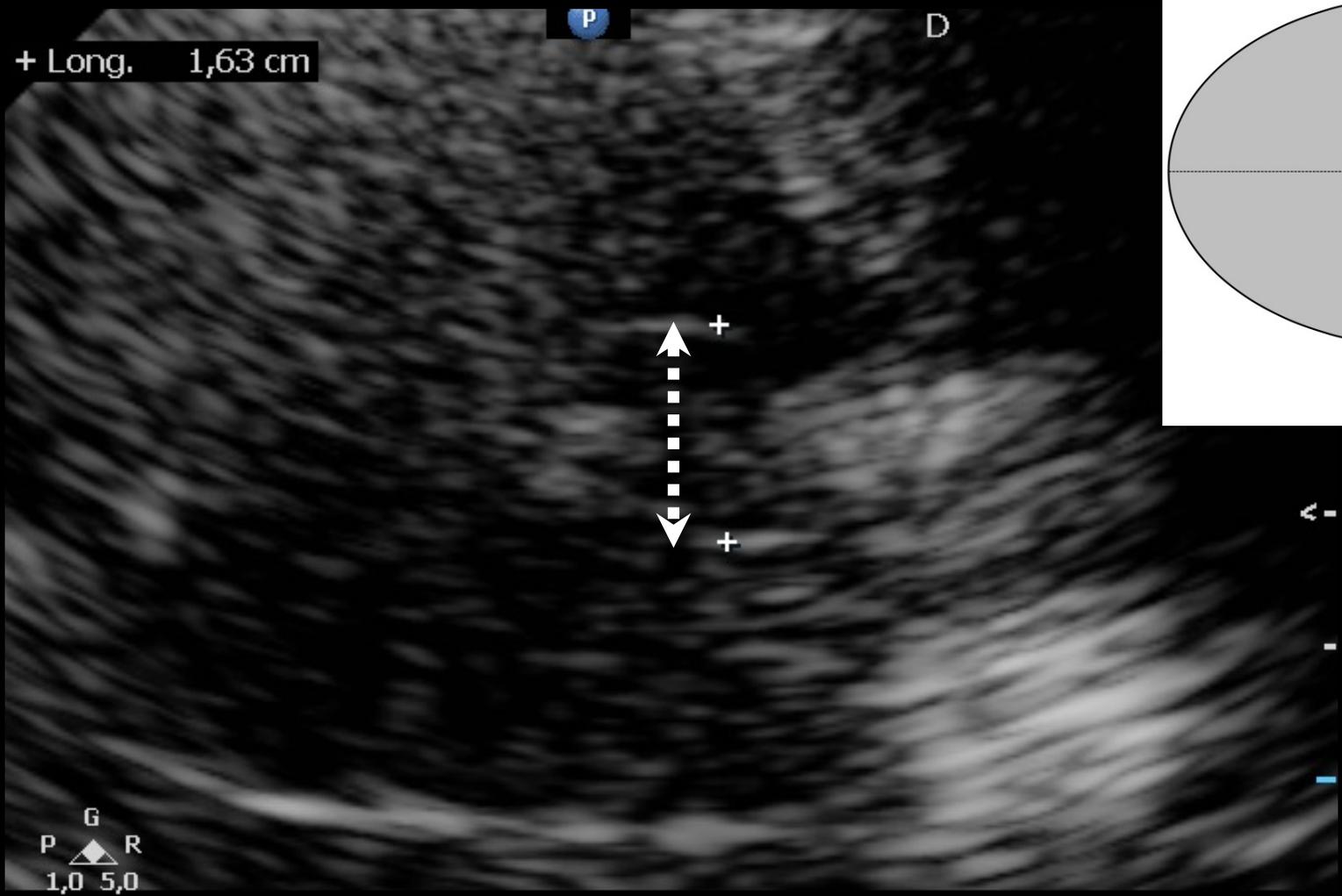
$$DLM = A' - B' / 2 > 0$$

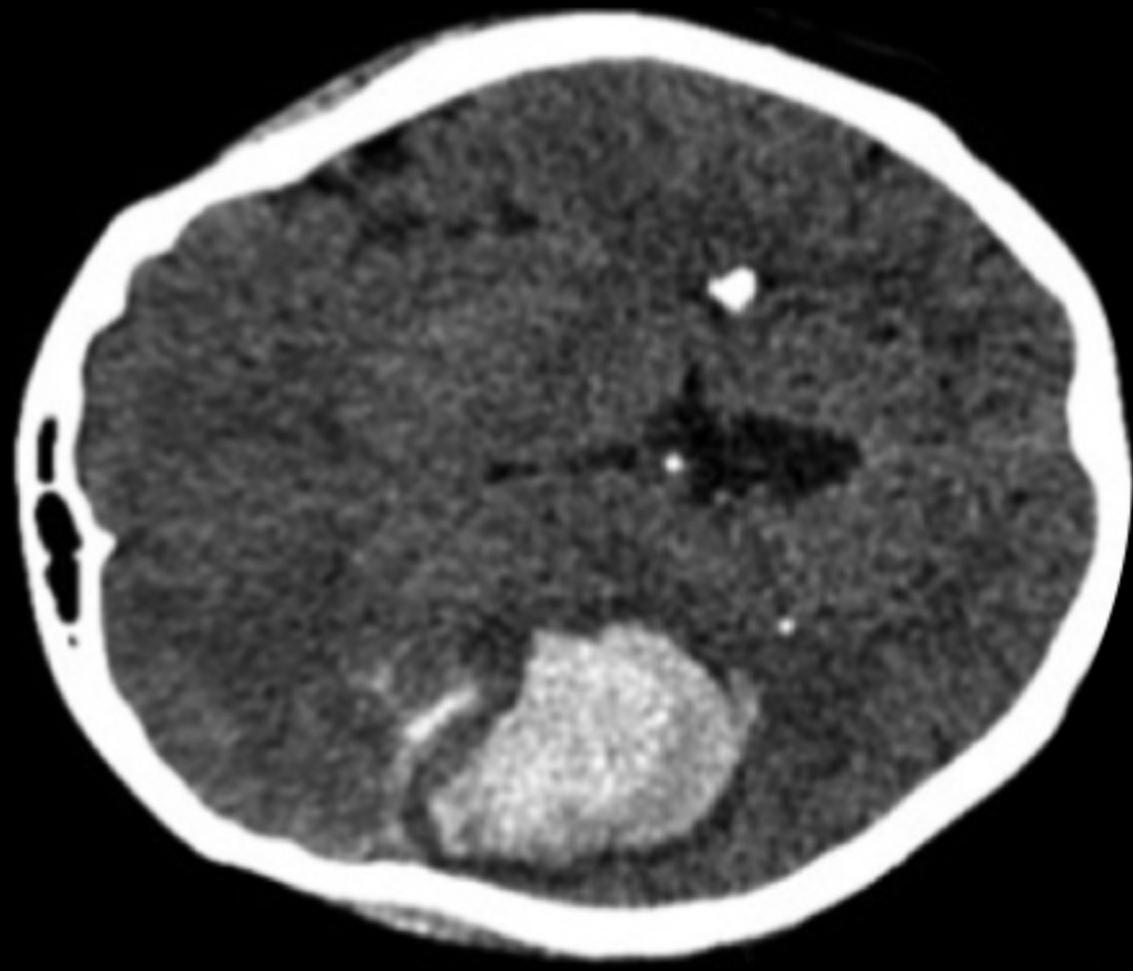
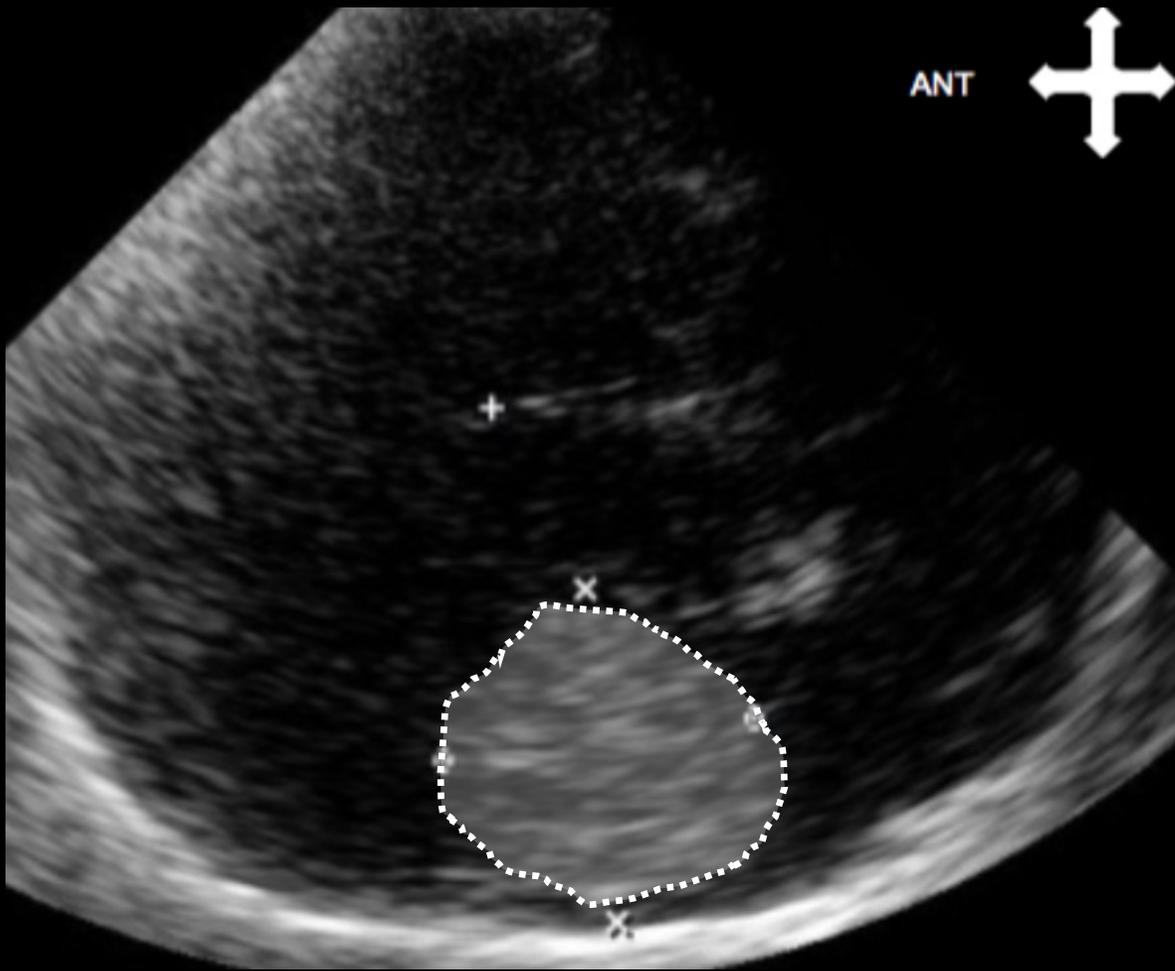


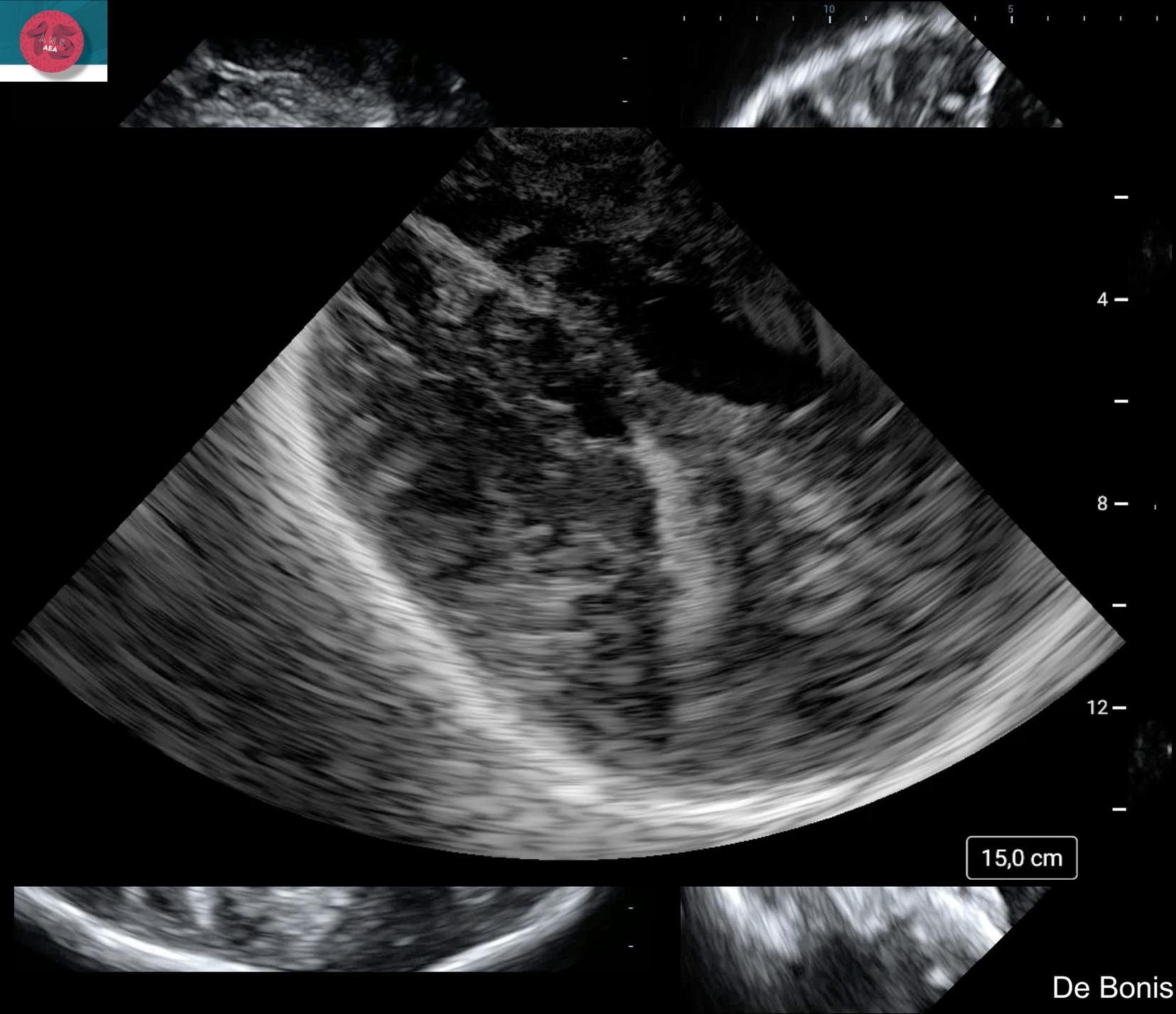


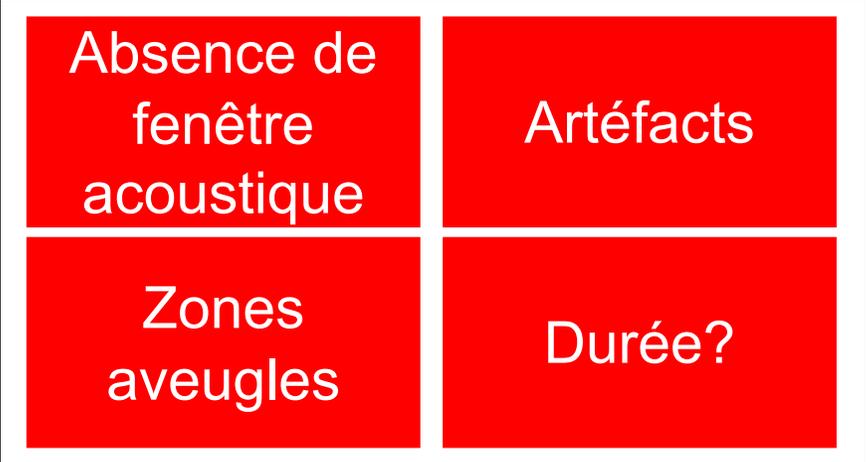
1 Dist 0.48 cm











Sécurité: Le principe A.L.A.R.A.

Effets biologiques:

- Thermiques

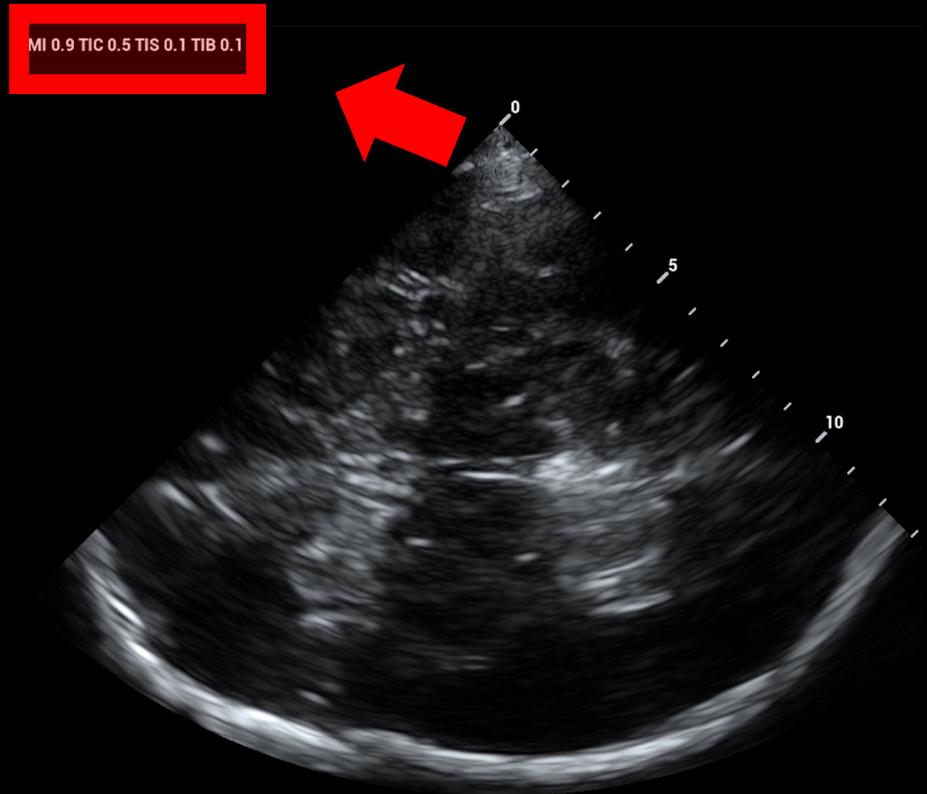
Index Thermiques < 1

- Mécaniques

Index Mécanique < 1

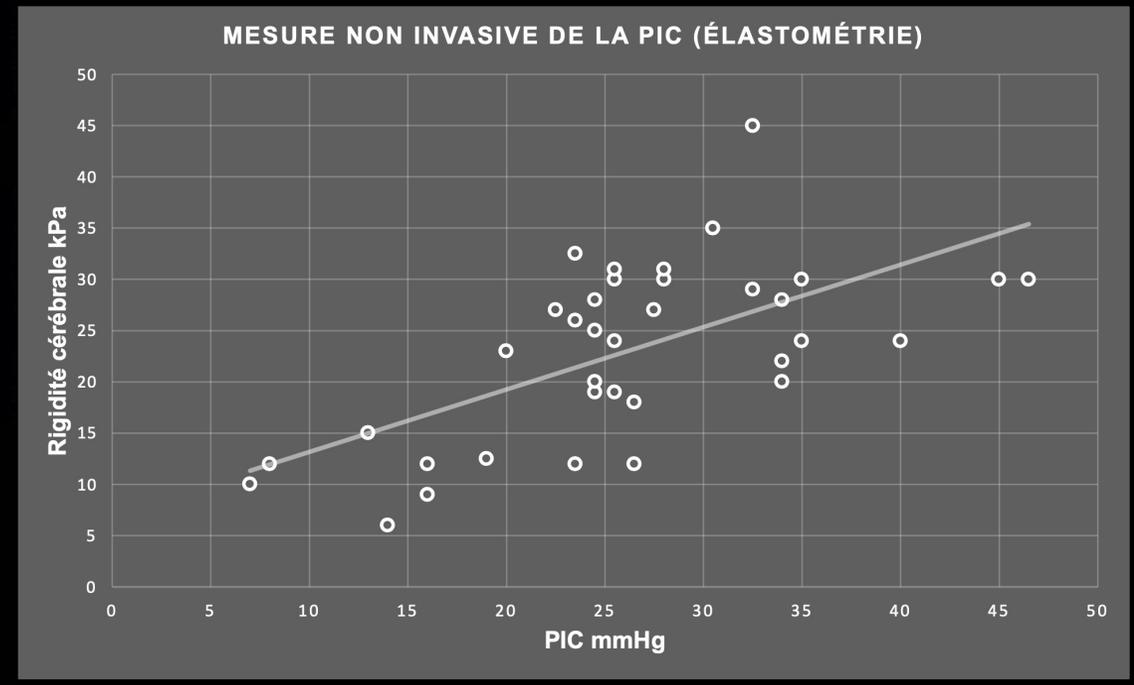
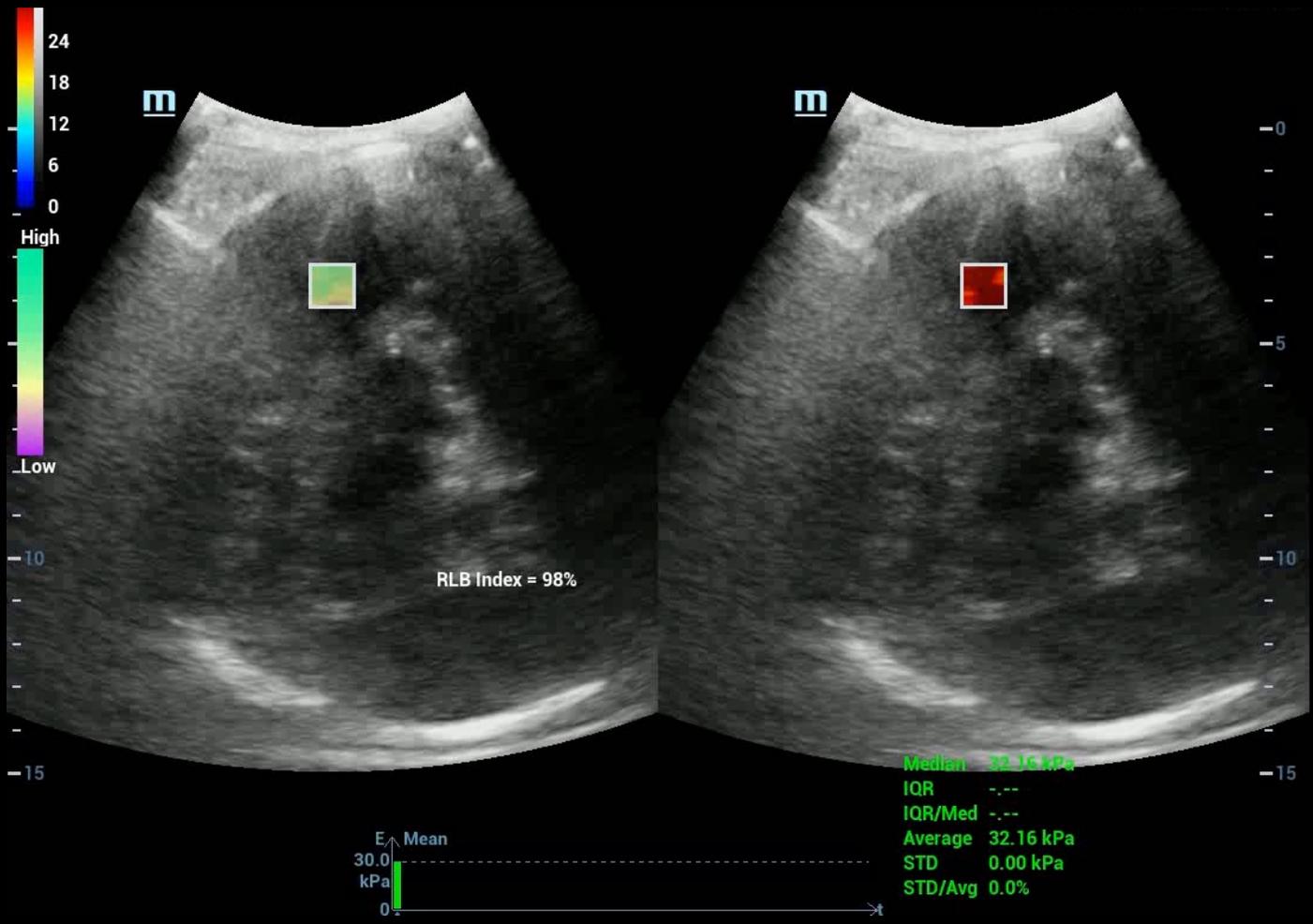
Recommandations:

- Débit acoustique
- Durée d'exposition



AIUM 2000, NF EN 60601-2-37 2008

Perspectives...



Tzschätzsch et al. Sci Rep 2018
 Dirrichs et al. Invest Radiol 2019

Écho transcrânien 2D + Doppler en 2021

+ **Imagerie conventionnelle**

Facile

Anatomie ↔ *Fonction*

Phase initiale (FAST echo)

Phase secondaire(*)

Au lit du patient (POCUS)

Rapide

Étude qualitative

Étude quantitative Non invasive

Reproductible

Lésion focale

Effet masse

Hydrocéphalie

Sure

DLM

Taille ventriculaire

Évaluation risque ischémique

Précise

Monitoring lésionnel

Surveillance traitement: chirurgie

Économique

Estimation PIC_{NI} si CI mesure invasive

(*) Alternative de choix si transports à risque (scanner) +++