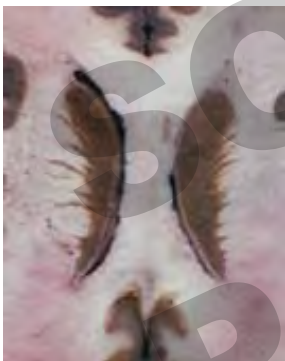
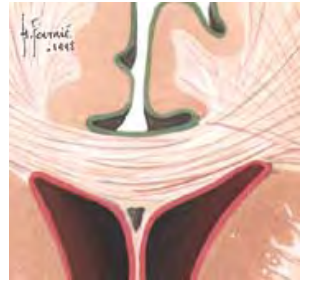




Identification Prénatale des Anomalies du Corps Calleux Par Imagerie Cérébrale

Étapes diagnostiques et pronostiques



Pascale Sonigo , Anne Elodie Millischer Radiopédiatrie Necker

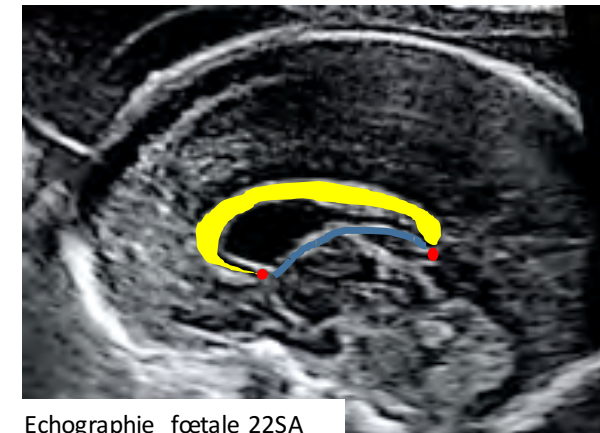
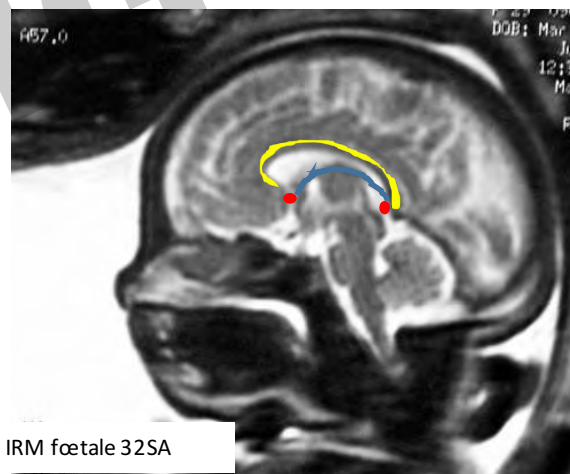
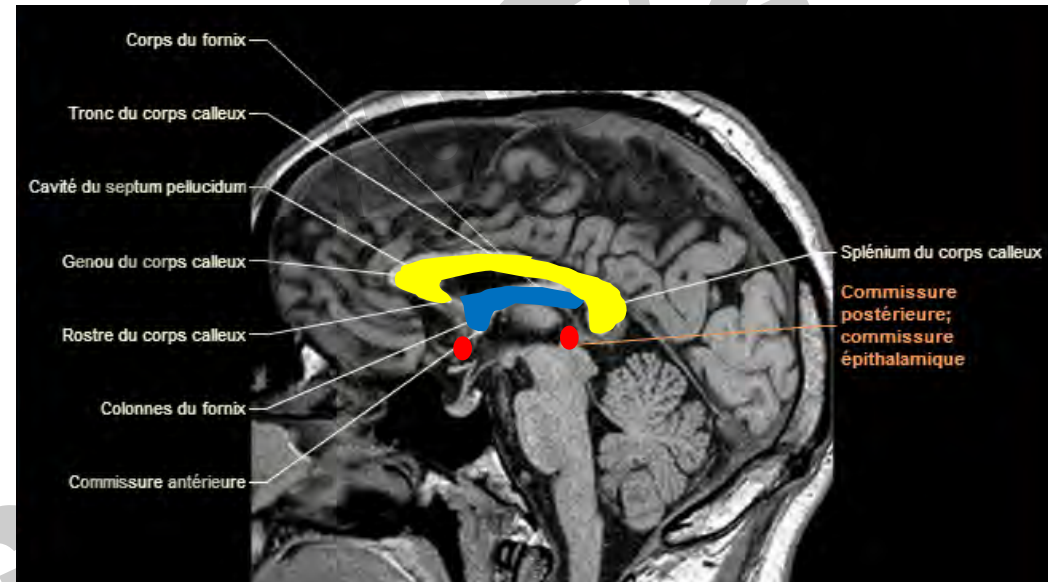
Remerciements à Jean Philippe Bault

Ligne médiane : Anatomie

LES COMMISSURES INTER HEMISPHERIQUES

fibres blanches unissant les deux hémisphères cérébraux

- **CORPS CALLEUX (CC)**
- **LE TRIGONE CEREBRAL OU FORNIX**
- **COMMISSURE BLANCHE ANTERIEURE**
- **COMMISSURE BLANCHE POSTERIEURE**
- **LE SEPTUM LUCIDUM**

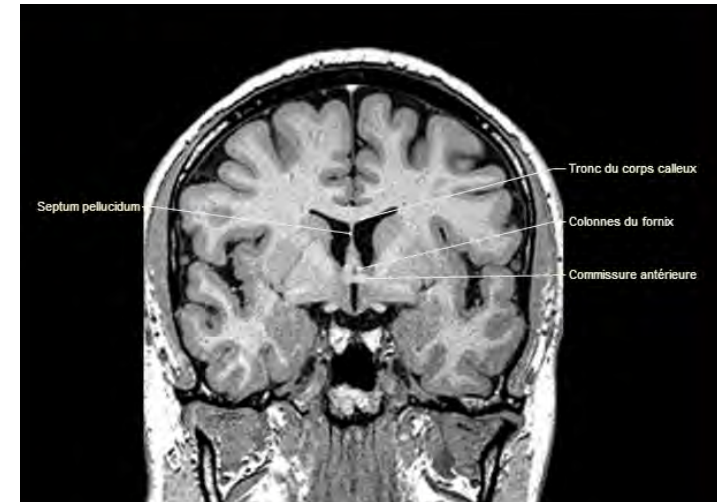
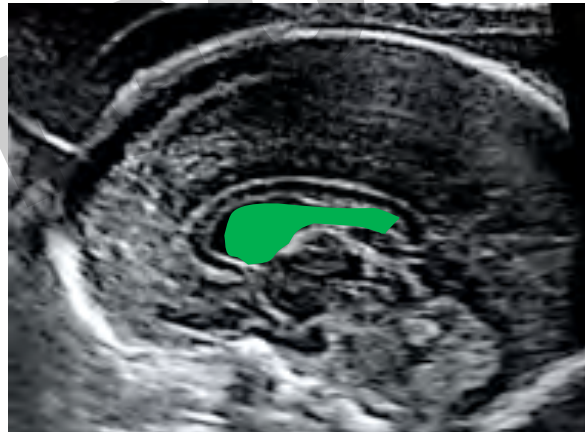
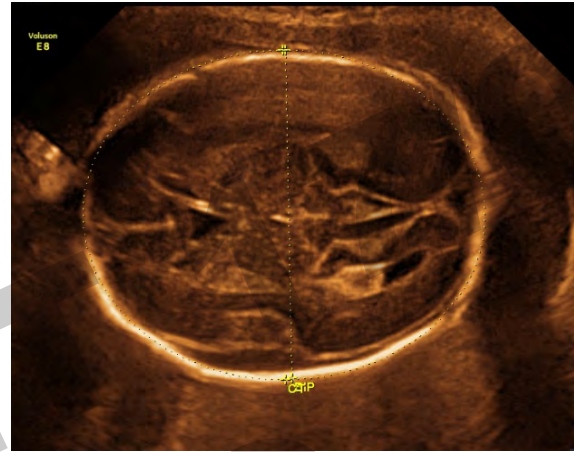


Ligne médiane : Anatomie

LES COMMISSURES INTER HEMISPHERIQUES

fibres blanches unissant les deux hémisphères cérébraux

- LE SEPTUM LUCIDUM



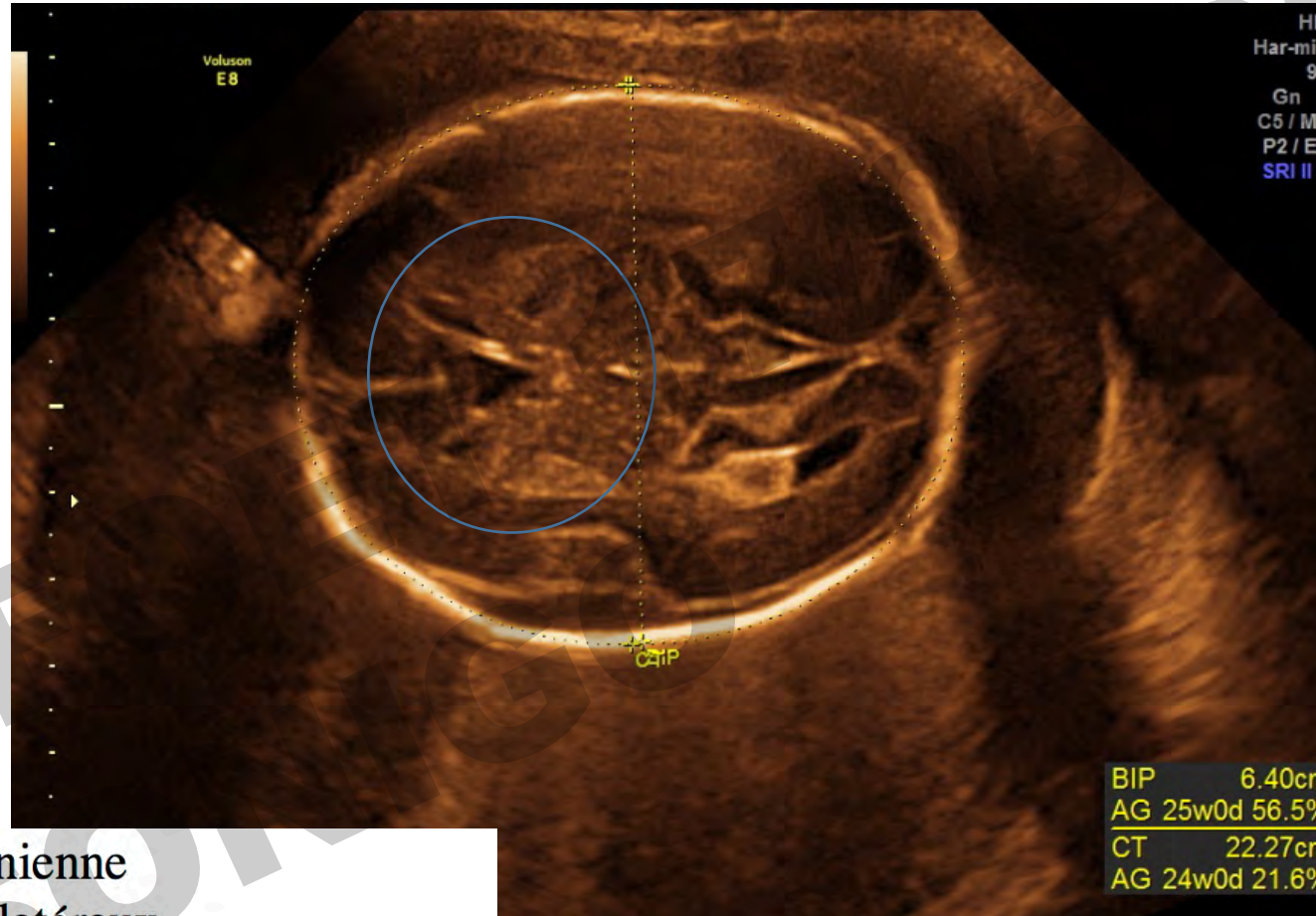
Le développement du corps calleux



15 SA

**Le corps calleux se développe
en observant un mouvement d'enroulement entre 10 et 20 SA .
Non visible en Echographie avant 15 SA**

Echographie de dépistage

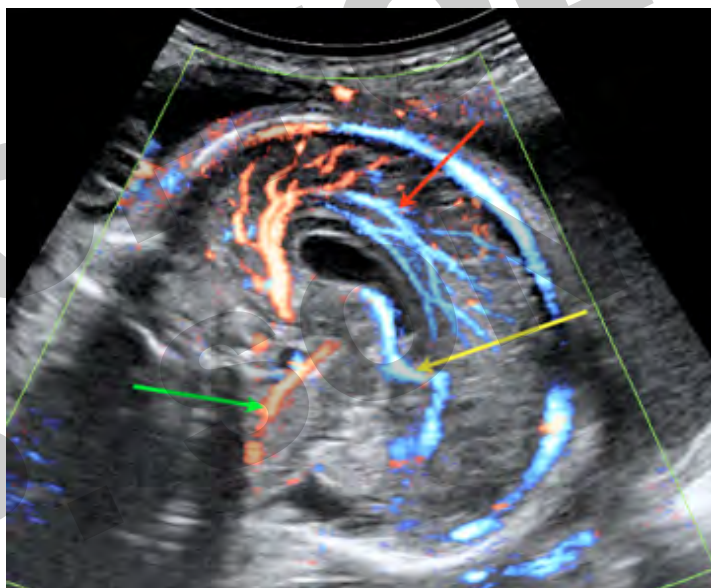
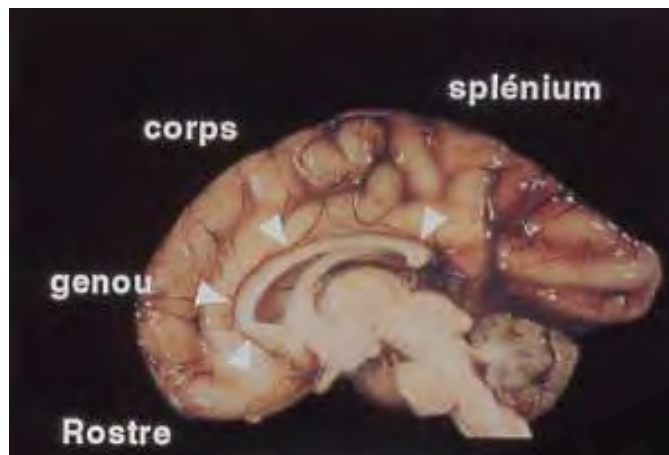


Selon le CTE

- Contour de la boîte crânienne
- Aspect des ventricules latéraux
- Aspect de la ligne médiane
- Cavum du septum pellucidum
- Aspect de la fosse postérieure et du cervelet

Iconographie : coupe axiale du BIP/PC
Marqueurs de Mesure en place

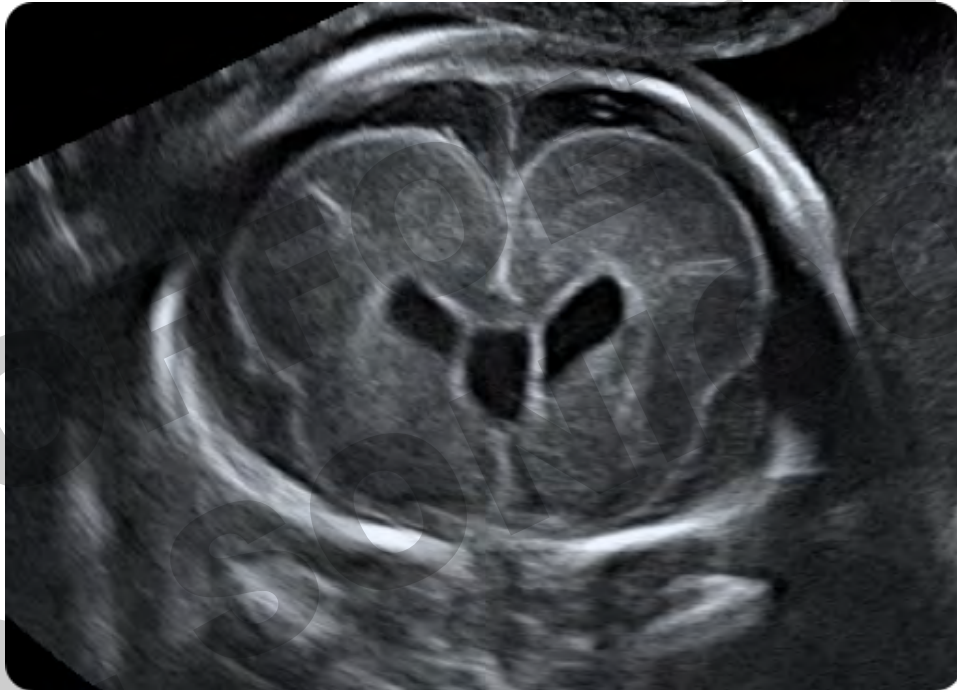
Aspects échographiques normaux



16

Aspects échographiques normaux

Coupe coronale



°Visualisation des parois latérales du septum pellucidum

°Symétrie des cornes frontales

°Corps calleux

Aspects échographiques normaux

Biométrie

Longueur du corps calleux

Table 1 Length of fetal corpus callosum by gestational age

Gestational age (weeks)	Observations (n)	Lower 95% CI	Mean length (mm)	Upper 95% CI
16	4	2.95	3.75	4.55
17	8	4.77	6.24	7.70
18	7	10.04	12.51	14.99
19	18	14.51	15.78	17.05
20	21	18.13	18.95	19.77
21	21	19.54	20.38	21.23
22	18	21.53	22.39	23.24
23	22	23.19	24.45	25.72
24	18	26.32	27.61	28.90
25	23	28.66	29.65	30.64
26	18	29.91	31.44	32.98
27	12	32.75	34.33	35.92
28	9	32.30	34.44	36.59
29	10	34.21	36.40	38.59
30	12	37.14	38.33	39.52
31	10	36.18	37.30	38.42
32	7	38.37	40.43	42.49
33	4	31.44	38.50	45.56
34	6	41.40	42.50	43.60
35	5	40.82	45.60	50.38
36	2	40.00	44.00	45.00
37	3	42.5	44.67	46.84

CI, confidence interval.

Development of the human fetal corpus callosum:

a high-resolution, cross-sectional sonographic study

*Ultrasound Obstet Gynecol 2001; 18: 343–347 R. ACHIRON and A. ACHIRON**

*Department of Obstetrics and Gynecology and *Multiple Sclerosis Center, The Chaim Sheba Medical Center, Tel Hashomer, Israel*

Biométrie

Epaisseur du corps calleux

Table 3 Thickness of fetal corpus callosum by gestational age

Gestational age (weeks)	Observations (n)	Lower 95% CI	Mean thickness (mm)	Upper 95% CI
16	4	0.42	0.75	1.08
17	8	0.58	1.12	1.32
18	7	1.12	1.30	1.48
19	18	1.03	1.13	1.24
20	21	1.31	1.47	1.63
21	21	1.60	1.73	1.86
22	18	1.82	2.00	2.18
23	22	1.87	2.04	2.20
24	18	1.90	2.07	2.24
25	23	1.89	2.11	2.34
26	18	1.87	2.09	2.31
27	12	1.94	2.14	2.35
28	9	1.66	2.14	2.63
29	10	1.73	1.99	2.25
30	12	2.04	2.35	2.66
31	10	1.93	2.37	2.81
32	7	1.96	2.66	3.36
33	4	2.13	2.75	3.37
34	6	2.20	2.62	3.03
35	5	2.21	2.76	3.31
36	2	2.20	2.50	3.00
37	3	1.98	2.27	2.55

CI, confidence interval.

Development of the human fetal corpus callosum:

a high-resolution, cross-sectional sonographic study *Ultrasound Obstet Gynecol* 2001; 18: 343–347

R. ACHIRON and A. ACHIRON*

Department of Obstetrics and Gynecology and *Multiple Sclerosis Center, The Chaim Sheba Medical Center, Tel Hashomer, Israel

Ligne médiane PATHOLOGIES

Classification

- Anomalie de la diverticulation: holoprosencéphalie
- Anomalie commissurale
- Anomalie Septale

Nombreuses Classifications

- **AGENESIE du CC**

La plus fréquente

Partielle

Complète

+/- Kyste interhémisphérique

- **ANOMALIE DE TAILLE du CC**

Fin : hypoplasie

Court mais complet

Epais

- **ANOMALIE CORTICALE ou de la SB : atteinte CC**

Secondaire

- **LIPOME PERICALLEUX**

Anomalies commissurales

La maladie

● Qu'est-ce que l'agénésie isolée du corps calleux ?

L'agénésie isolée du corps calleux est une malformation du cerveau qui correspond à l'absence du corps calleux. Le corps calleux est une sorte de pont reliant entre elles les moitiés (hémisphères) gauche et droite du cerveau et permettant le passage de l'information d'un côté à l'autre. Le terme « isolée » signifie que cette malformation n'est associée à aucune autre anomalie.

L'agénésie isolée du corps calleux peut ne se manifester par aucun symptôme, mais elle peut également provoquer un déficit intellectuel (se traduisant le plus souvent par des difficultés scolaires), des crises d'épilepsie ou encore des troubles du comportement.

Cette malformation est aussi appelée dysgénésie du corps calleux ou agénésie calleuse, le terme agénésie ou dysgénésie signifiant « absence de développement » ou « développement imparfait ».

- **AGENESIE du CC**

La plus fréquente

Partielle

Complète

+/- Kyste interhémisphérique

AGENESIE : ABSENCE

- **ANOMALIE DE TAILLE du CC**

FIN: hypoplasie

COURT : mais complet

EPAIS

DYSGENESIE : DEVELOPPEMENT IMPARFAIT

- **ANOMALIE CORTICALE ou de la SB : atteinte CC**

Secondaire

- **LIPOME PERICALLEUX**

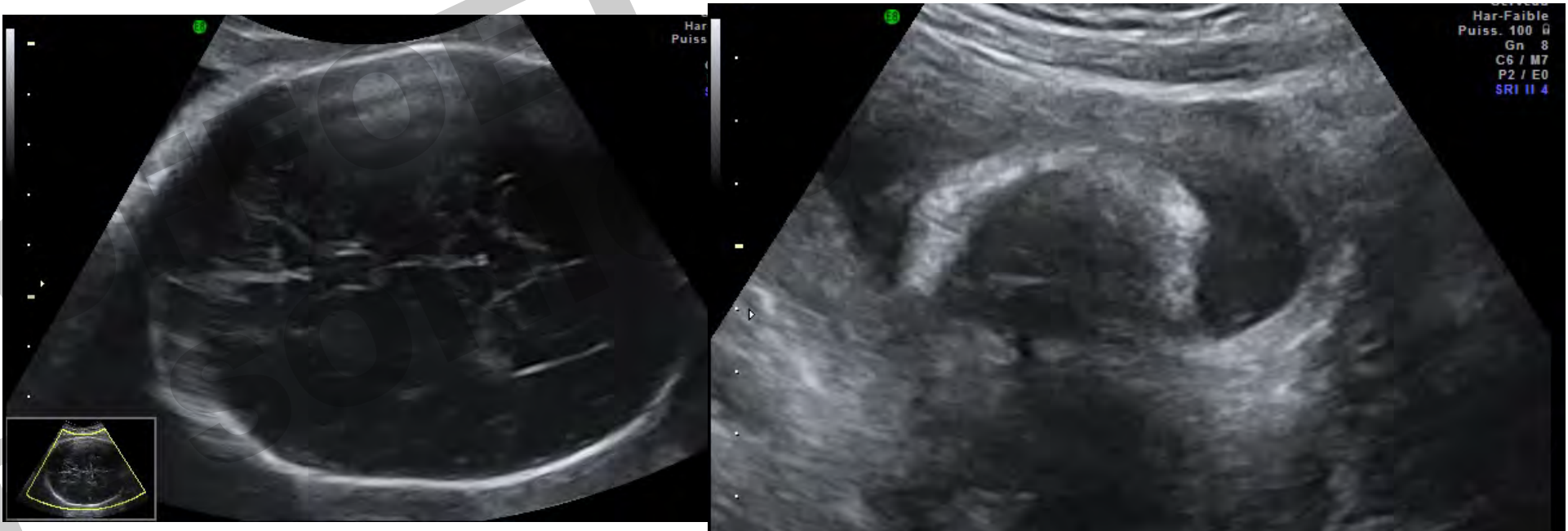
Diagnostic des agénésies du corps calleux

- **Signes indirects +++**
- **Signe direct**

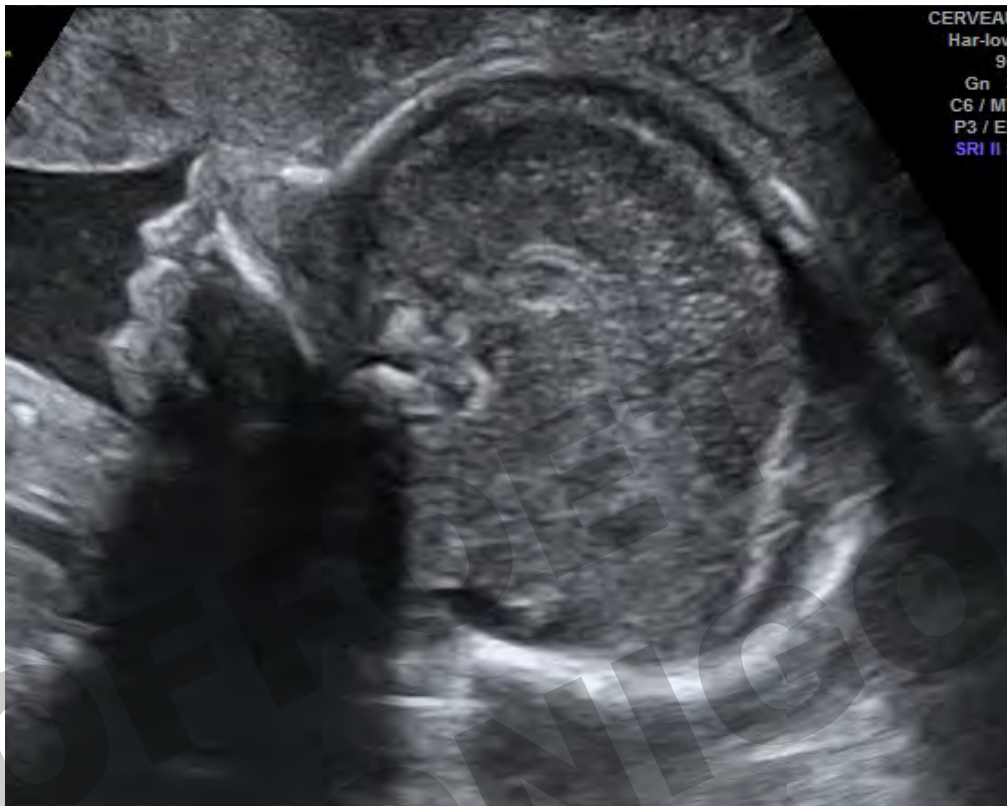
SOFFOET 17/06/2016
P. SONIGO

Agénésie complète du CC : SIGNES INDIRECTS

- **Dysmorphie du système ventriculaire :**
 - - Cornes frontales fines ,parallèles, à distance de la ligne médiane
 - Ascension et dilatation du V3
 - Colpocéphalie
- **Absence de cavité du septum pellucidum**
- **Faux : triple feuillet**



Agénésie du corps calleux



Dr P Uzan



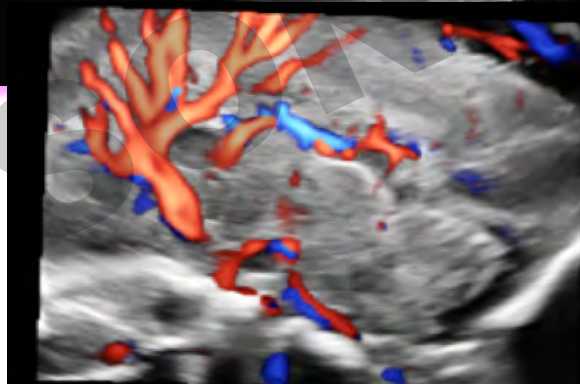
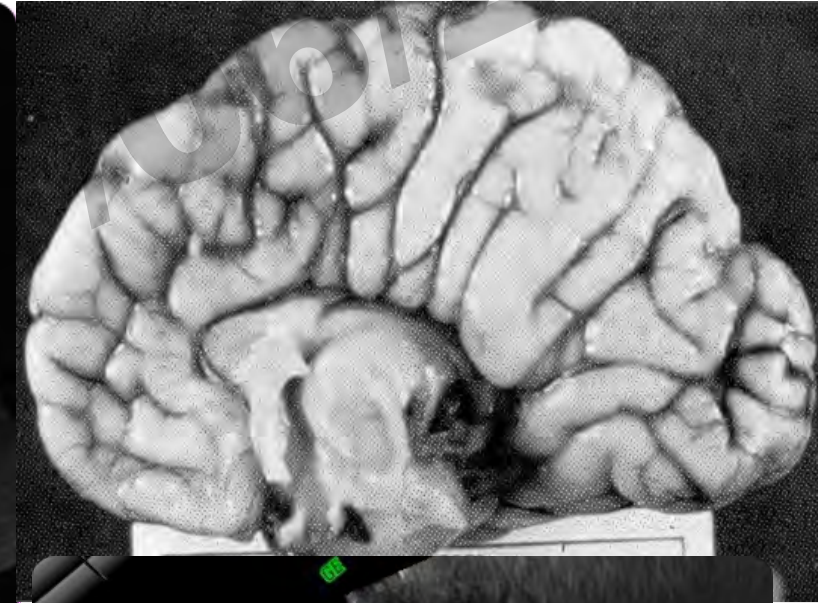
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16

Agénésie complète du CC : SIGNES DIRECTS

Absence de visualisation du corps calleux

Sillons radiaires



32 SA

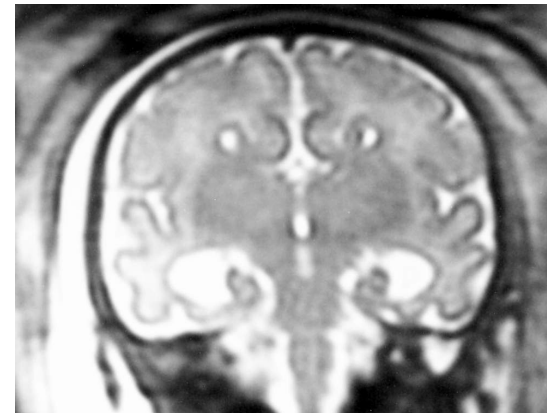
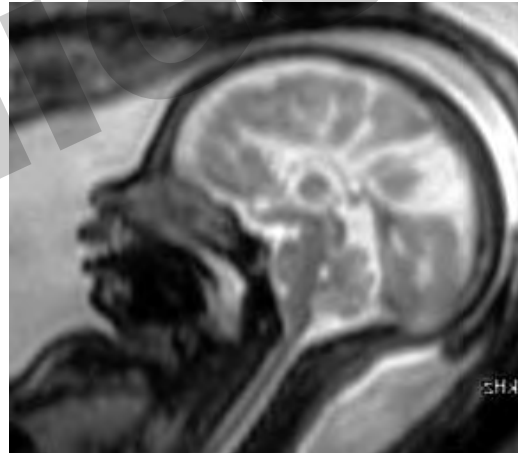
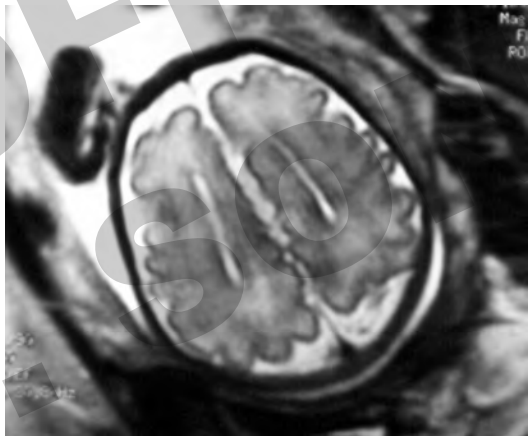


L'IRM : QUELLES INDICATIONS ?

Confirmation du diagnostic

Pronostic ? :

ACC isolée ou associée ?

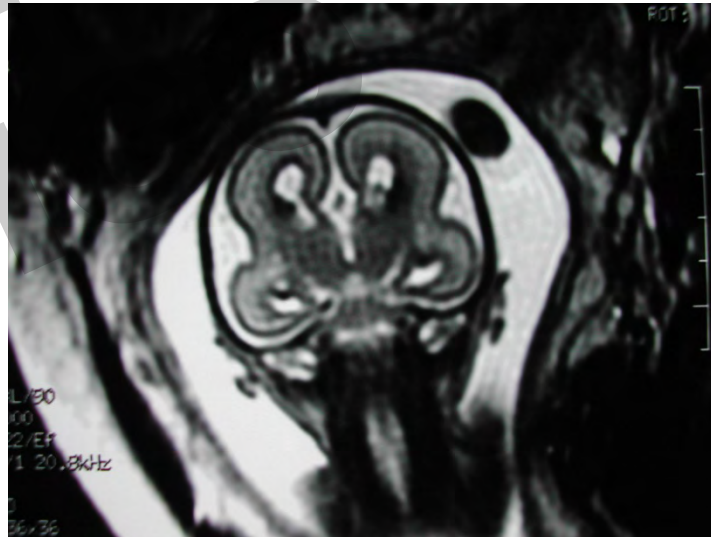


Quand?

- Corps Calleux complet à 22 SA
- Anomalies de la gyration: interprétables à partir de 28 SA (vallée sylvienne operculée)

Pourquoi?

- Affirmer le caractère isolé
- Recherche Malformations associées

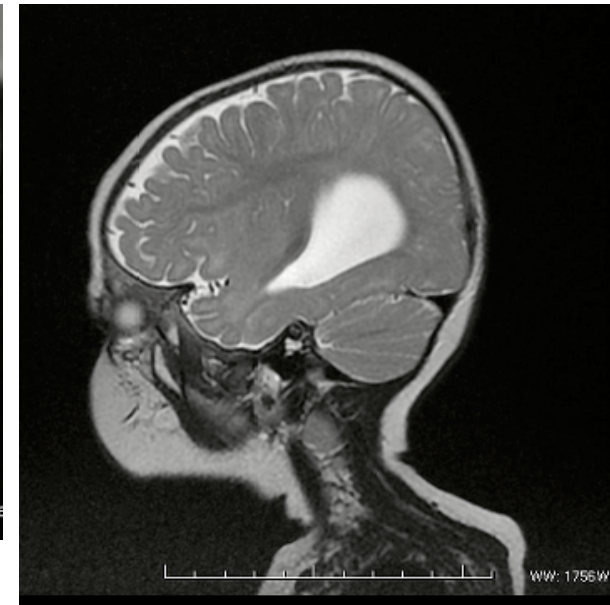
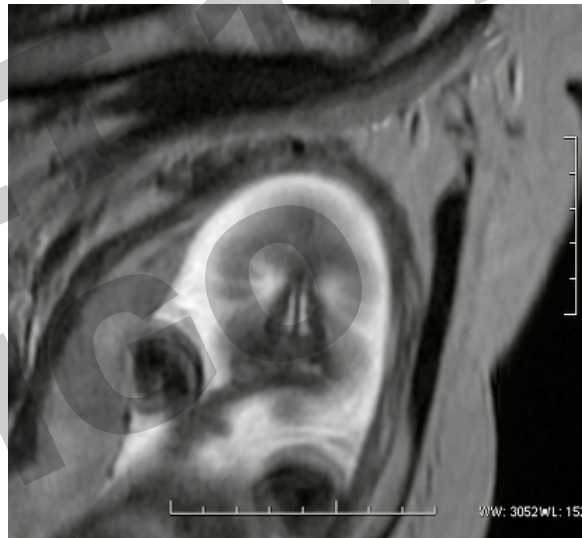
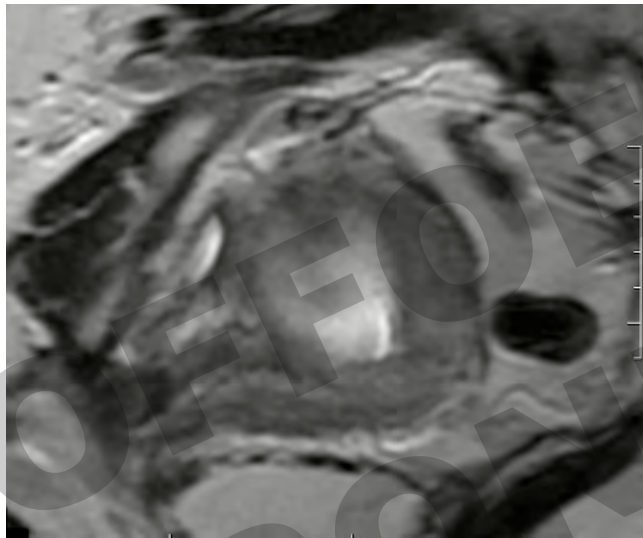


32 SA

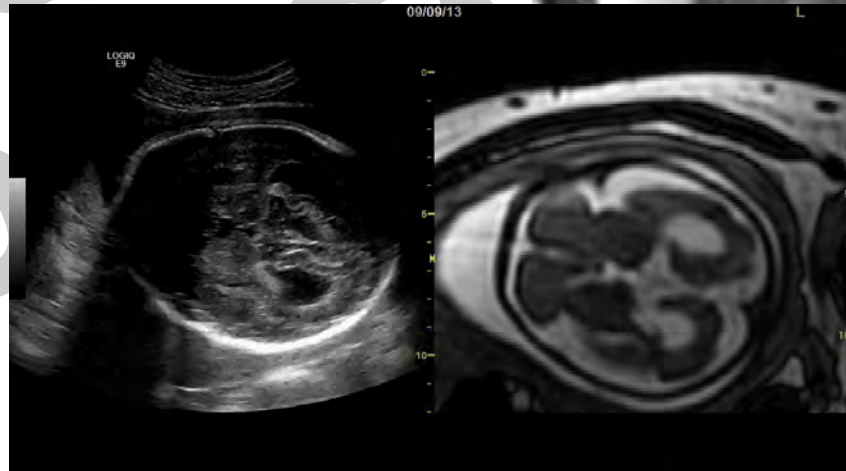
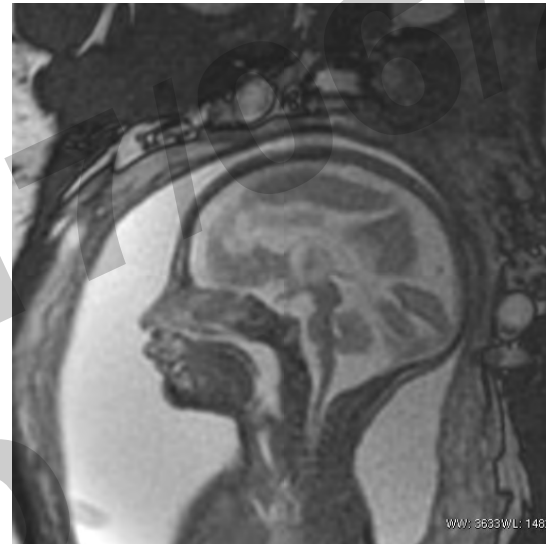
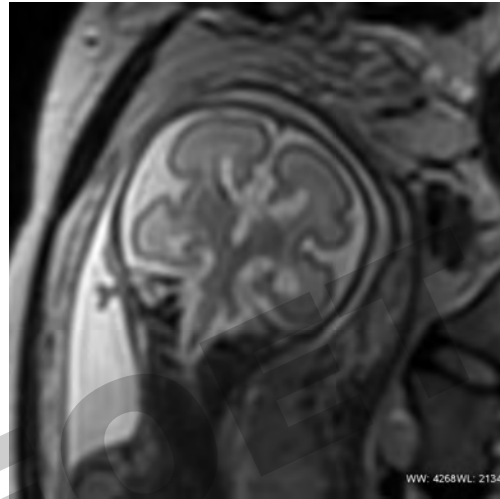
ACC + lissencéphalie

Agénésie complète du corps calleux isolée

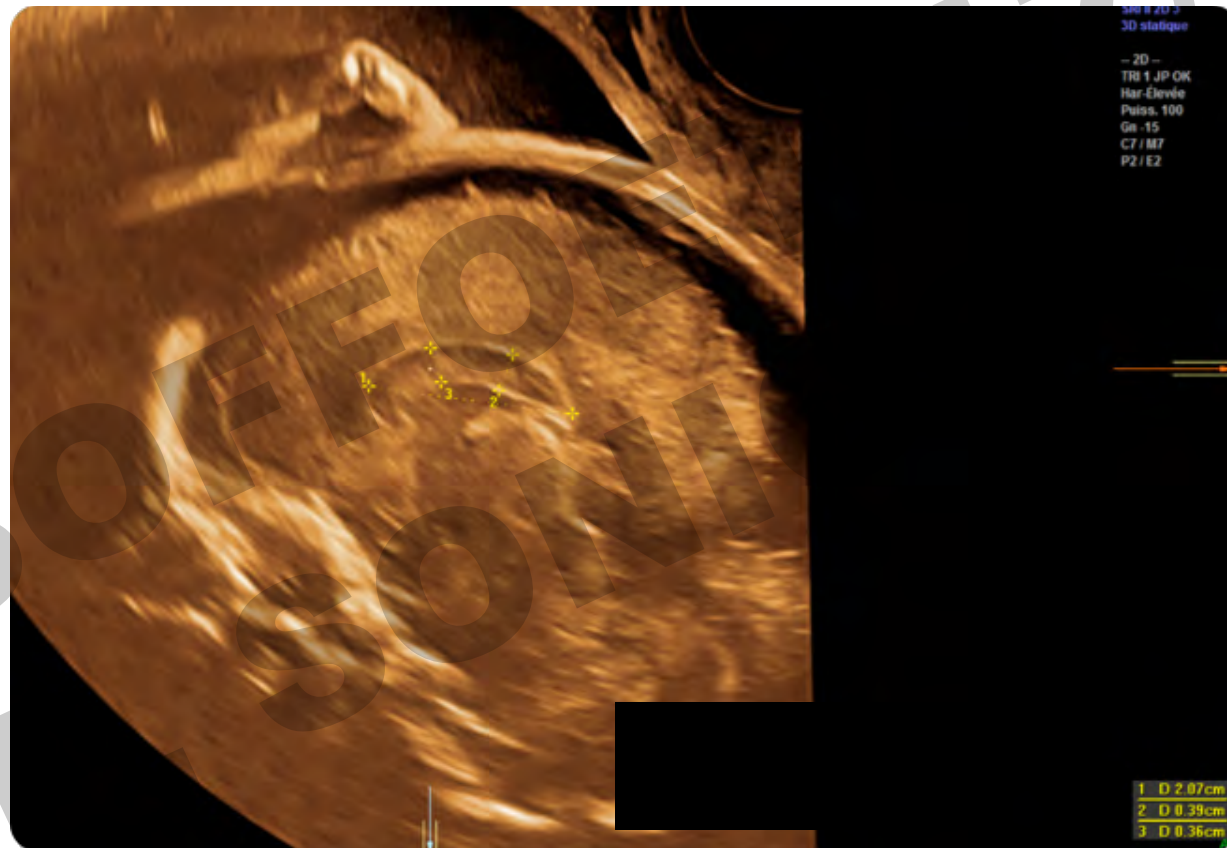
Aspects IRM



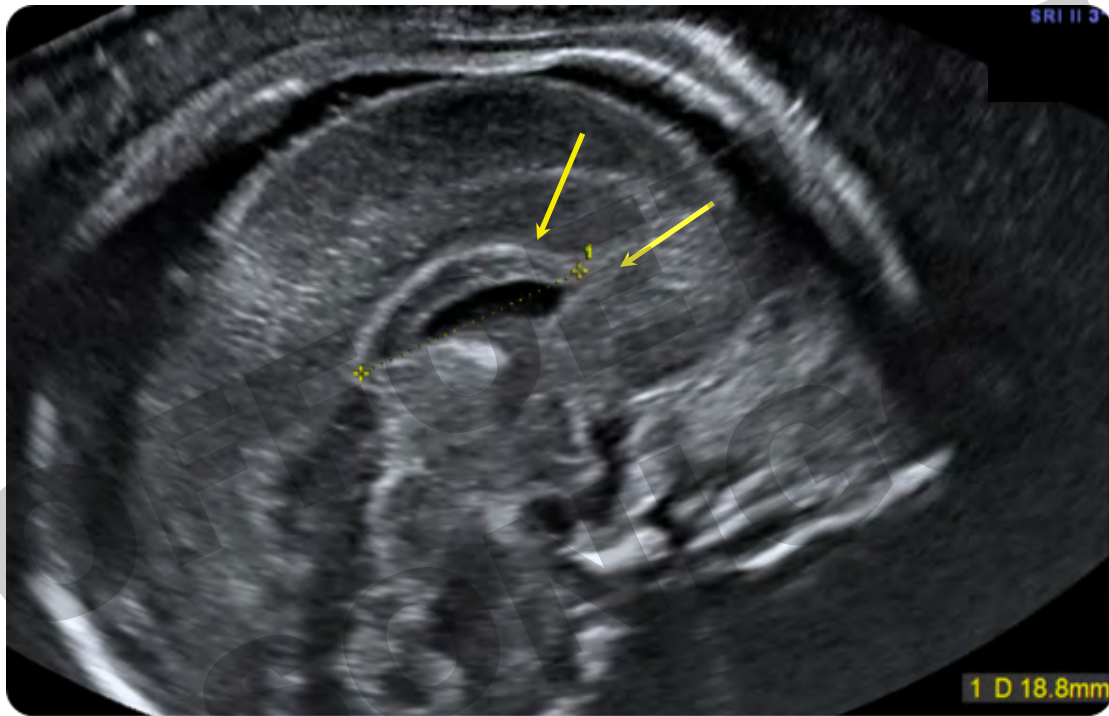
Agénésie complète du corps calleux associée



Agénésie partielle du corps calleux

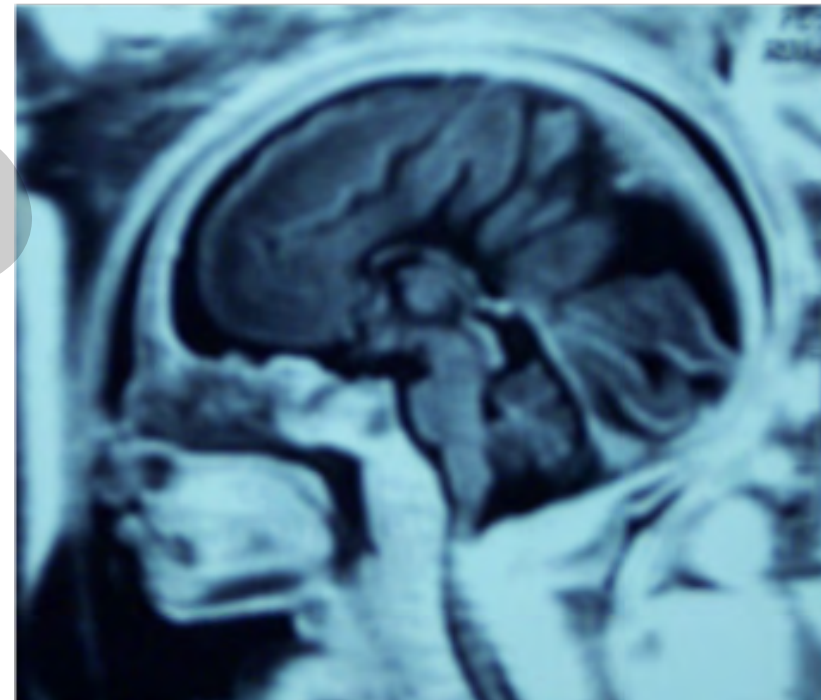


Agénésie partielle du corps calleux

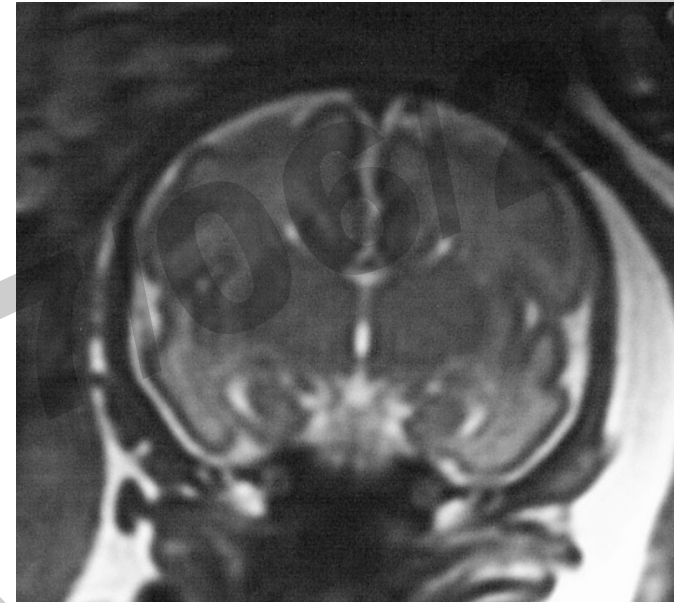
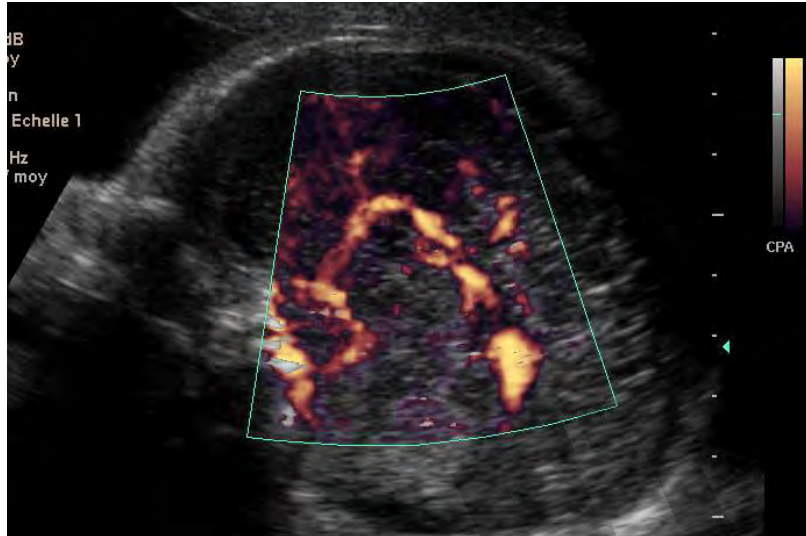


Agénésie partielle du corps calleux

Aspects IRM



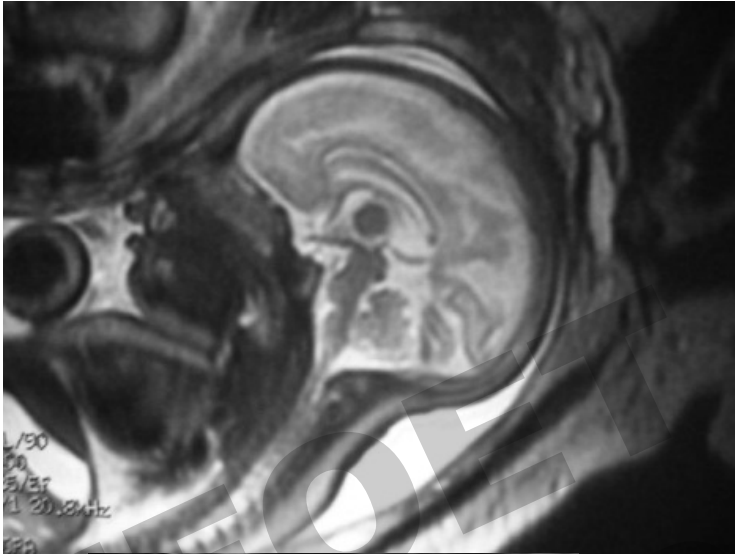
Hypoplasie du Corps calleux : CC fin



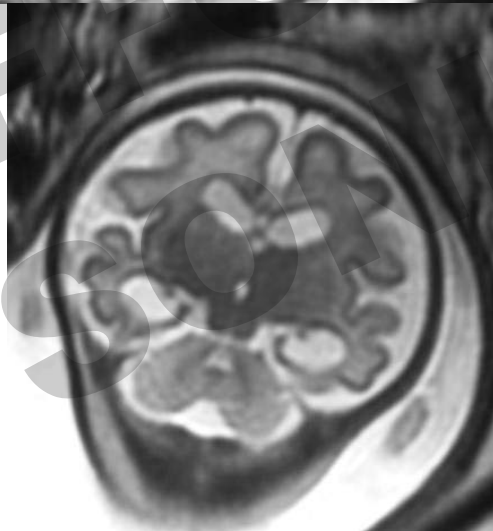
CC complet mais fin

Dysmorphie du système VL ctte

Hypoplasie du Corps calleux « secondaire »



- **Secondaire à une atrophie cérébrale**
- **Maladie métabolique**
(hyperglycinémie sans cétose)

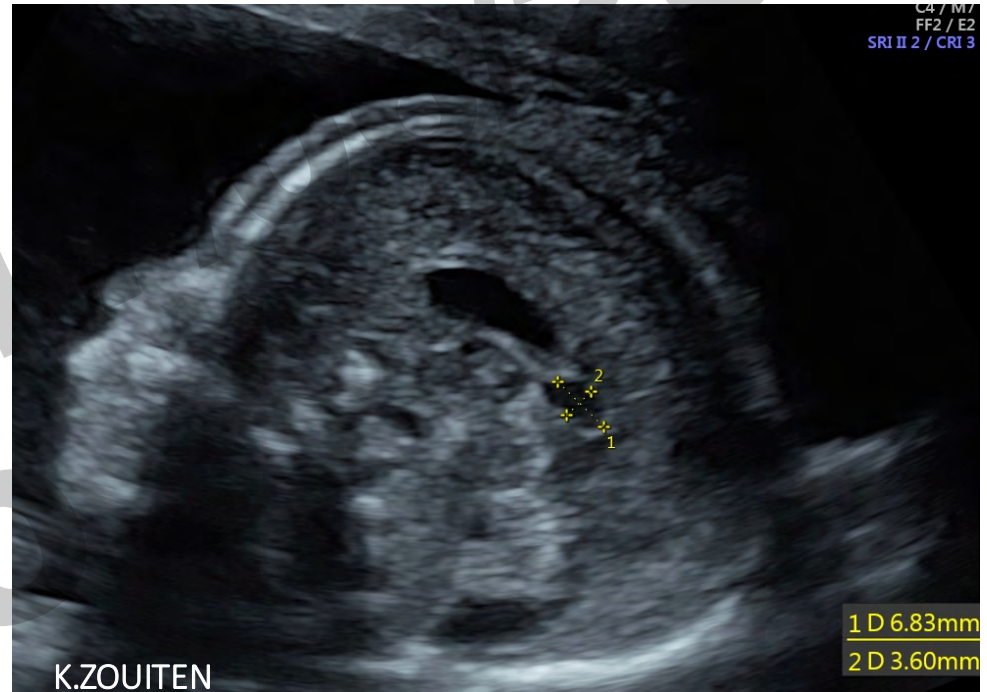
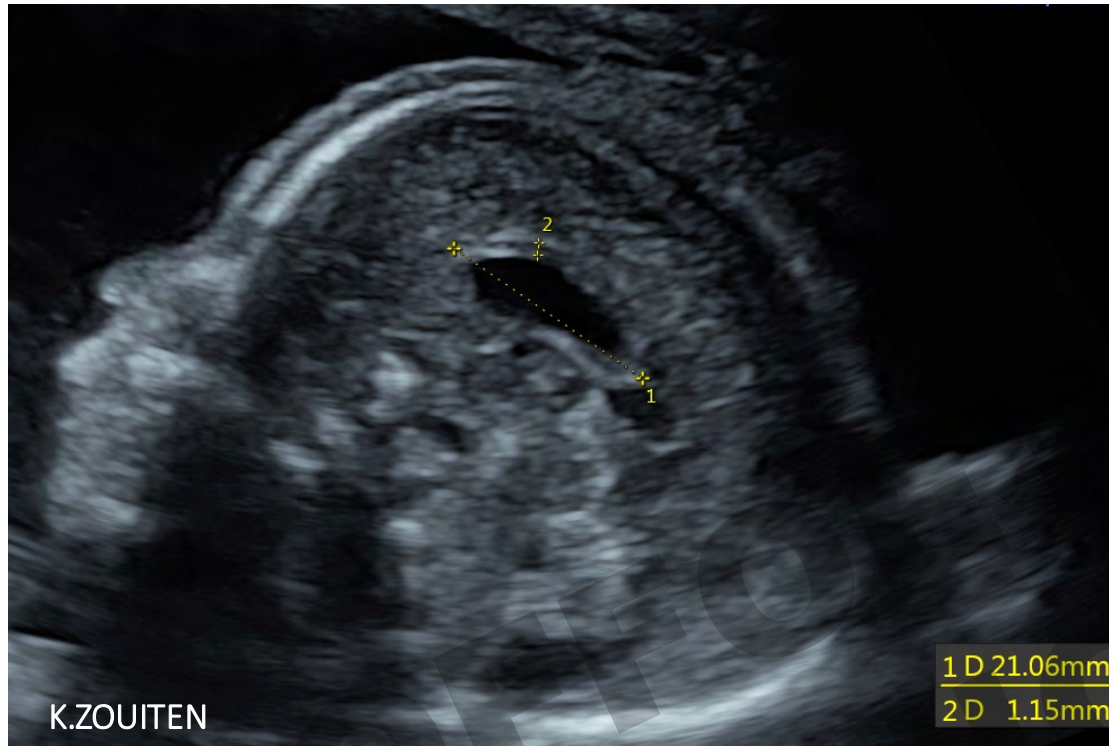


Prenatal diagnosis of hypoplasia of the corpus callosum in association with non-ketotic hyperglycinemia .

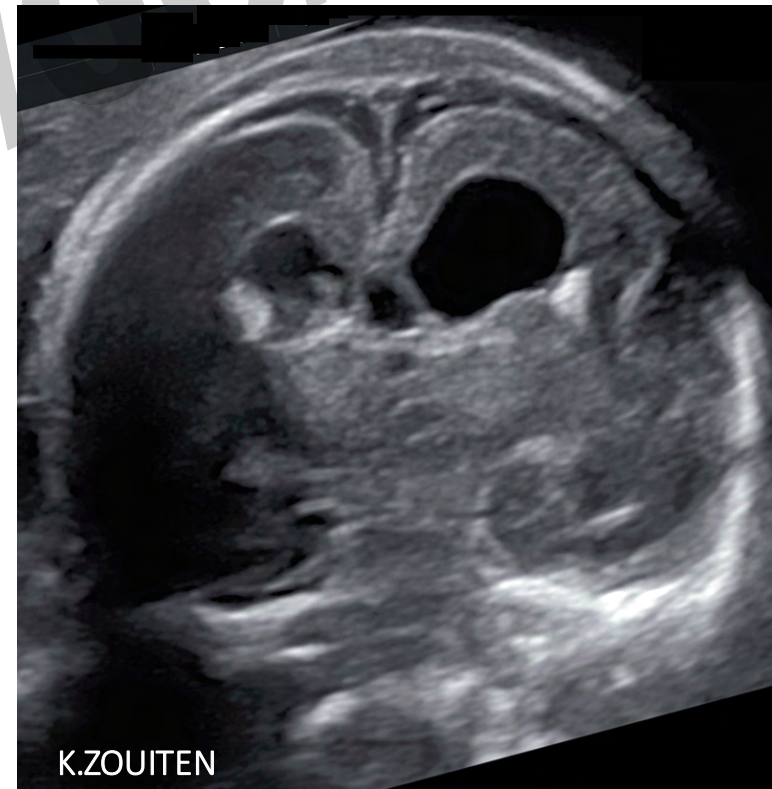
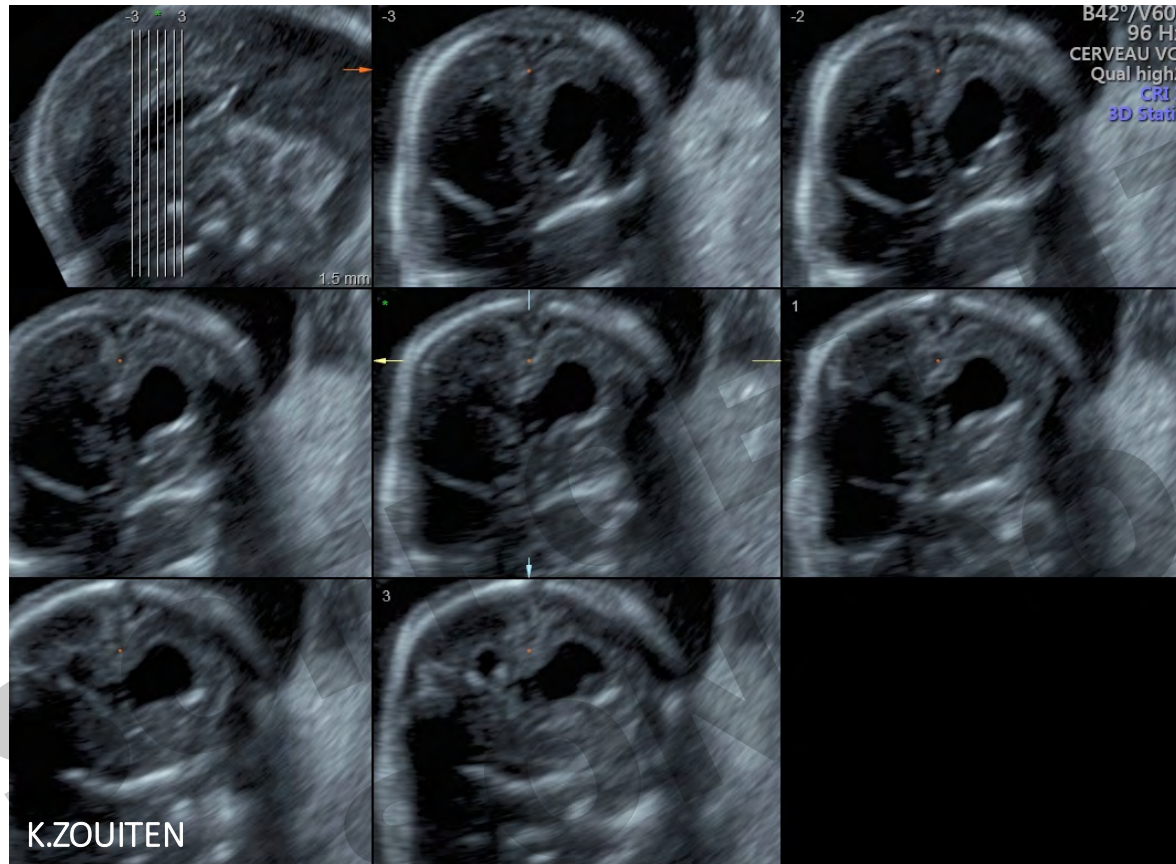
Antenatal diagnosis, hypoplasia of the corpus callosum, Non-ketotic hyperglycinemia.

A.PAUPE, L.BIDAT, P.SONIGO, R.LENCLÉN, M.MOLHO and Y.VILLE.
Ultrasound Obstet Gynecol. 2002 Dec;20(6):616-9

Hypoplasie du Corps calleux « secondaire »



Foetopathie infectieuse à ZYKA



P. 5

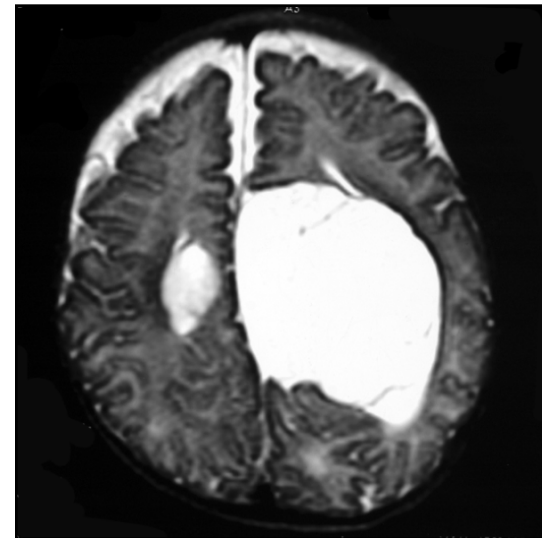
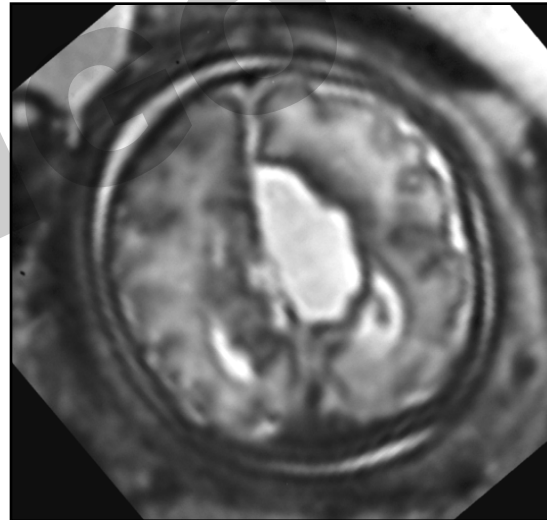
7/26/2016

23 + 5 SA



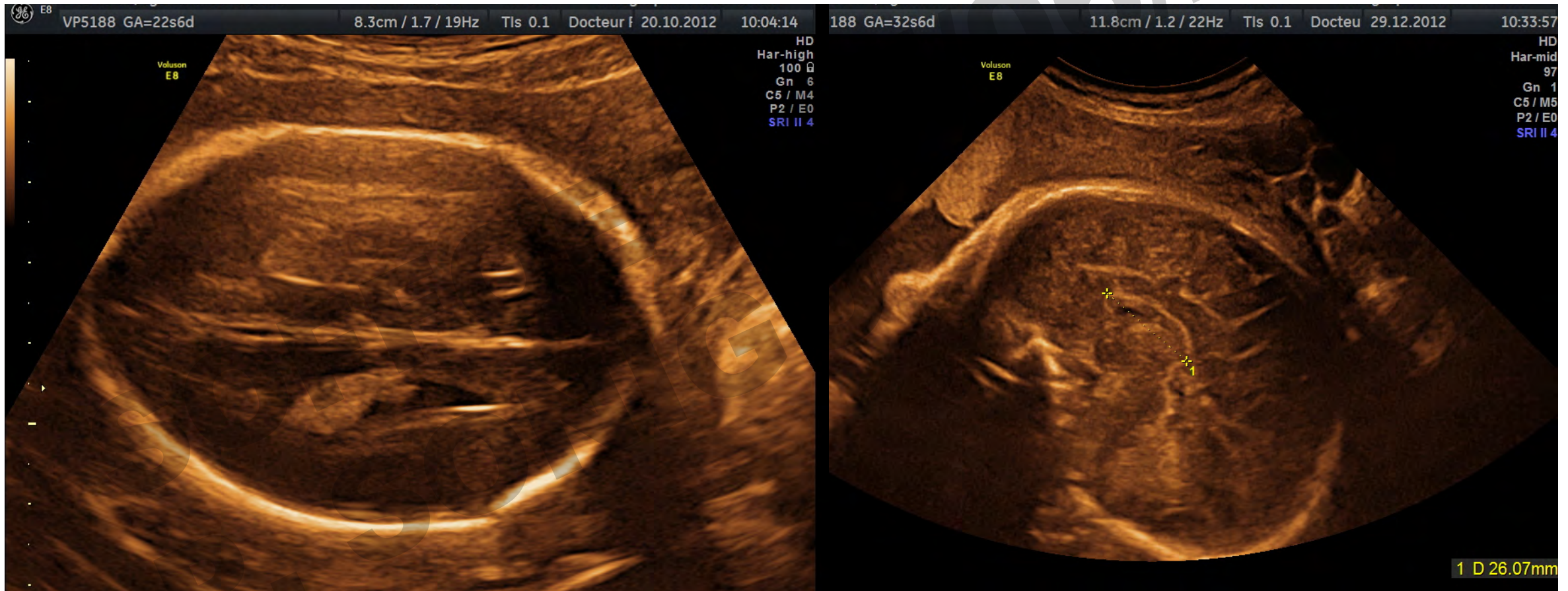
Kyste interhémisphérique et ACC

- Agénésie du corps calleux secondaire à un kyste interhémisphérique
- Meilleur pronostic ?
- Augmentation du volume du kyste en post natal

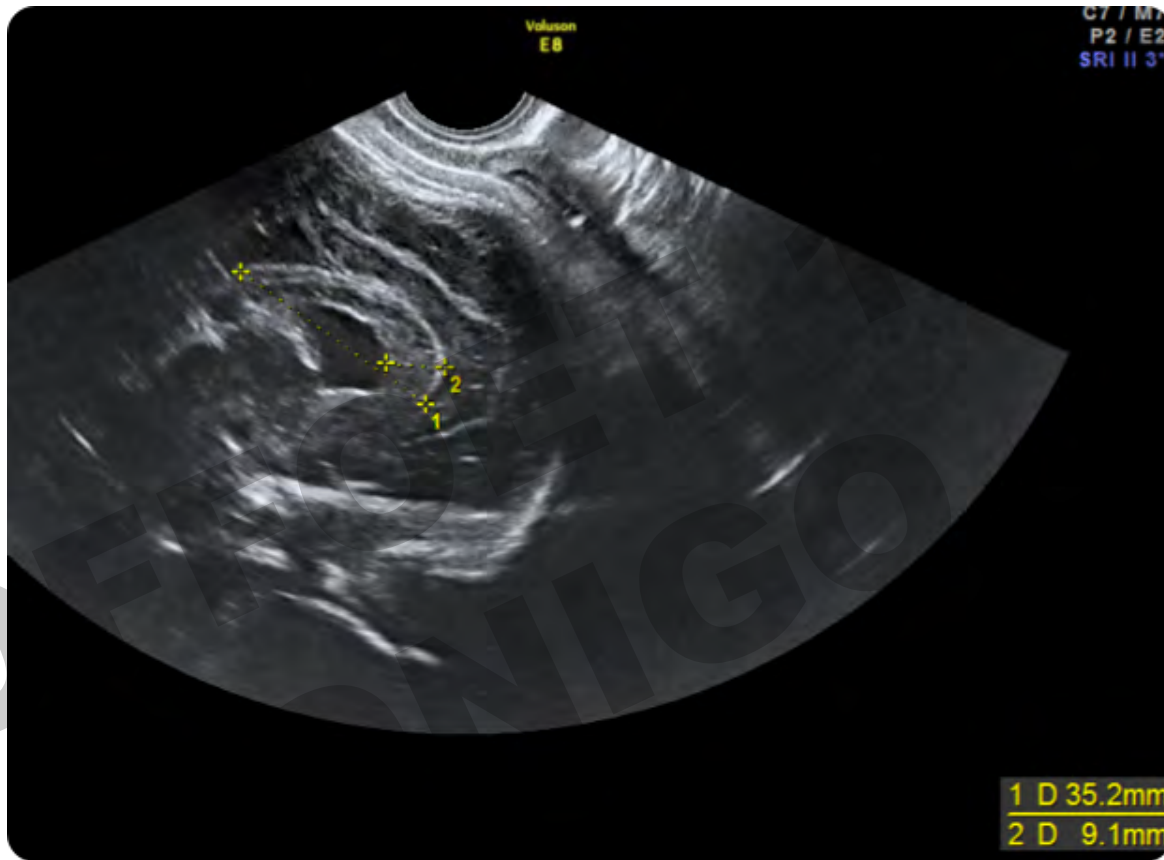


CC court et complet pronostic?

06/2016



Corps Calleux épais



Troubles de la migration associés , pronostic défavorable

Biométrie

Epaisseur du corps calleux

Table 3 Thickness of fetal corpus callosum by gestational age

Gestational age (weeks)	Observations (n)	Lower 95% CI	Mean thickness (mm)	Upper 95% CI
16	4	0.42	0.75	1.08
17	8	0.58	1.12	1.32
18	7	1.12	1.30	1.48
19	18	1.03	1.13	1.24
20	21	1.31	1.47	1.63
21	21	1.60	1.73	1.86
22	18	1.82	2.00	2.18
23	22	1.87	2.04	2.20
24	18	1.90	2.07	2.24
25	23	1.89	2.11	2.34
26	18	1.87	2.09	2.31
27	12	1.94	2.14	2.35
28	9	1.66	2.14	2.63
29	10	1.73	1.99	2.25
30	12	2.04	2.35	2.66
31	10	1.93	2.37	2.81
32	7	1.96	2.66	3.36
33	4	2.13	2.75	3.37
34	6	2.20	2.62	3.03
35	5	2.21	2.76	3.31
36	2	2.20	2.50	3.00
37	3	1.98	2.27	2.55

CI, confidence interval.

Development of the human fetal corpus callosum:

a high-resolution, cross-sectional sonographic study *Ultrasound Obstet Gynecol* 2001; 18: 343–347

R. ACHIRON and A. ACHIRON*

Department of Obstetrics and Gynecology and *Multiple Sclerosis Center, The Chaim Sheba Medical Center, Tel Hashomer, Israel



SOFTFOOT
P
106/2
16

- **Dysmorphie faciale**
- **Retard des acquisitions**
- **Mégalencéphalie , lissencéphalie**
- **Syndrome d'alcoolisme foetal**

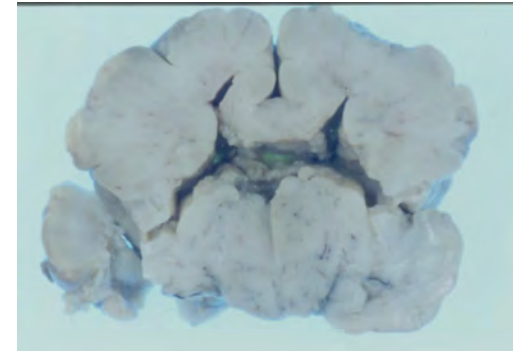
Corpus callosum shape and neuropsychological deficits in adult males with heavy fetal alcohol exposure.

Bookstein FL, Streissguth AP, Sampson PD , Connor PD , Barr HM
Neuroimage.2002 Jan ;15 (1):253-51

Hygroma kystique à caryotype normal 46 XX
24 SA

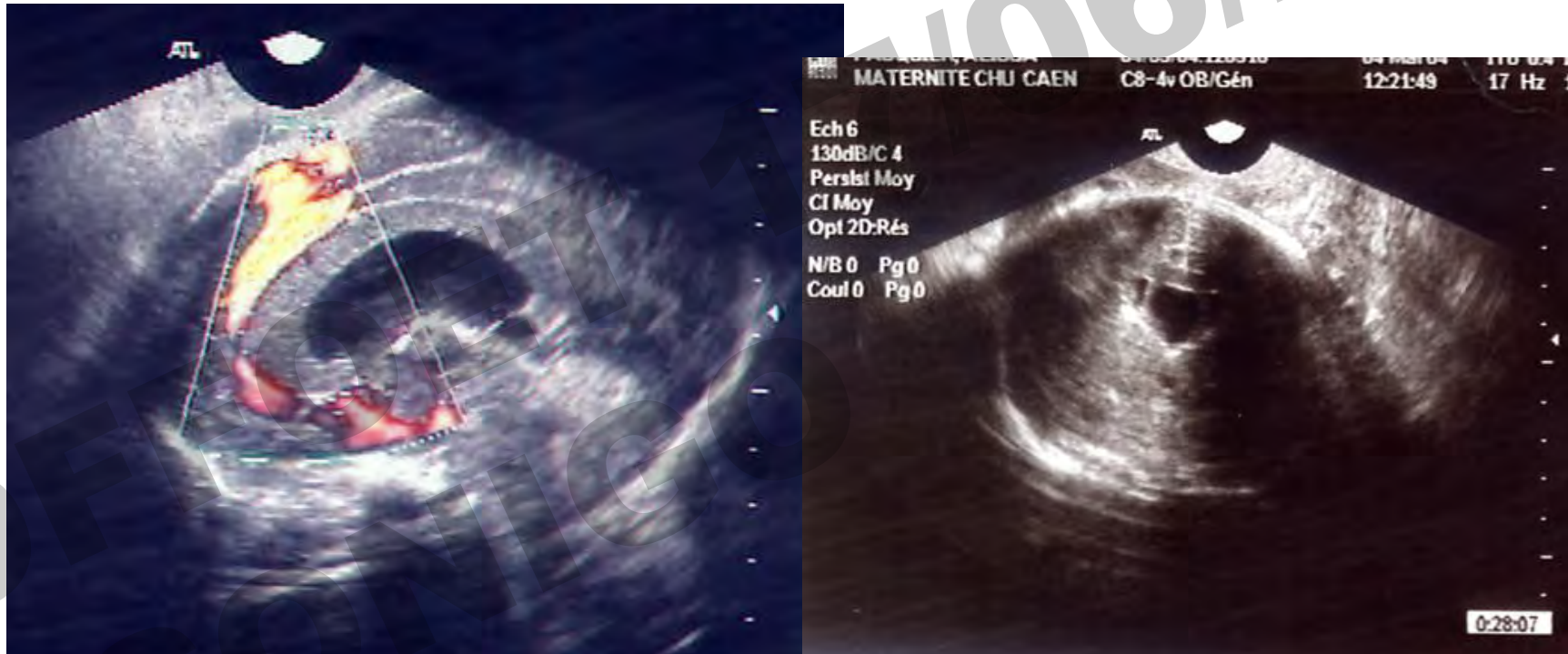


IMG à 34,5 SA:
Dysmorphogénèse majeure du cerveau trouble diffus de la
migration neuronale

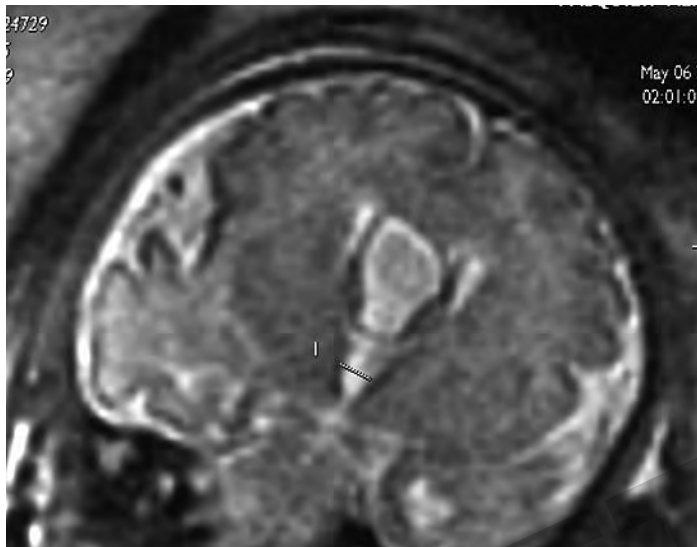


F. Rypens, P. Sonigo, M-C. Aubry, A-L. Delezoide, F. Cessot, F. Brunelle
Prenatal MR Diagnosis of a thick corpus callosum
AJNR 17 : 1918-1920 Nov 1996

CC épais TRES EPAIS !



CHU CAEN



CHU CAEN

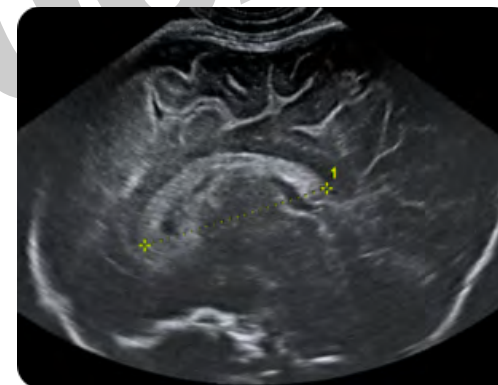
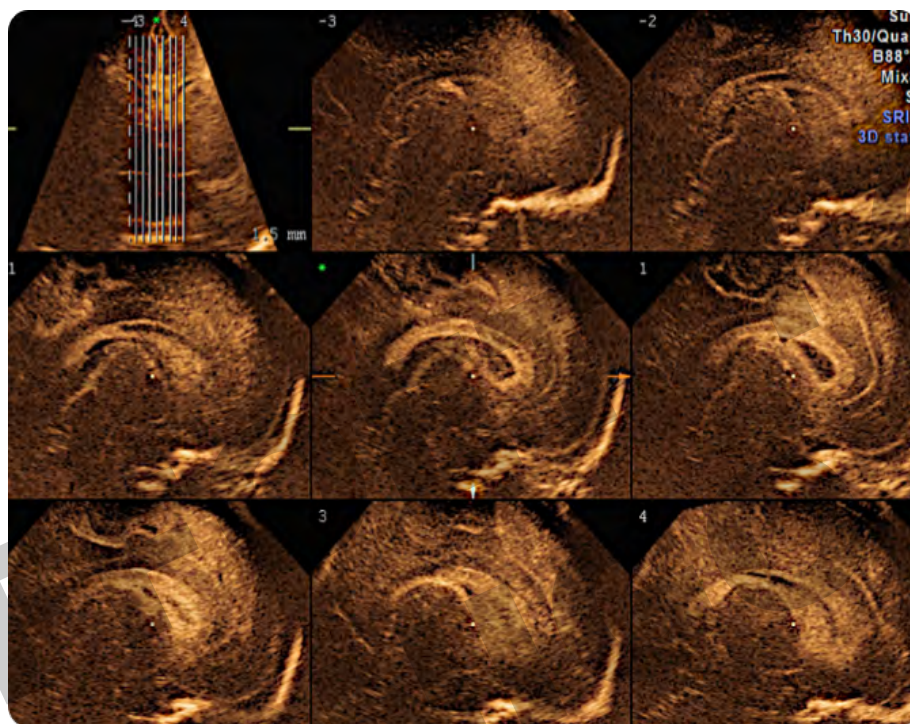
CC épaisseur corps > 5 mm



SIGNE D'APPEL → BILAN

SOFFOJET 17/06/2016
P. SONIGO

Lipome péricalleux

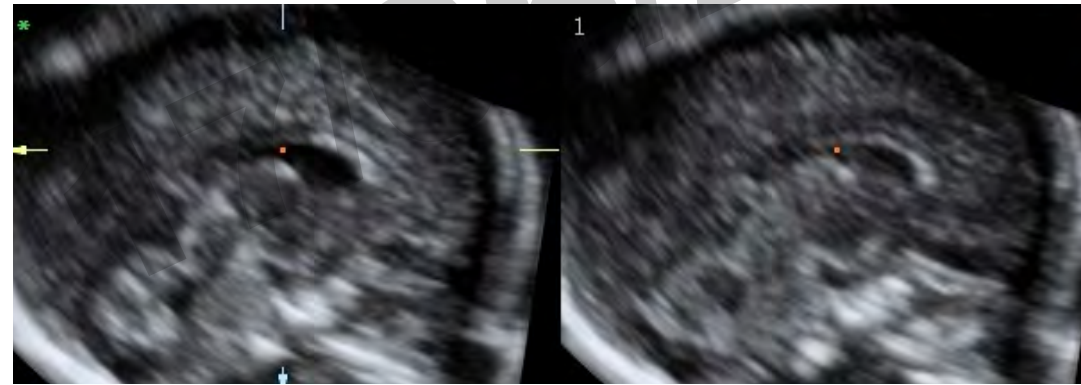


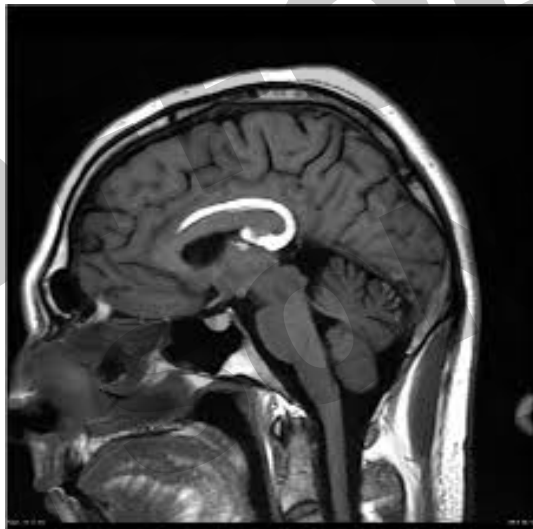
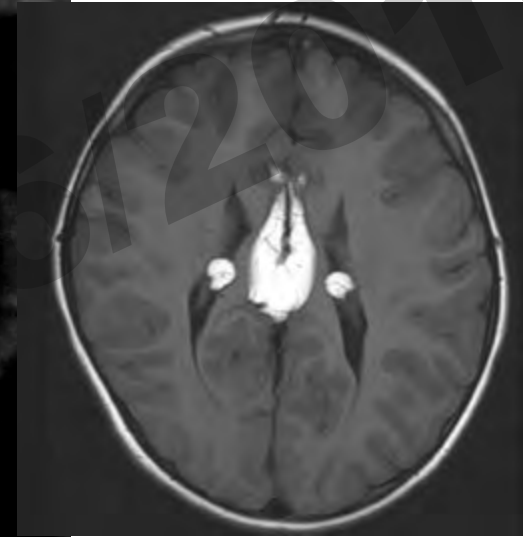
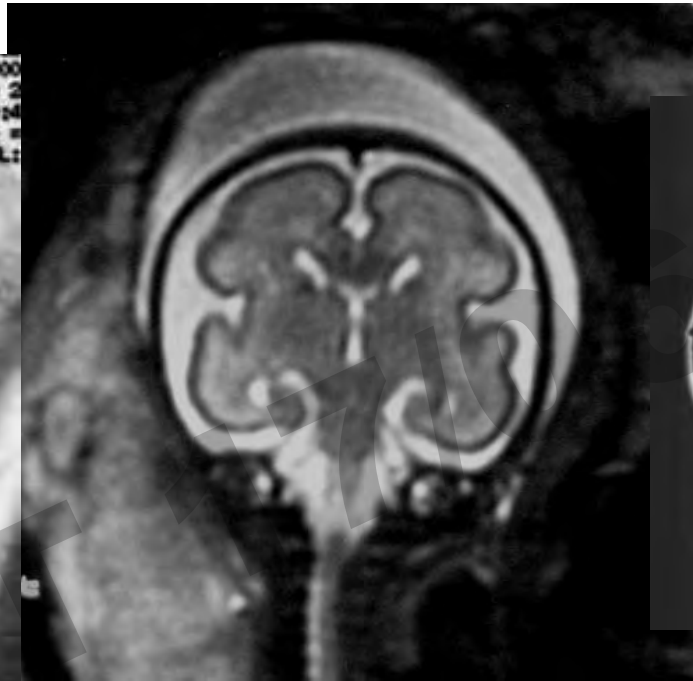
.Prenatal diagnosis and postnatal follow-up of pericallosal lipoma :Report of seven new cases

V.IKOVITCH,D.EURIN,F.RYPENS,P.SONIGO,I.SIMON,P.DAVID,F.BRUNELLE,F.AVNI

AJNR am J neuroradiol 22 :767-772, April 2001

Lipome péricalleux





LE FUTUR PRONOSTIC ?



la **tractographie** est une méthode utilisée en IRM pour mettre en évidence les voies neuronales

Magnetic resonance methods in fetal neurology

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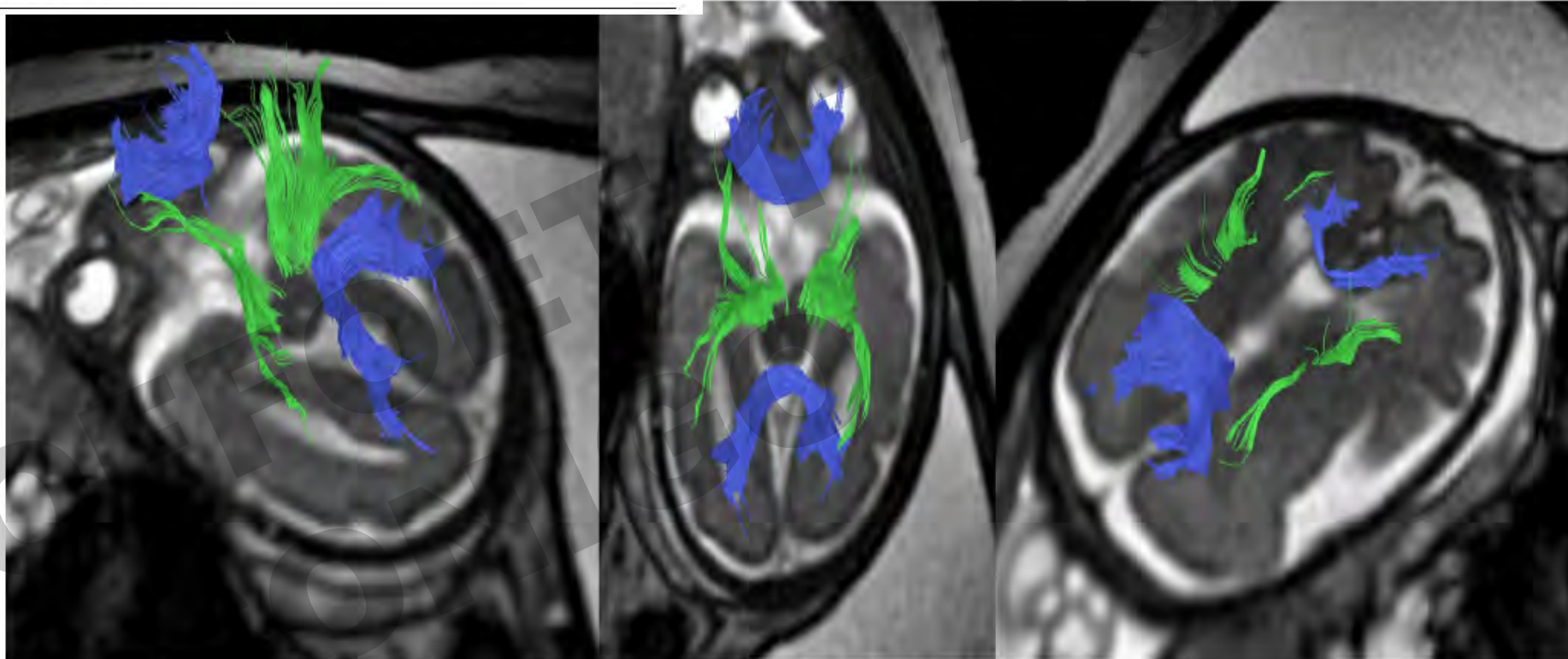


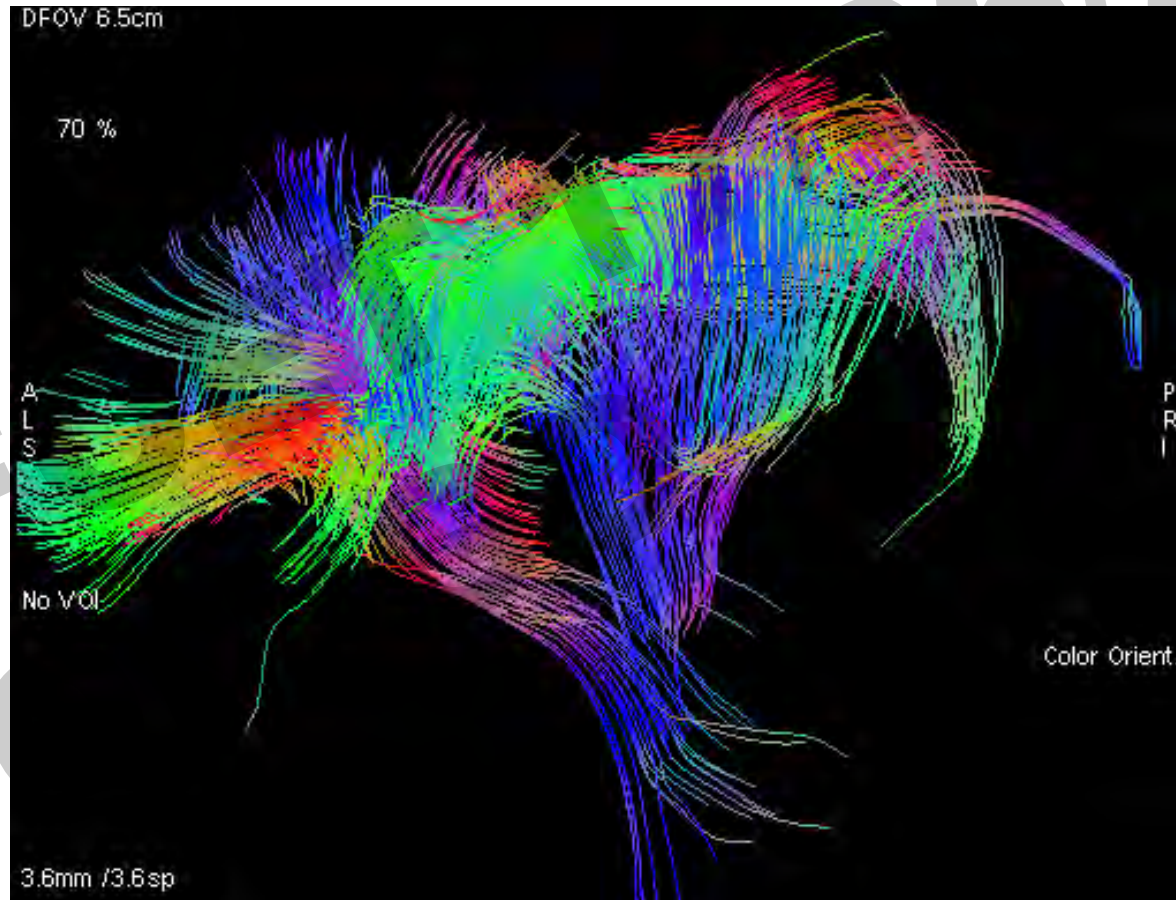
Fig. 1. Axial T2-weighted magnetic resonance images of fetus at 28 weeks of gestation showing three-dimensional fiber tracts projected onto the fetal brain. Note the genu and the splenium of the corpus callosum (blue) and the corticopontine/corticospinal projection fibers (green).

Previously



4 mn

Tractography neuronal connection



2 mn 40

Normal tractography

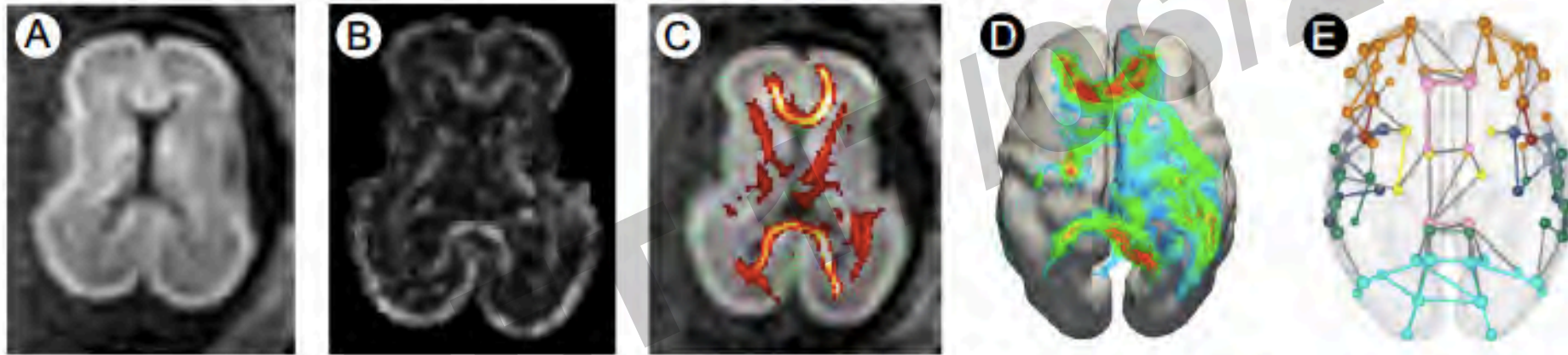
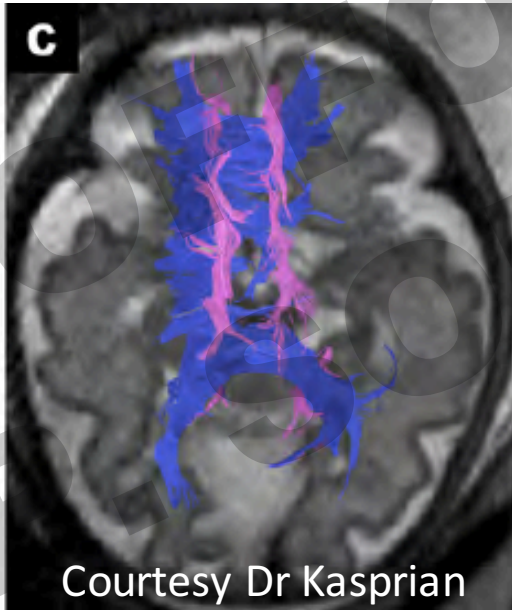
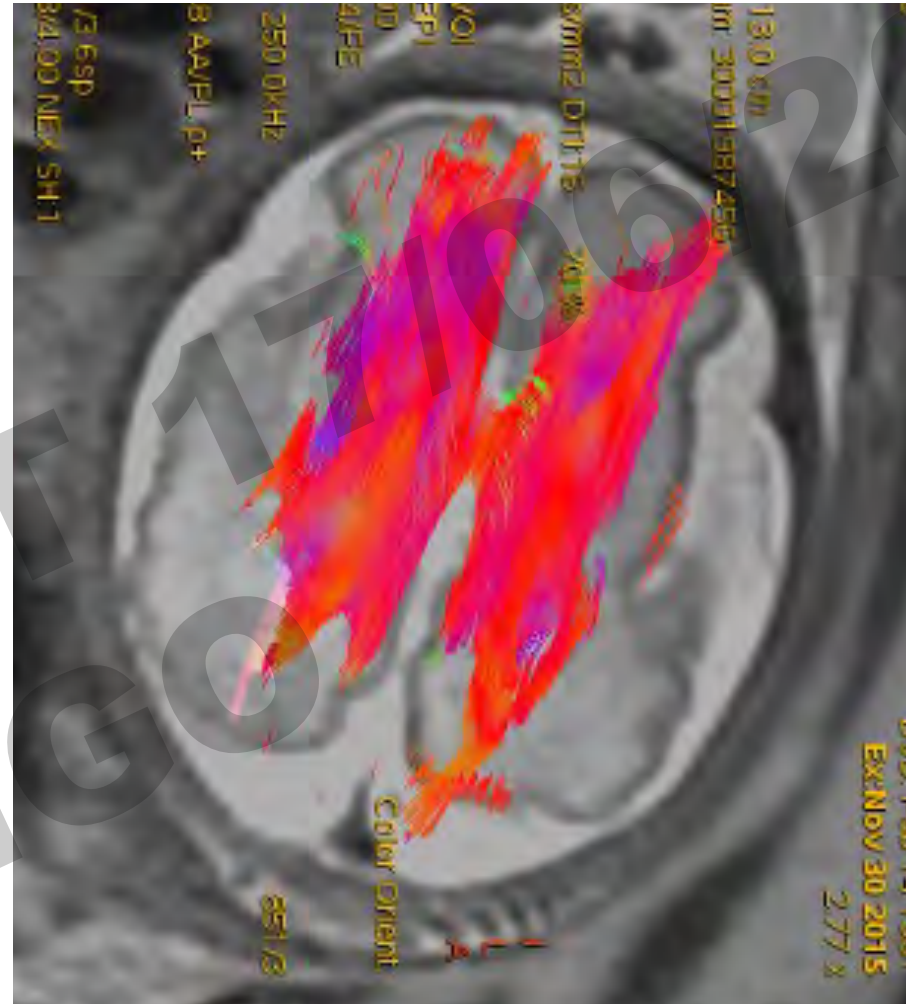
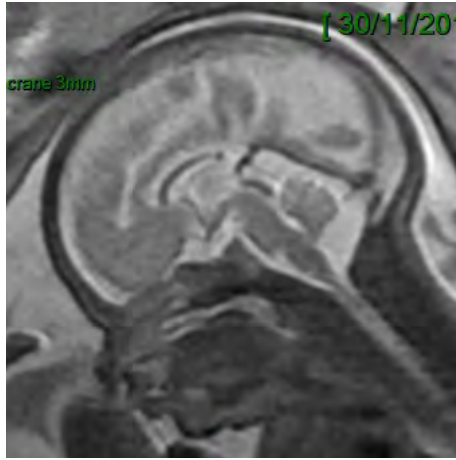
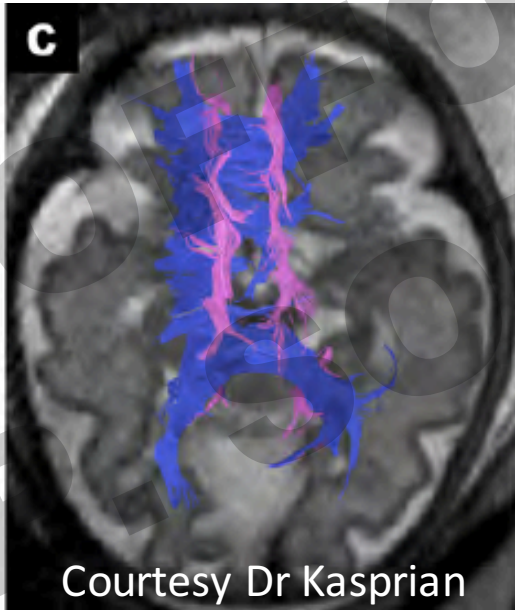
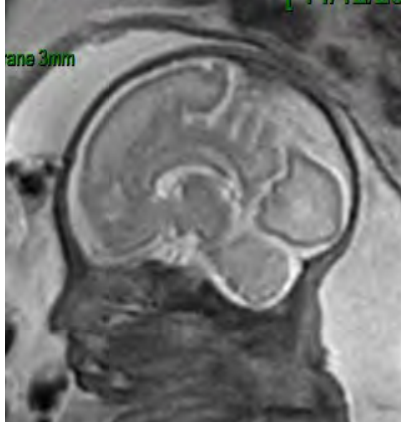
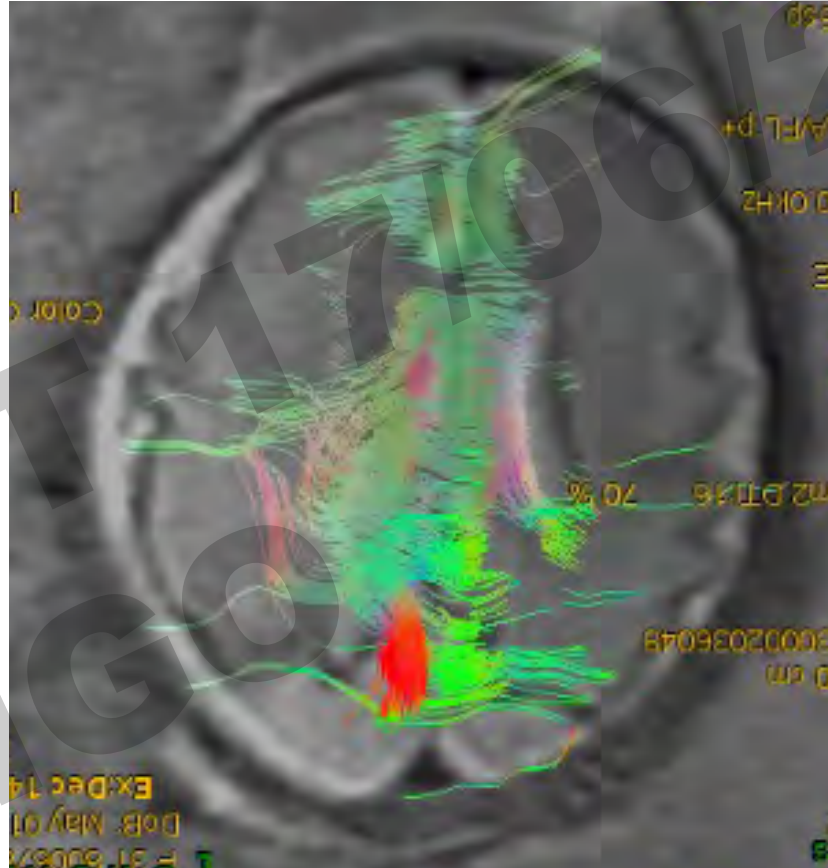


Figure 1 Fetal diffusion tensor imaging and tractography: from scalar images to complex visualizations. These images represent the DTI data and various reconstructions of a fetus at the 25th week of gestation. (A) Mean diffusion-weighted image, (B) the raw diffusion tensor data are used to calculate the fractional anisotropy image, (C) probabilistic tractography quantifies the connection probability between regions, or can be used to map global brain connectivity, (D) by a similar approach, whole-brain connection mapping can be performed by streamline tractography, and (E) the quantitative connection strength data between a set of ROIs (a fetal brain atlas) are used to reconstruct the fetal brain connectome.





Courtesy Dr Kasprian



Aspects échographiques normaux

IRM : variantes anatomiques

