



Changes in the Corpus Callosum of Newborn Infants with Prenatal Alcohol Exposure (PAE)



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Conflict of interest disclosure

None of the authors have an affiliation (financial or otherwise) with a pharmaceutical, medical device or communications organization, and cannot identify any conflict of interest.

Management of potential bias

There are therefore no potential sources of bias identified or foreseen which require management

Ethics statement

- This study involves the retrieval and sharing of retrospective clinical data which was acquired for normal medical purposes
- Any data shared between the collaborators is first pseudo-anonymised and contains no personally identifiable clinical information
- This data can be used for research purposes as the following principles - relevant to UK and European legislation were adhered to :
 - Caldicott principles,
 - The UK Data Protection Act (sect.33)
 - Confidential Advisory group (CAG sect. 251)
 - HM Gov. Information Commissioner's Office guidance
 - NHS Digital Information governance procedures

Diagnosis of children affected by PAE

CHALLENGING

- Long gap: exposure...outcome
- Recognition?
- Additional comorbidity
- History difficult
 - Guilt
 - Recall ?
 - Unavailable?
- Variation: Exposure → outcome
- Overlap – other conditions

IMPORTANT

- Self - understanding
- Appropriate interventions
- Family support
- Leads to better outcome
- Mental health

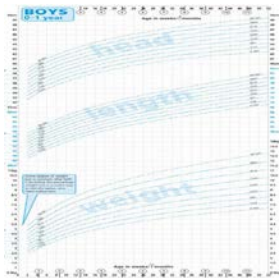
Earlier Diagnosis – neonatal period ?



Exposure



Growth



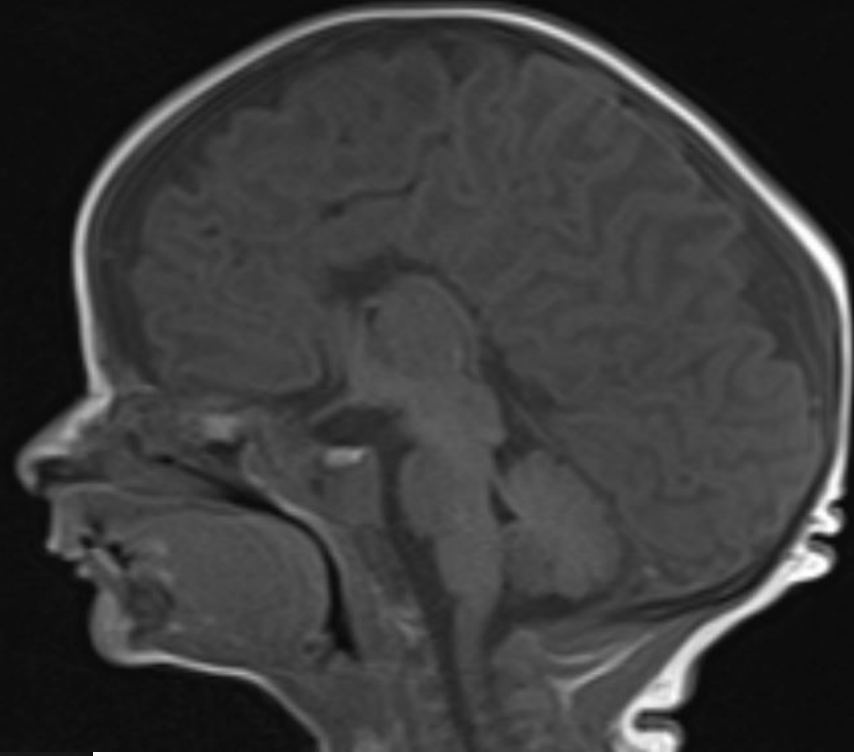
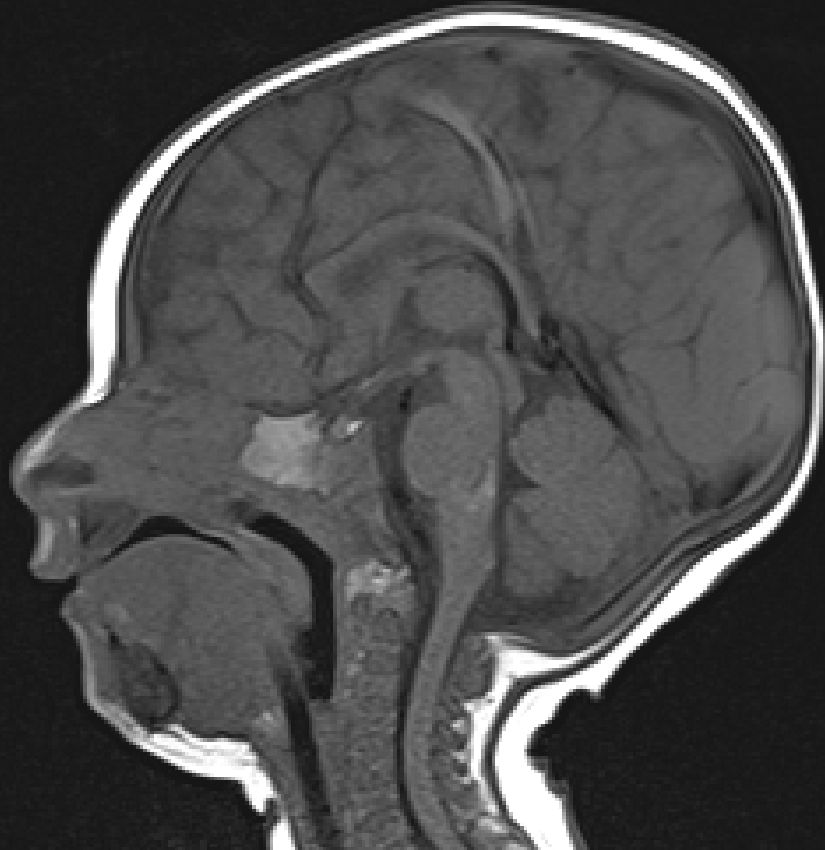
Features



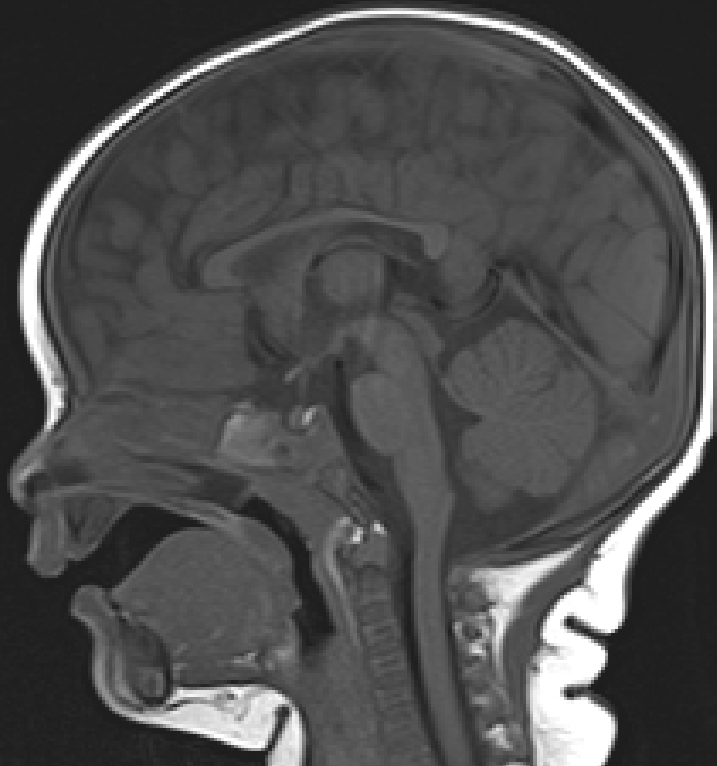
Neurological.....



Neuroimaging



Corpus callosum with PAE



23/02/2018

Princess Royal Hospital

MI 0.6

12/0

TIC 0.3

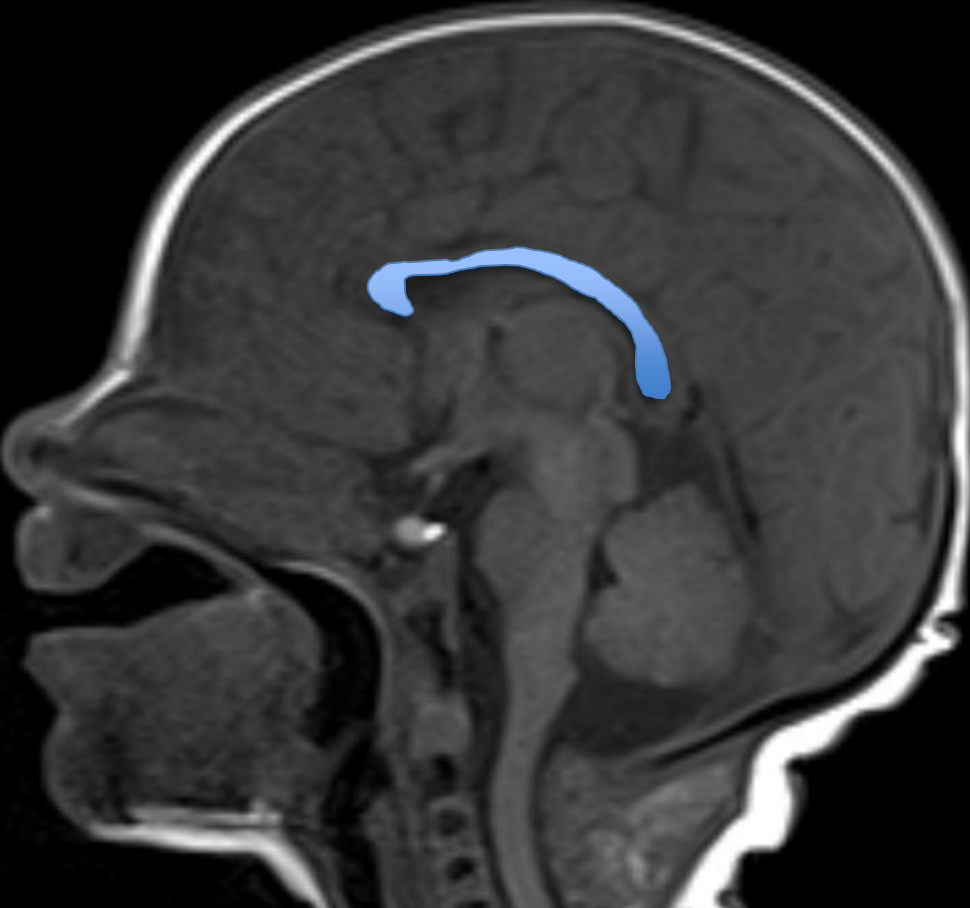
12:1

p

RT



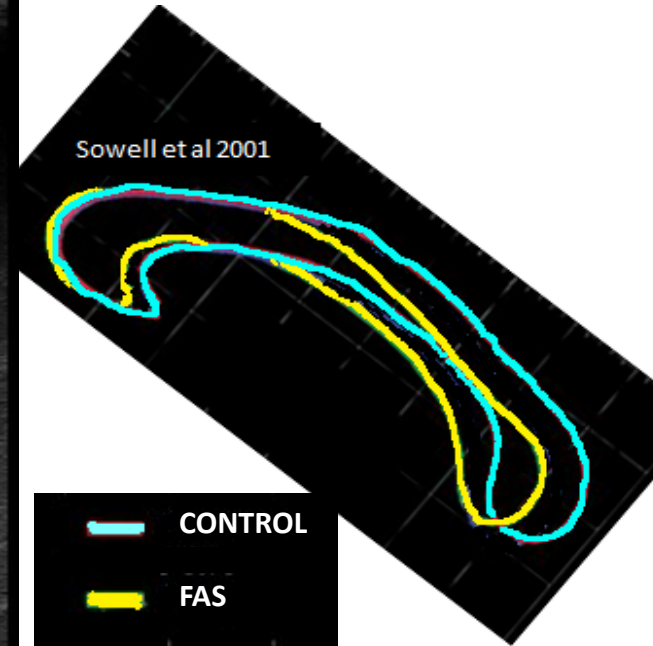
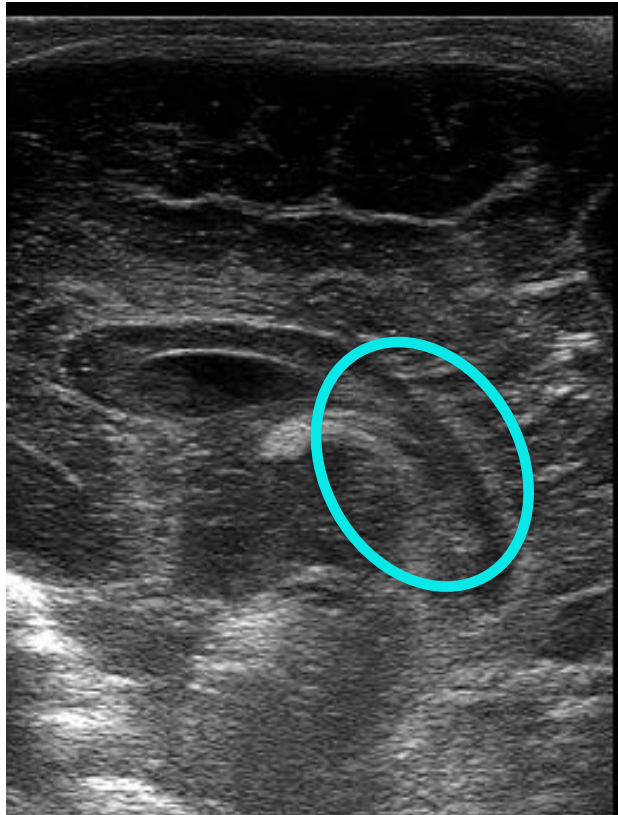
The corpus callosum - MRI



Fibre Tracking



CC with Ultrasound



Methodological approach 1

RETROSPECTIVE COMPARISON – 3 groups:

1. *“normal group” – mild hypoxic-ischaemic encephalopathy*
2. Prenatal alcohol exposure
3. substance misuse with no PAE

Validation against the ‘gold standard’ (MRI)



MI 0.3 30/01/2018

TIC 0.1 08:17:55

TMBU CRAN
L12-5
46Hz
9cm

2D
F1
Gn 85
232dB/C6
D / 3 / 4

P



G
P R
5.0 12.0

Load Dicom

Segment

Save result

Reset

Load mask

Static Text

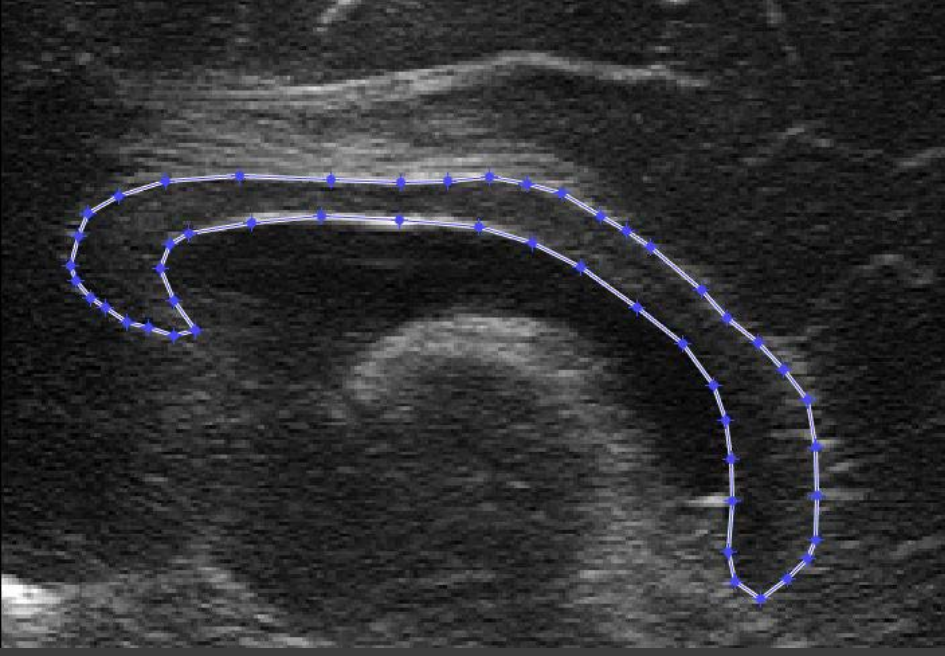
Calculation

Type here to search



08:58
07/03/2019

Research purposes



Measuring the C C



Area: 1.73cm²
Perimeter: 11.52cm
Length: 4.54cm
Circularity: 76.82
Eccentricity: 0.95



Area: 1.61cm²
Perimeter: 11.02cm
Length: 4.45cm
Circularity: 75.52
Eccentricity: 0.96



Area: 0.86cm²
Perimeter: 10.54cm
Length: 4.16cm
Circularity: 128.85
Eccentricity: 0.97

Methodological approach 2

the way forward

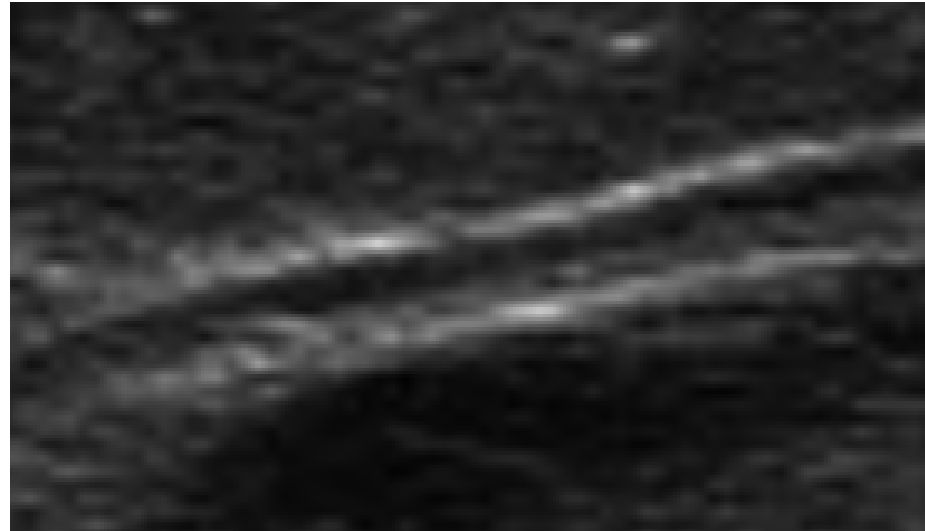
- Standardising the approach – ‘best way’
- What are the normal values ?
- measurement variation

PROSPECTIVE..... (collection normal data)

Accounting for prenatal alcohol exposure

Optimising the CC image

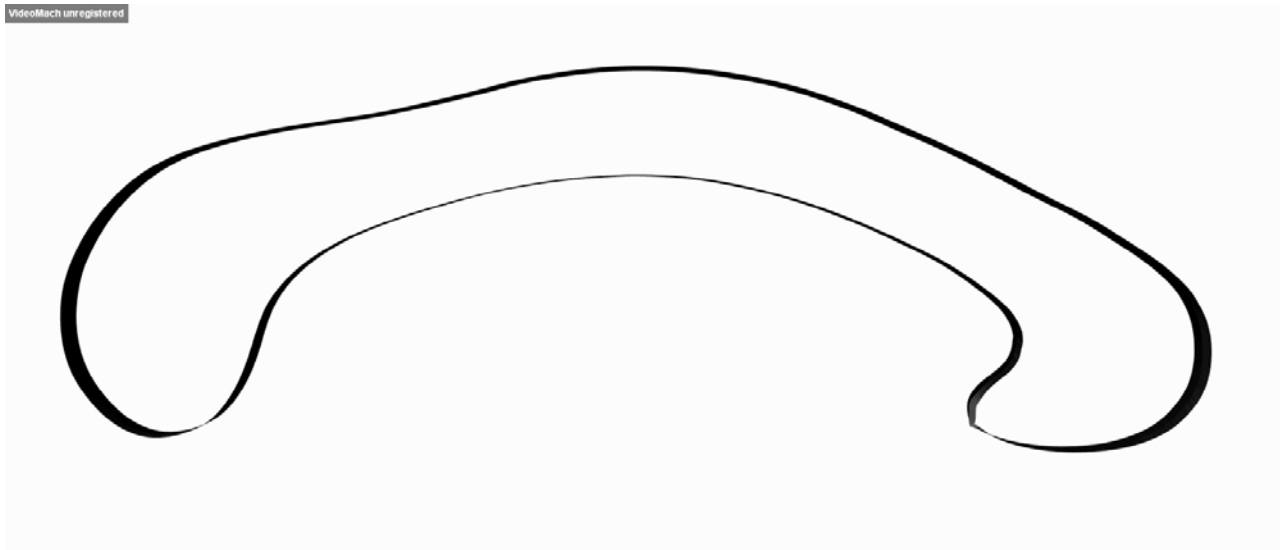
- Standardising technique
- Contrast
- Edge enhancement
- Digital image processing



Automation

- Manual v automated
- Machine learning
 - Comparison: normal values
- Building 3D picture? Potential - Gyral pattern/migration

Corpus Callosum Image – Digital Surface Modelling



- Complicated 3D shape
- Relationship with normal
- What measurements are most discriminatory?

Prediction ?

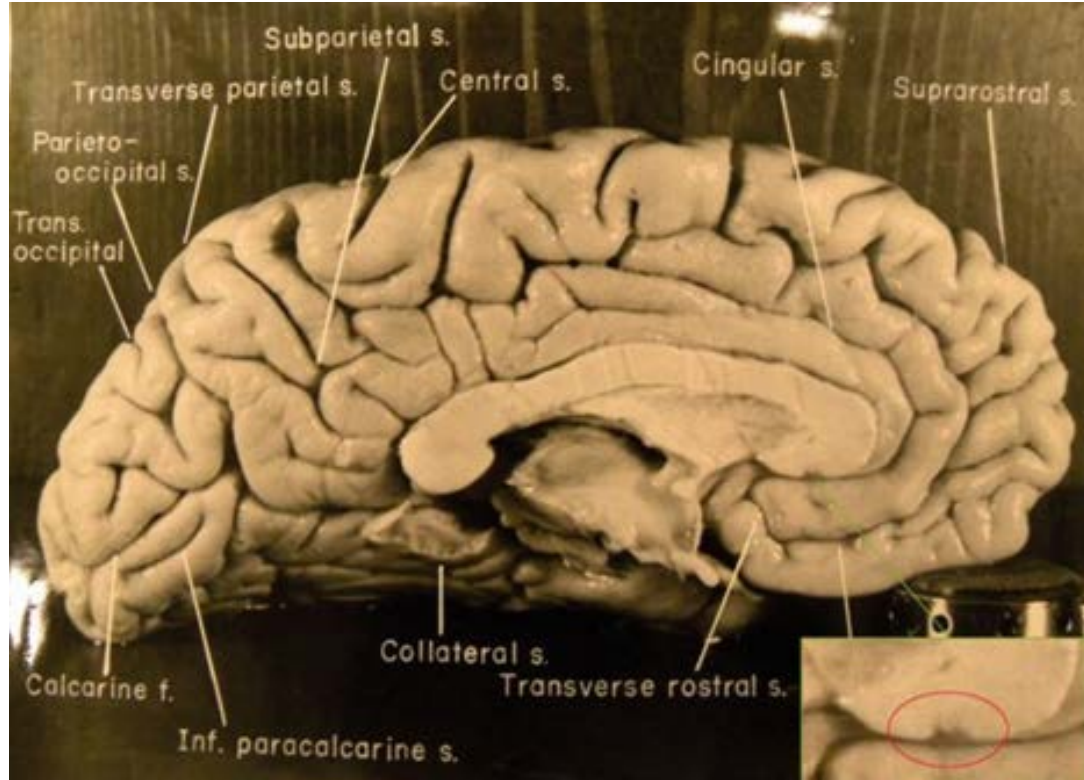
Diagnosis



Outcome



Exposure



From: The corpus callosum of Albert Einstein's brain: another clue to his high intelligence? Brain. 2013;137(4):e268. doi:10.1093/brain/awt252 Brain | © The Author (2013). Published by OUP

THANK YOU

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Brighton and Sussex
University Hospitals
NHS Trust



NIAAA
National Institute on Alcohol
Abuse and Alcoholism



Utility of US measurement of CC ?

- Role in screening?
 - Those at risk
 - Selecting for detailed follow-up
- Role in diagnosis?
 - Determined by future follow-up studies
- ? Is it an early marker of neurological impairment