# Corpus callosum thickness in patients with Neurofibromatosis type 1 and behavioral and developmental associations

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# Conflicts of interest

- None to disclose

# Background

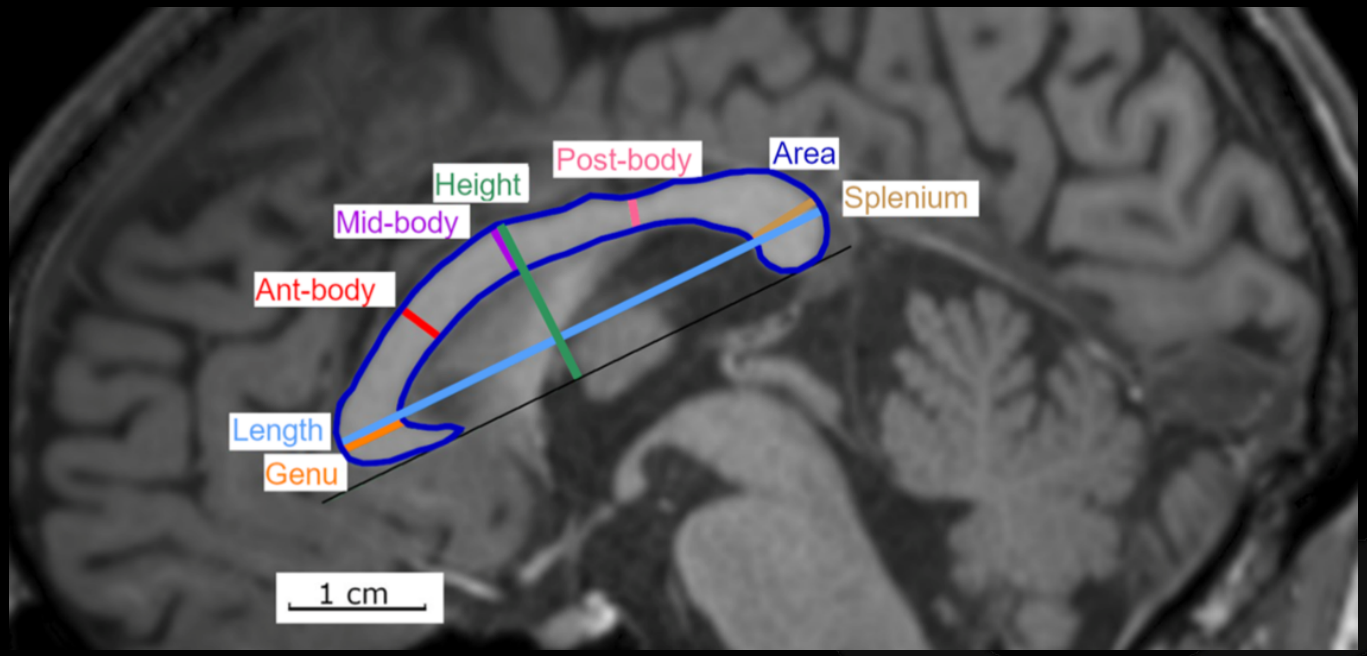
1 in 3,000 live births

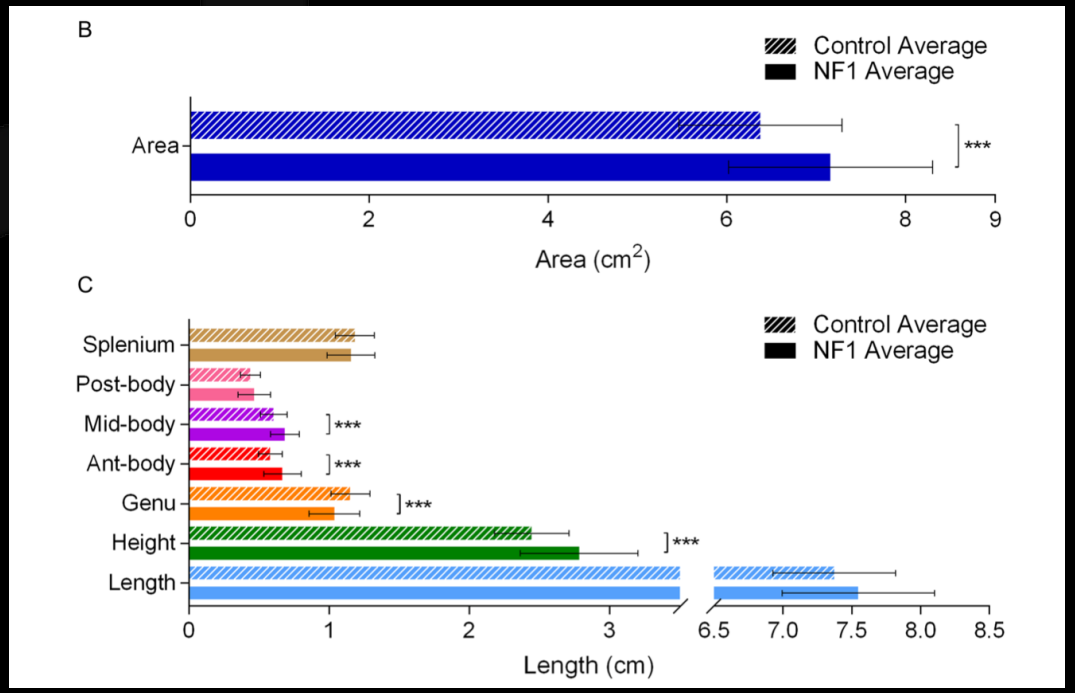
NF1

Increased Schwann cell proliferation

Clinical implications of Brain Findings are still unclear

# Background




Wang et al, Orphanet J Rare Dis (2021), Wang et al, Orphanet J Rare Dis (2022)

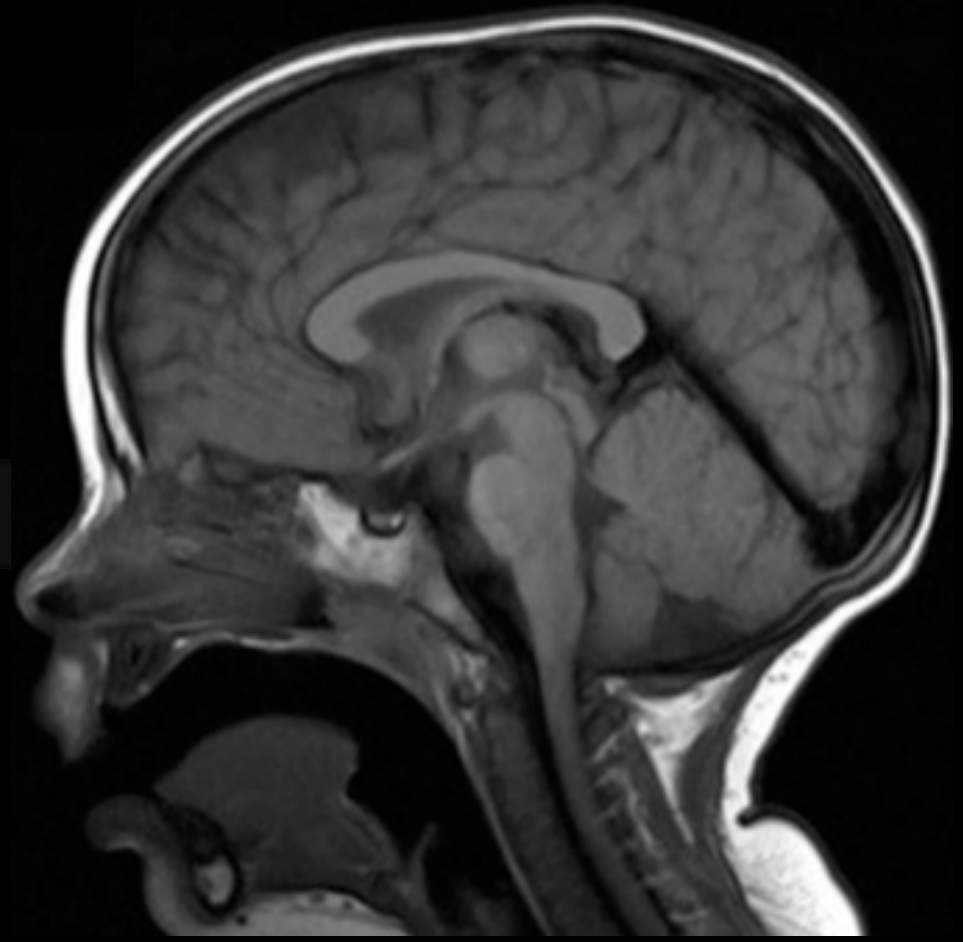
# Purpose

- We sought to measure  and compare CC in patients with NF1 with unaffected controls seen at our institution.

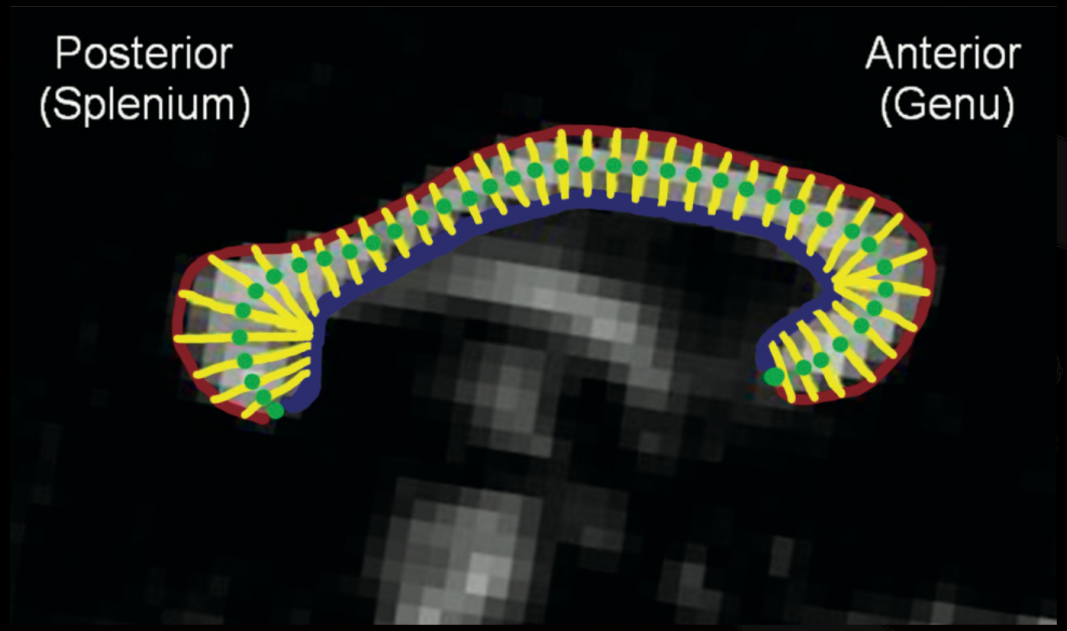
# Methods

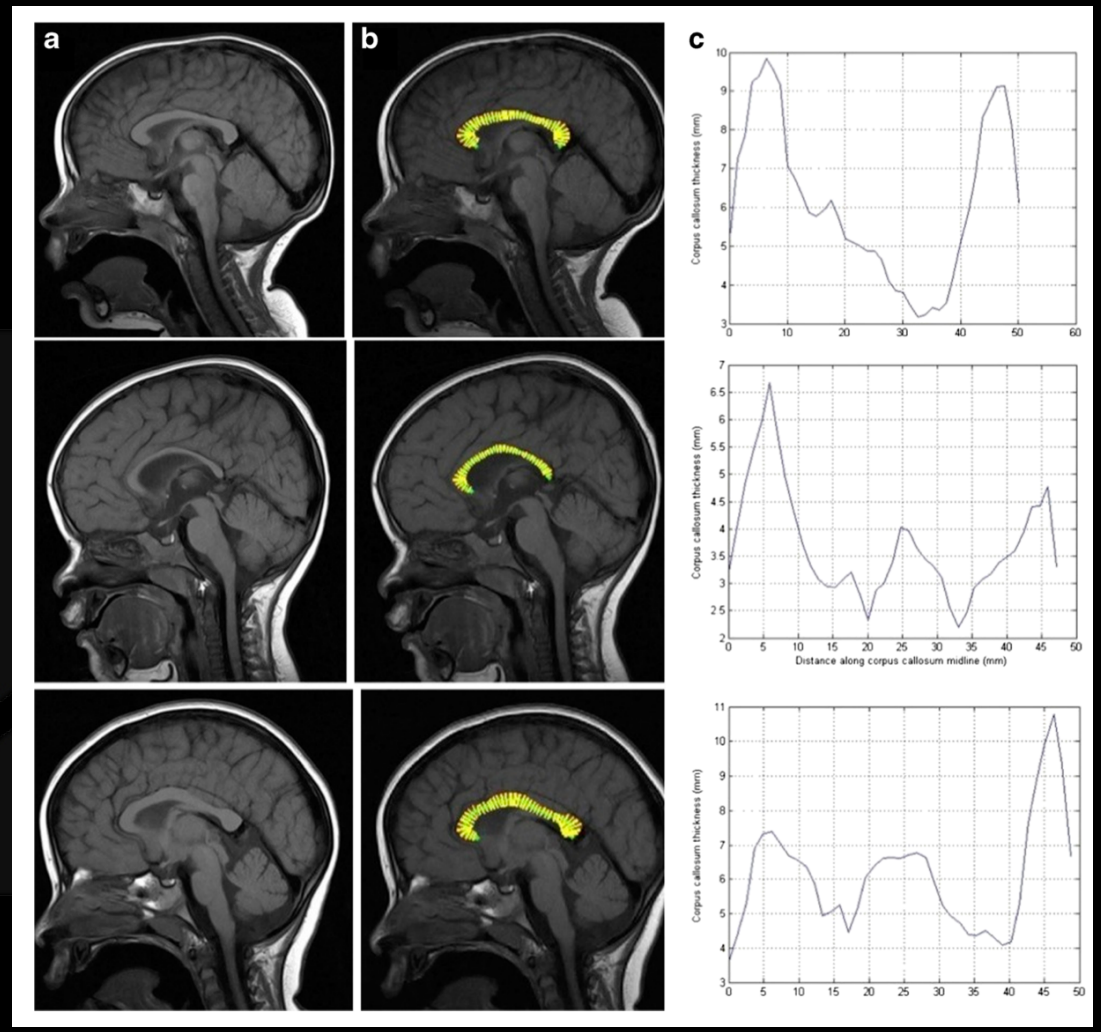
**Single center, retrospective cross-sectional evaluation**

- Midline sagittal images, T1-weighted MRI sequence
- Patients with NF1 and controls 1 to 15 years of age with NF1
- 2002 to 2021
- Controls: MR indication for headache, unremarkable MR report, seen at the ER.



# Methods



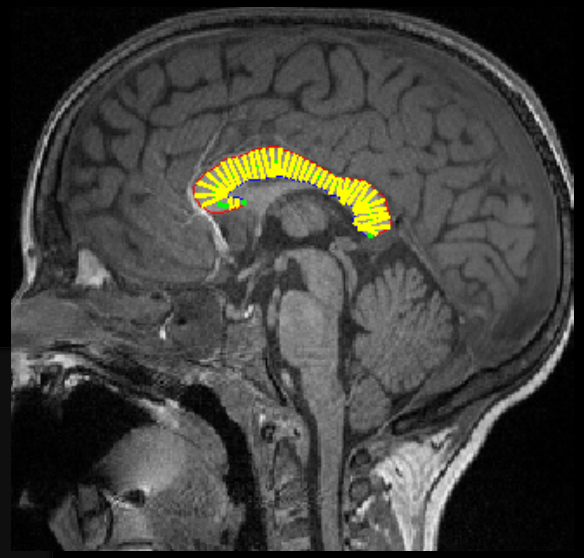



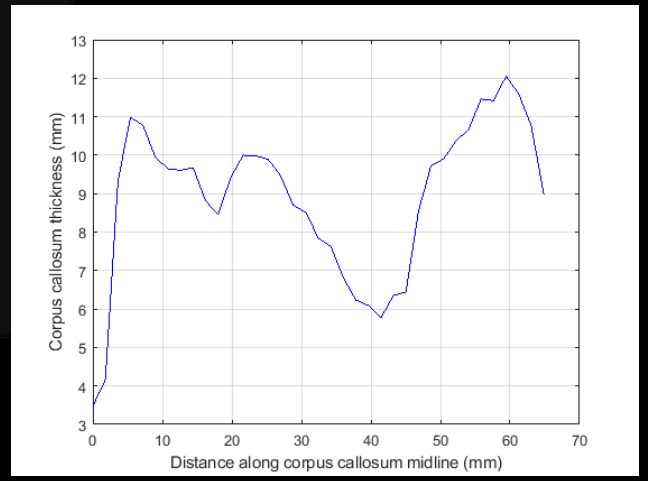

- MATLAB to conduct CC measurements (dichotomous)
- Clinical data extracted from medical records

Andronikou et al, 2015

# Results

| | Case (n =138) | Control (n=28) | P-value |
|---|---|---|---|
| Age mean(SD) | 10.2 (5.68) | 9.70 (5.25) | 0.17 |
| Sex female n (%) | 64 (53.62) | 20 (71.43) | 0.97 |
| **CC measurements** | | | |
| **Genu** mean(SD) | 11.27 (1.91) | 11.1 (2.32) | 0.689 |
| **Body** mean(SD) | 6.69(1.43) | 6.3 (1.30) | 0.42 |
| **Isthmus** mean(SD) | 5.55(1.38) | 5.3 (1.22) | 0.21 |
| **Splenium** mean(SD) | 7.34 (2.14) | 7.2 (1.78) | 0.84 |





# Results – NF1

| | Comorbidity | | Genu | Body | Isthmus | Splenium |
|---|---|---|---|---|---|---|
| | Yes | No | P-value* | P-value* | P-value* | P-value* |
| Any behavioral / cognitive development disorder | 81.1% | 18.9% | 0.134 | 0.007 | 0.255 | 0.455 |
| ASD | 12.2% | 87.8% | 0.123 | 0.174 | 0.559 | 0.839 |
| ADHD | 43.3% | 56.7% | 0.3948 | 0.175 | 0.008 | 0.997 |
| Intellectual disability | 8.9% | 91.1% | 0.514 | 0.052 | 0.251 | 0.865 |
| Learning disorders | 44.4% | 55.6% | 0.005 | 0.005 | 0.211 | 0.314 |
| Language disorders | 34.4% | 65.6% | 0.065 | 0.983 | 0.484 | 0.159 |
| Motor delay | 23.3% | 76.7% | 0.235 | 0.793 | 0.808 | 0.597 |
| Global delay | 18.89% | 81.1% | 0.34 | 0.044 | 0.955 | 0.745 |
| Seizures | 6.67% | 93.3% | 0.808 | 0.698 | 0.225 | 0.093 |

# Discussion and conclusions

- Overall, CC thickness median values did not significantly differ between NF1 patients and controls.
- The CC was significantly thicker in patients with ADHD, learning disorders and global delay. Further studies with larger sample sizes, and longitudinal assessments would explain the relationship between CC thickness and these disorders in children with NF 1.

# Limitations

- Sample size (n=166)
- Cross sectional evaluation
- No information of behavioral and developmental characteristics of controls.

# Future directions

- Volume measurements
- Consideration of the anterior commissure
- Correlation of imaging  patterns with specific genetic mutations

# Thank you!

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