

Brain functional connectivity changes in adolescent and young women with endometriosis-associated pain: A pilot resting-state MRI study



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Background

- Endometriosis is the leading cause of chronic pelvic pain.
- The pathophysiology of **endometriosis-associated pain (EAP)** has remained unclear, but it is likely related to central sensitization (Sieberg et al., 2020).
- Alterations in brain function and structure have been previously demonstrated in adult women with EAP (As-Sanie et al., 2016).
- Aim of the study:** To examine potential **functional connectivity** differences in adolescent and young women with EAP in brain regions implicated in chronic pain compared to pain-free, healthy controls.

Methods

- Resting-state fMRI** scans were obtained from 11 adolescent women with surgically confirmed endometriosis (13–21 years old, M age=17.1, SD =1.9) and 14 healthy female controls (13–21 years old, M age=16.6, SD =2.7).
- Using a **seed-to-voxel approach**, we investigated functional connectivity between the **anterior insula**, **medial prefrontal cortex**, and the rest of the brain.
- We explored whether functional connectivity differences were correlated with clinical characteristics including **disease duration** and **pain intensity**.

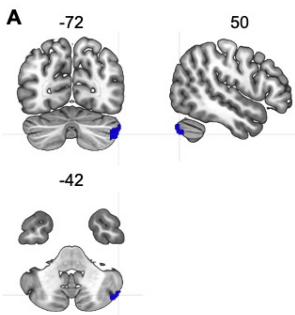
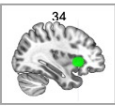
Results

Participants' characteristics:

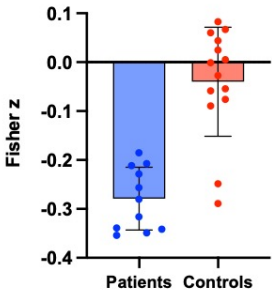
	Patients with EAP	Controls	Test statistic	<i>p</i> value
Age (years)	17.1 ±1.9 (13-21)	16.6 ±2.7 (13-21)	$t(23) = 0.45$	0.65
Pain severity (average pain in the last week, 0 to 10)	5.6 ±1.6 (3-8)	–	–	–
Pain duration (months)	36.6 ± 32.6 (4-117)	–	–	–
Using hormonal contraceptives	11 (100%)	3 (27%)	$\chi^2 = 15.43$	< 0.001
Length of menstrual cycle (days)	–	32.7 ±7.6 (23-49)	–	–
Day of menstrual cycle (at the time of the scan)	–	12.5 ±10.8 (2-36)	–	–

Main Effect of Group: Patients with EAP > Controls

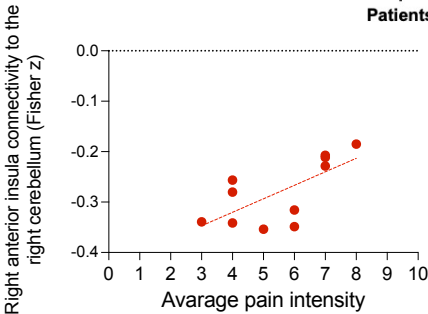
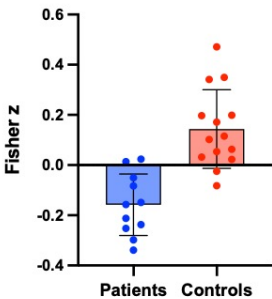
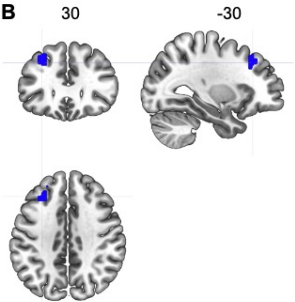
Seed region:
Right anterior insula



Right anterior insula connectivity to the right cerebellum



Right anterior insula connectivity to the left middle frontal gyrus



Discussion

- This pilot study is the first to demonstrate that functional brain alterations are also present in younger women with EAP (13–21 years) and give further support for the **involvement of central nervous system** in endometriosis.
- Detecting early “normalization” of atypical brain changes could be an important biomarker for predicting pain chronification, treatment response, and for developing centrally mediated treatments in endometriosis.

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