Individual differences in functional connectivity in neonates

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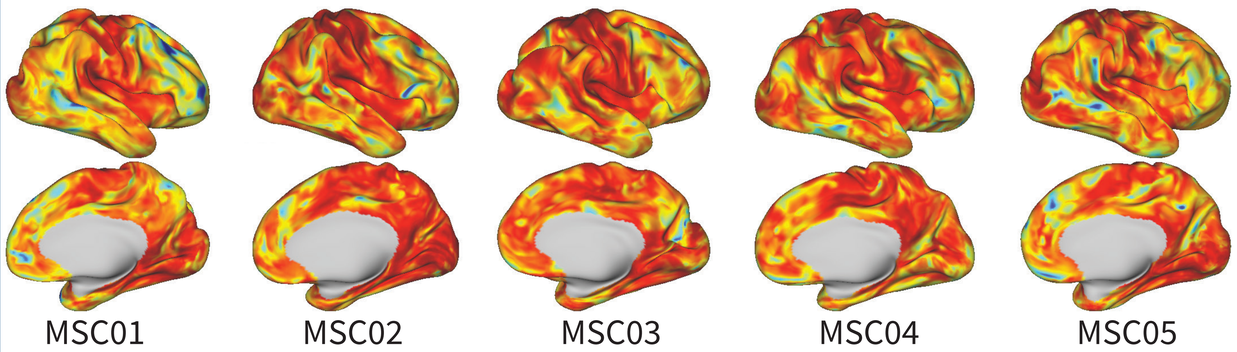
Summary

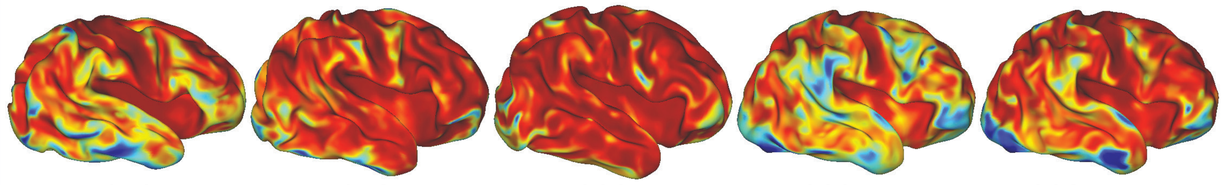
- Cortical organization varies across individuals. Highly sampled individuals show specific topographic deviations from group-average functional connectivity patterns, deemed "network variants."
- In adults, network variants show trait-like qualities: they are stable over time, heritable, and predict differences in behavior[1-4].
- **We examined deviations from group-average connectivity patterns in highly sampled neonates, finding that individual variability in connectivity patterns is reduced compared to adults, and this is driven by high interindividual similarity in local connectivity in neonates.**
- **vNetwork variants are still detectable in neonates, in similar brain regions as they occur in adults.**

Neonates have less individually variable patterns of connectivity than adults



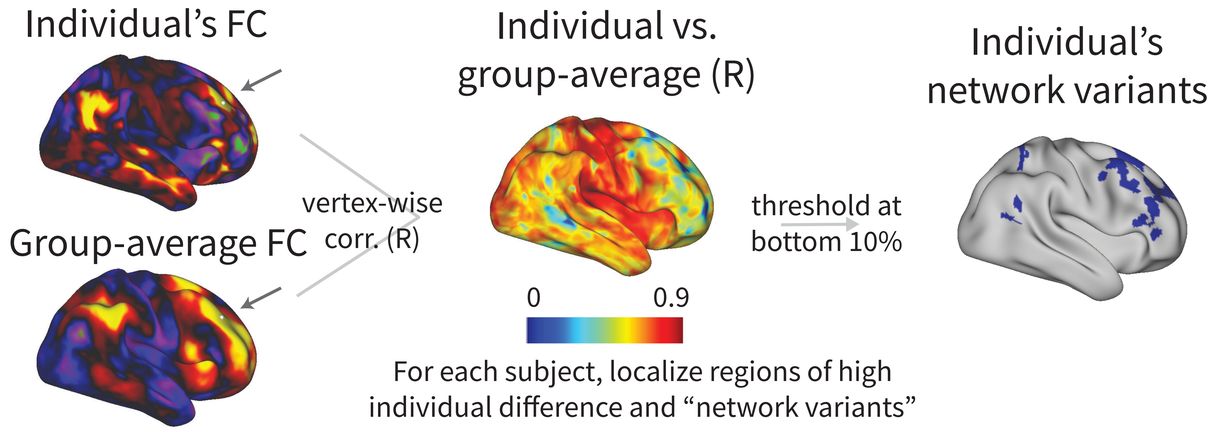
	4049	4053	5000	5003-pre	5003-post
Age	41	43	45	42	43
Min < 0.25 mm FD	118.7 min	133.02 min	202.92 min	110.72 min	146.66 min

Lower individual variability in neonates is driven to some extent by similarity in local connectivity



Using a distance exclusion of 49 mm before estimating individual-to-group spatial correlation.

Methods

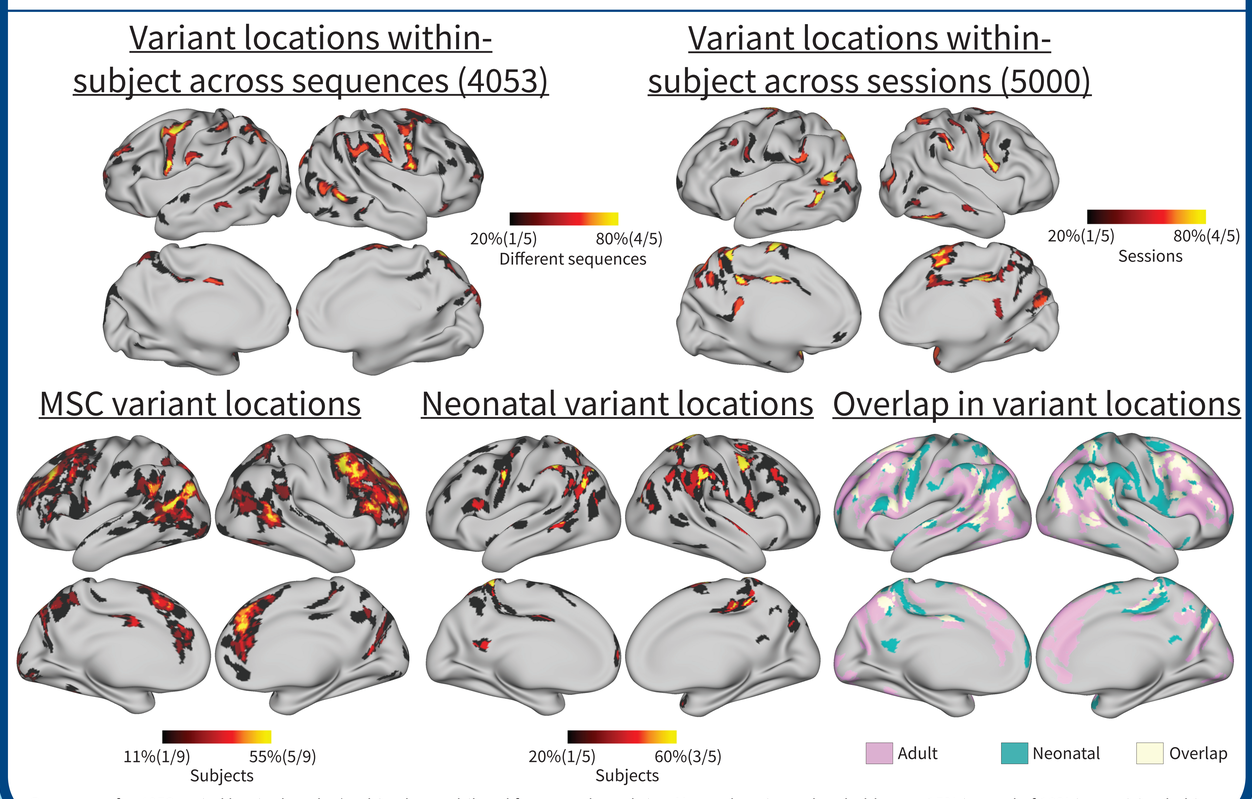


For each subject, localize regions of high individual difference and "network variants"

Precision baby ID	4049 (multi-echo)	4053 (all scans)	5000	5003 pre	5003 post
Gestational age (wks)	40	39	39	39	39
Postmenstrual age at scan (wks)	42	43	45	42	43
Time ex-utero at scan (days)	13	32	37	20	27
Sex at birth	F	F	M	F	F
Sessions	4	4	5	3	3
Total min of fMRI (FD < 0.25 mm)	118.57	133.02	202.92	110.72	146.66

4053 had variation in scan parameters across runs, multi-echo and single-echo, multiband 4/6, voxel size 2.0/2.4mm. 4049 was all collected multi-echo, otherwise scan sequences were single-echo. Group average neonate drawn from a sample of n=319 neonates[4] (37-45 wks, M = 41 wks, 55% male).

Network variants are robustly detectable and occur in similar areas in babies as in adults



Sequences for 4053 varied by single-echo/multi-echo, multiband factor, and voxel size. Network variants threshold set to 15% instead of 10% in precision babies.

References

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Acknowledgements

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