

ERRATUM

Open Access



Erratum to: Delta rhythmicity is a reliable EEG biomarker in Angelman syndrome: a parallel mouse and human analysis

Michael S. Sidorov^{1,2,3}, Gina M. Deck^{4,5,8}, Marjan Dolatshahi^{4,5}, Ronald L. Thibert⁴, Lynne M. Bird^{6,7}, Catherine J. Chu^{4,5*} and Benjamin D. Philpot^{1,2,3*}

Erratum

After publication of our article [1], we became aware that there were two minor data loading and analysis scripting errors in the human EEG data processing pipeline. These errors affected the channel loading/grouping and sleep/wake coding of EEG data. We have re-analysed all the data affected by these errors. The errors do not affect any interpretations or conclusions, thus no changes to the text are required apart from correcting *p* values and raw values affected by the errors. There are no changes to statistical significance or lack thereof. The errors affect data presented in Fig. 3, Fig. 4, Fig. 5, and Additional file 3: Figure S3 and thus we have re-plotted these figures (see below).

More information on the errors:

The first error was in the script used to load and preprocess a subset of neurotypical EEG files. This error affected only neurotypical EEG files, as their raw formatting was different from Angelman syndrome (AS) EEG files. The error in the loading script resulted in nine channels being mislabelled. The erroneous channel mapping was as follows:

Reported channel/Actual channel

O1/Fpz*
O2/O1
P3/O2*
P4/P3
Pz/P4
T3/Pz*
T4/T3
T5/T4
T6/T5

For analysis, we averaged all data by region (i.e. O1 and O2 = occipital). Therefore only the three channels noted above with an asterisk were loaded in a way that impacted data analysis. This error affected a subset of neurotypical data presented in Fig. 3, Fig. 4, Fig. 5, and Additional file 3: Figure S3. We have corrected these figures, re-run all statistical tests, and corrected *p* values as detailed below.

In Table 1 the wakeful EEG length of 18.2 ± 2.3 min for children with Angelman syndrome should be replaced by 15.1 ± 2.3 min.

In the subsection “Children with Angelman syndrome exhibit enhanced delta power and dynamics” the last sentence should read: “As some antiepileptic medications are known to cause EEG slowing [34], we confirmed that the two children with AS not taking medication displayed elevated delta power (awake occipital relative delta power in NT, $18.2 \pm 0.7\%$, in AS $37.9 \pm 1.6\%$; in child 1, age 4, 49.5%; in child 2, age 5, 53.1%.”

In the first paragraph of the subsection “Delta power in Angelman syndrome is age-dependent” $p = 0.0011$ should read $p = 0.0003$, $p = 0.041$ should read $p = 0.044$, $p = 0.0801$ should read $p = 0.2862$, $p = 0.069$ should read $p = 0.052$, and $p = 0.769$ should read $p = 0.962$.

In the second paragraph of the same subsection, $p = 0.0003$ should read $p = 0.0009$, $p = 0.458$ should read $p = 0.356$, $p = 0.658$ should read $p = 0.775$, $p = 0.259$ should read $p = 0.188$, and $p = 0.645$ should read $p = 0.894$.

In the figure legend for Fig. 5, $p = 0.0002$ should read $p < 0.0001$, and $p = 0.0007$ should read $p < 0.0001$.

The second error was in reading files containing sleep/wake annotations. These files contained time stamps followed by a code indicating “sleep”, “wake”, or “drowsy/unsure”. All sleep data were loaded correctly and were not affected by this error. The error occurred in a subset of wake data. A subset of EEGs that we

* Correspondence: cjchu@mgh.harvard.edu; bphilpot@med.unc.edu

⁴Department of Neurology, Massachusetts General Hospital, Boston, MA 02114, USA

¹Department of Cell Biology and Physiology, University of North Carolina, Chapel Hill, NC 27599, USA

Full list of author information is available at the end of the article

reported as “awake” also included short periods of “drowsy/unsure.” Correcting this error resulted in tiny adjustments to the values of delta and the power spectra reported. These adjustments may not be visible beyond perhaps a “jitter” of a few AS data points in Fig. 5a–d. A smaller subset (3) of EEGs that we reported as “awake” did include periods of defined sleep, and this has now been corrected.

The corrected figures are as follows:

Additional file

Additional file 3: Figure S3. Power spectra from all regions during epochs of wake and sleep. *Black*: neurotypical (NT), *red*: AS. During wakefulness (NT: $n = 54$, AS: $n = 26$), **a** occipital, **b** temporal, **c** parietal, **d** central, and **e** frontal spectra. During sleep (NT: $n = 54$, AS: $n = 13$), **f** occipital, **g** temporal, **h** parietal, **i** central, and **j** frontal spectra. (DOC 138 kb)

Author details

¹Department of Cell Biology and Physiology, University of North Carolina, Chapel Hill, NC 27599, USA. ²Carolina Institute for Developmental Disabilities, University of North Carolina, Chapel Hill, NC 27599, USA. ³Neuroscience Center, University of North Carolina, Chapel Hill, NC 27599, USA.

⁴Department of Neurology, Massachusetts General Hospital, Boston, MA 02114, USA. ⁵Harvard Medical School, Boston, MA 02215, USA. ⁶Department of Pediatrics, University of California, San Diego, CA, USA. ⁷Division of Dysmorphology/Genetics, Rady Children’s Hospital, San Diego, CA, USA.

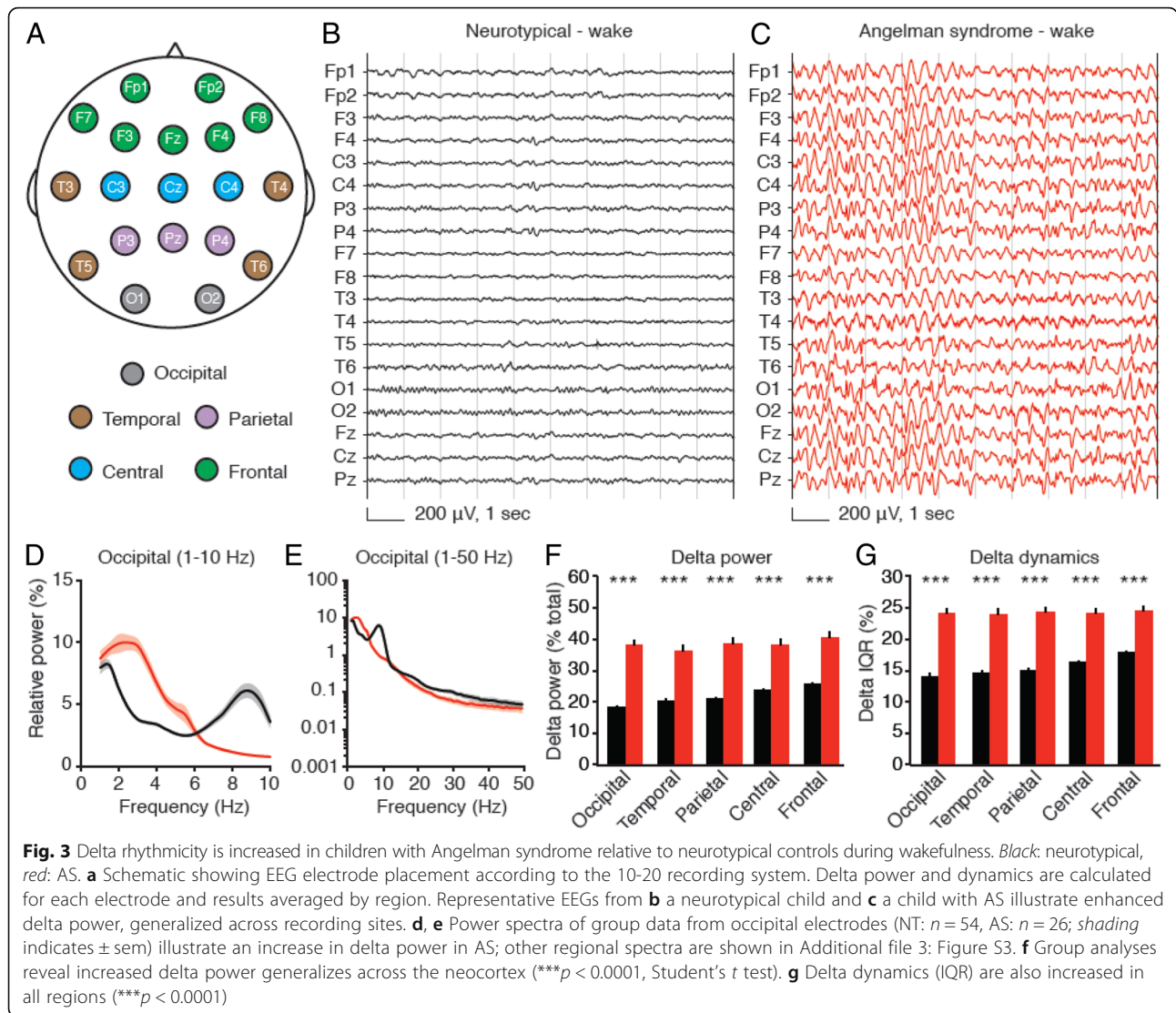
⁸Present Address: The Neurology Foundation, Rhode Island Hospital and Warren Alpert School of Medicine at Brown University, Providence, RI 02903, USA.

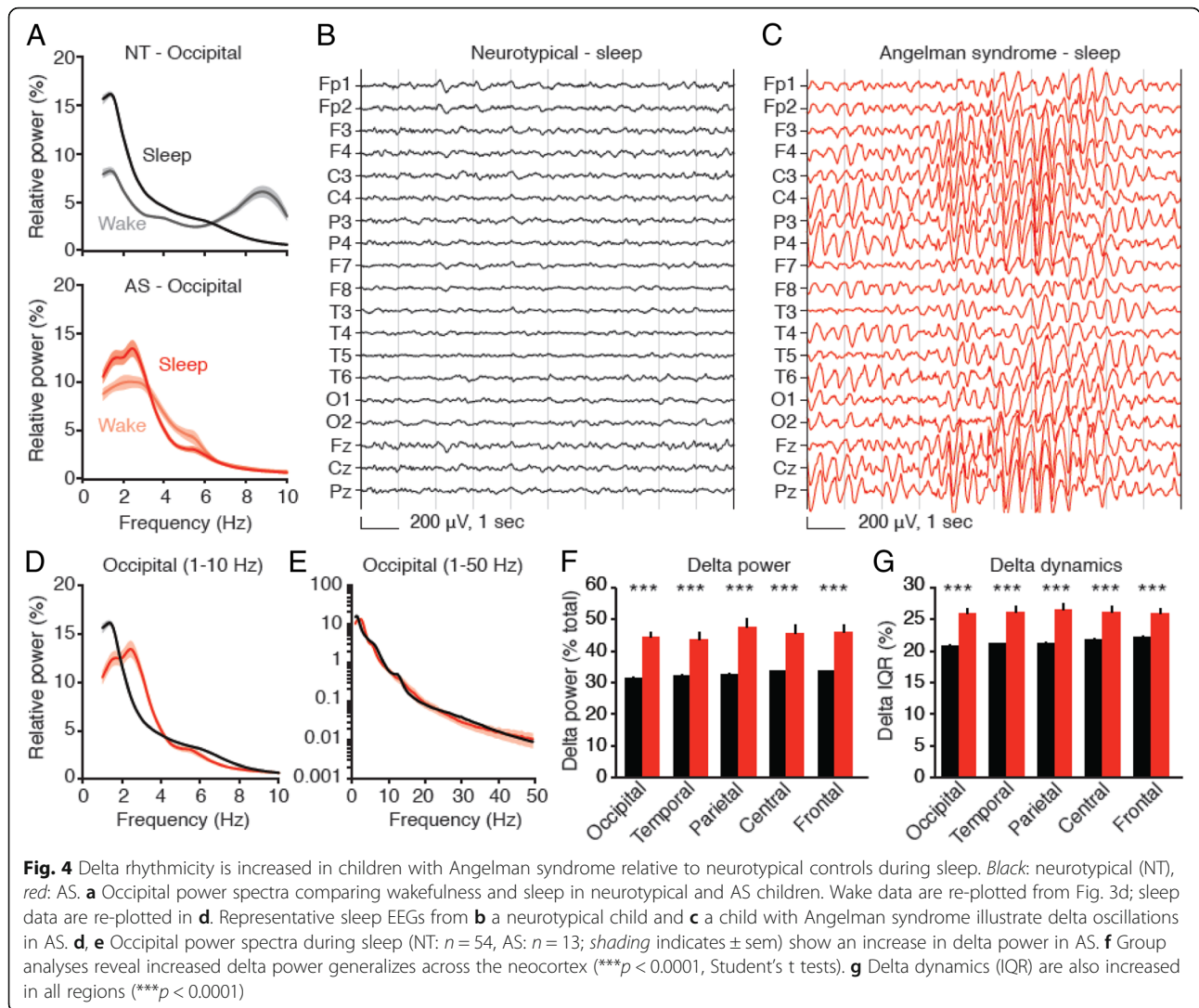
Received: 16 June 2017 Accepted: 19 June 2017

Published online: 17 July 2017

Reference

1. Sidorov MS, Deck GM, Dolatshahi M, Thibert RL, Bird LM, Cui CJ, Philpot BD. Delta rhythmicity is a reliable EEG biomarker in Angelman syndrome: a parallel mouse and human analysis. *Journal of Neurodevelopmental Disorders*. 2017;9:17. doi:10.1186/s11689-017-9195-8.





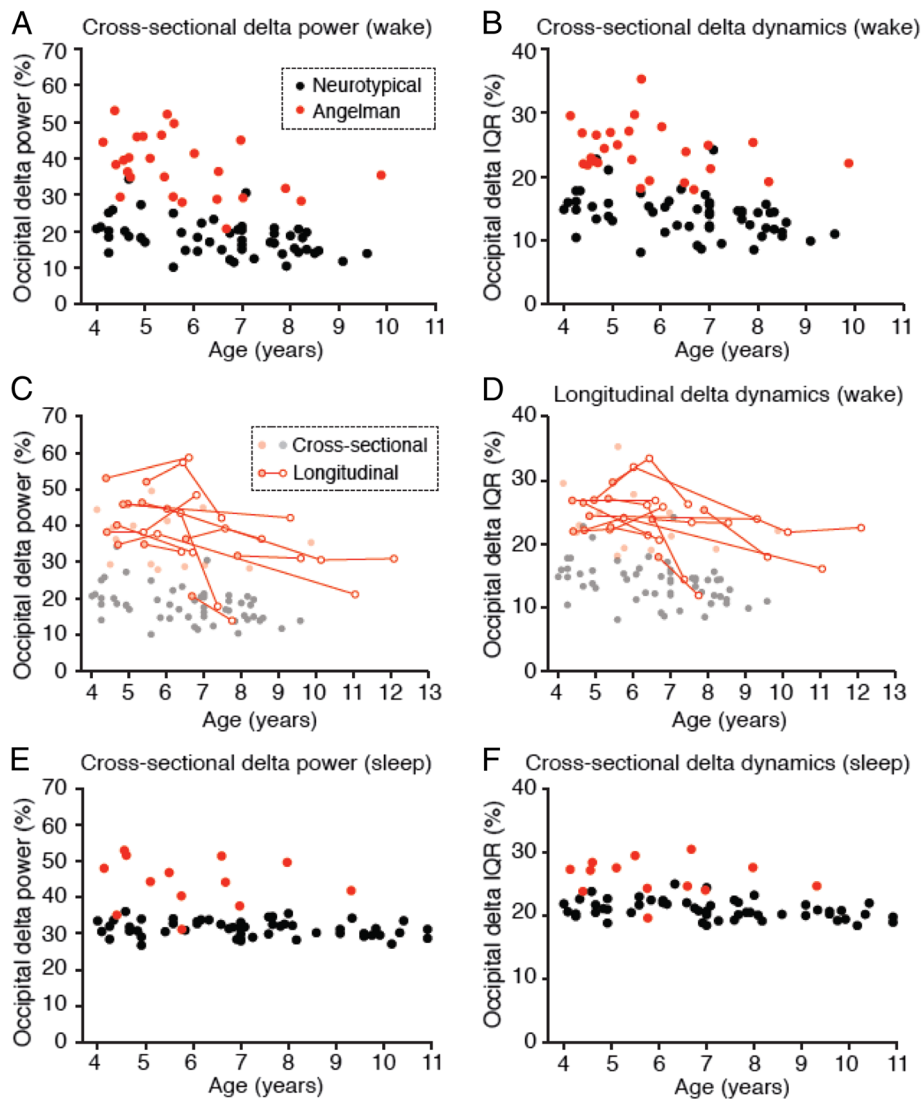


Fig. 5 Delta phenotypes are stronger at earlier ages in children with Angelman syndrome. **a** Increased occipital delta power in children with AS is age-dependent during wakefulness (NT: $n = 54$, AS: $n = 26$). **b** Occipital delta dynamics as a function of age in neurotypical and AS children. Longitudinal studies in a subset of AS patients show that **c** delta power and **d** delta dynamics decrease as a function of age ($n = 12$ children, $n = 31$ sessions). **e** Delta power during sleep (NT: $n = 54$, AS: $n = 13$) and **f** delta dynamics during sleep do not show statistical age dependence. **g, h** Analysis of grouped cross-sectional and longitudinal occipital delta power and dynamics during wakefulness and sleep. **g** Delta power during wakefulness was increased in AS at ages 4–6, 6–8, and 8+ (two-way ANOVA and post hoc Bonferroni: $***p < 0.0001$). Delta dynamics (IQR) during wakefulness were increased in AS at ages 4–6, 6–8, and 8+ ($***p < 0.0001$). Sample sizes are represented in bars. **h** Delta power and dynamics during sleep were increased in AS at ages 4–6 and 6–8 ($***p < 0.0001$)