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Corrigendum: Brain scaling in mammalian evolution as a consequence of concerted and mosaic changes in numbers of neurons and average neuronal cell size

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A Corrigendum on

Brain scaling in mammalian evolution as a consequence of concerted and mosaic changes in numbers of neurons and average neuronal cell size
by Herculano-Houzel, S., Manger, P. R., and Kaas, J. H. (2014). Front. Neuroanat. 8:77. doi: 10.3389/fnana.2014.00077

It has come to our attention that some of the data on the cellular composition of the brain of artiodactyls, presented in Table 1 of Kazu et al. (2014) and used in this review, needed minor corrections, which were published in a Corrigendum to that paper.

While those corrections do not at all modify the conclusions of the present paper, some of the power exponents reported here were influenced in minor, non-significant ways. We provide those corrected power exponents below.

p. 4, Figure 2, top right—The mass of each brain structure varies as a similar, shared power function of the number of non-neuronal (other) cells in the structure of exponent 1.050 ± 0.018 ($p < 0.0001$).

p. 6, Figure 3, top: Mass of the cerebral cortex increases with number of neurons raised to an exponent of 1.694 ± 0.048 across non-primates.

p. 6, Figure 3, bottom: Neuronal density in the cerebral cortex decreases with number of neurons raised to an exponent of -0.693 ± 0.048 ($p < 0.0001$).

p. 9, Figure 4: In non-primates, non-eulipotyphlans, cerebellar mass increases with number of neurons raised to an exponent of 1.283 ± 0.035 ($p < 0.0001$) and cerebellar neuronal density scales with number of neurons raised to an exponent of -0.282 ± 0.035 ($p < 0.0001$).

Figure 7:

A—Neuronal density in the cerebral cortex scales with neuronal density in the rest of brain raised to an exponent of 0.876 ± 0.041, $p < 0.0001$ (excludes primates).

B—Neuronal density in the cerebellum scales with neuronal density in the rest of brain raised to an exponent of 0.442 ± 0.049, $p < 0.0001$ (excludes primates and eulipotyphlans).

C—Neuronal density in the olfactory bulb scales with neuronal density in the rest of brain raised to an exponent of 0.994 ± 0.118, $p < 0.0001$ (excludes primates and eulipotyphlans).

D—Neuronal density in the olfactory bulb scales with neuronal density in the cerebral cortex raised to an exponent of 1.139 ± 0.113, $p < 0.0001$ (excludes primates and eulipotyphlans).

E—Neuronal density in the cerebellum scales with neuronal density in the cerebral cortex raised to an exponent of 0.516 ± 0.041, $p < 0.0001$ (excludes primates and eulipotyphlans).

F—Neuronal density in the olfactory bulb scales with neuronal density in the cerebellum raised to an exponent of 1.706 ± 0.161, $p < 0.0001$ (includes all clades).

p. 12, Figure 8A—Artiodactyls gain neurons in the cerebral cortex faster than they gain neurons in the rest of brain, as a power function of exponent 1.552 ± 0.056, $p = 0.0013$, $r^2 = 0.997$ (excludes the giraffe).

p. 12, Figure 8B—Artiodactyls gain neurons in the cerebellum faster than they gain neurons in the rest of brain, as a power function of exponent 1.737 ± 0.304, $p = 0.0107$, $r^2 = 0.916$.

p. 14, Figure 9B—The number of neurons in the cerebellum varies as a power function of the number of neurons in the cerebral cortex with an exponent of 0.922 ± 0.110, $p = 0.0036$, across artiodactyls. The relationship for the ensemble of clades can also be fit with a linear function of slope 4.16 ($p < 0.0001$, $r^2 = 0.985$).

p. 15, Figure 10A—Artiodactyls have on average 7.35 ± 1.24 neurons in the cerebral cortex to every neuron in the rest of brain. This ratio increases as a power function of the number of neurons in the rest of brain with an exponent of 0.904 ± 0.132 ($p = 0.0135$, $r^2 = 0.902$).

p. 16, Figure 10B—Artiodactyls have a ratio between numbers of neurons in the cerebellum and in the rest of brain of 38.32 ± 6.19.

p. 17—Artiodactyls have an average ratio of neurons in the cerebellum relative to the cerebral cortex of 5.28 ± 0.31.

p. 21, Figure 13:

A—The mass of the cerebral cortex increases across non-primates with the mass of the rest of brain raised to an exponent of 1.155 ± 0.027, $p < 0.0001$.

B—The mass of the cerebellum increases across non-primates with the mass of the rest of brain raised to an exponent of 1.054 ± 0.019, $p < 0.0001$.

C—The mass of the olfactory bulb increases across non-primates with the mass of the rest of brain raised to an exponent of 0.812 ± 0.043, $p < 0.0001$.

D—The relative mass of the cerebral cortex increases across all species in correlation with brain mass with a Spearman correlation $r^2 = 0.7840$, $p < 0.0001$.

E—The relative mass of the cerebellum varies across all species in correlation with brain mass with a Spearman correlation $r^2 = -0.5270$, $p = 0.0008$.

F—The relative mass of the rest of brain varies across all species in correlation with brain mass with a Spearman correlation $r^2 = -0.7994$, $p < 0.0001$.

p. 21, Figure 14—The cerebral cortex of artiodactyls gains mass as a function of the number of neurons in the rest of brain with exponent 2.759 ± 0.145, $p = 0.0028$. The cerebellum of artiodactyls gains mass as a function of the number of neurons in the rest of brain with exponent 2.142 ± 0.492, $p = 0.0489$.

p. 24, Figure S17—In artiodactyls, cerebral cortical mass increases as a power function of body mass with exponent 0.589 ± 0.028, $p = 0.0023$; rest of brain mass increases as a power function of body mass with exponent 0.378 ± 0.056, $p = 0.0215$; the number of neurons in the cerebral cortex scales with body mass raised to an exponent of 0.454 ± 0.107, $p = 0.0511$; and the number of neurons in the rest of brain scales with body mass raised to an exponent of 0.227 ± 0.027, $p = 0.0136$.

Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.