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Fig. S1. Partial sequence of the centromeric region of chromosome 12 in the C57BL/6J T2T genome assembly (https://www.ncbi.nlm.nih.gov/datasets/genome/GCA_96418853.1/), including the *D12Centromere-E* (green) and *D12Centromere-F* (orange) amplicons. Repeat sequences identified by RepeatMasker (<https://www.repeatmasker.org/>) are highlighted in gray.

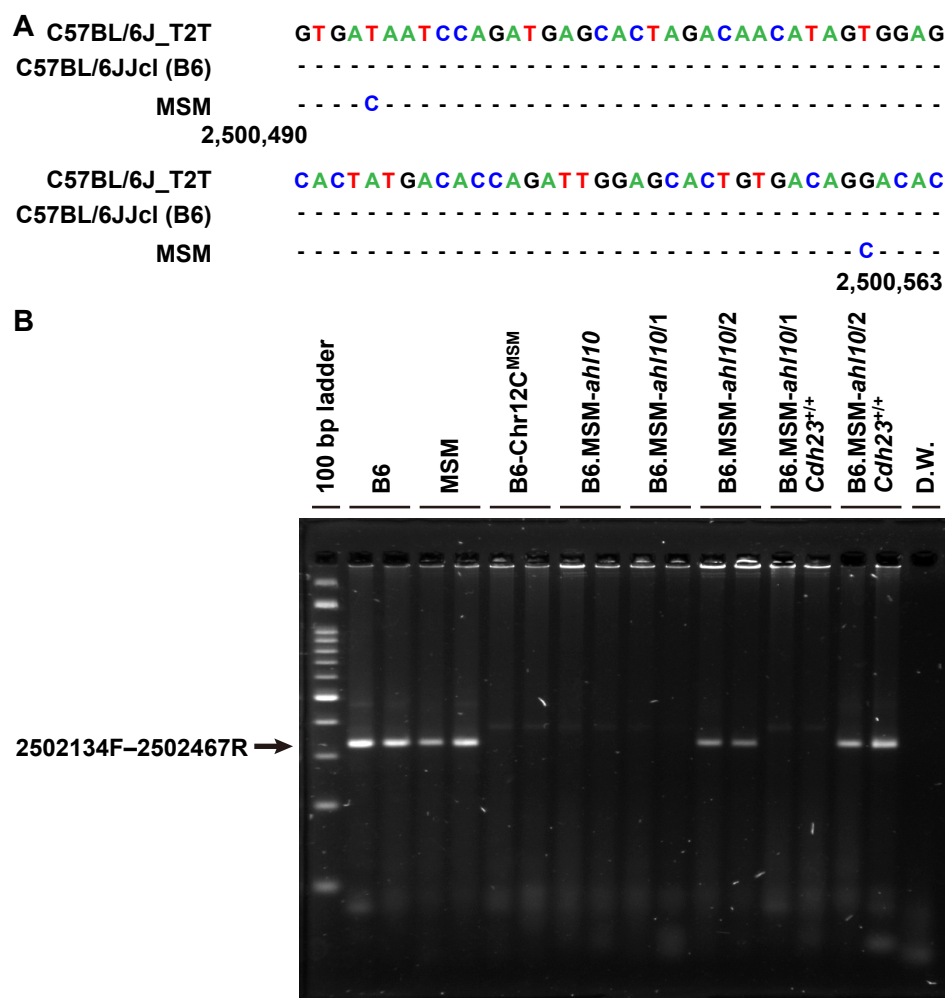


Fig. S2. Sequence polymorphisms within the *D12Centromere-E* (A) and *D12Centromere-F* (B) amplicons among B6, MSM, B6-Chr12C^{MSM} subconsomic, B6.MSM-*ahl10* congenic, and B6.MSM-*ahl10* subcongenic strains. (A) Two SNPs identified within the *D12Centromere-E* amplicon between B6 and MSM mice. (B) A single PCR product was amplified using the *D12Centromere-F* primer set in B6, MSM, B6.MSM-*ahl10/2*, and B6.MSM-*ahl10/2 Cdh23*^{+/+} mice, but not in B6-Chr12C^{MSM}, B6.MSM-*ahl10*, B6.MSM-*ahl10/1*, or B6.MSM-*ahl10/1 Cdh23*^{+/+} mice. D.W., distilled water (negative control).

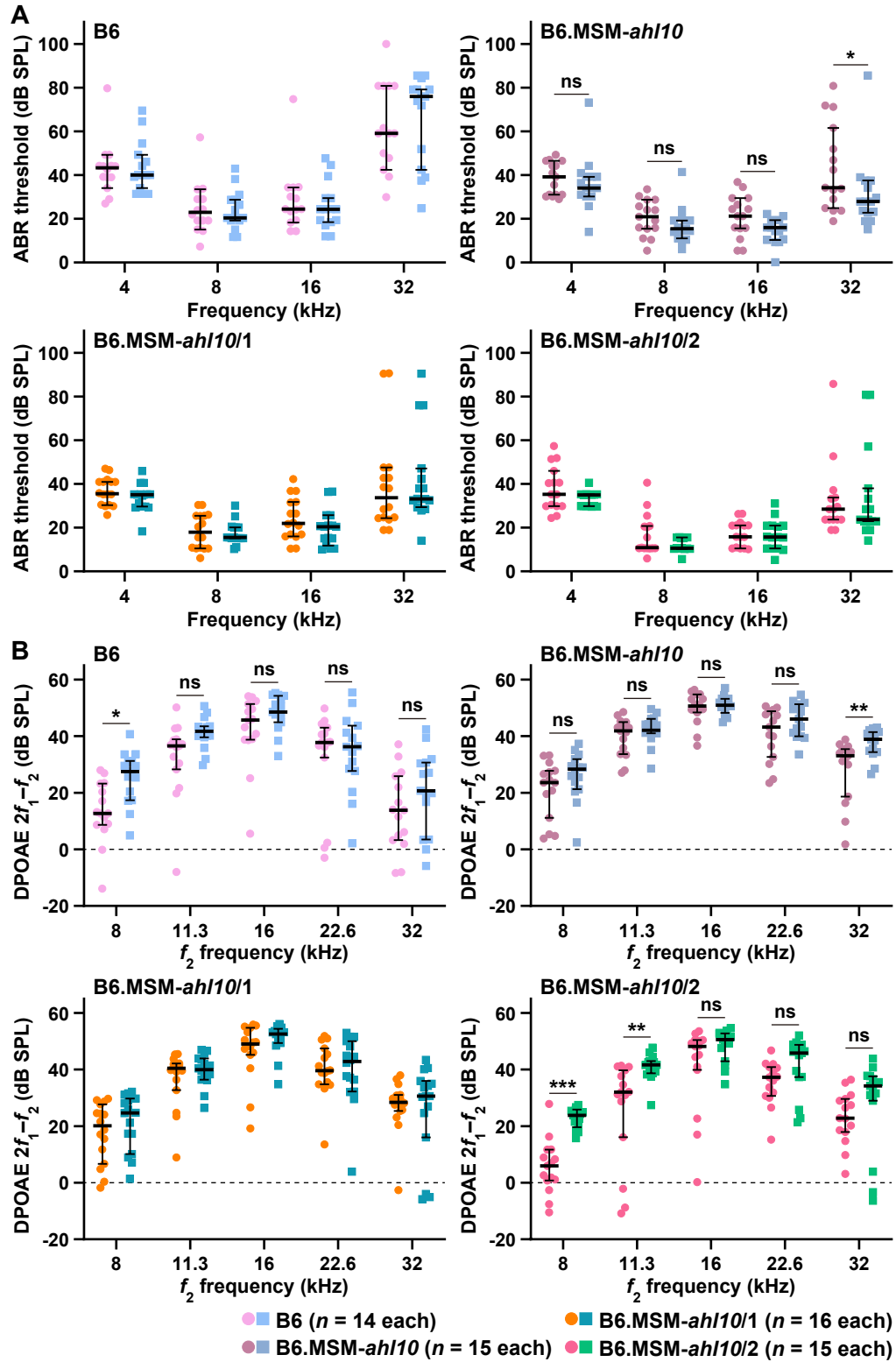


Fig. S3. Comparison of ABR thresholds (A) at 4-, 8-, 16-, and 32-kHz sound stimuli and DPOAE ($2f_1 - f_2$) amplitudes (B) against the f_2 frequencies at 8-, 11.3-, 16-, 22.6-, and 32-kHz between female and male mice of the B6, B6.MSM-*ahl10*, B6.MSM-*ahl10/1*, and B6.MSM-*ahl10/2* strains at 4 months of age. Circles and squares represent individual data from female and male mice, respectively. Median values (bold center lines) and 95% CIs (error bars) are shown. Asterisks and “ns” indicate significant (* $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$) and non-significant differences, respectively. Statistical significance was determined using Šidák's multiple-comparison tests following two-way ANOVA (Table S4). Exact p values from Šidák's tests are provided in Table S5.

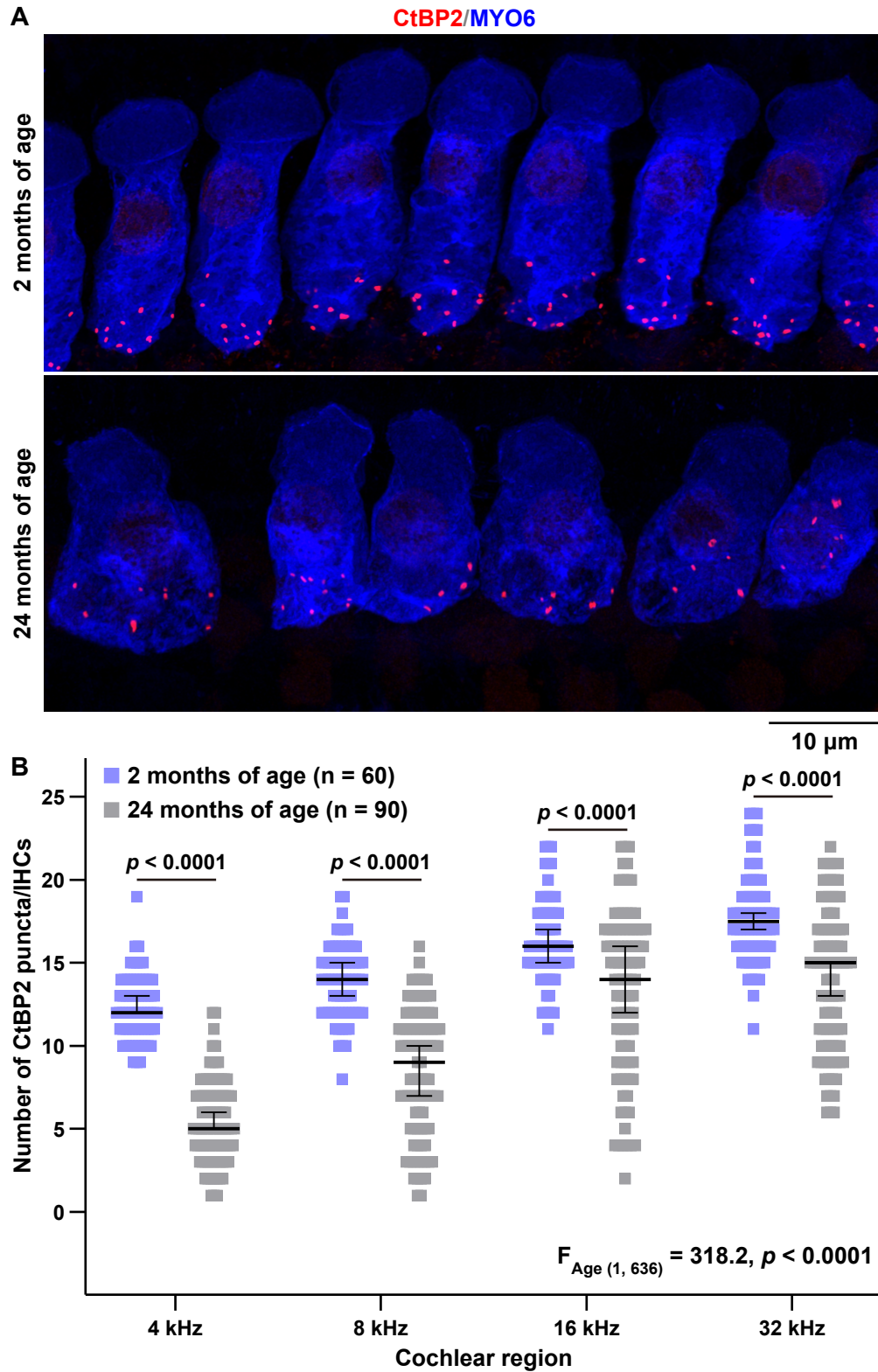


Fig. S4. Age-related ribbon synapse survival in the B6-*Cdh23*^{+/+} strain. **(A)** Representative confocal images of ribbon synapses (red) and IHC cytoplasm (blue) in the 8-kHz region of B6-*Cdh23*^{+/+} mice at 2 and 24 months of age, visualized using anti-CtBP2 and anti-MYO6 antibodies, respectively. **(B)** Comparison of CtBP2 puncta numbers in the 4-, 8-, 16-, and 32-kHz regions of cochlea between males of the B6-*Cdh23*^{+/+} strain at 2 and 24 months of age. Squares represent individual data. Median values (bold center lines) and 95% CIs (error bars) are shown. Statistical significance was determined using Tukey's multiple-comparison tests following two-way ANOVA.

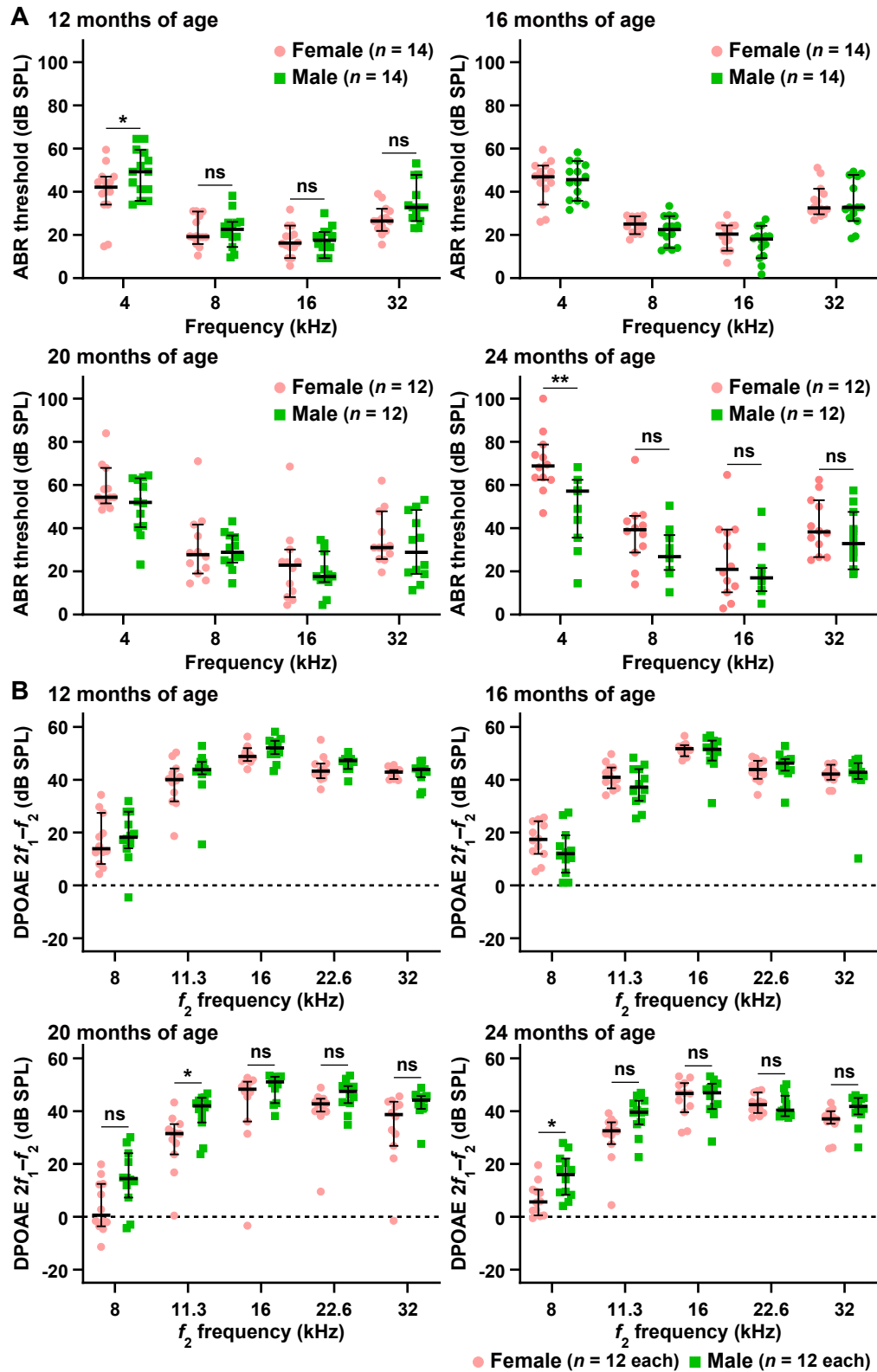


Fig. S6. Comparison of ABR thresholds (**A**) at 4-, 8-, 16-, and 32-kHz sound stimuli and DPOAE ($2f_1 - f_2$) amplitudes (**B**) against the f_2 frequencies at 8-, 11.3-, 16-, 22.6-, and 32-kHz between female and male MSM mice at 12, 16, 20, and 24 months of age. Circles and squares represent individual data from female and male mice, respectively. Median values (bold center lines) and 95% CIs (error bars) are shown. Asterisks and “ns” indicate significant ($*p < 0.05$ and $**p < 0.01$) and non-significant differences, respectively. Statistical significance was determined using Šidák's and Tukey's multiple-comparison tests following two-way ANOVA (Tables S14 and S16). Exact p values from post hoc comparisons are provided in Tables S15 and S17.

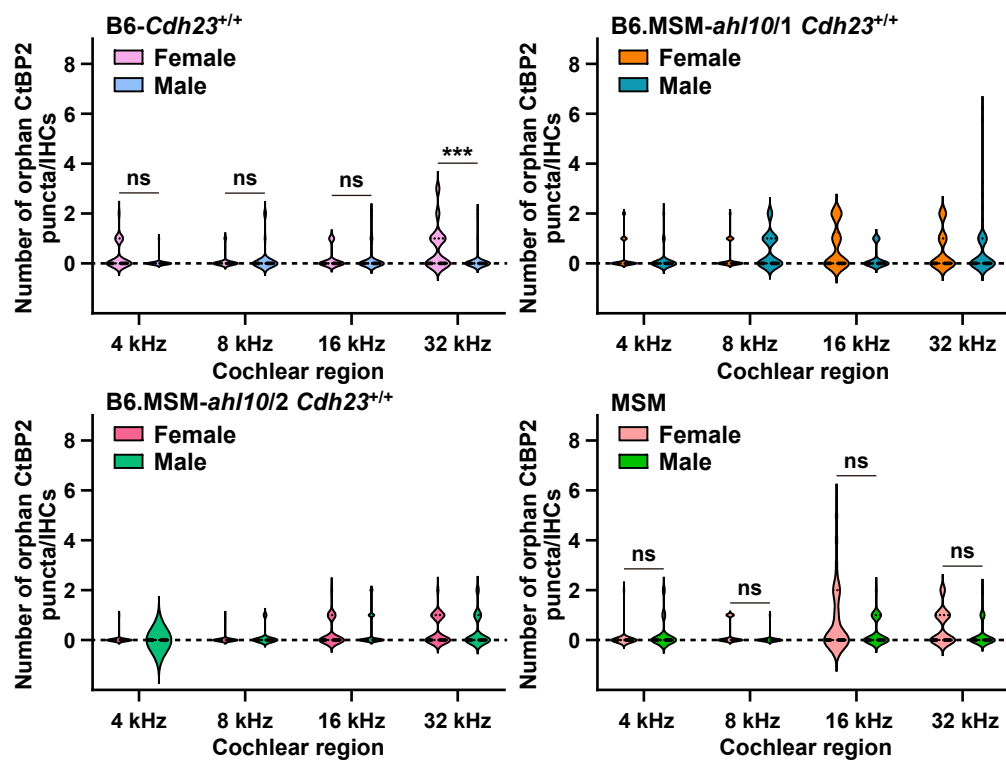


Fig. S7. Violin plots showing the distribution and number of orphan CtBP2 puncta in the 4-, 8-, 16-, and 32-kHz regions of the cochlea between female and male mice within each strain (B6-*Cdh23*^{+/+}, B6.MSM-*ahl10/1 Cdh23*^{+/+}, B6.MSM-*ahl10/2 Cdh23*^{+/+}, and MSM) at 24 months of age. $n = 30$ IHCs per sex per strain. Median values (bold dotted lines) and interquartile range (dotted lines) are shown. Asterisks and “ns” indicate significant (***) and non-significant differences, respectively. Statistical significance was determined using Tukey's multiple-comparison tests following two-way ANOVA (Table S20). Exact p values from Tukey's tests are provided in Table S21.