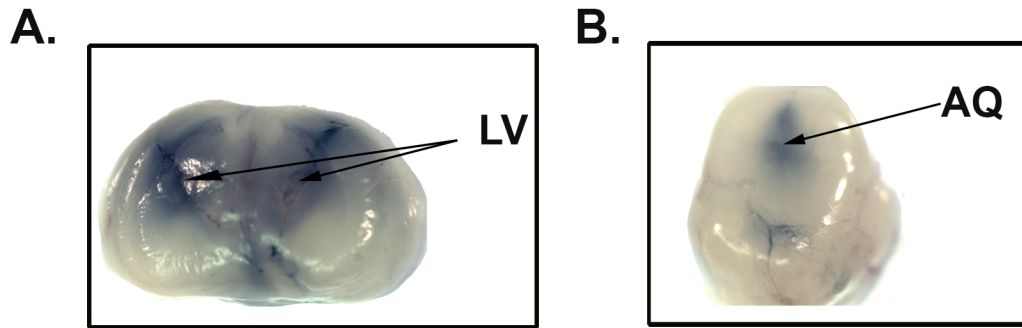
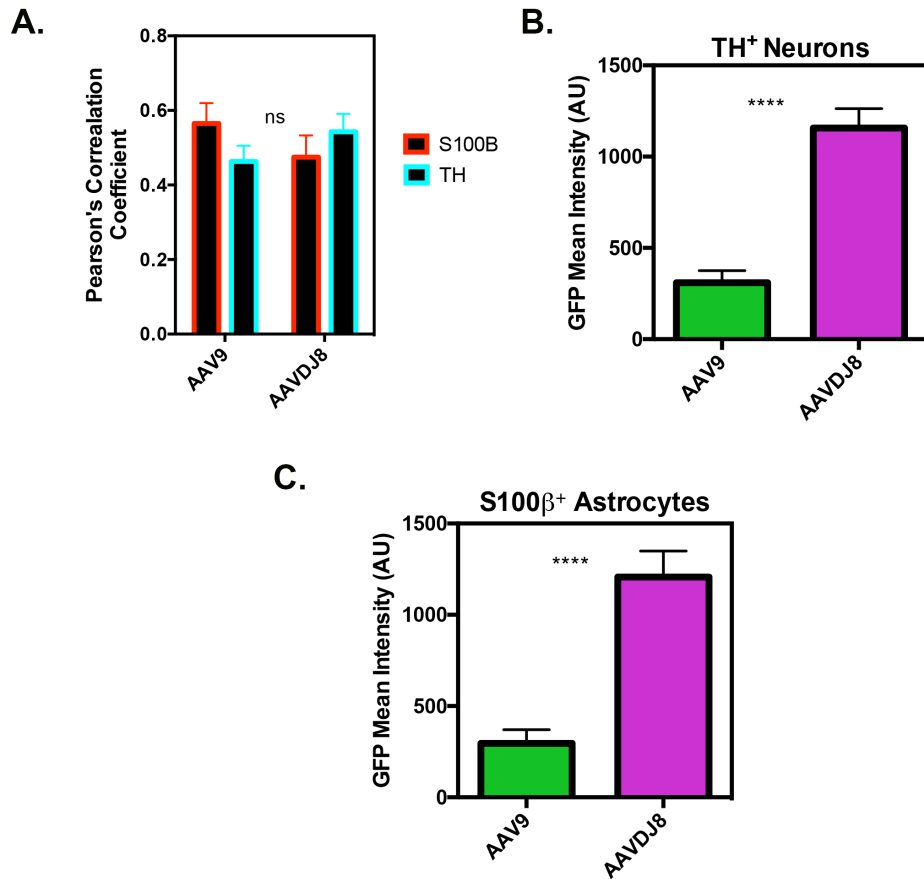


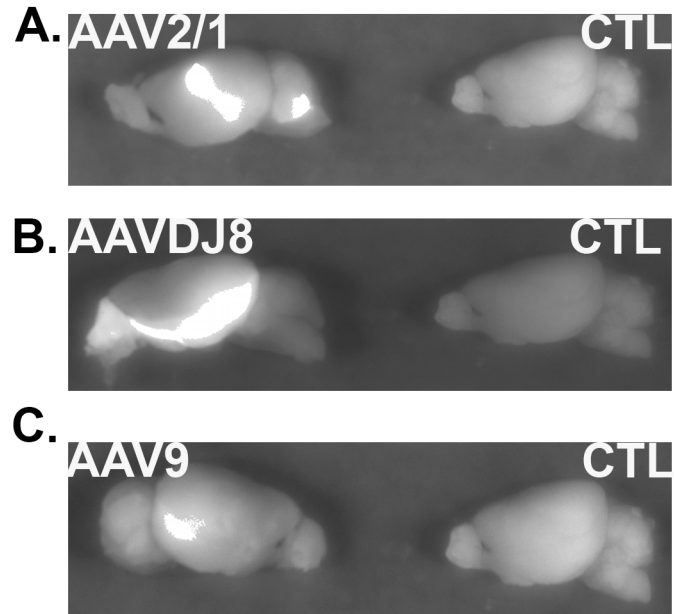
## S1 File- Supplemental Figures



**Fig A. ICV Mock injected brain.** Mock ICV injected brains were rapidly dissected and imaged for bright field on stereo dissection microscope to confirm ICV technique targeted the **(A)** lateral ventricles (LV) and spread to **(B)** the mesencephalic aqueduct (AQ).

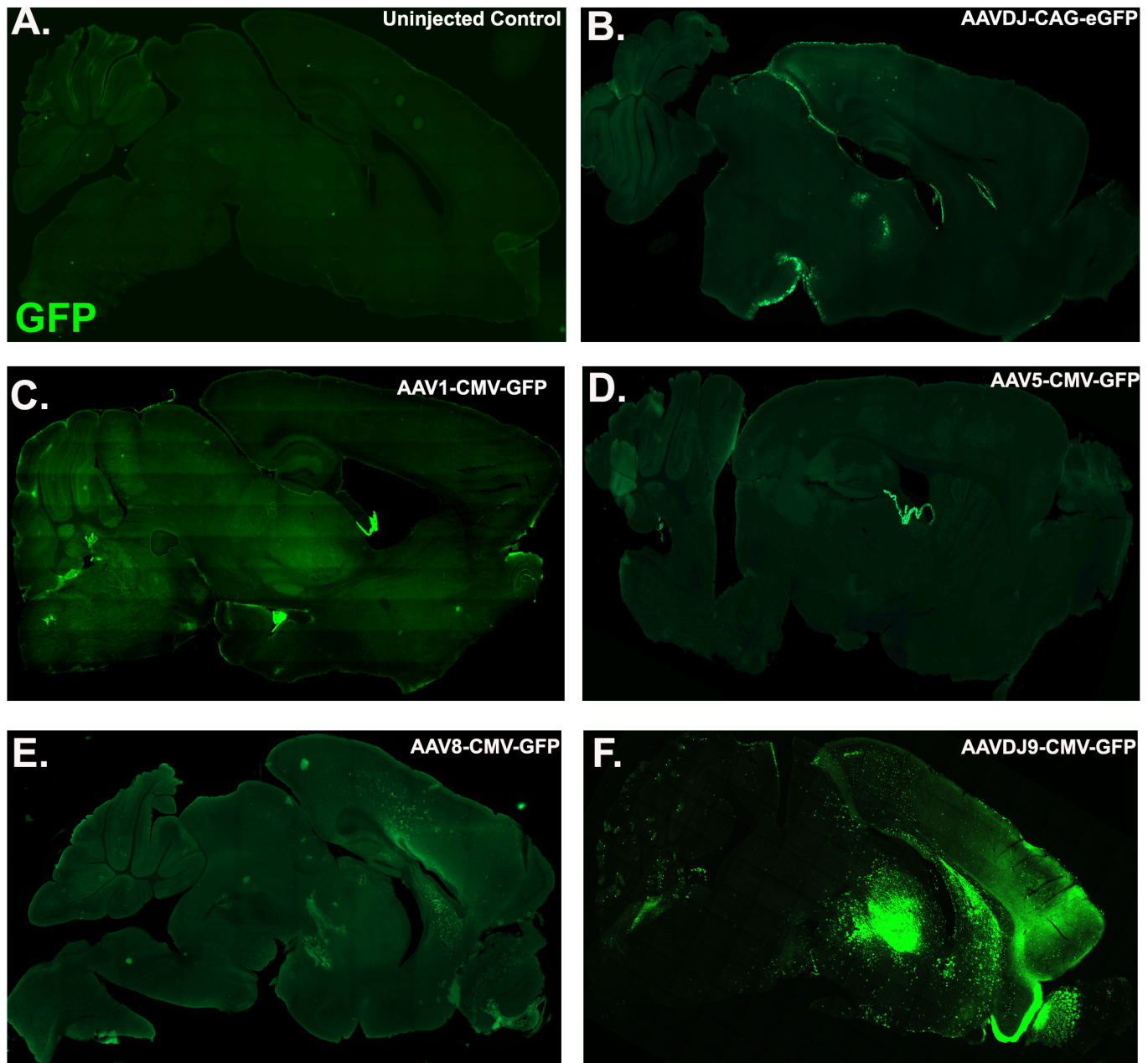


**Fig B. Quantitation of astrocyte/neuron co-localization of AAV9 and AAVDJ8 in the SNpc (A)** Pearson's correlation coefficients were measured for S100 $\beta$ <sup>+</sup>/GFP<sup>+</sup> and TH<sup>+</sup>/GFP<sup>+</sup> co-localizing cells identified in the SNpc from 40x-objective images of AAV9-GFP and AAVDJ8-eGFP 6-week infected brain tissue. AAV-GFP intensity values were also measured in (B) TH<sup>+</sup> and (C) S100 $\beta$ <sup>+</sup> cells (25-42 GFP<sup>+</sup> cells/over  $n=3$  animals/serotype;  $p<0.0001$ \*\*\*\*).



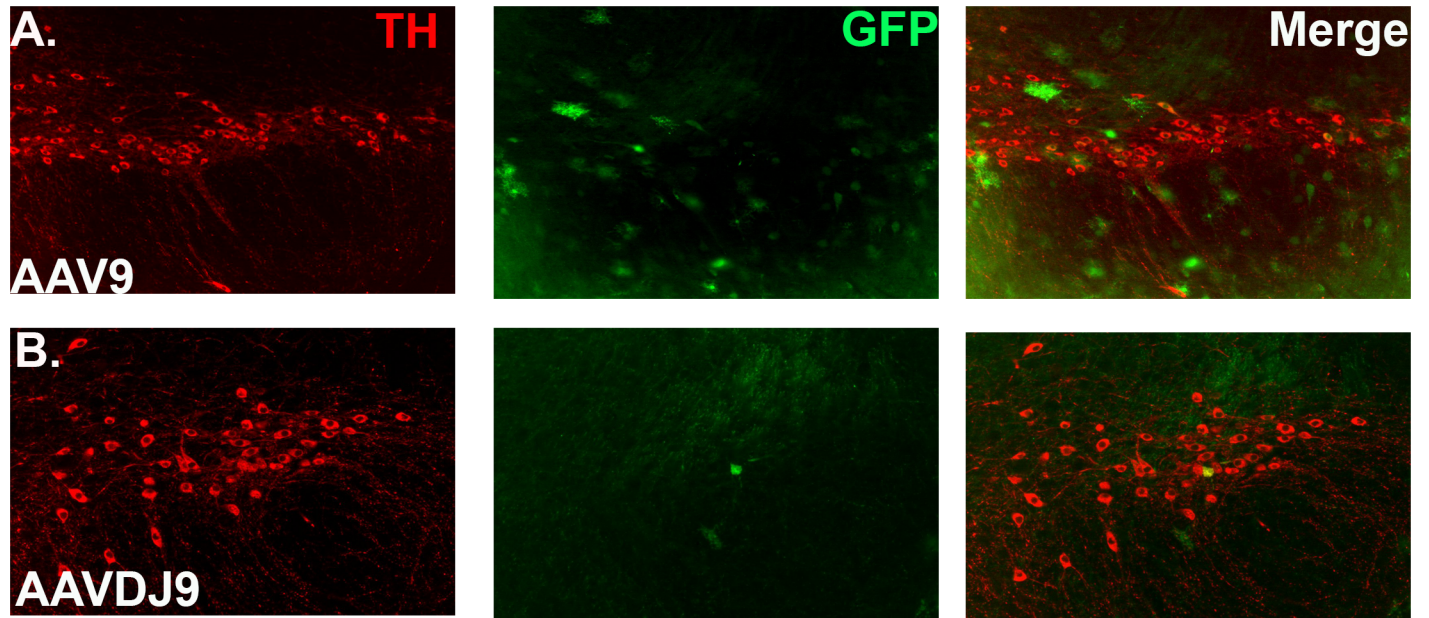
**Fig C. Intrinsic GFP detection of whole brain AAV infected brains**

Lateral views of GFP fluorescence in grayscale compared to uninjected control of (A) AAV2/1-eGFP, (B) AAVDJ8-eGFP, and (C) AAV9-GFP 3-week infected whole brains (images are representation of  $n=3$ /serotype).



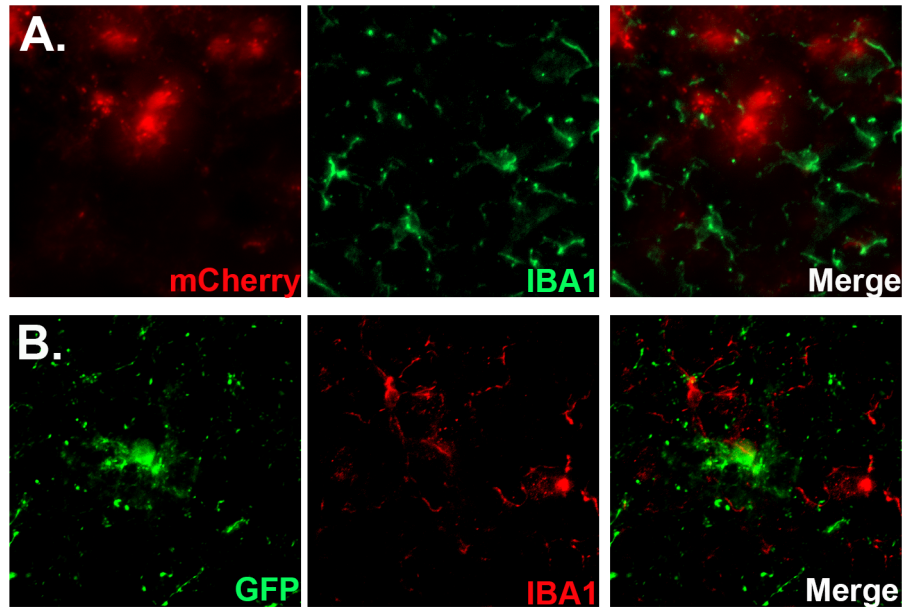
**Fig D. Sagittal plane views of other AAV serotypes tested by ICV**

All serotypes screened *in vitro* were also tested *in vivo* by ICV administration. (A) Uninjected control (B) AAVDJ-CAG-eGFP, (C) AAV1-CMV-GFP, (D) AAV5-CMV-GFP, (E) AAV8-CMV-GFP, and (F) AAVDJ9-CAG-eGFP at 3-weeks post injection were observed for native GFP fluorescence as depicted in representative 10x-objective montage images of sagittal cross sections (Images are representation of  $n=3$ /serotype).



**Fig E. AAV9 has better penetrance to the SN than AAVDJ9 by ICV**

Immunofluorescence for TH (red) and intrinsic GFP (green) are depicted in 10X objective images of the SN from (A) AAV9 and (B) AAVDJ9 3-week infected brains (Representation of  $n=3$ /serotype).



**Fig F. AAVDJ8-GFP and AAVDJ8-GFAP-mCherry do not transduce microglia in the SNpc**

64X objective immunofluorescent images of **(A)** anti-mCherry (red) and anti-IBA1 (green) depict no co-localization of AAVDJ8-GFAP-mCherry infected cells. **(B)** Anti-GFP (green) and anti-IBA1(red) immunofluorescent images also depict no co-localization of AAVDJ8-GFP (Images are representation of  $n=3$ /serotype).