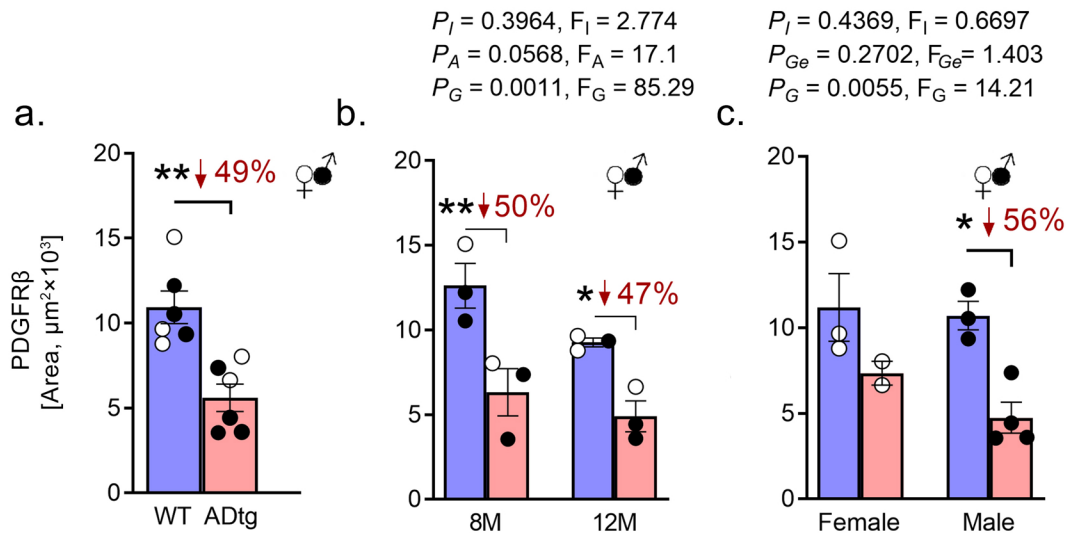
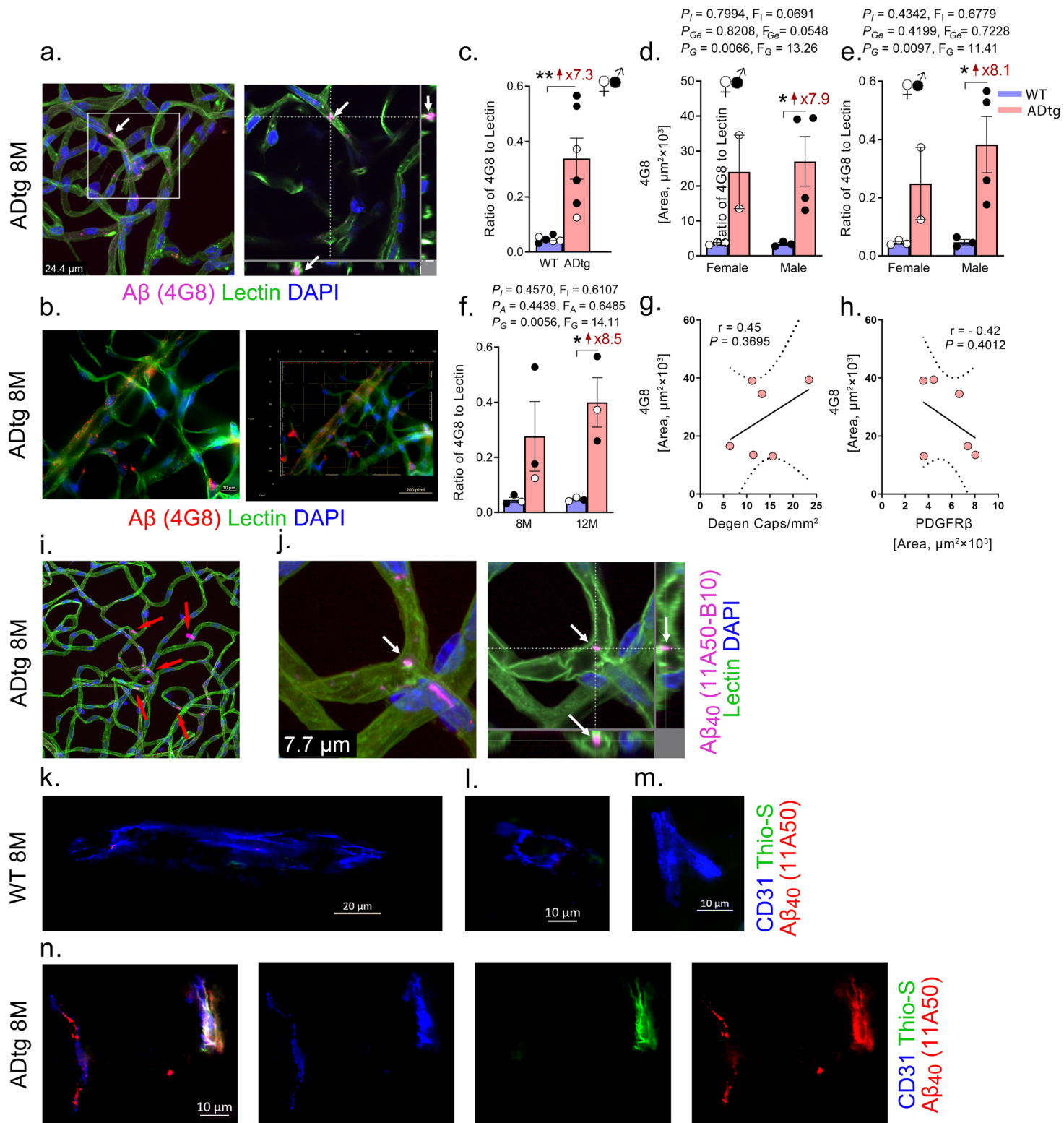


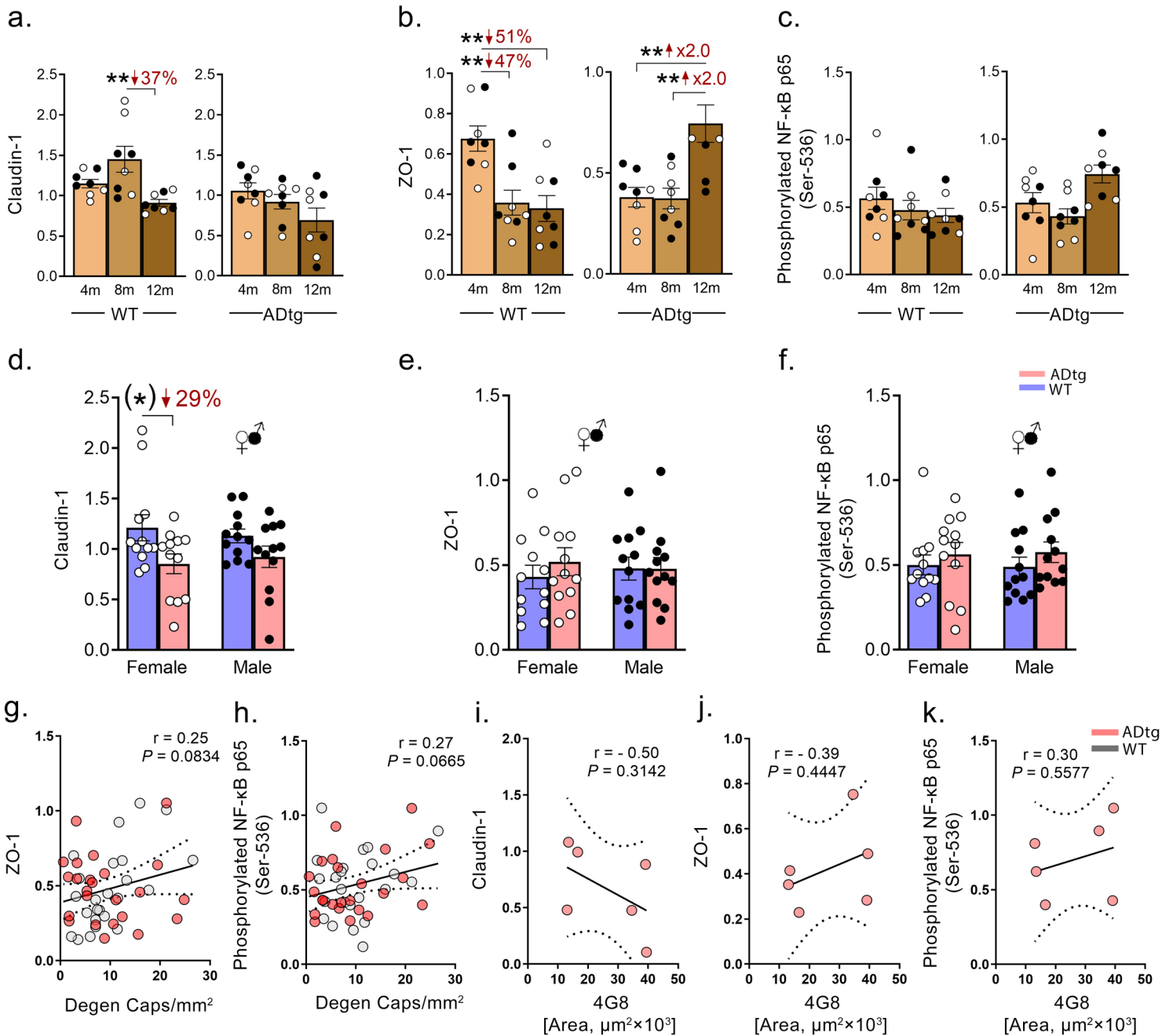
Supplementary figure 1. Additional representative images and quantifications for figure 1. **a-b.** Representative images of acellular, degenerated retinal capillaries from **a.** a 12-month-old wild type (WT) mouse or **b.** a 12-month-old APP_{SWE}/PS1 Δ E9 (ADtg) mouse. Red arrows indicate the degenerated capillaries. Scale bar = 20 μ m. **c-d.** Numbers of degenerated retinal capillaries when mice are stratified by mouse age in **c.** WT or **d.** ADtg mice groups. Data from individual mice (circles) as well as group means \pm SEMs are shown. Fold changes are shown in red. Black-filled circles represent males and clear circles represent females. * $p < 0.05$, **** $p < 0.0001$, by one-way ANOVA with Tukey's post-hoc multiple comparison test.



Supplementary figure 2. Raw data of quantification of retinal vascular PDGFR β . **a.** Quantitative analysis of raw PDGFR β -immunoreactive (IR) area in each microscopic field of isolated retinal microvasculature from wild type (WT) ($n=6$) and APP_{SWE}/PS1 $\Delta E9$ ADtg ($n=6$) mice. **b.** Quantification of PDGFR β -IR in the same mice cohort when mice are stratified by genotypes of WT and ADtg with **b.** age of mice by 8 month and 12 month or **c.** sex of mice. Data from individual mice (circles) as well as from groups are shown with means \pm SEMs. Black-filled circles represent males and empty circles represent females; * $p < 0.05$, ** $p < 0.01$, by two-way ANOVA with Tukey's post-hoc multiple comparison test. Two group statistical analysis was performed using an unpaired 2-tailed Student t-test. Percentage changes are shown in red.



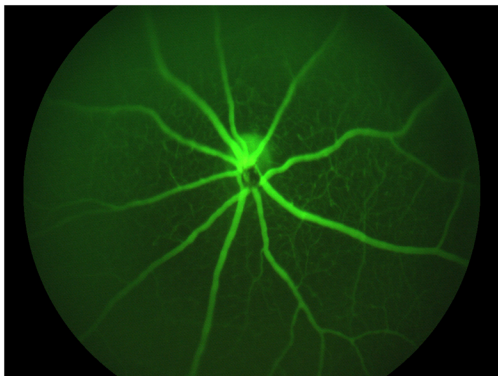
Supplementary figure 3. Supplementary images, quantifications and correlations for figure 3. **a-b.** Representative fluorescence images of isolated retinal microvasculature stained for Aβ (4G8, magenta or red, as indicated under the images), blood vessels (lectin, green), and nuclei (DAPI, blue) in a perfused 8-month-old APP^{SWE}/PS1^{ΔE9} (ADtg) mice. Arrows indicate vascular Aβ. **c.** Quantitative analysis of the Aβ (4G8)-immunoreactive (IR) area normalized by lectin area in each microscopic field of isolated retinal microvasculature from wild type (WT) (n=6) or ADtg (n=6) mice. **d-e.** Quantitative analysis of the Aβ (4G8)-IR area or **e.** Aβ (4G8)-IR area normalized by lectin area in each microscopic field of isolated retinal microvasculature from the same cohort separated by different sex of mice. **f.** Quantitative analysis of the Aβ (4G8)-IR area normalized by lectin area separated by different mice age groups (8 months and 12 months) and genotypes (WT and ADtg) in the same cohort. n=3 for each group. **g-h.** Pearson's coefficient (r) correlation between the retinal Aβ (4G8)-IR area against **g.** degenerated capillaries or **h.** PDGFRβ-IR area in ADtg mice (n=6) of this cohort. **i-j.** Representative fluorescence images of isolated retinal microvasculature stained for Aβ₄₀ (11A50-B10, magenta), blood vessels (lectin, green), and nuclei (DAPI, blue) in a perfused 8-month-old ADtg mice. Arrows indicate vascular Aβ. **k-n.** Representative fluorescence images of retinal cross-section for thioflavin-S (Thio-S, green), Aβ₄₀ (11A50-B10, red) and blood vessels (CD31, blue) in a perfused 8-month-old **k-m.** WT or **n.** ADtg mice. Data from individual mice (circles) as well as from groups are shown with means ± SEMs. Black-filled circles represent males and empty circles represent females; * $p < 0.05$, ** $p < 0.01$, by two-way ANOVA with Tukey's post-hoc multiple comparison test. Two group statistical analysis was performed using an unpaired 2-tailed Student t-test. Fold changes are shown in red.



Supplementary figure 4. Additional data for figure 4. **a-c.** Densitometric analysis of western blot protein bands of **a.** claudin-1, **b.** ZO-1, and **c.** pNF-κB p65 with normalization, separated by mice age (4, 8, and 12 months) and genotype (WT and ADtg) in the same mice cohort as Figure 4. n=8 for each group. **d-f.** Densitometric analysis of western blot protein bands of **d.** Claudin-1, **e.** ZO-1 and **f.** pNF-κB p65 in the same mice cohort (n=12 for each group) separated by sex. Data from individual mouse (circles) as well as groups are shown as means ± SEMs. Black circles represent males and clear circles represent females. **p* < 0.05, ***p* < 0.01, by one-way or two-way ANOVA with Tukey's post-hoc multiple comparison test. Two group statistical analysis was done by an unpaired 2-tailed Student t-test, and is shown in parenthesis. Percentage and fold changes are shown in red. **g-h.** Pearson's coefficient (*r*) correlation between retinal degenerated capillaries (Degen Caps) and the densitometric analysis of western blot protein bands of **g.** ZO-1, or **h.** pNF-κB p65 in the same mice cohort of figure 4 (n=48). **i-k.** Pearson's coefficient (*r*) correlation between retinal 4G8-immunoreactive area and the densitometric analysis of western blot protein bands of **i.** claudin-1, **j.** ZO-1, or **k.** pNF-κB p65 in a subset of the APP_{SWE}/PS1_{ΔE9} (ADtg) mice cohort in figure 4 (n=6).

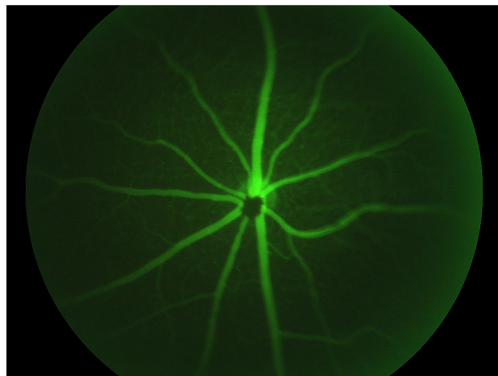
a.

ADtg 16M



b.

ADtg 8M



Supplementary figure 5. Additional representative images for figure 5. **a-b.** Representative images of noninvasive retinal microvascular imaging after intraperitoneal fluorescein injection in **a.** 16-month-old $APP_{SWE}/PS1_{\Delta E9}$ (ADtg) and **b.** 8-month-old ADtg mice.