Supplementary Table 1. Antibodies used in tissue immunofluorescence staining and their application.

Primary Antibody (Manufacture, catalog #, dilution)	**Secondary Antibody (Manufacture, catalog #, dilution)**	**Application**
Rat anti-myelin basic protein (Millipore, MAB386, 1:1,000)	Alexa fluor 594-conjugated donkey anti rat (Jacksonimmuno, 712-586-150, 1:2,000)	White matter marker
Mouse anti-CD68 (AbD Serotec, MCA341R, 1:1,000)	Cy3-conjugated donkey anti mouse (Millipore, AP192C, 1:2,000)	Microinfarct marker
Mouse anti-GFAP (Millipore, MAB360, 1:1,000)	Cy3-conjugated donkey anti mouse (Millipore, AP192C, 1:2,000)	Astrogliosis marker
Mouse anti-NeuN (Millipore, MAB377, 1:1,000)	Cy3-conjugated donkey anti mouse (Millipore, AP192C, 1:2,000)	Neruonal marker
None	Cy3-conjugated donkey anti mouse (Millipore, AP192C, 1:10,000)	Endogenous IgG

Supplementary table 2. Detailed information for statistical analysis of two-way ANOVA results.

Experiments		Results from two-way ANOVA	
MBP	Genotype	F = 7.599	P = 0.0089
	BCAS operation	F = 40.15	P < 0.0001
	Interaction	F = 0.02038	P = 0.8872
GFAP cortex	Genotype	F = 48.50	P < 0.0001
	BCAS operation	F = 15.12	P = 0.0003
	Interaction	F = 16.76	P = 0.0002
GFAP Hippocampus	Genotype	F = 8.699	P = 0.0050
	BCAS operation	F = 30.07	P < 0.0001

	Interaction	F = 2.914	P = 0.0946
GFAP WM	Genotype	F = 5.24	P = 0.0267
	BCAS operation	F = 32.85	P < 0.0001
	Interaction	F = 0.2765	P = 0.6015
Locomotion total distance	Genotype	F = 1.721	P = 0.2026
	BCAS operation	F = 8.517	P = 0.0077
	Interaction	F = 0.4536	P = 0.5073
Locomotion center duration	Genotype	F = 3.765	P = 0.6457
	BCAS operation	F = 4.708	P = 0.9950
	Interaction	F = 0.1977	P = 0.6607
Y-maze	Genotype	F = 0.0011	P = 0.9737
	BCAS operation	F = 38.78	P < 0.0001
	Interaction	F = 1.382	P = 0.2488
NOR	Genotype	F = 4.475	P = 0.0423
	BCAS operation	F = 4.65	P = 0.0387
	Interaction	F = 5.318	P = 0.0277
CD31	Genotype	F = 14.19	P = 0.0006
	BCAS operation	F = 0.3226	P = 0.5735
	Interaction	F = 0.1897	P = 0.6657
IgG cortex	Genotype	F = 92.24	P < 0.0001
	BCAS operation	F = 39.88	P < 0.0001
	Interaction	F = 9.358	P = 0.0042
IgG Hippocampus	Genotype	F = 183.6	P < 0.0001
	BCAS operation	F = 30.49	P < 0.0001

	Interaction	F = 8.337	P = 0.0065
IgG WM	Genotype	F = 75.86	P < 0.0001
	BCAS operation	F = 23.4	P < 0.0001
	Interaction	F = 3.002	P = 0.0917

Supplementary table 3. Posthoc power analysis

Variable		Power (1-β)		
		Gene	**OP**	**Interaction**
MBP		23.8%	97.6%	5.2%
GFAP	Cortex	100.0%	100.0%	100.0%
	Hippocampus	100.0%	100.0%	100.0%
	White matter	100.0%	100.0%	48.2%
CD31		59.4%	5.7%	22.0%
Capillary length		5.0%	5.0%	-
IgG	Cortex	100.0%	100.0%	100.0%
	Hippocampus	100.0%	100.0%	100.0%
	White matter	100.0%	100.0%	100.0%

Significance level (α) at 0.05

Supplementary Figure Legends

Supplementary Figure 1. White Matter Damages in Aged Mice

(a) Representative images of LFB staining. BCAS-operated wild-type and BCAS-operated ApoE$^{-/-}$ mice developed white matter injury. (b) Severity score of white matter from LFB staining. Data are presented as number of mice. Difference between groups was statistically significant by chi-square test (P = 0.01). 4 wild-type sham, 5 wild-type BCAS, 4 ApoE$^{-/-}$ sham, and 4 ApoE$^{-/-}$ BCAS mice. Scale bar, 200 μm.

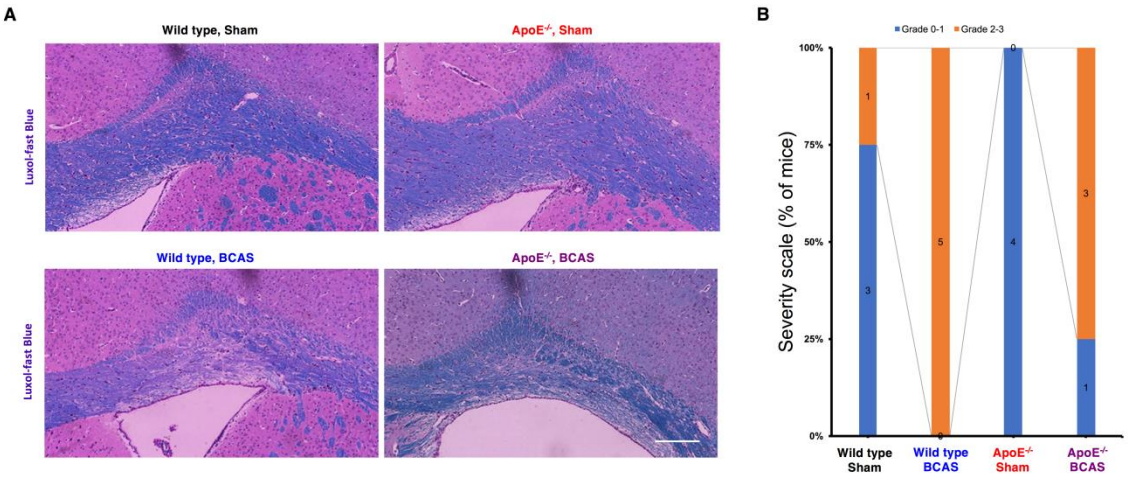
Supplementary Figure 2. Hippocampal Neuronal Loss and Ischemic Stroke in Aged Mice

Representative images of haematoxylin and eosin staining and immunohistochemistry for CD68. Hippocampal neuronal loss (arrowheads) and ischemic stroke (arrow) was seen only in ApoE$^{-/-}$ BCAS-operated mice.

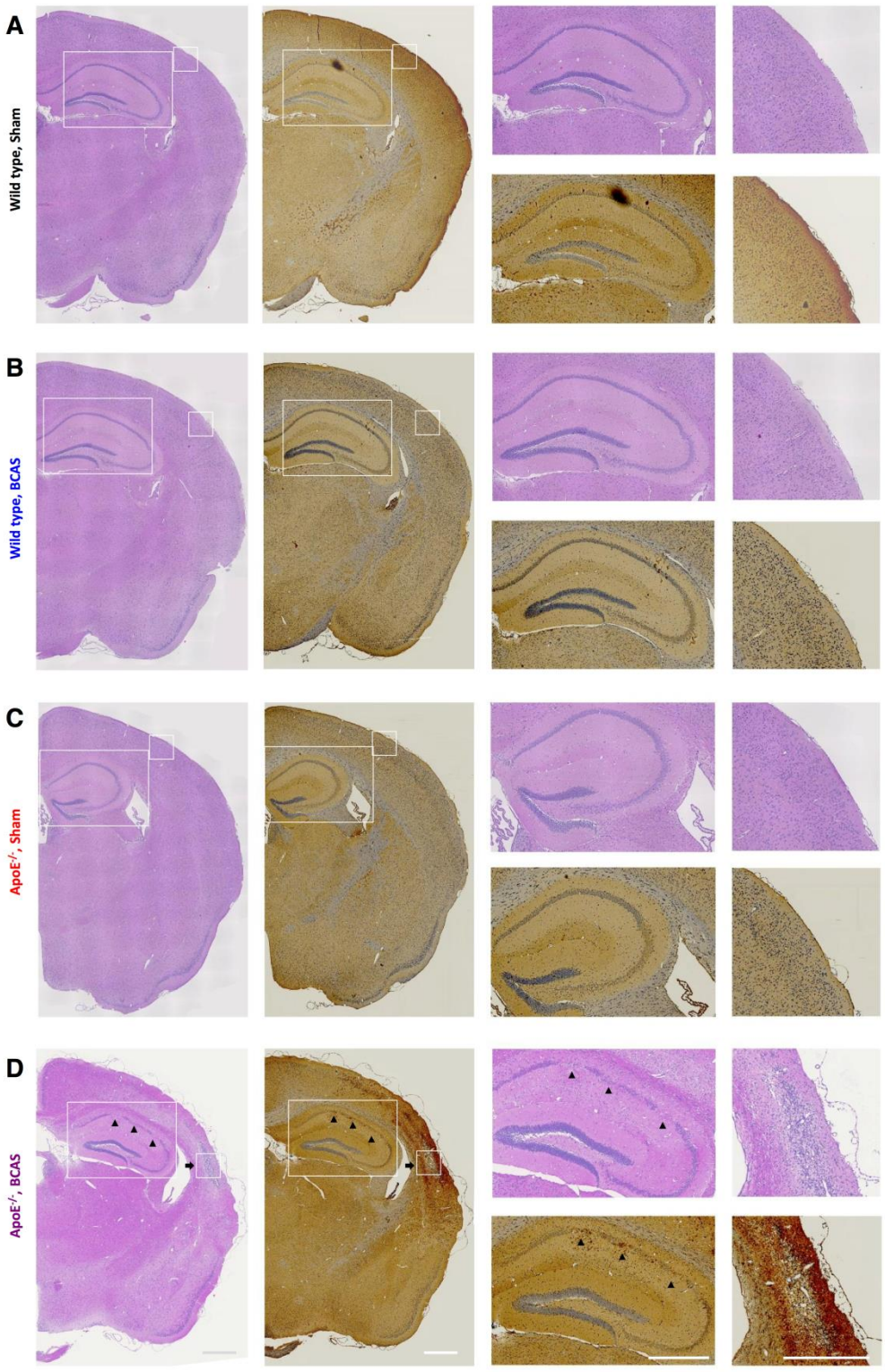
Supplementary Figure 3. Weight and Food Consumption Before and After Surgery

Weight (a) and food consumption (b) were not different among the groups (by two-way ANOVA). The dotted line indicates the time of the operation. Data are presented as gram. 4 wild-type sham, **5** wild-type BCAS, **4** ApoE$^{-/-}$ sham, and **4** ApoE$^{-/-}$ BCAS mice.

Supplementary Figure 1.



Supplementary Figure 2.



Supplementary Figure 3.