

Supplementary information

Title: Model-based vascular elastography improves the detection of flow-induced carotid artery remodeling in mice

Short title: Carotid elastography in mice

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Table S1. Left carotid ligation procedure had no effect on cardiac function in FVB mice over 2 weeks time-course.

Parameter	Group	1 week		2 weeks	
		Sham, n=5	Ligated, n=5	Sham, n=5	Ligated, n=6
Heart rate, beats/min		566 ± 13	559 ± 9	580 ± 9	570 ± 11
Systolic diameter, mm		1.88 ± 0.08	1.93 ± 0.11	1.84 ± 0.06	1.83 ± 0.09
Diastolic diameter, mm		3.26 ± 0.13	3.34 ± 0.11	3.32 ± 0.08	3.24 ± 0.13
Systolic volume, µL		11 ± 1	12 ± 2	10 ± 1	10 ± 1
Diastolic volume, µL		44 ± 4	46 ± 4	45 ± 3	42 ± 3
Stroke volume, µL		32 ± 3	34 ± 3	34 ± 2	32 ± 2
Ejection fraction, %		75 ± 1	74 ± 3	77 ± 1	76 ± 2
Fractional shortening, %		42 ± 1	42 ± 3	44 ± 1	44 ± 1
Cardiac output, mL/min		19 ± 2	19 ± 2	20 ± 1	18 ± 1
LV mass, mg		67 ± 5	69 ± 6	72 ± 6	63 ± 7
LV mass corrected, mg		54 ± 4	55 ± 5	58 ± 5	50 ± 5

LV, left ventricular. Parameters are shown as mean±SEM. n, number per group.

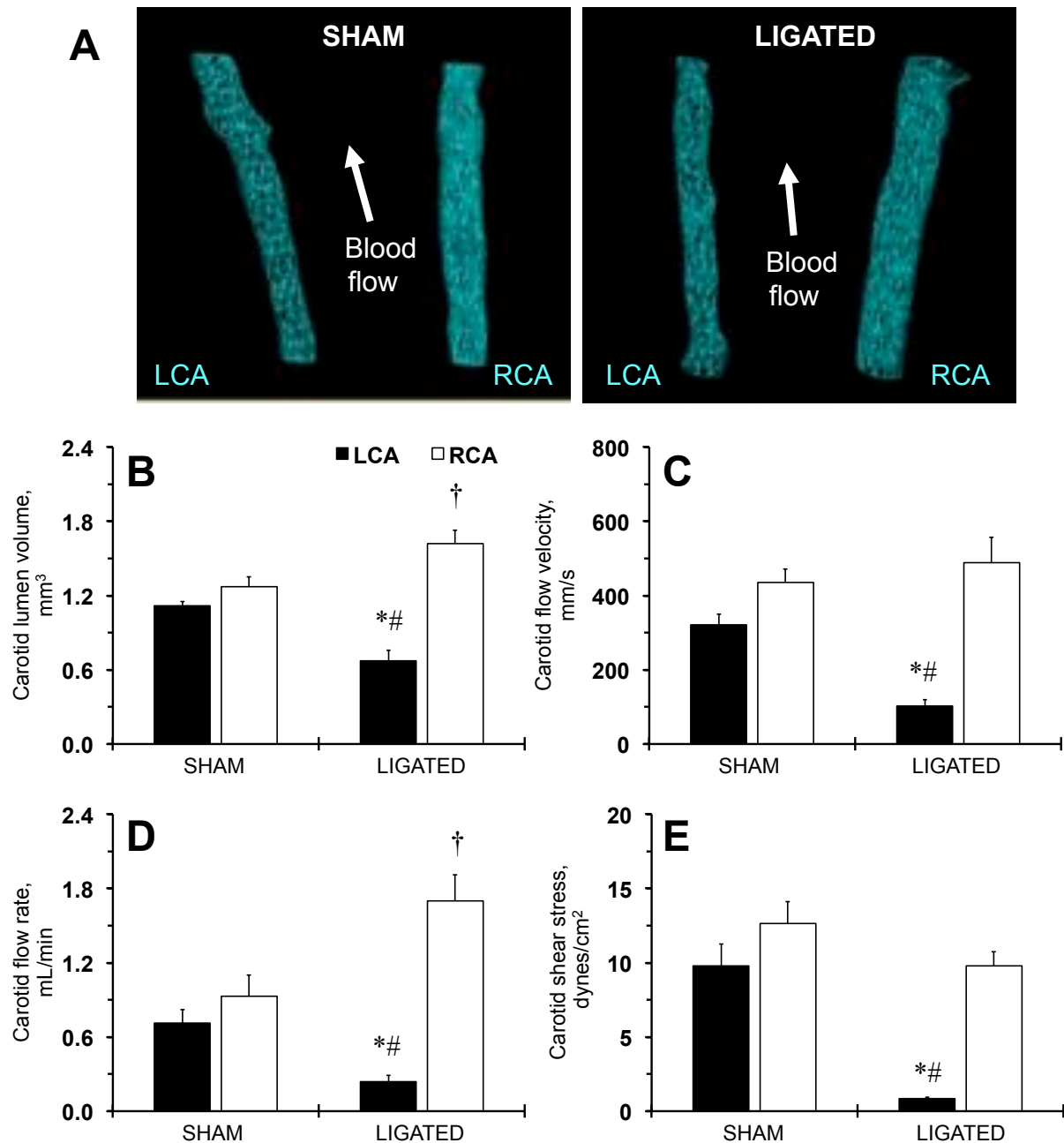


Figure S1. Hemodynamic changes in carotid arteries determined by ultrasound in FVB mice one week after ligation. **A.** Representative 3D-images of the lumen of the sham-operated (SHAM) or ligated (LIGATED) mice. LCA, left carotid artery. RCA, right carotid artery. Arrows show direction of the blood flow. **B.** Carotid lumen volume, mm³. **C.** Carotid blood flow velocity rate, mm/s. **D.** Carotid blood flow volume rate, mL/min. **E.** Carotid shear stress, dynes/cm². Black bars are LCA. Open bars – RCA. SHAM and LIGATED mice are shown on X-axis. Values are mean±SEM. *, p<0.05 vs. LCA, SHAM. †, p<0.05 vs. RCA, SHAM. #, p<0.05 vs. RCA, LIGATED. n=5-6 per group

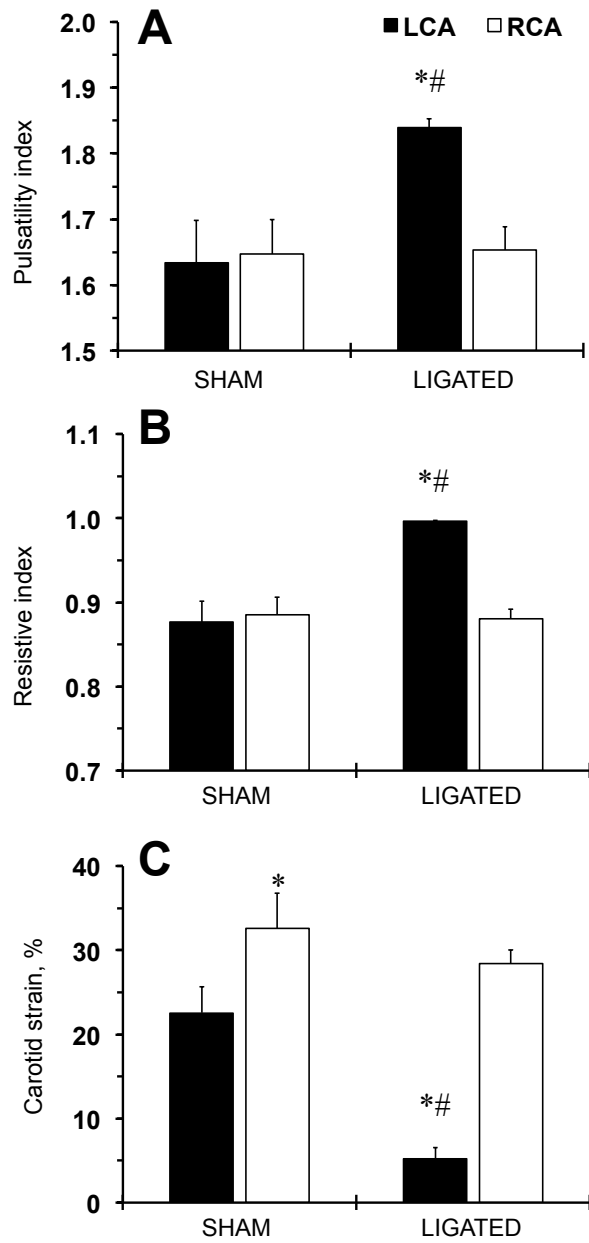


Figure S2. Ultrasound profiles of the carotid artery wall in FVB mice one week after ligation. A. Carotid artery pulsatility index. **B.** Carotid artery resistive index. **C.** Carotid artery strength, %. Black bars are left carotid artery (LCA). Open bars – right carotid artery (RCA). SHAM and LIGATED mice are shown on X-axis. Values are mean±SEM. *, p<0.05 vs. LCA, SHAM. #, p<0.05 vs. RCA, LIGATED. n=5-6 per group

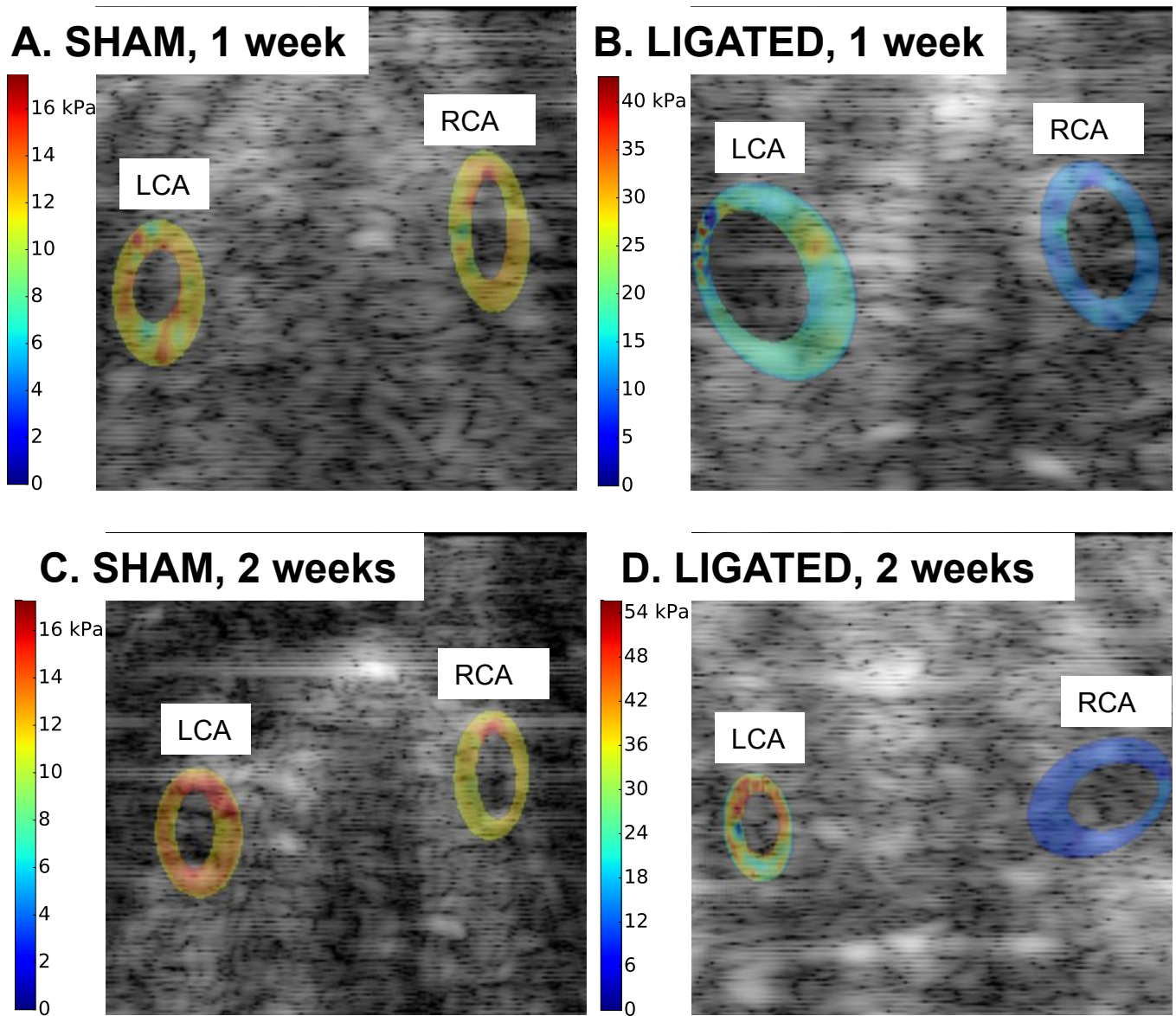


Figure S3. Elastography profiles of the carotid arteries in FVB mice after ligation. Computed sonograms of the carotid arteries from the same animal at 1 week (A) or 2 weeks (C) after sham operation. Computed sonograms of the carotid arteries from the same animal at 1 week (B) or 2 weeks (D) after ligation. LCA, left carotid artery. RCA, right carotid artery. The Young's modulus is color-coded: lowest (zero) is set to blue color; highest value (16 or 40 or 54 kPa) is in red

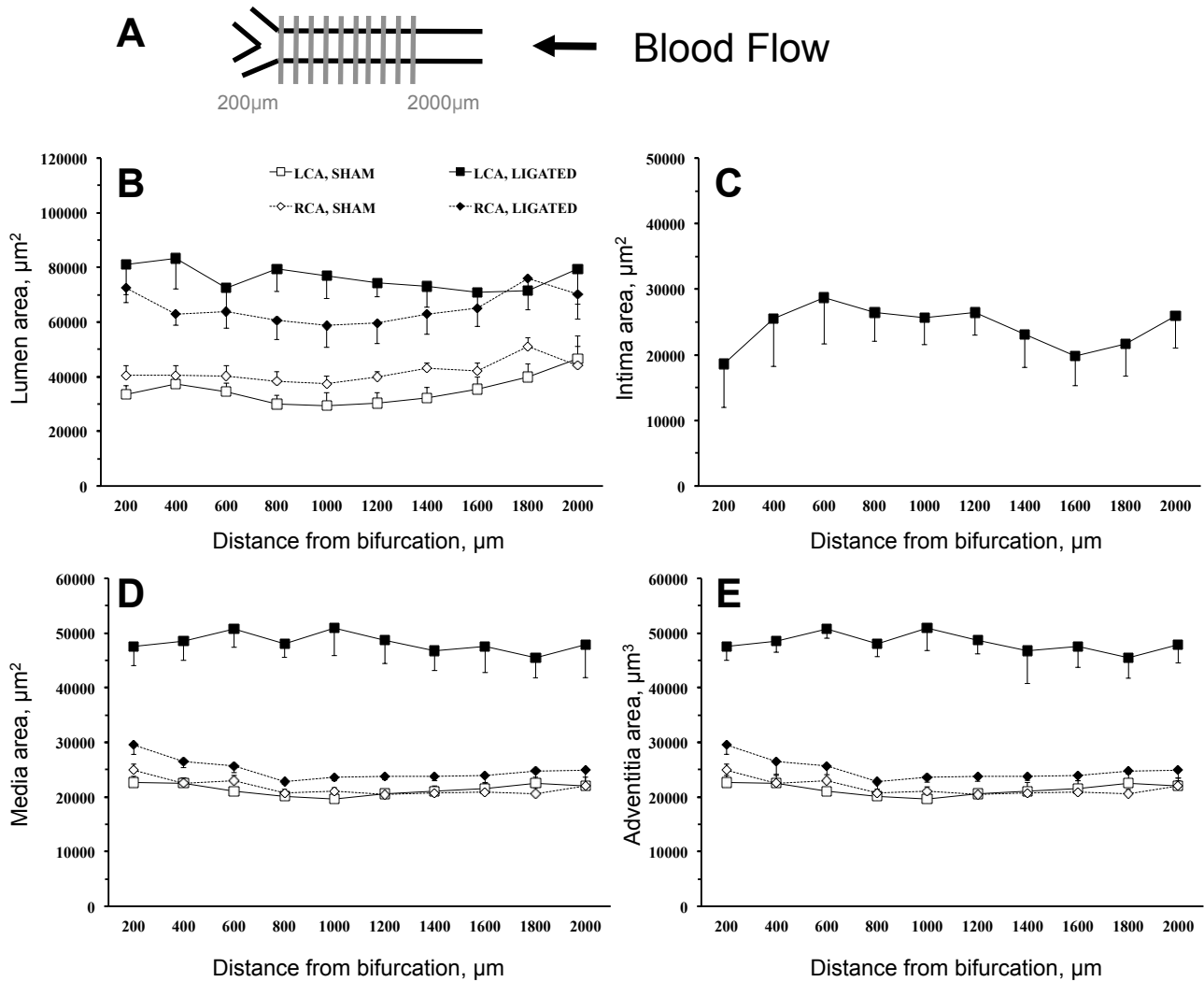


Figure S4. The carotid component areas are plotted versus the length of the carotid arteries cross-sections from FVB mice with or without ligation. A. A cartoon showing carotid artery at the bifurcation point. Series of cross-sections marked with grey perpendicular lines (every 200 μm) are covering 2,000 μm carotid artery length. Arrow shows direction of blood flow. **B.** Lumen area distribution. **C.** Intima area distribution. It was not possible to measure the intimal layer in non-ligated arteries. **D.** Media area distribution. **E.** Adventitia area distribution. Black lines and open squares are left carotid artery (LCA) from SHAM-operated mice. Interrupted lines and open rhombs are right carotid artery (RCA) from SHAM-operated mice. Black lines and black squares are LCA from LIGATED mice. Interrupted lines and black rhombs are RCA from LIGATED mice. X-axis shows distance from carotid bifurcation, μm . Values are mean \pm SEM. n=5-6 per group

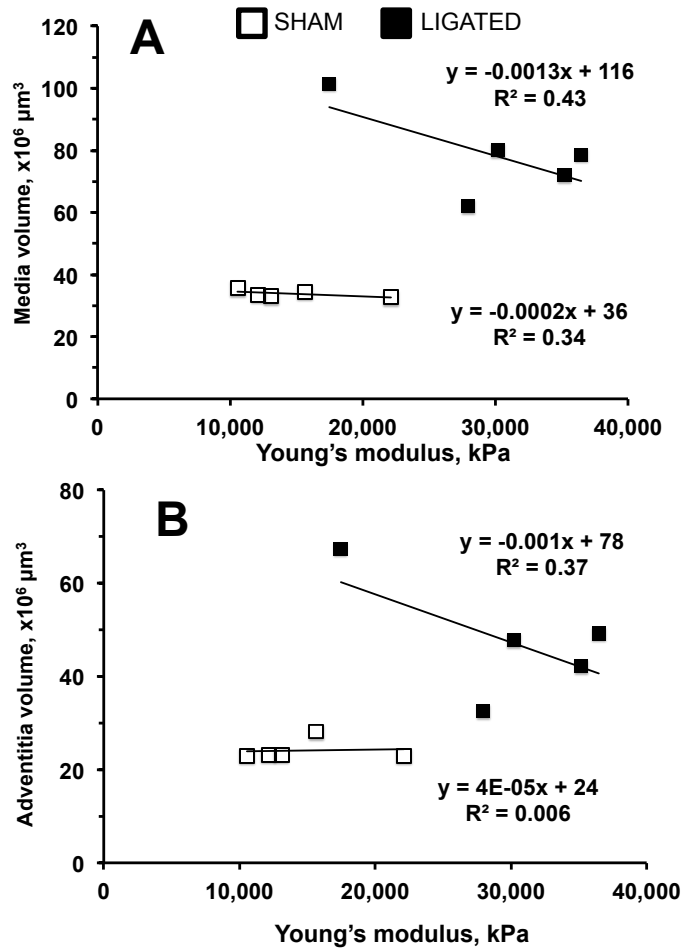


Figure S5. Relationships between the Young's modulus and the left carotid remodeling in FVB mice after 2 weeks after ligation. Open squares are sham-operated animals (SHAM). Black squares are ligated mice (LIGATED). Media volume (**A**) and Adventitia volume (**B**) negatively correlate with the Young's modulus after ligation. No correlation was noted in shams. n=5 per group