SUPPLEMENTAL MATERIAL

Supplemental tables

Table S1. Diameter changes and dilation percentages of suprarenal abdominal aortas of AngII group mice

Sample	Healthy(mm)	Aneurysmal(mm)	Diameter Measurements	
			Dilation Percentages	Fold Increase
MS#1	1.18±0.01	2.27±0.04	92.67%	1.93
MS#2	1.12±0.02	2.31±0.04	106.62%	2.07
MS#3	1.03±0.05	2.35±0.01	127.97%	2.28
MS#4	1.30±0.05	2.83±0.08	117.64%	2.18
MS#5	1.17±0.01	2.25±0.01	92.20%	1.92
MS#6	0.93±0.04	1.55±0.04	66.39%	1.66
MS#7	0.88±0.06	2.15±0.08	144.83%	2.45
MS#8	1.03±0.07	1.84±0.10	79.15%	1.79
MS#9	1.02±0.05	1.40±0.08	38.23%	1.38
MS#10	1.23±0.02	1.39±0.06	12.18%	1.12
MS#11	1.30±0.03	2.51±0.03	92.45%	1.92

Supplemental figures and figure legends

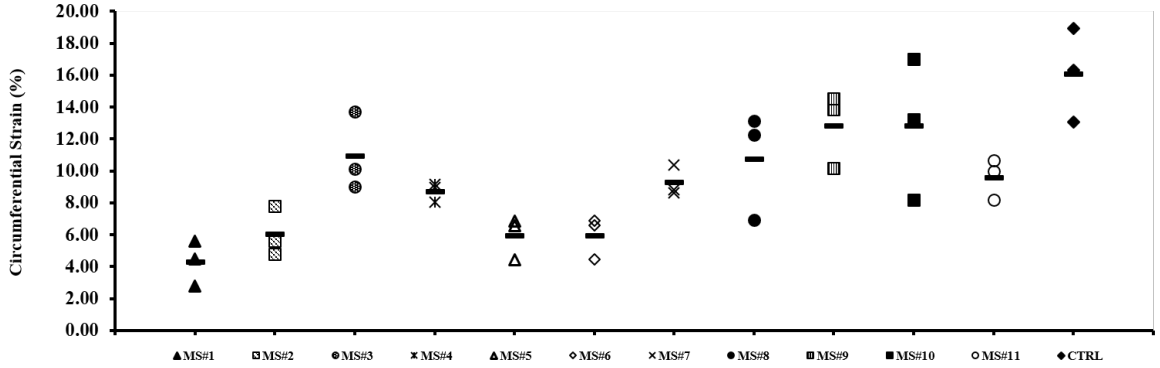

Figure S1. Circumferential strains for all samples

Circumferential Green-LaGrange strains throughout the cardiac cycle. All aneurysmal aortas showed a reduction in the strain values when compared to a healthy control. Measurements were obtained from three different cardiac cycles represented by the data points in the graph. Solid line in each group represents the mean value.

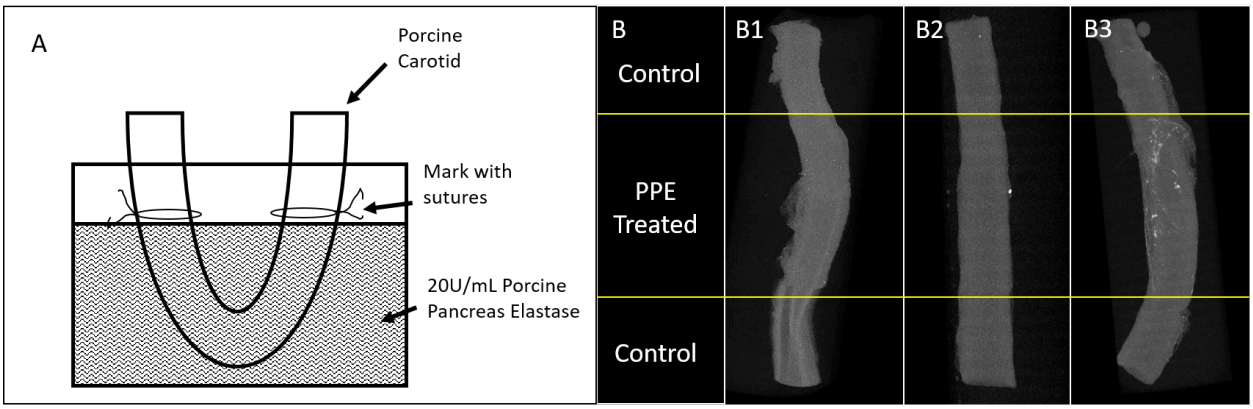

Figure S2. In vitro study to optimize the imaging property of gold nanoparticles

A. Schematic representation of the *in vitro* study that was used to test the targeting properties of degraded elastase targeting antibody conjugated gold nanoparticles (EL-GNPs). The middle part of each porcine carotid segment was immersed in 20U/mL porcine pancreas elastase (PPE, Tris buffered, pH= 7.8) for 90mins. After the PPE treatment, entire segments were immersed in 2mL of 3mg/mL different EL-GNPs overnight. Samples were washed three times in PBS for 5 mins per wash before being scanned with micro-CT in corn oil. **B.** Signals for differently conjugated EL-GNPs in the reconstructed porcine carotid MIP models. **B1.** Porcine carotid with GNPs that were incubated with PEG at a ratio of 4:1 for 4 hrs at room temperature, reacted with sulfo-NHS and EDC for 2hrs at room temperature and incubated with elastase antibody at 4°C overnight; **B2.** Porcine carotid with GNPs were incubated with PEG at a ratio of 2:5 for 8 hrs at room temperature, reacted with sulfo-NHS and EDC for 4hrs at room temperature and incubated with elastase antibody at 4°C overnight; **B3.** Porcine carotid with GNPs were incubated with PEG at a ratio of 1:4 for 48 hrs at 4°C, reacted with sulfo-NHS and EDC for 6hrs at room temperature and incubated with elastase antibody at 4°C overnight. B3 showed more EL-GNP accumulation which resulted in a much stronger signal, therefore, this conjugating method was used in the later experiments.

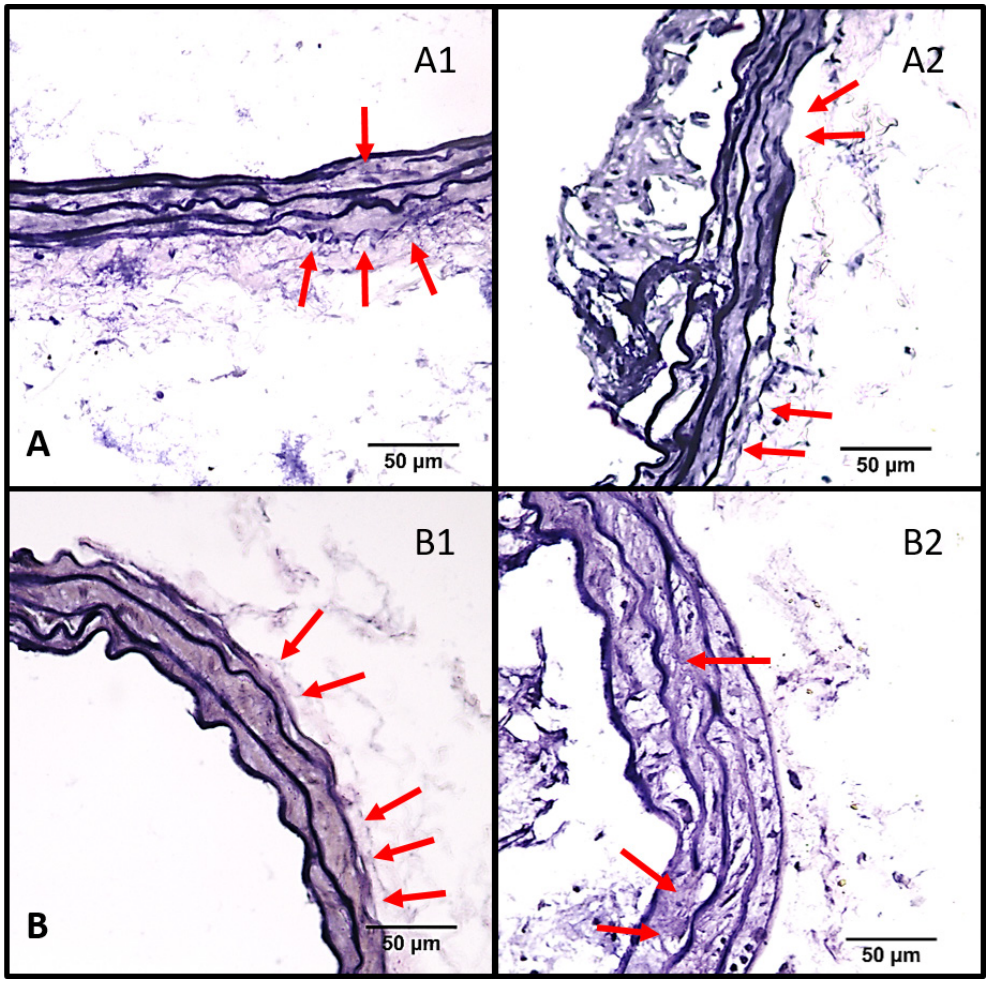

Figure S3. Elastin damage in aortic walls for MS#9 and MS#10

A. Verhoeff van Gieson staining for MS#9 and **B.** for MS#10. Both samples did not meet the 1.5-fold threshold but still presented with elastin damage, indicated by the red arrows.