Supplemental Materials: Multiscale model of the physiological control of myocardial perfusion to delineate putative metabolic feedback mechanisms

Hamidreza Gharahi[1,2], C. Alberto Figueroa[1,3], Johnathan D. Tune[4], Daniel A. Beard[2]

[1]Section of Vascular Surgery, Department of Surgery, University of Michigan, Ann Arbor, MI
[2]Department of Molecular and Integrative Physiology, University of Michigan, Ann Arbor, MI
[3]Department of Biomedical Engineering, University of Michigan, Ann Arbor, MI
[4]Department of Physiology and Anatomy, University of North Texas Health Sciences Center, Fort Worth, TX

S1. Aortic and left ventricular pressure

The aortic pressure (P_{ao}) is continuously measured during the zero-flow pressure measurements (before and after occlusion). To estimate left ventricular pressure P_{lv}, half-sine functions were used to match AoP in the systolic phase. Figure S1 shows P_{ao} measurements and estimated P_{lv} for Pig D (control) experiment with 100 mmHg CPP. Analogous data exist for all experiments.

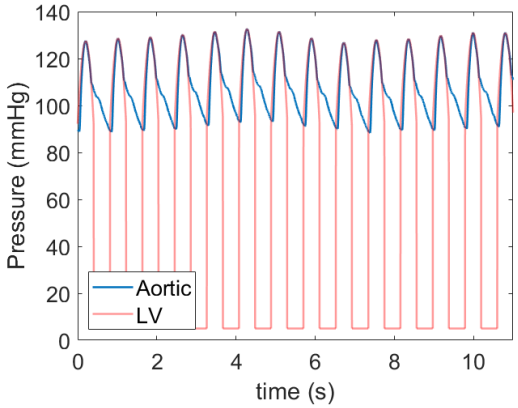
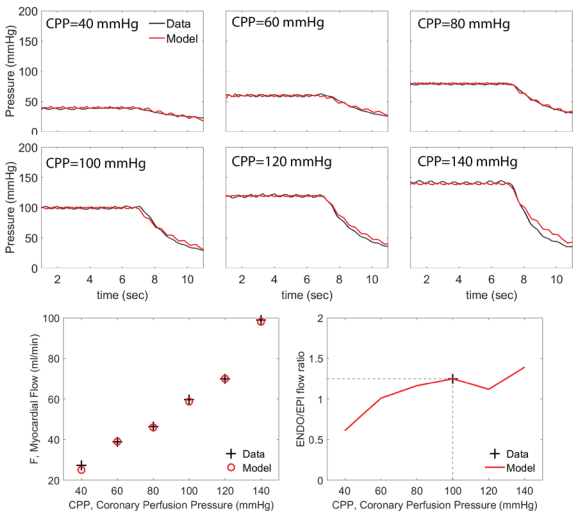
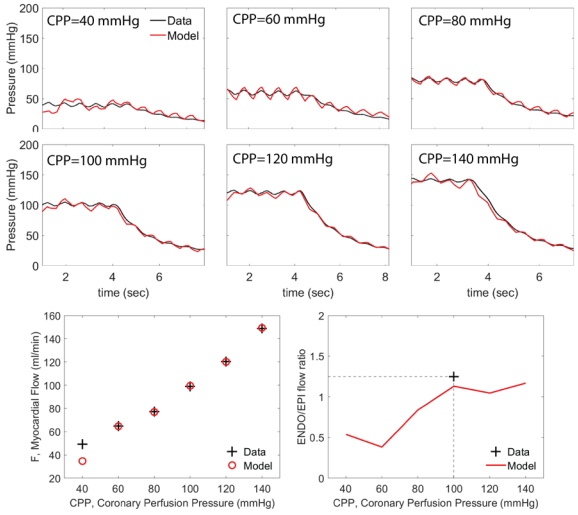


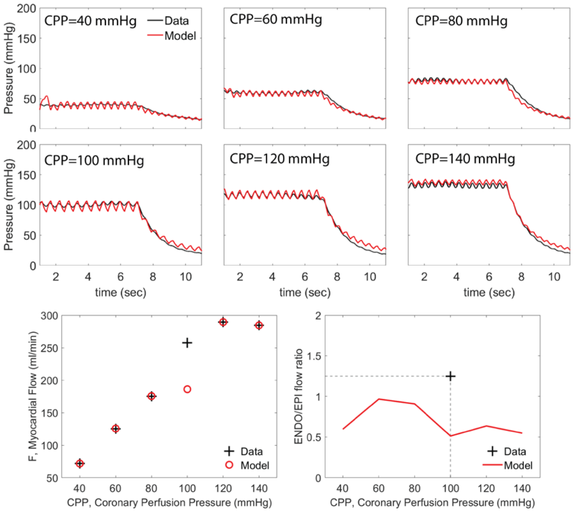
Figure S1. Measured aortic and estimated left ventricular pressure for Pig D, CPP = 100 mmHg.

S2. Myocardial circulation model fits

Model fits to zero-flow pressure time course data for all animals/experimental conditions are illustrated below.



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CPP=100 mmHg
CPP=120 mmHg
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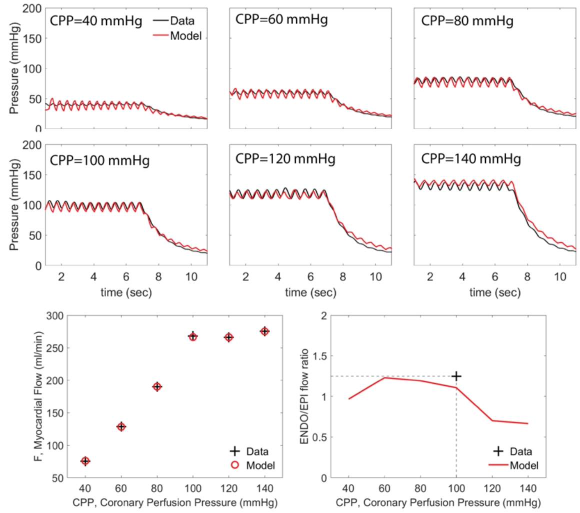
Data
Model
Pressure (mmHg)
time (sec)
F, Myocardial Flow (ml/min)
ENDO/EPI flow ratio
CPP, Coronary Perfusion Pressure (mmHg)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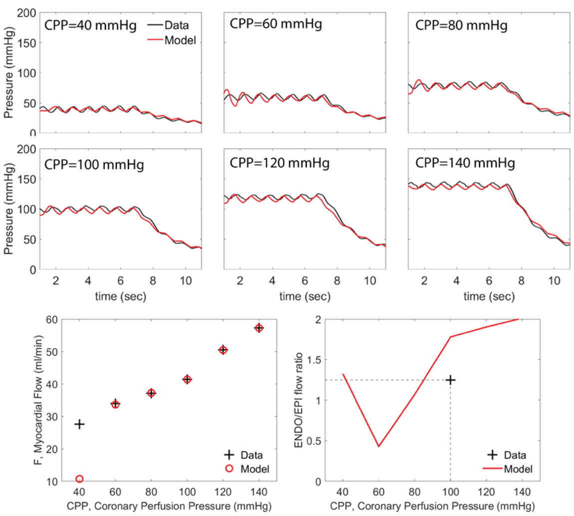
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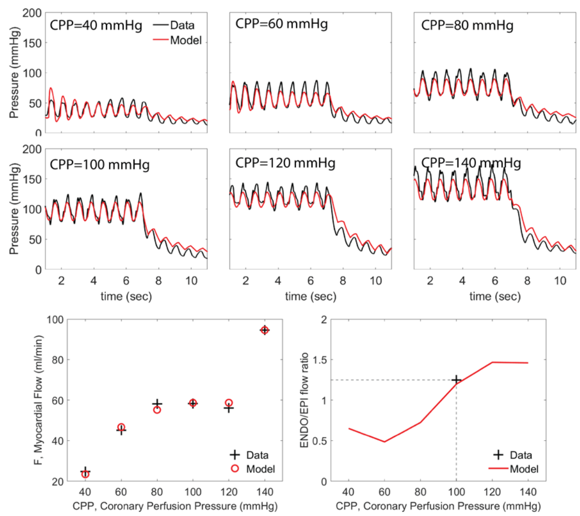
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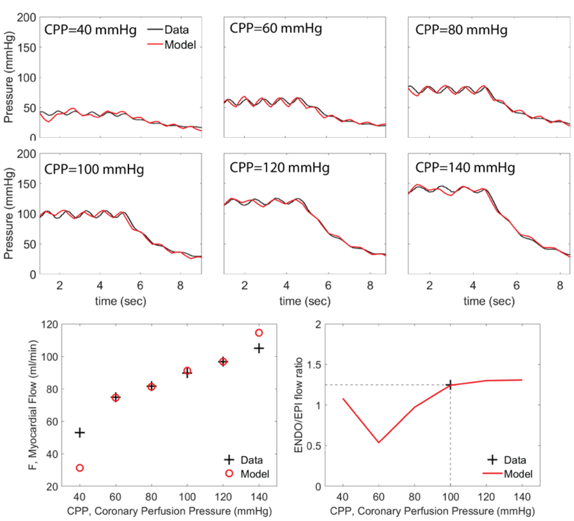
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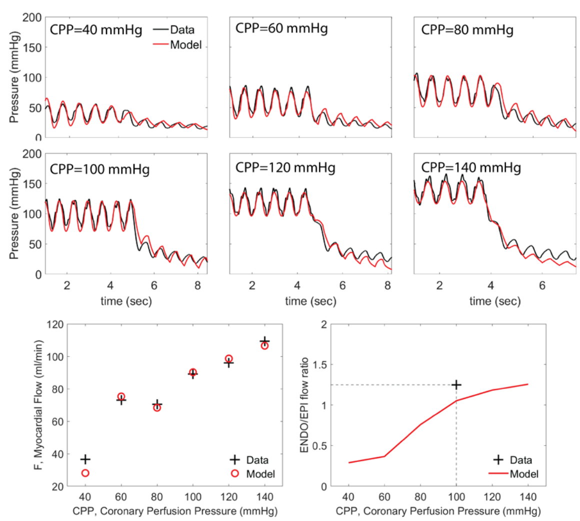
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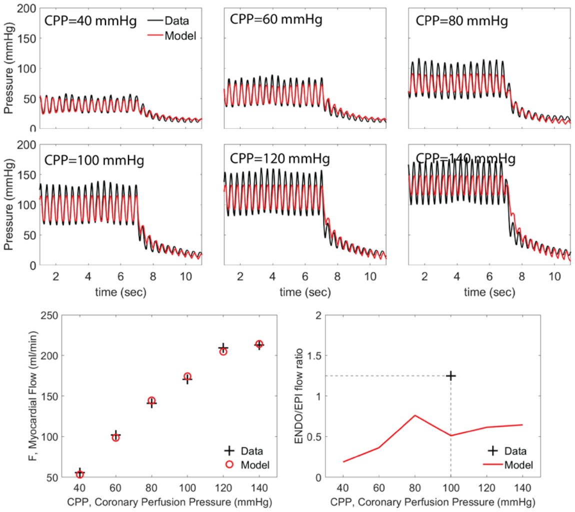
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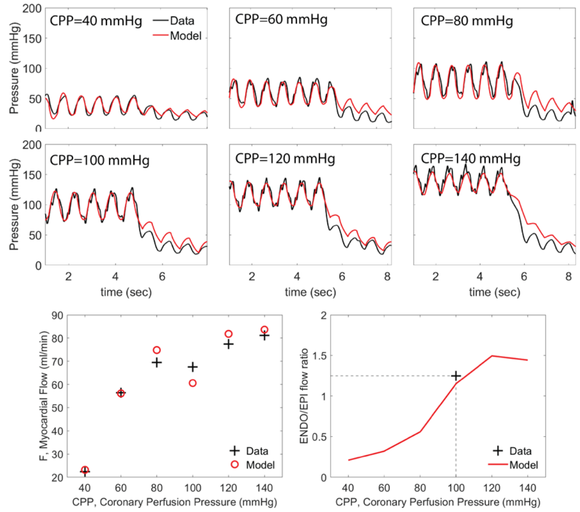
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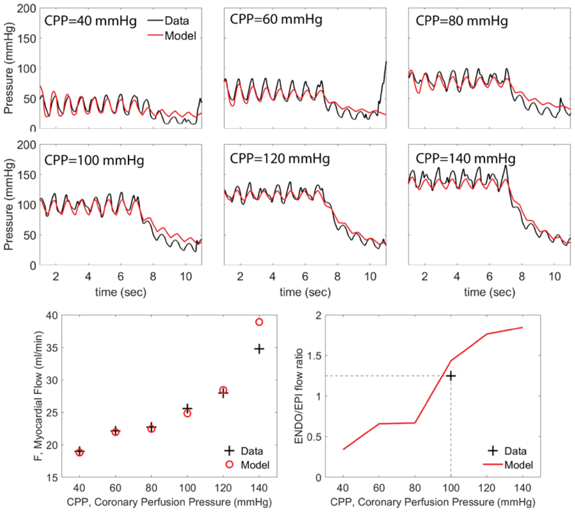
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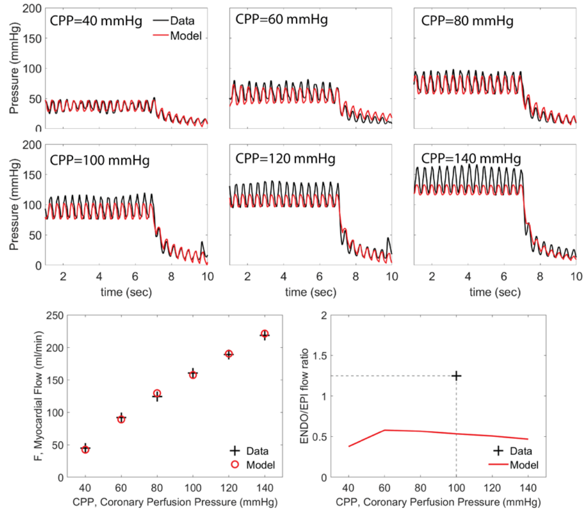
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Data
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Pressure (mmHg)
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S3. Representative vessel model fits

The representative vessel model fits with the top-ranking metabolic signal MS_{FM} are illustrated below. Each figure plots: Panel A: equivalent diameters as functions of transmural pressure in the representative vessel, with markers "+" and "o" showing Model 1 and Model 2 results, respectively; Panel B: predicted vessel activation vs. transmural pressure; Panels C-E: predicted regulatory signals strengths as functions transmural pressure.

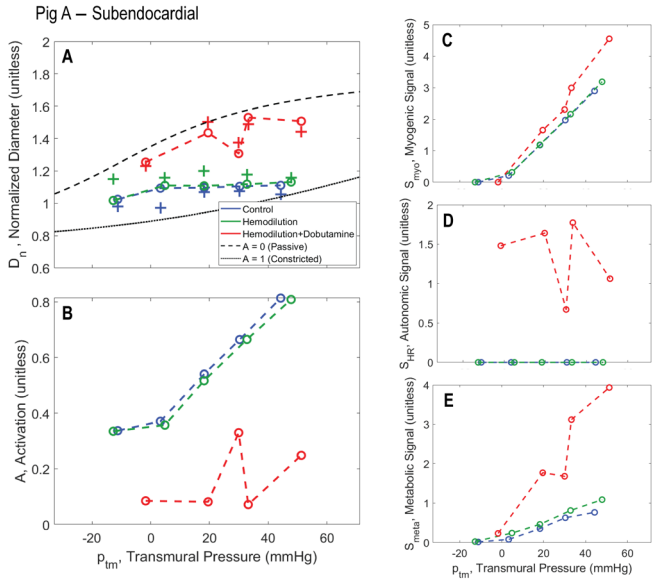


Figure S14.

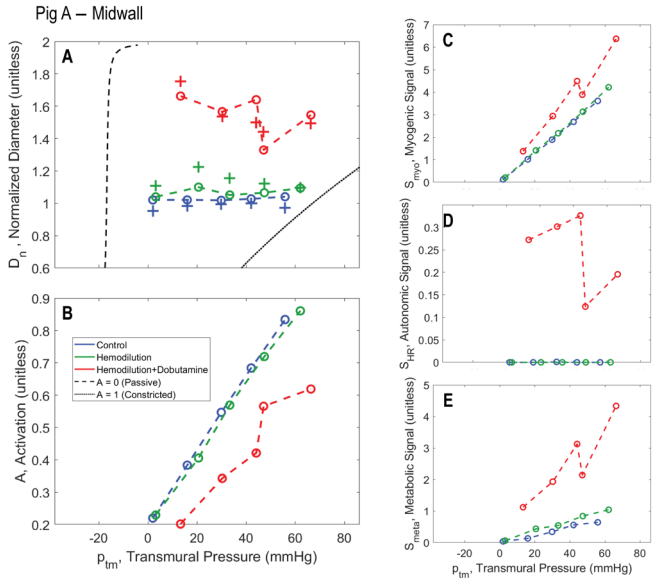
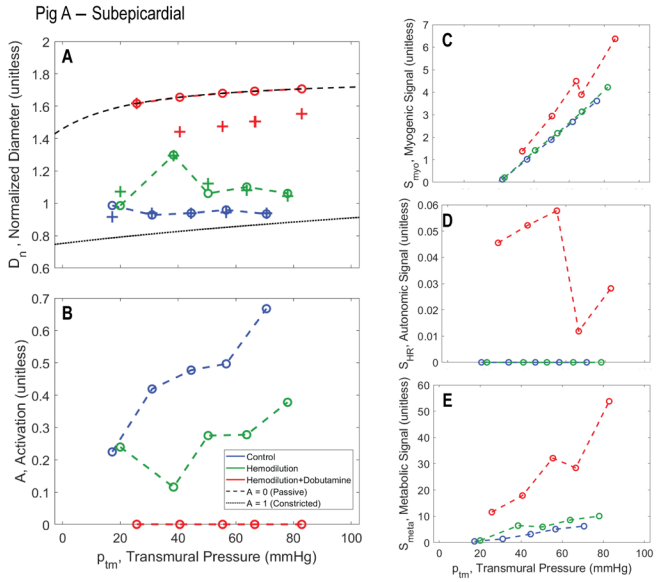


Figure S15.



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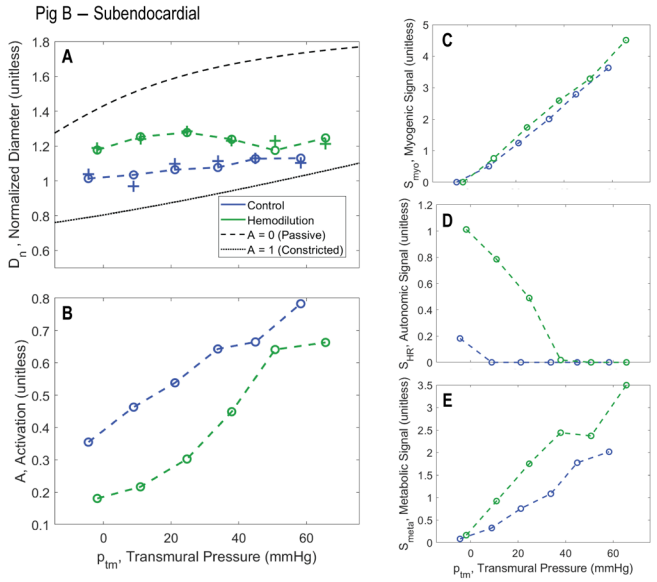

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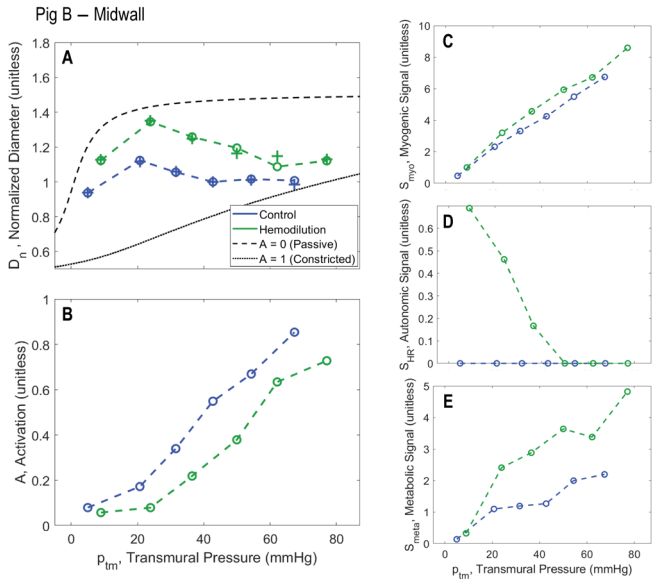

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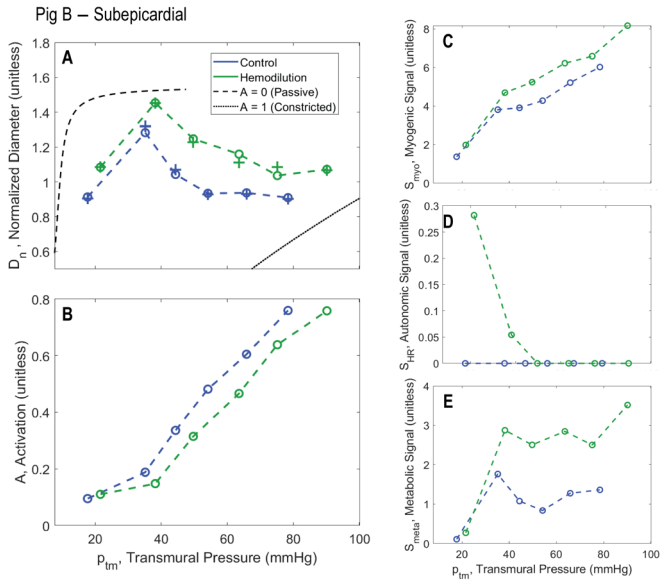

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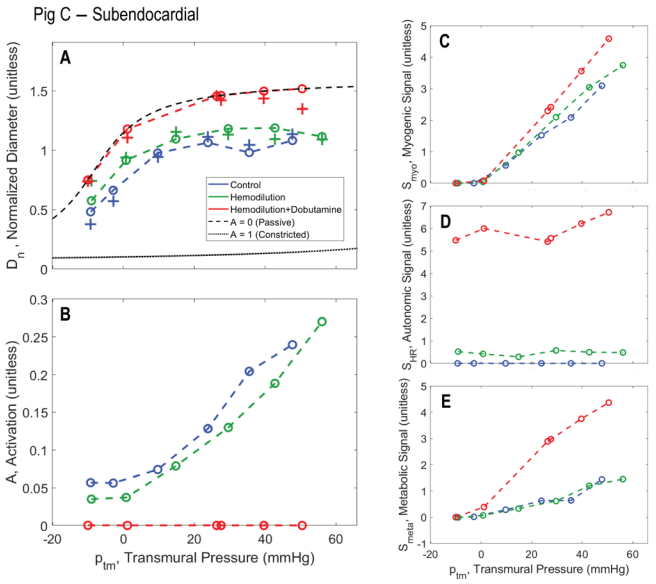

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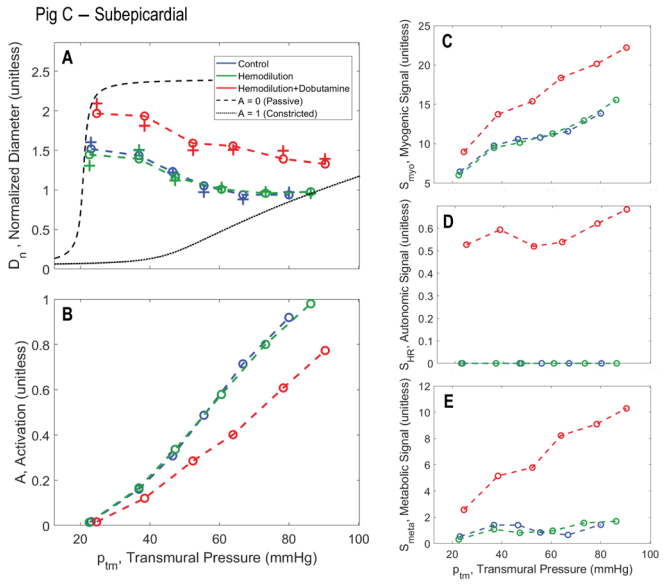

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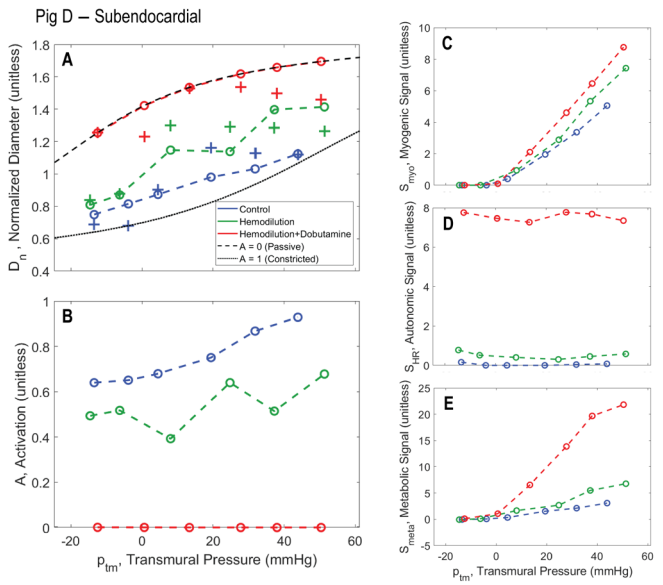

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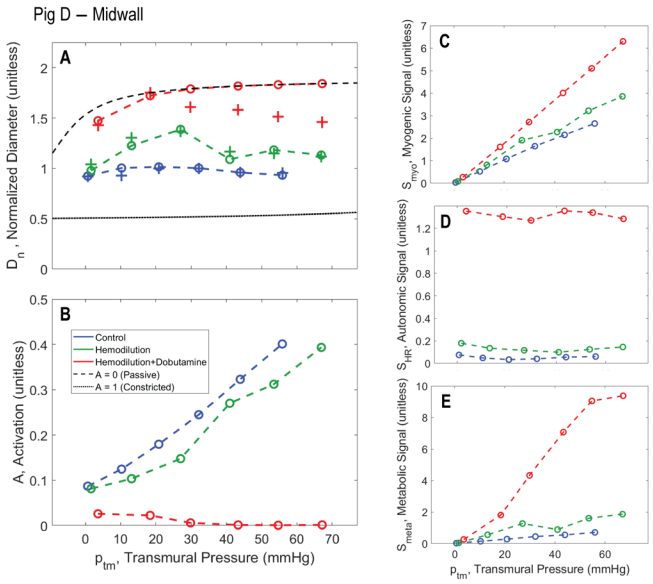

Figure S25.