

## INTRODUCTION

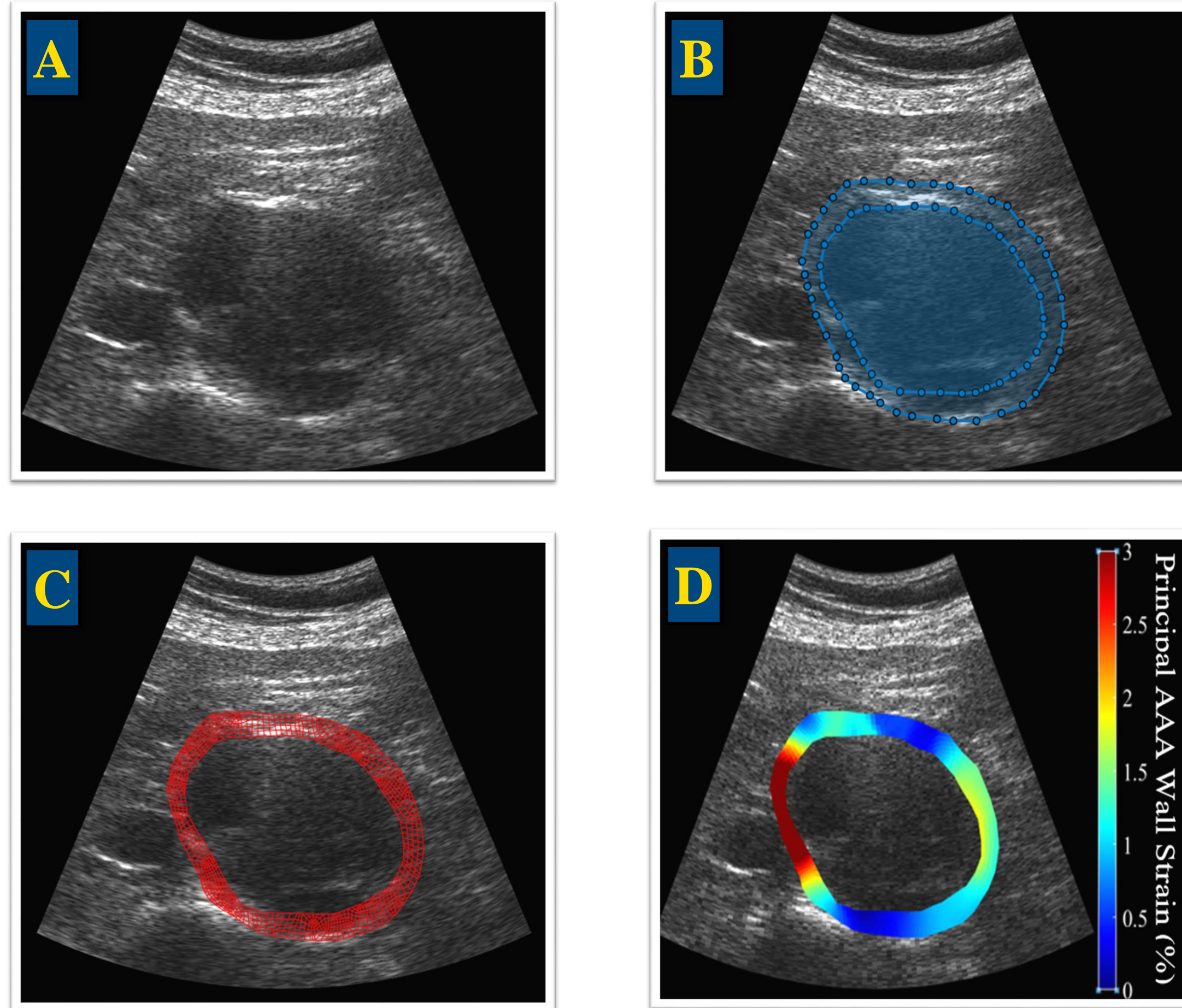
The IMPEDE-FX plug is a self-expanding shape memory polymer that promotes clot formation and collagen production

Ultrasound elastography (USE) can measure pressure-normalized aortic principal wall strain ( $\overline{\epsilon_{\rho+}}/PP$ , %/mmHg)

**Aim 1:** Measure the effect of IMPEDE-FX on  $\overline{\epsilon_{\rho+}}/PP$  via USE

**Aim 2:** Evaluate device-tissue interactions in explanted plugs

## METHODS



**Figure 1.** A) B-mode ultrasound image; B) Region of interest defined; C) Finite element mesh overlay; D) Parametric color map; E) Graph of mean principal strain per frame.

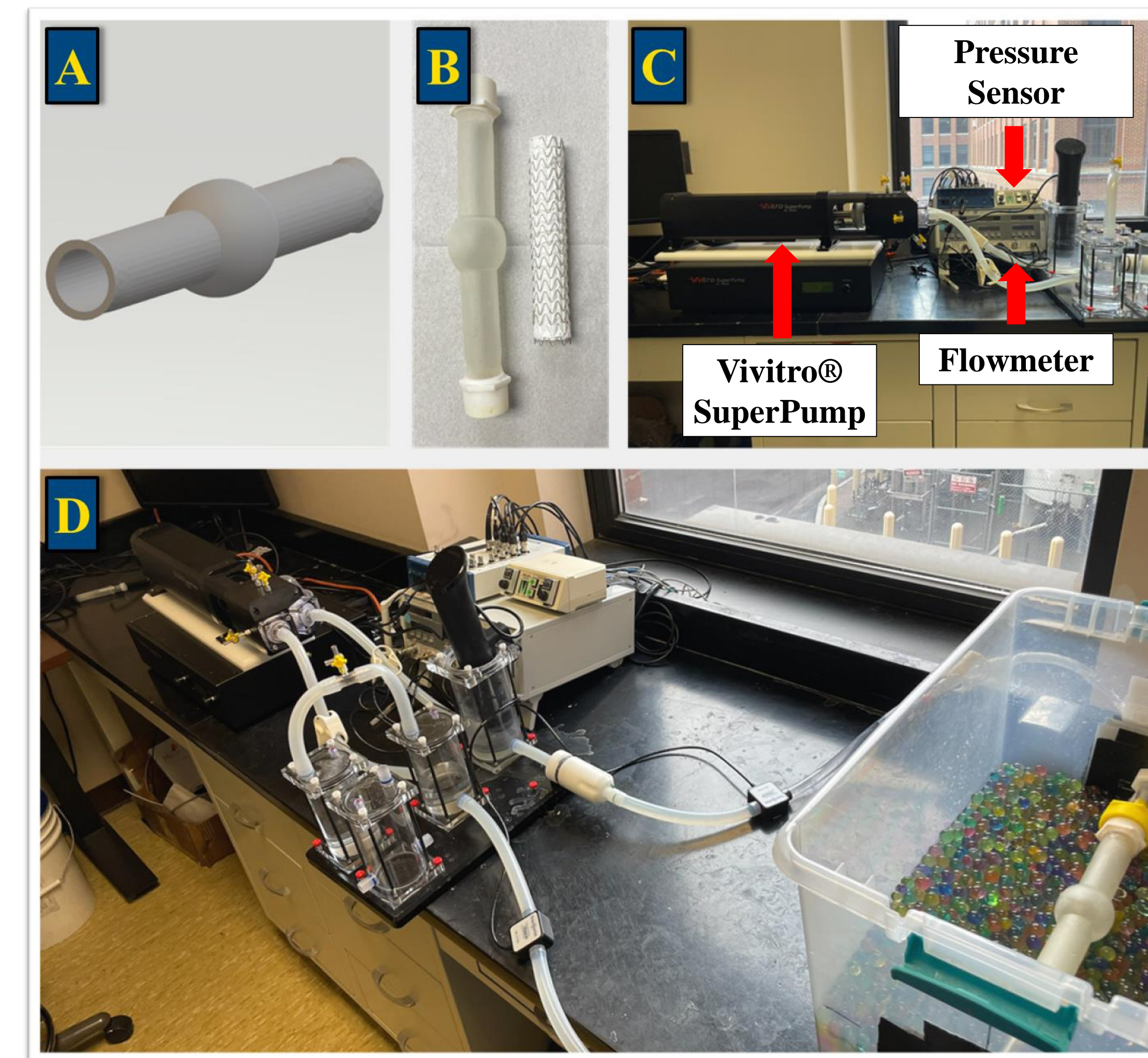
## METHODS

3.4 cm endograft deployed into 3D-printed axisymmetric AAA model and connected to hemodynamic flow circuit

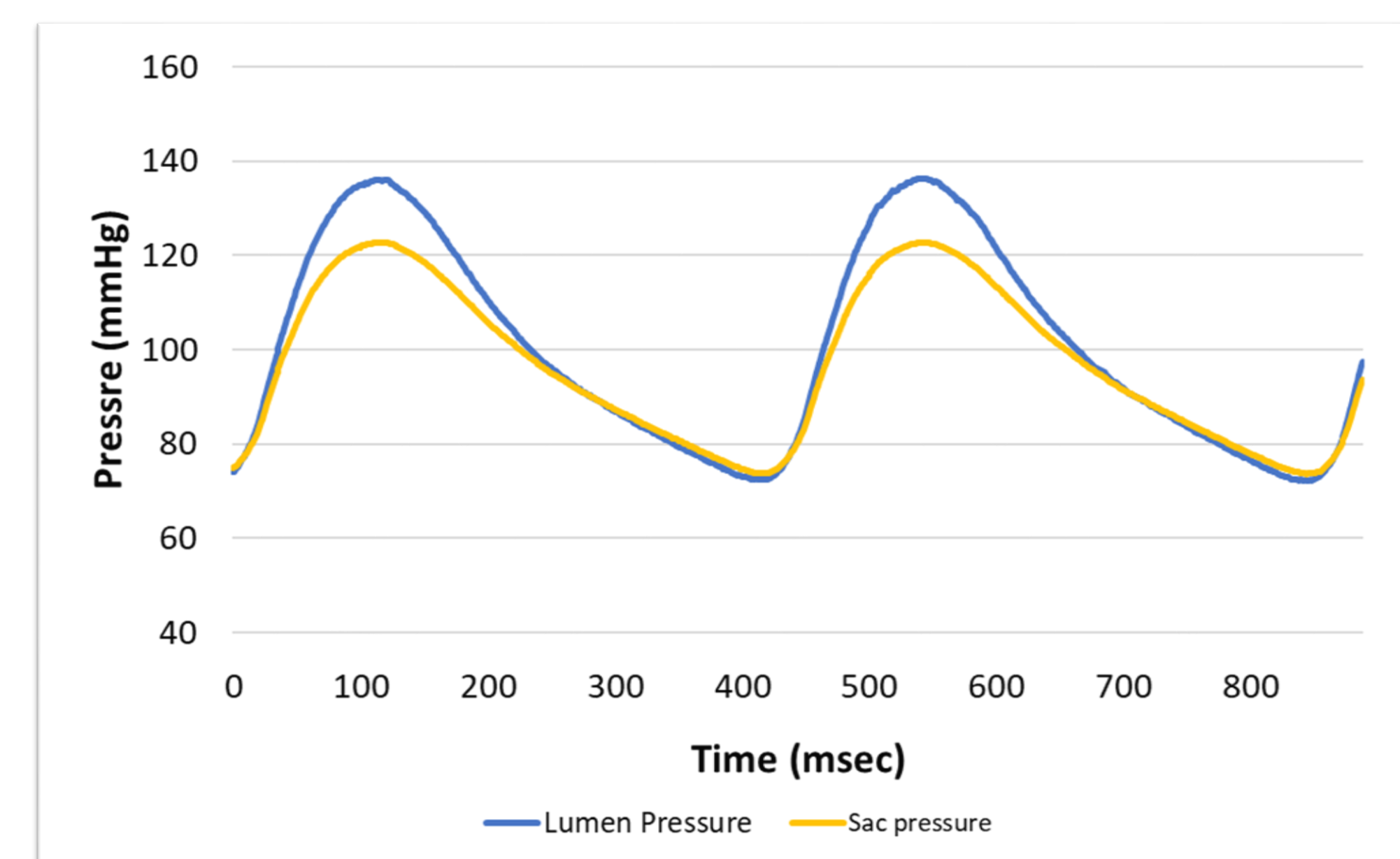
IMPEDE-FX plugs deployed in two conditions:

- Stepwise to 100% (16 plugs) then 150% (24 plugs)
- Immediate to 250% (40 plugs)

Axial ultrasound imaging at 5, 10 & 15 mins for each volume

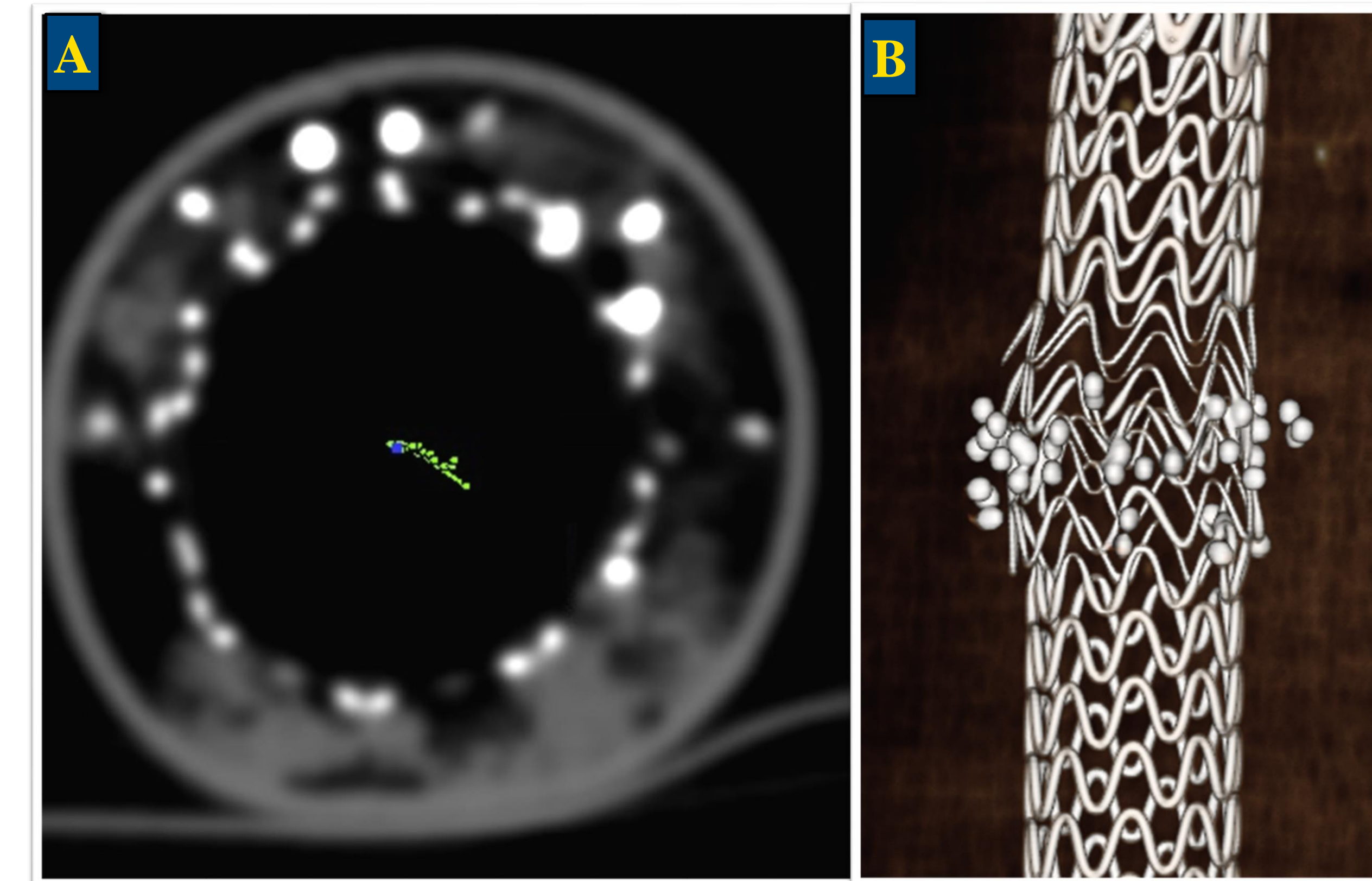


**Figure 2.** A) Stl. file of idealized AAA model; B) 3D-printed model; C) Flow circuit; D) Model attached to flow circuit.

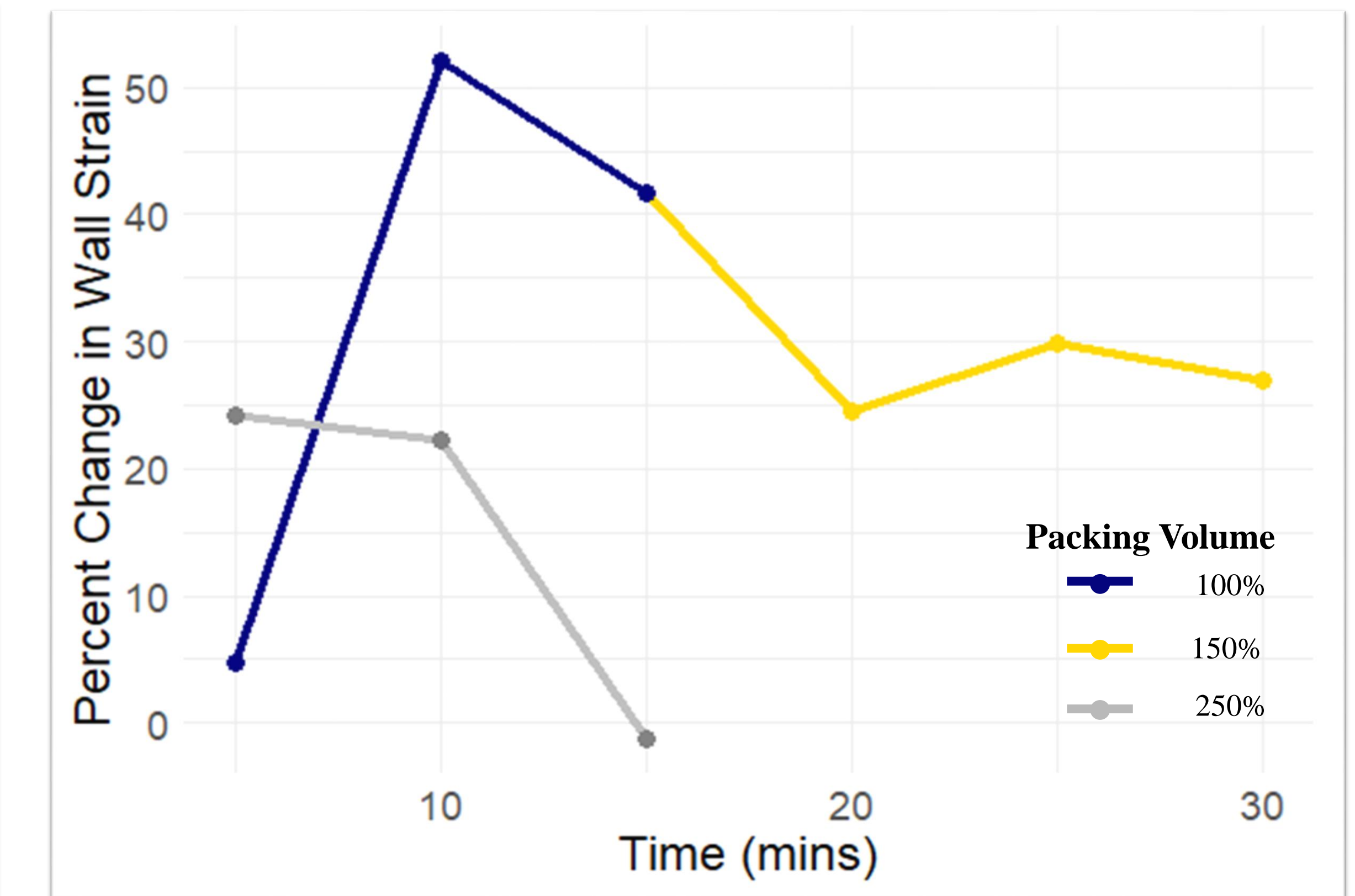


**Figure 3.** Pressure tracings over time.

## RESULTS



**Figure 4.** A) Axial CT and B) 3D reconstruction of endograft-model construct after plug deployment.



**Figure 5.** Relative change in  $\overline{\epsilon_{\rho+}}/PP$  over time after plug deployment.

## CASE STUDY: EXPLANTED IMPEDE-FX PLUGS



**Figure 6.** A) Explanted graft; B) Extracted clot; C) H&E stain of polyurethane plug material and thrombus.

## CONCLUSIONS

Higher packing volumes and rates of the IMPEDE-FX Plug are associated with reduced  $\overline{\epsilon_{\rho+}}/PP$  in idealized aneurysm models

No evidence of device-tissue integration on preliminary H&E stain analysis

Future directions

- Study the effects of a wider range of packing volumes and deployment rates on  $\overline{\epsilon_{\rho+}}/PP$
- Conduct micro-CT and comprehensive histopathologic testing to examine the host response of aneurysms to explanted plugs