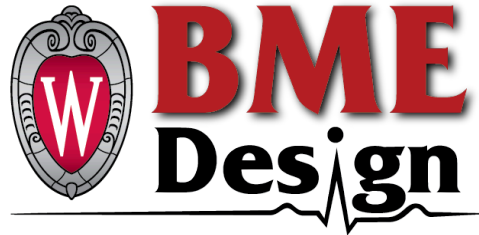


Progress Report: January 26th - February 1st



Computed Tomography (CT) Circulation Phantom to Assess Hyperdynamic Contrast Flow Rates

Client: Dr. Giuseppe Toia gtoia@uwhealth.org

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Team:

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Problem statement

A CT phantom is a device used to calibrate Computed Tomography machines by acting as a “stand in” for human tissues [1]. Most phantoms currently in use are static; they do not allow for dynamic flow. Some patients obtaining a CT scan may need a circulatory support device, such as a VA-ECMO (veno-arterial extracorporeal membrane oxygenation) [2] device. There is a clinical need for a CT phantom with dynamic flow capabilities to study the correct ways to conduct CT vascular imaging for patients on ECMO devices. This phantom should model the inflow and outflow of an ECMO patient and have capabilities to simulate the addition of contrast media into the vascular system. Ultimately, this device will help medical personnel to better understand the flow of CT contrast through a patient on an ECMO machine, as the circulation flow rate of an ECMO patient differs from a patient not on ECMO.

Brief status update

On 01/26 the current team was established and role expectations were set for the semester. The new team members began preliminary research and the old team members continued research.

Difficulties / advice requests

Current design

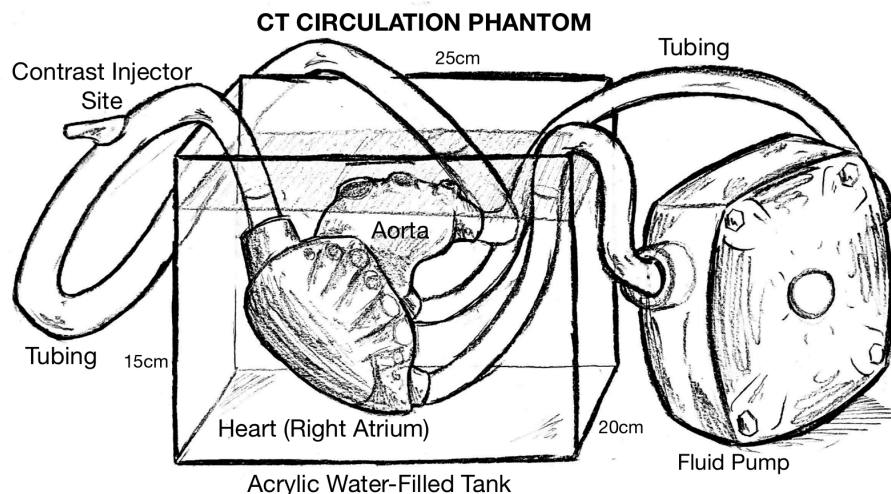


Figure 1: Final design sketch.

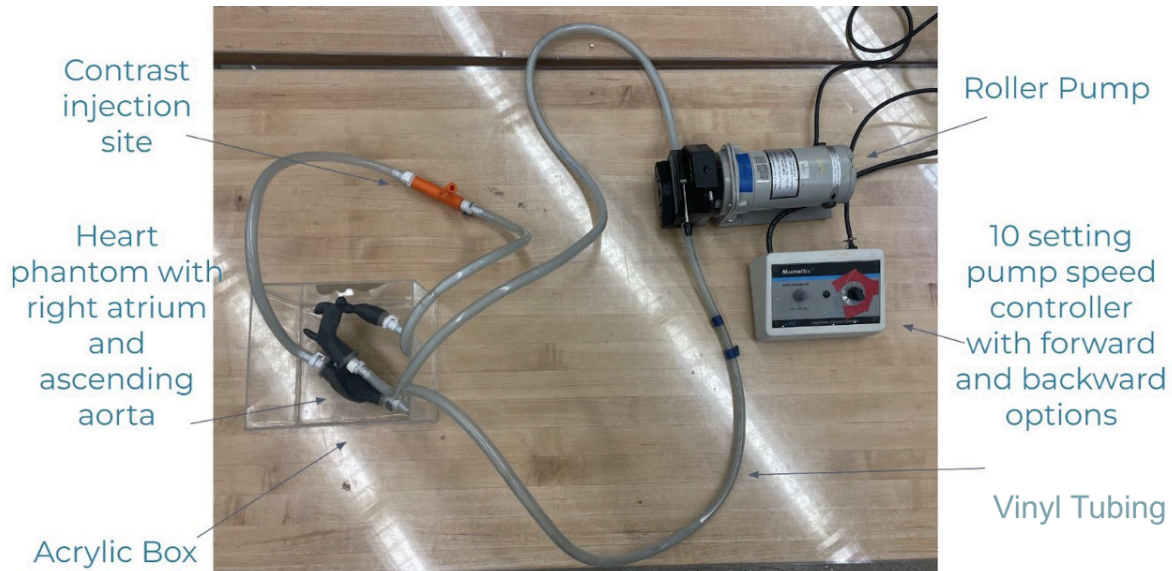


Figure 2: Final fabricated circulation phantom prototype with acrylic box, heart phantom, injection site, roller pump, speed controller, tubing, and connectors

Materials and expenses

Item	Description	Manufacturer	Mft Pt#	Vendor	Vendor Cat#	Date	#	Cost Each	Total	Link
Category 1										
									\$0.00	
									\$0.00	
Category 2										
									\$0.00	
									\$0.00	
								TOTAL:	\$0.00	

Major team goals for the next week

1. Set up meeting with the client
2. Compile research and start brainstorming how the phantom can be redesigned to be more anatomically accurate
3. Begin organizing design ideas for deliverables

Meetings																
Client																
Advisor																
Website																
Update																

Filled boxes = projected timeline
X = task was worked on or completed

Previous week’s goals and accomplishments

- Lucy O’Cull
 - Conducted up to date research on anatomy, and imaging techniques specific to patients on ECMO
- Emma Flemmer
 - Refreshed existing knowledge on phantoms, CT scanners, and iodinated contrast
 - Researched alternative 3D printing materials for the heart
- Lizzie Maly
 - Learned details of project and determined what information from the previous ct heart phantom project may be relevant for this project.
 - Performed general research on ECMO phantoms and hemodynamic flow to better understand the purpose of the project.
- Shriya Kaushik
 - Started researching VA ECMO and learned how its operated and on which patients
 - Researched ethics behind practices and the basic anatomy involved
- Sophie Speece
 - Began general research on the clinical use of VA-ECMO, both when cannulated centrally and peripherally, as well as their pros and cons depending on the patient’s needs

Activities

Name	Date	Activity	Time (h)	Week Total (h)	Sem. Total (h)
Lucy O’Cull	01/31/2024	Literature research	2	2	2
Lizzie Maly	01/31/2024	Literature Research	2	2	2
Shriya Kaushik	01/31/2024	Background and literature research	2	2	2

Sophie Speece	01/31/2024	Literature research			
Emma Flemmer	02/01/2024	Literature research	2	2	2