

Veterinary bone marrow aspirate models

Date: 9/26/2024

Client: Dr. McLean Gunderson

Advisor: Prof. Randy Bartels

Team:

- Avery Schuda - Co-Leader - aschuda@wisc.edu
- Helene Schroeder - Co-Leader, BSAC - hschroeder4@wisc.edu
- Anya Bergman - Communicator - ambergman2@wisc.edu
- Ella Cain - BWIG - elcain2@wisc.edu
- Ellie Kothbauer - BPAG - ekothbauer@wisc.edu

Problem Statement

Veterinary professionals commonly collect bone marrow aspirates from three main sites in dogs and cats: the iliac crest, the trochanteric fossa, and, mostly commonly, the proximal humerus. Currently no veterinary bone aspiration models exist for students to practice on, requiring the use of cadaver dogs. Cadavers can only be used for about 5-10 insertions of the Illinois bone marrow biopsy needle per site, but does not contain live bone marrow that can be collected. This project aims to create a low-cost 3D anatomically correct model of the humerus with relevant soft tissue structures, mimics the consistency and structure of the bones, and allows for insertion of "bone marrow" for collection, allowing veterinary students to practice the skill of bone marrow aspiration.

Brief Status Update

This week the team worked on two decision matrices, one for the 3D printed material and one for the design of the replaceable component of the humerus. The team also began brainstorming how to create the musculature, articulable shoulder joint, and how best to integrate the replaceable components with the bone structure.

Difficulties / advice requests

We would like to confirm how to access funding in the Makerspace and go over how to convert CT scans into .STL files. We were able to confirm that they also have 3D scanning available to create 3D printing files as an alternative.

Final Report/Notebook																			
Meetings																			
Client		X																	
Advisor	X	X	X																
Website																			
Update	X	X	X	X															

*Subject to change after advisor/client meetings

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

Previous week's goals and accomplishments

- Team
 - Researched materials and fabrication methods related to the bone marrow aspiration model
 - Brainstormed and created two design matrices
- Avery
 - Researched what filament, type of printer is best for mimicking bone
 - Design brainstorming and decision matrix
- Helene
 - Researched materials/methods used when creating artificial/model bones.
 - Brainstormed and visualized ideas with the design matrix.
- Anya
 - Researched the structure of dog legs, talked with clients about CT scans available.
 - Worked on the design matrix.
- Ella
 - Researched the joint mechanics of the canine forelimb
 - Looked at anatomical and CT diagrams for canine muscles and bones
 - Worked on the design matrix
- Ellie
 - Researched the strength of filaments and the costs
 - Worked on the design matrix

Activities

Name	Date	Activity	Time (h)	Week Total (h)	Sem. Total (h)
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Avery Schuda	9/26/24	-Researched filament to mimic bone -Brainstormed design ideas and worked on two design matrices with team -Started creating design graphics for preliminary presentation -Worked on defining criteria for matrices	6	6	17
Ellie Kothbauer	9/26/24	-Researched bone marrow aspiration and designs for a replaceable material. -Worked on the design matrix -Met with advisor and team -Attended BPAG meeting	4	4	11
Anya Bergman	9/26/24	-Created model ideas for replaceable component -Printed swatches for testing with aspiration needles -Worked on design matrix ideas -Researched bone structure and 3D printing materials	5	5	7
Helene Schroeder	9/26/24	- Researched materials used when 3D printing bone models from CT scans. - Worked on the design matrix with the team.	4	4	11
Ella Cain	9/26/24	-Worked on creating the design matrix -Met with advisor and team last week -Researched materials for replaceable component of bone -Researched angles of motion for dog forelimb	5	5	12

Current design

Materials and expenses

Item	Description	Manufac-turer	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	

