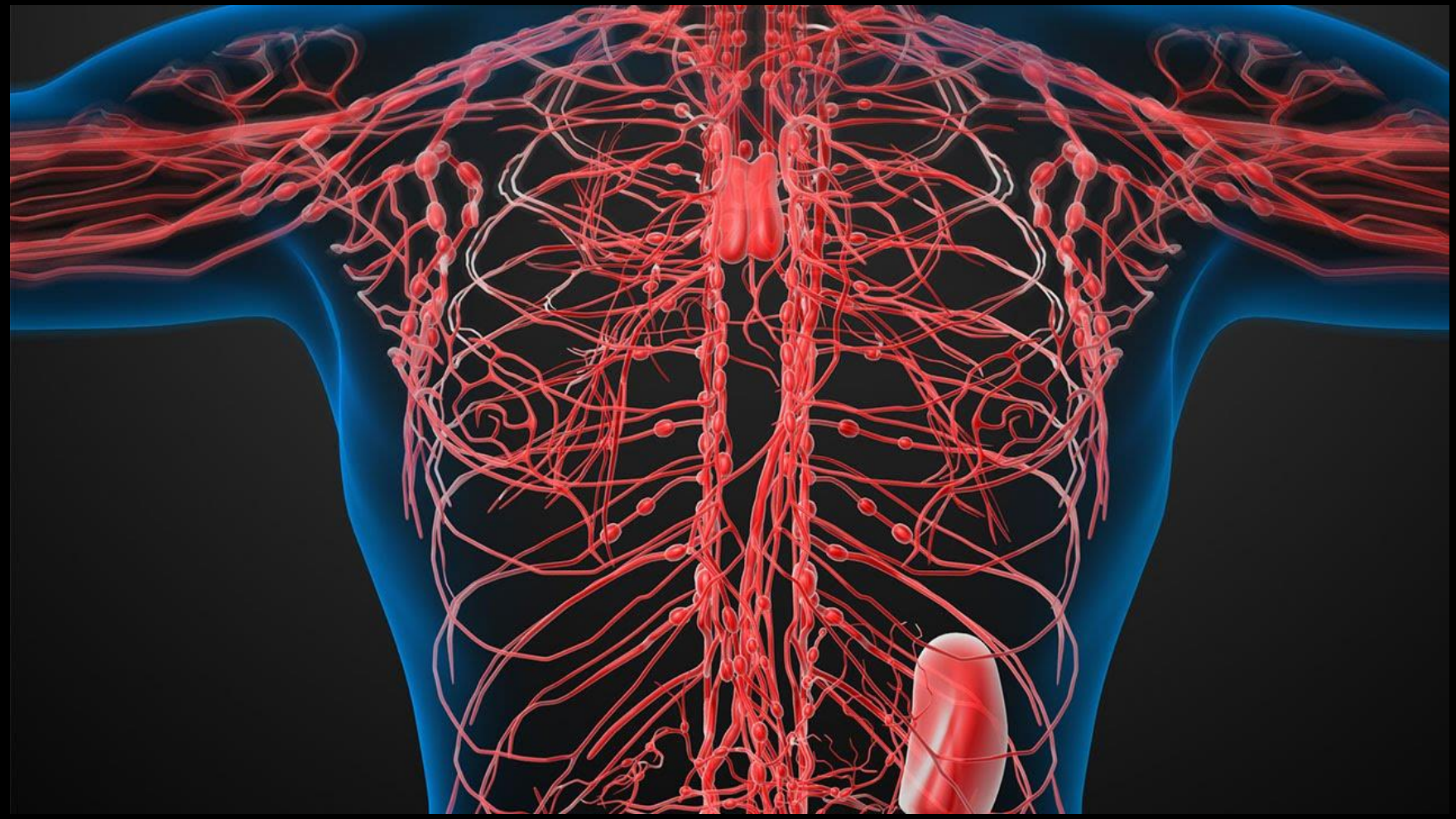


HuBMAP
TMC
Florida / Zurich

Mark Atkinson, Harry Nick, Bernd Bodenmiller, Kevin Otto, Todd Brusko, Marda Jorgensen, Maigan Brusko, Seth Currlin, Jesus Penaloza, Clive Wasserfall

A 3-D Tissue Map of the Human Lymphatic System

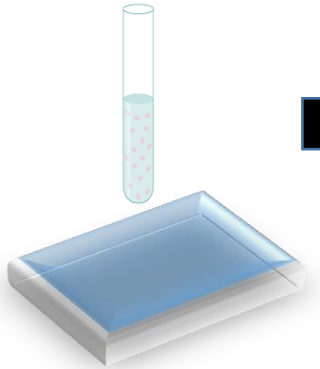
2019 HuBMAP Meeting

Project Overview

Spleen

Thymus

Lymph Node



FACS

Confirm all cell types are represented. Pre assay sorting

10x scRNA-Seq
CITE-Seq
Spatial Transcriptomics

Identify new cell populations and guide marker selection for immune panel

CODEX

2-D multiplexed staining

Immune Panel

Cross assay integration through shared markers

IMC

3D Volume multiplexed staining cellular level

LSFM

3D Volume staining at structural level

Anticipated Deliverables

- Data release upload and integration testing
  - Complete data sets for all four modalities by end of the year
  - January transfer of data sets (raw and processed) to HIVE for comparative analysis and/or testing integration into existing infrastructure.
- June 2020 Data Release
  - Imaging Mass Cytometry 2-D images of thymus, spleen and lymph nodes from 3 donor cases
  - scRNA-seq (10x) analysis from thymus, spleen and lymph nodes from 3 donor cases
  - CODEX data, 18 primaries applied to thymus, spleen and lymph nodes (3 cases)
  - Light Sheet 3-D images of cleared thymus, spleen and lymph nodes (3 cases)

Collaborations

- UW-Cal Tech- Apply seq-FISH and sci-seq to a single tissue site collected from one spleen. (Thymus and LN with Cal Tech separate collaboration)
  - Protocols have been received and a test run has been performed.
  - Waiting for the perfect case with low ischemia time and clean harvest.
  - Reciprocal UF pipeline on cardiac/vasculature
- Vanderbilt University- Apply the Matrix Assisted Laser Desorption/Ionization (MALDI) imaging mass spectrometry (IMS) pipeline to a minimum of 5 spleen samples.
  - Collected 2 test spleen blocks to confirm preparation protocol is acceptable.
  - Agreed to collect and provide lymph nodes as control material.

  - Neil Kelleher Northwestern University UH3 Grant Application
    - Provided application support and committed to collecting tissue for funded project.

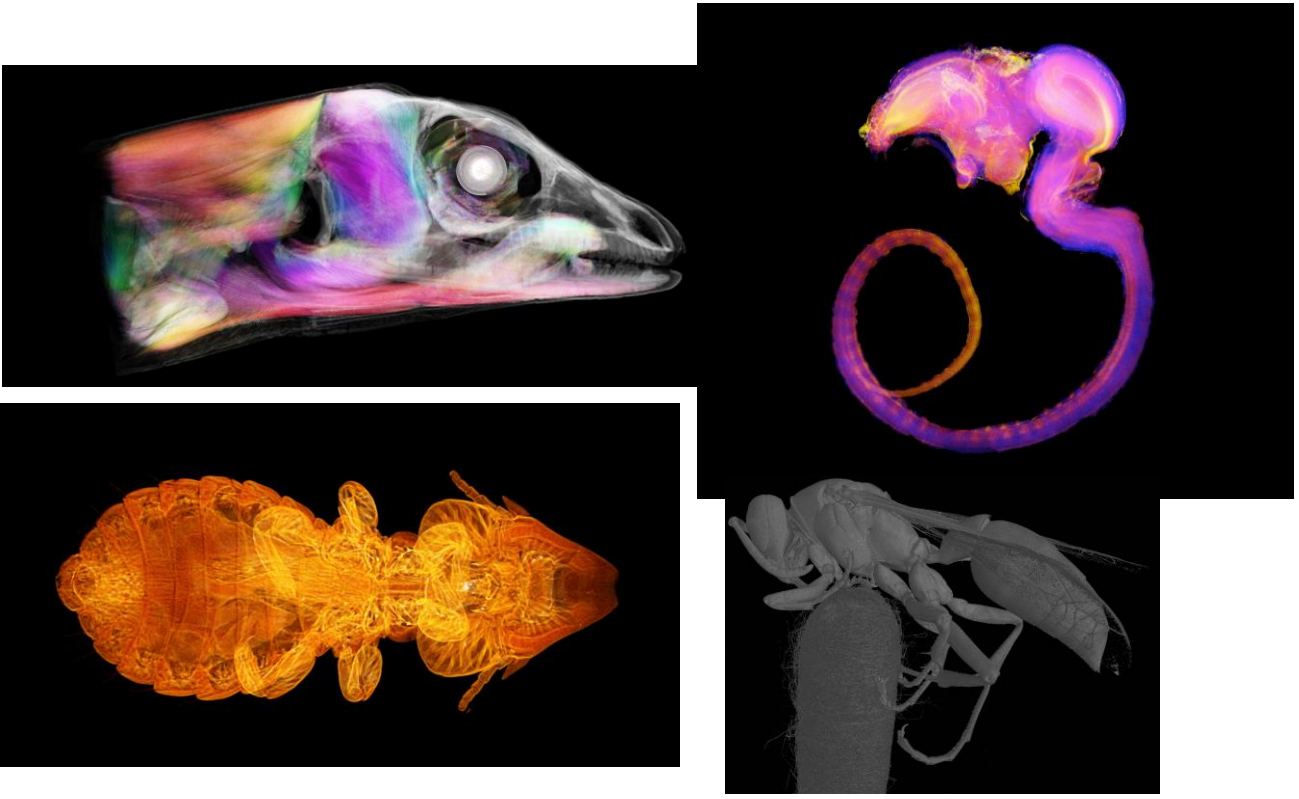
What should HuBMAP do ?

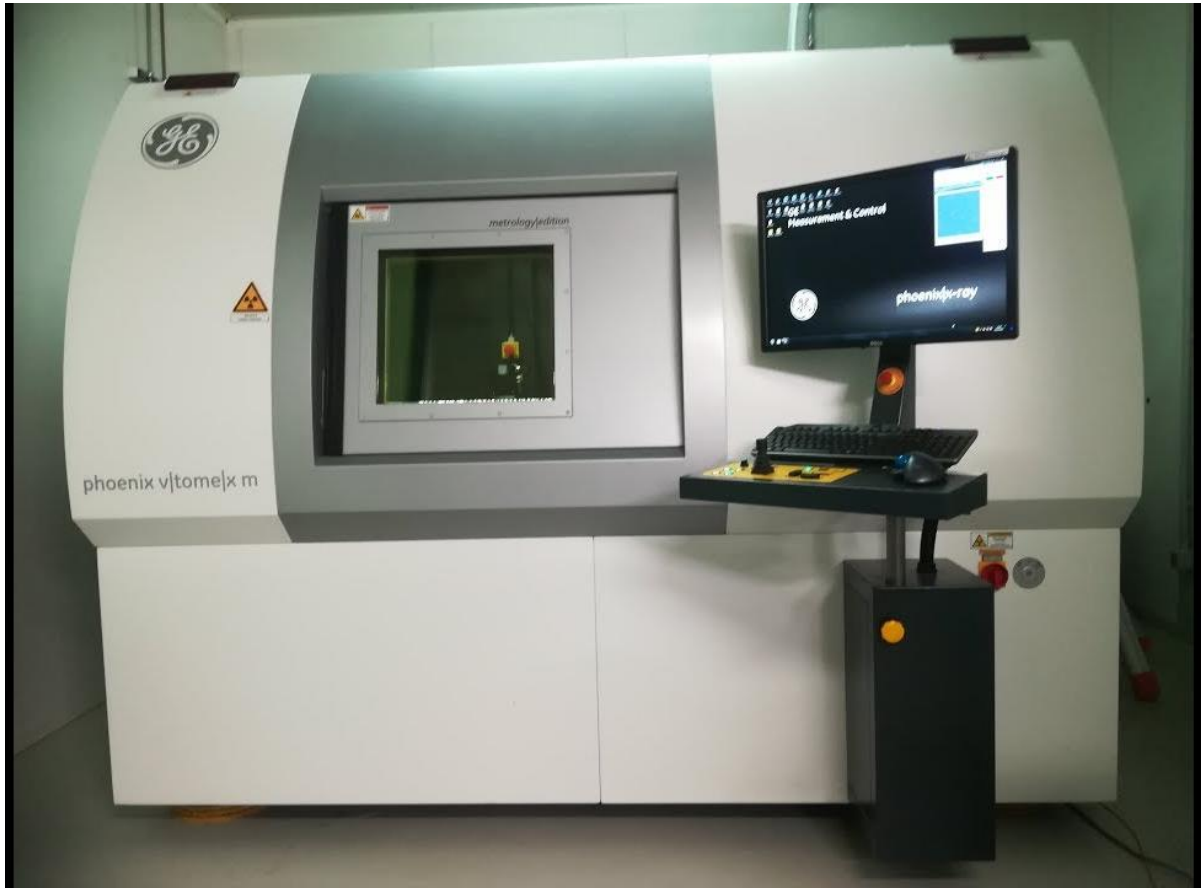
- Consortium priorities should include
  - Cultivating interaction between technologists performing the same techniques at the bench level .
  - Identify HIVE staff to assist with site specific integration of multiple modalities.

UF Computed Tomography System

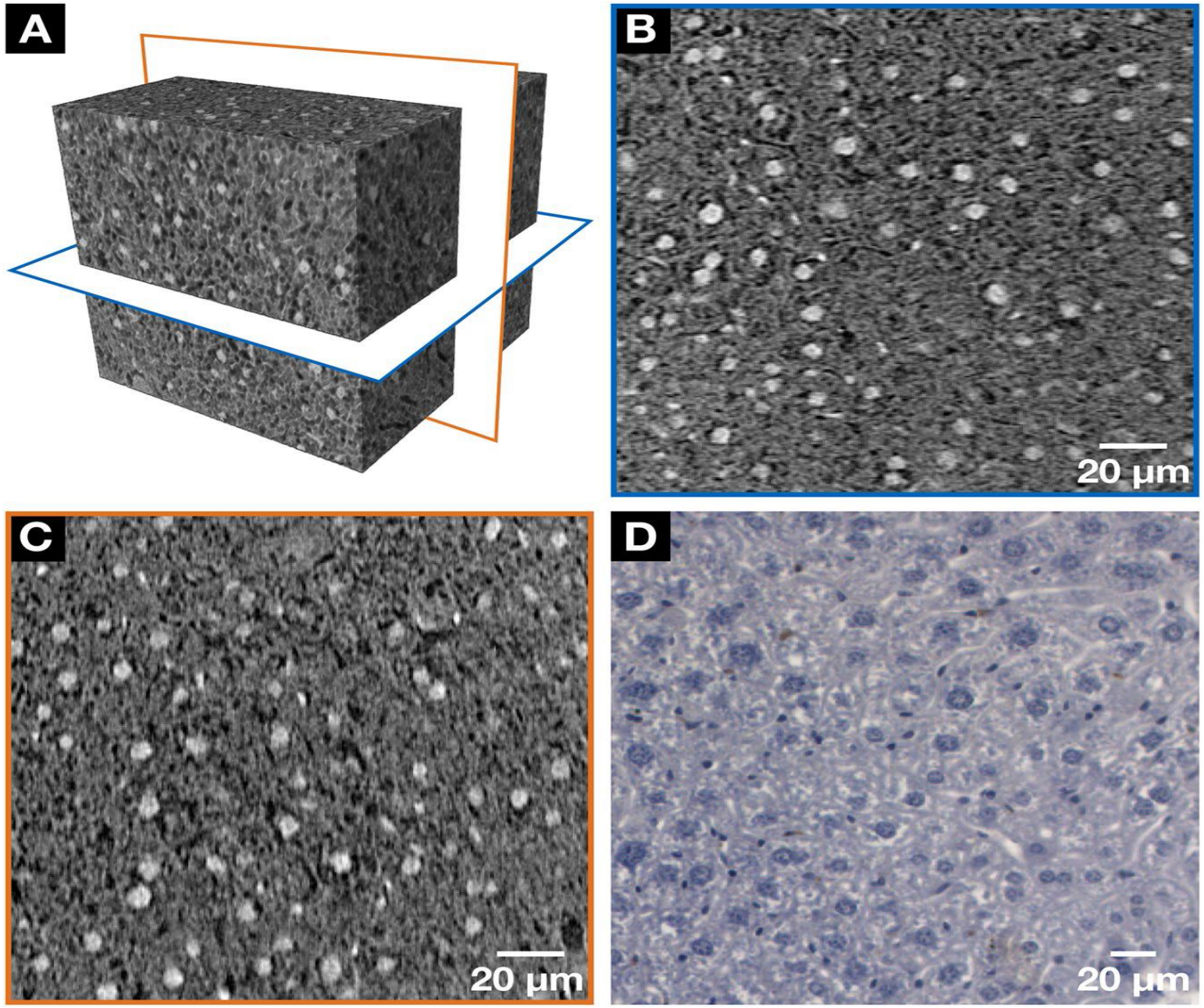
Nanoscale Research Facility

GE Phoenix V|Tome|X M
Dual Tube system
Nanofocus X-ray tube = <1µm resolution
Temperature stabilized digital GE DXR detector (up to 30 fps)
Fast Scans, Multiscans, and Batch Scan capable.






Z
X
Y



Muller, M. *et al. Sci Rep* (2018)