3D ex vivo imaging and characterization of vascular network in rodent heart

Tissues & Organs • Ligh Sheet • Advanced Media • Vascular Network • Cardiology

YOUR NEEDS

- Study of the impact of pathologies on the cardiac vascular network
- Preclinical study of treatment efficacy

OUR SOLUTIONS

- Light sheet microscopy and clearing to characterize the vascular network in 3D
- Automated 3D image processing for microvascular network quantification

General Procedure

Prior to sample collection by Imactiv-3D:

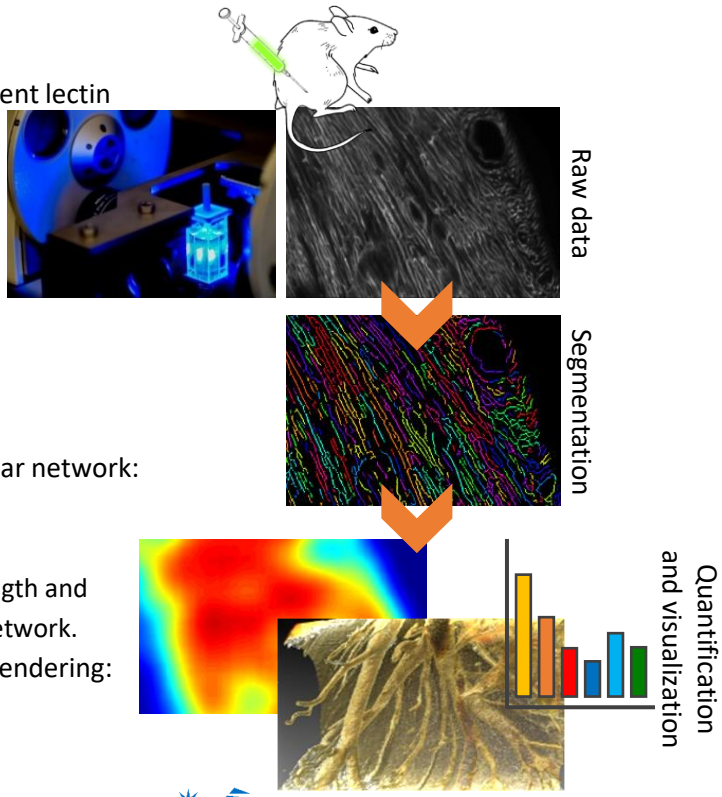
- In vivo labelling by infusion with a fluorescent lectin before euthanasia.
- Formalin fixation of extracted sample.

Image acquisition:

- Sample clearing.
- 3D light sheet fluorescence microscopy.
- Multi-position acquisition.

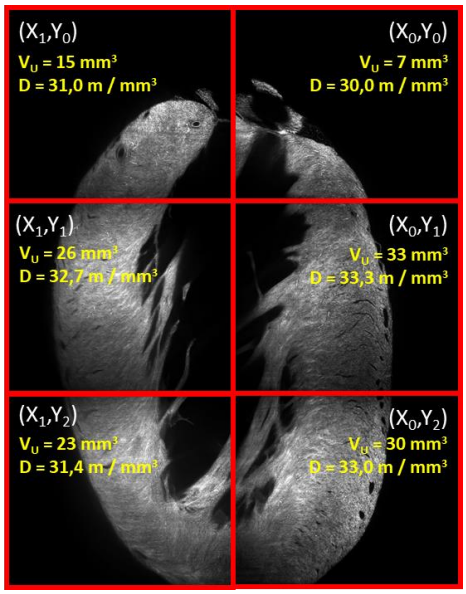
Image processing and analysis:

- Quantitative characterization of the vascular network:
  - Vessel segmentation.
  - Extraction of efficient volume.
  - Computation of parameters of interest: length and size of the vessels, density of the vascular network.
- 3D visualization with surface and volume rendering:
  - Reconstruction of the whole sample.
  - Advanced display using 3D animations.



Application example

in collaboration with SERVIER



- **Aim**: characterization of the microvascular network of a whole rat heart.
- **Technical specifications**:
  - Whole sample acquisition using 6 to 9 fields of view.
  - Raw data amounts to about 200 GB or 100 billion voxels.
  - Image processing takes 14 hours using a parallel architecture.
- Analysis of the microvascular network in 33 samples following this procedure exhibited an internal variation of only 3.5 % with respect to the mean.
- Assessment of micro-vascular alteration in pathological rat with comorbidities such as hypertension/diabetes (and effect of a potential treatment on vascular density).

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