

Histology Services for Cardio-Vascular Research and Development using Laser Microtomy

Introduction

In cardiovascular medicine insertion of stents into arteries or heart valves is a frequently used method. For product approval by a regulatory body, the stent material must first be tested in a preclinical animal model. Histology is part of the evaluation scheme applied. When testing metal stents, current histological methods require stented vessels to be first embedded into resin or plastic and then sectioned thick using a diamond studded blade/wire or sectioned thin using a tungsten-carbide knife. The metal stent material can cause many artefacts during these mechanical methods of microtomy. Additionally, the preparation of sections is far from easy, as both methods typically require multiple lengthy steps in order to achieve a mounted section ready for staining.

Laser microtomy as a non-contact laser-based process to prepare histological thin sections facilitates:

- Time saving due to higher throughput
- Material saving compared to ground sectioning and diamond saw/wire techniques
- Semi-serial sectioning based on minimal material loss possible
- Quality control of sectioning via Optical Coherence Tomography
- Good preservation of the structure of implant-tissue interface
- No sectioning artefacts thanks to contact free cutting

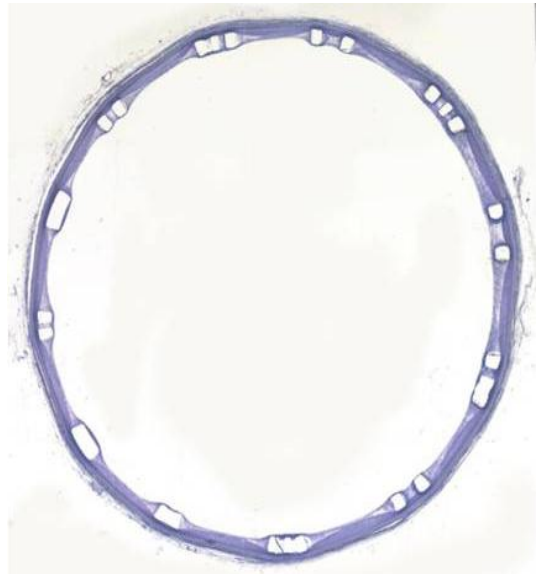
Thin sectioning for histology by laser microtomy

We offer to cut your tissue, organ, biopsy or sample according to your needs:

- Sections of embedded tissue samples (except paraffin embedding)
- Sections of samples containing biomaterials or implants. Usually polymer implants can be cut, metal implants are removed with the remaining block after cutting, due to the fact that metal is not sliceable by the laser. The interface stays intact.
- Sections of non-decalcified hard tissue

Histological Staining Service

All common staining protocols for vessel analysis are provided. Standards are Haematoxylin & Eosin, Verhoeffs Elastica, Movat Pentachrome, Elastica van Gieson, Masson Goldner. Other staining protocols and immunohistochemistry are offered on request.

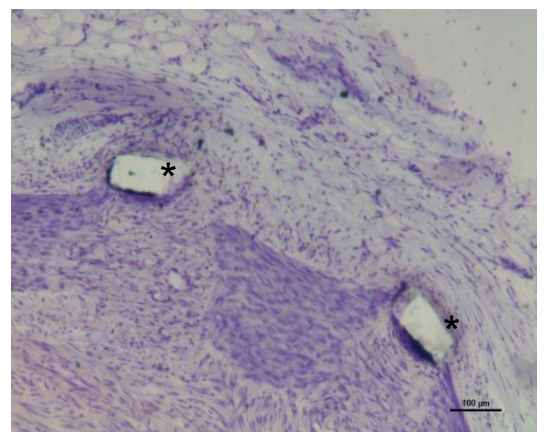


Histologic image of coronary artery with metal stents sectioned with TissueSurgeon, Sanderson's Rapid Stain.



Courtesy of MED Institute

Detail of stented vessels showing the stent-tissue interface. H&E stain, (*) show empty positions of stent inside tissue.



Detail of stented vessels showing the stent-tissue interface, Sanderson's Rapid Stain, (*) show empty positions of stent inside tissue.

Specimen preparation and embedding service

For routine laser microtomy samples have to be embedded in resin (e.g. epoxy resin, MMA). We offer fixation and/or embedding service with the right medium for your special sample. Alternatively, we offer embedding protocols customized for laser microtomy to embed in your own lab to get the best results for you.

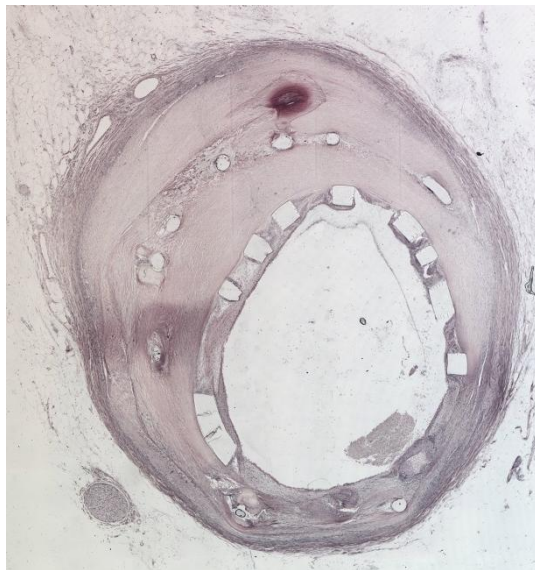
Imaging and documentation

Laser microtomy with integrated imaging enables a unique combination of imaging and cutting, facilitating analysis and dissection of samples.

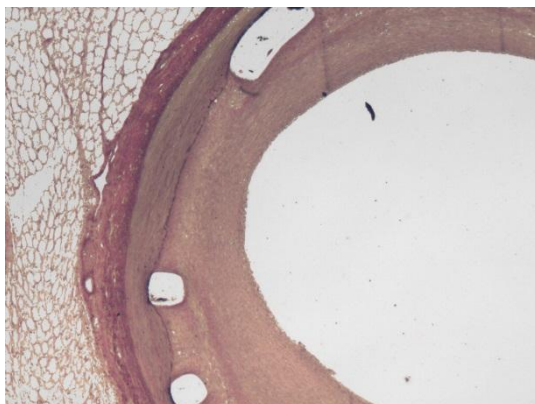
- Optical Coherence Tomography for monitoring of cutting process and quality control
- 3D Optical Coherence Tomography for 3D reconstruction on request
- Histological documentation of sections in transmitted light, phase contrast and fluorescence mode

Histomorphometry

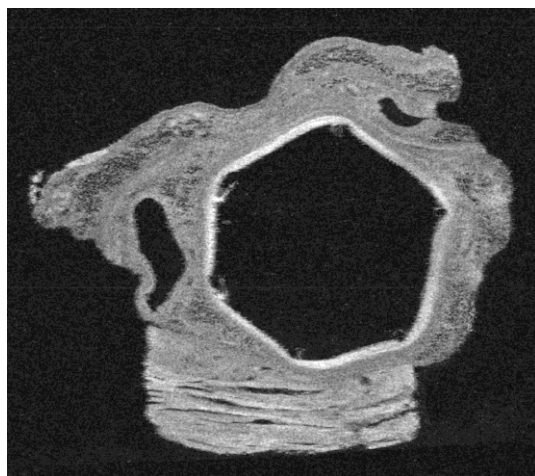
Quantitative coronary vascular histomorphometry to analyze stent-related pathophysiological processes imply standard parameter as vessel and lumen diameter, vessel and luminal area, injury or inflammation score. Reports are provided according to international standards.



Histological section of MMA-embedded coronary artery with bioresorbable stent. H&E stain



Histological section of MMA-embedded coronary artery. Special stain (Verhoeffs Elastica) to show elastic fibers in stented vessel.



OCT-reconstruction of coronary artery containing metal stent.