Microradiographic Guidance of Flow Modifying Stents

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Supported by EB002873

Microradiographic Guidance of Flow Modifying Stents - S. Rudin, PI

U. Buffalo-Toshiba Stroke Research Center:

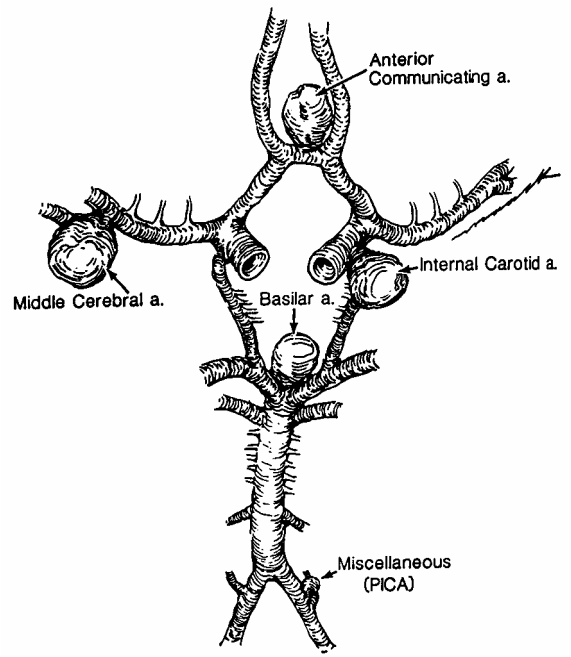
Multi-disciplinary, Multi-decanal, Multi-departmental Groups:

Imaging Physics, Bio-engineering (hemodynamics), Clinical intervention

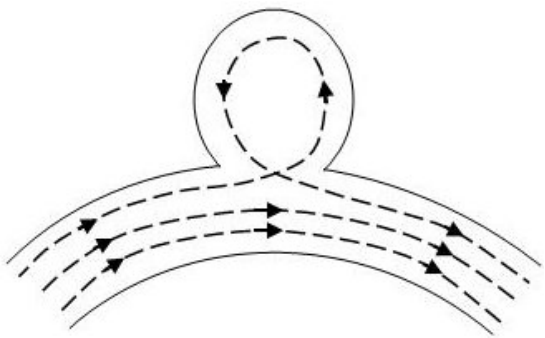
Aim: to build a very high spatial resolution, rapid frame-rate region-of-interest (ROI) x-ray detector system, the micro-angiographic fluoroscope (MAF), and to use it for guiding and evaluating new stents used for flow modification in the treatment of intracranial aneurysms.

Application to aneurysms in Circle of Willis:

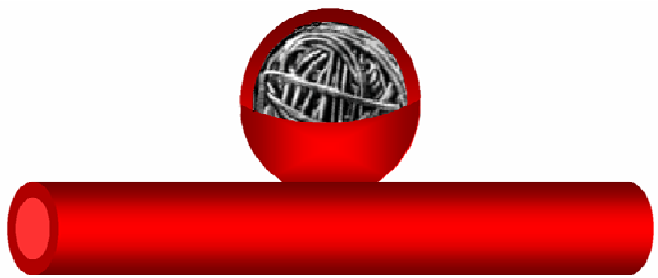
(notice small perforator side-branch vessels)



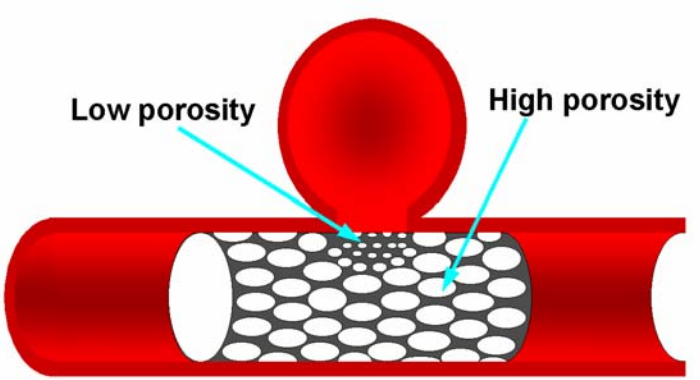
Vortex flow in untreated aneurysm:

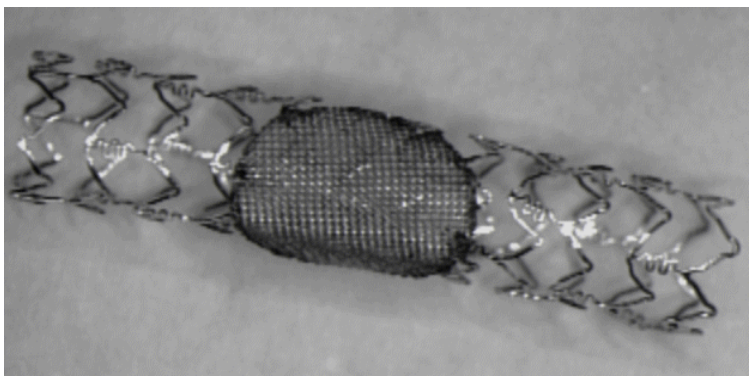


Problems with current treatment of coiling: remnant regrowth, poor endothelialization, may go into main vessel, not for giants, wall perforation

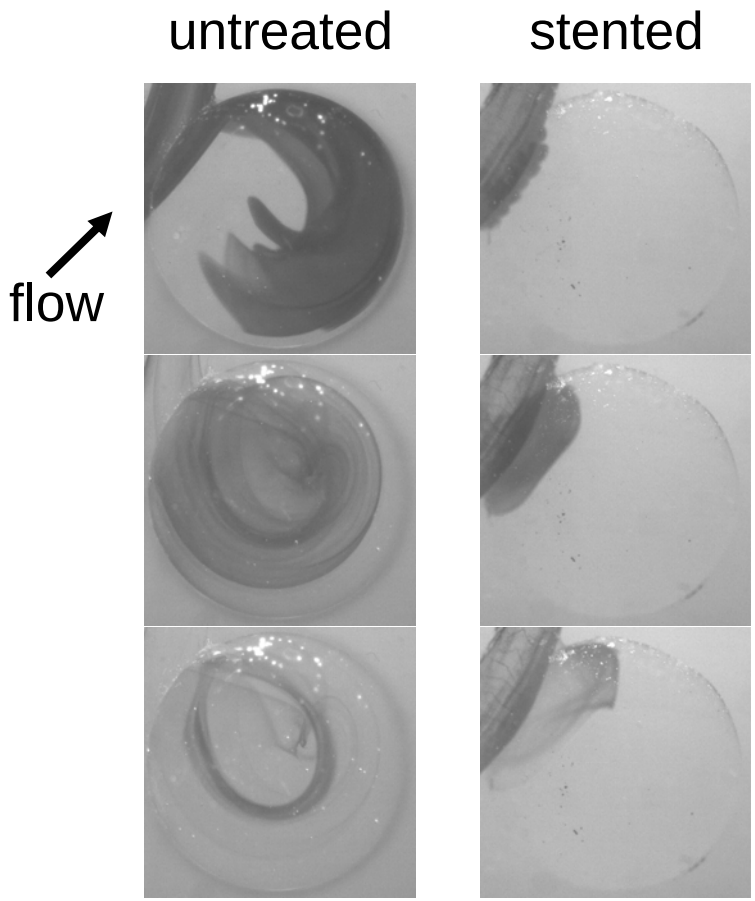


Asymmetric stents for flow modification and reduction of wall shear stress:

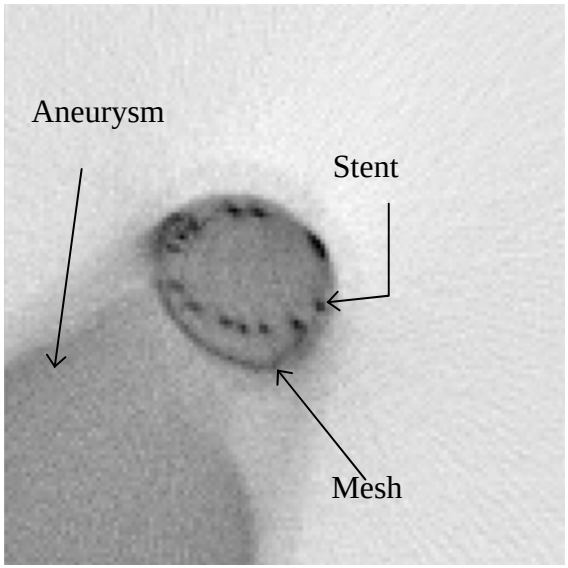




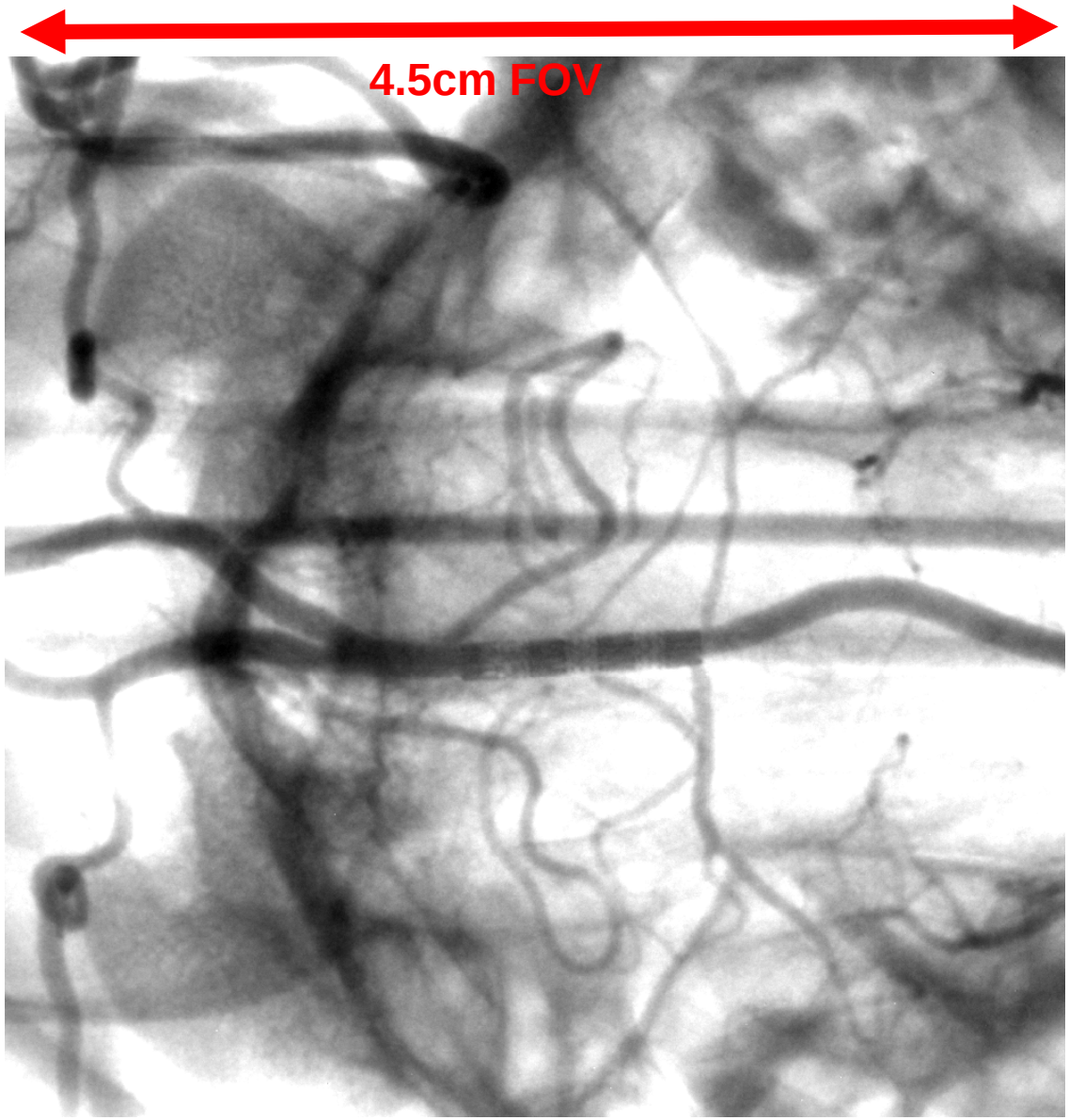
mesh stent



Localization and Evaluation with high resolution micro CT and micro-angiographic fluoroscopy in phantoms and animals

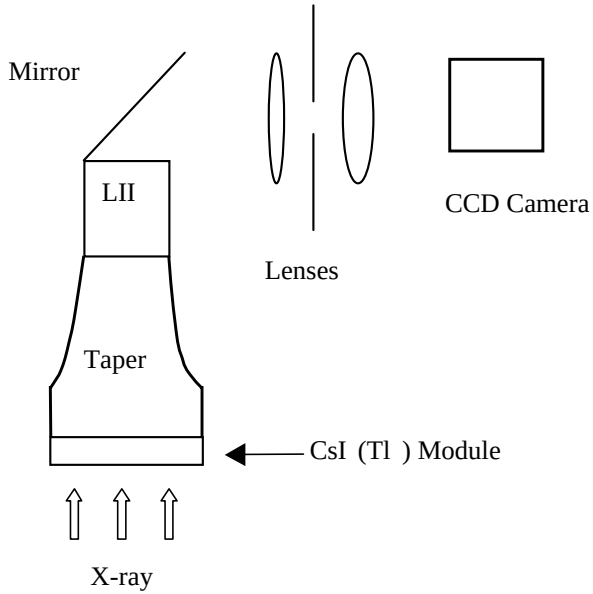


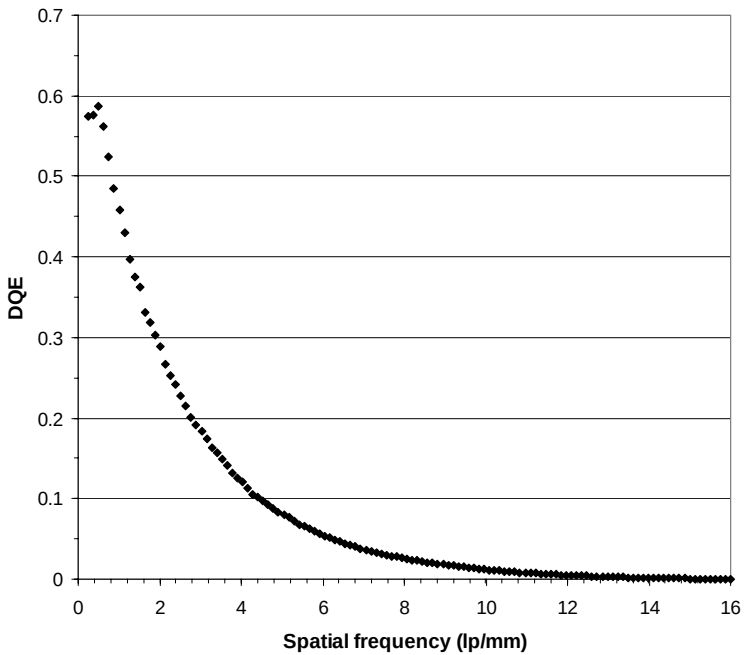
Micro CT of 3mm diam. phantom vessel.

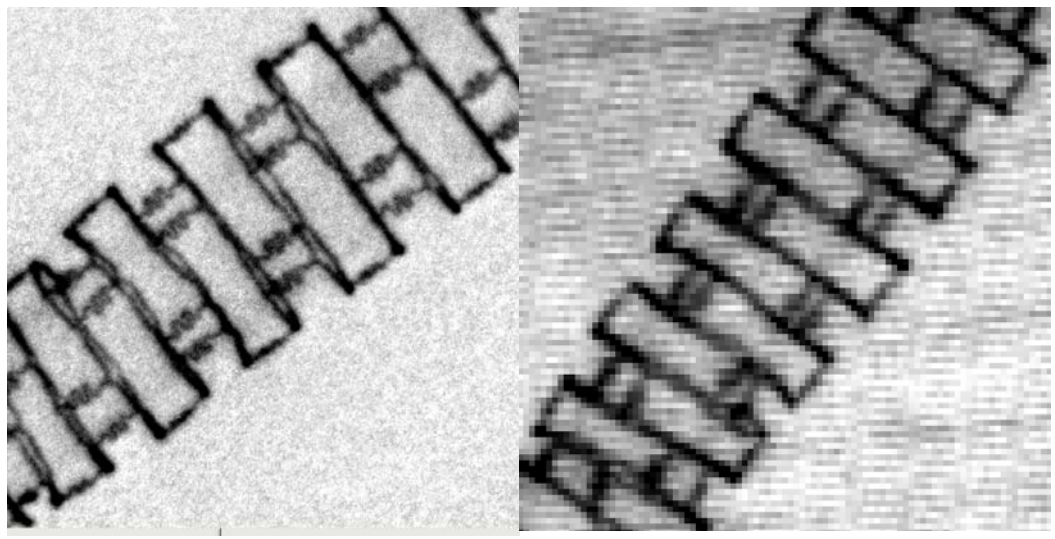


Canine with 1.3 mm diam. stent (Bx Velocity) in basilar artery with perforator-like side-branches.

Micro-Angiographic Fluoroscope (MAF)







MAF II

University at Buffalo
The State University of New York

TOSHIBA STROKE RESEARCH CENTER

Microradiographic Guidance of Flow Modifying Stents

Review of specific goals:

1. Build micro angiographic fluoroscope (MAF)
2. Characterize MAF (MTF, NPS, NEQ, DQE)
3. Asymmetric stent
4. Flow studies (PIV, CFD)
5. Evaluate IGI in phantoms and animals
6. Adapt MAF for rot-DSA, ROI-CT in phantoms and animals
7. Adapt MAF design for clinical applications