

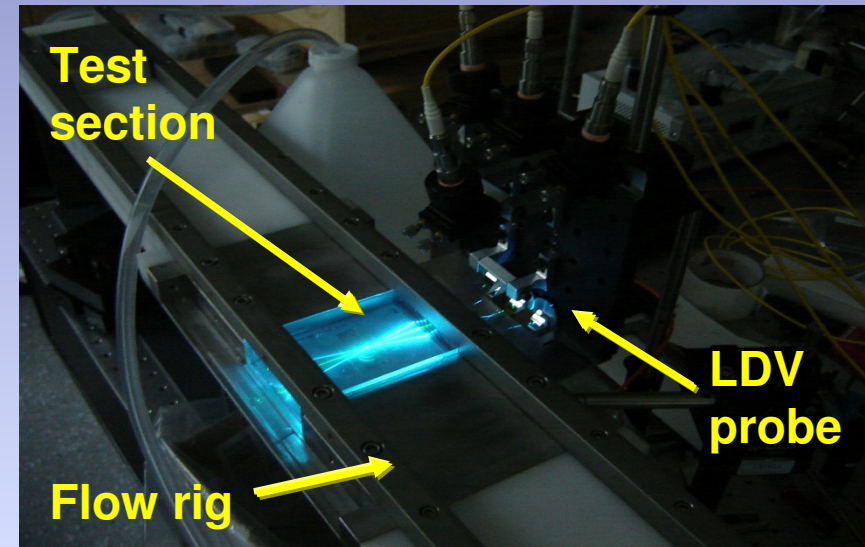
BLOOD FLOW INDUCED SHEAR STRESSES AND THE ENDOTHELIUM BIOCHEMICAL RESPONSE

Background

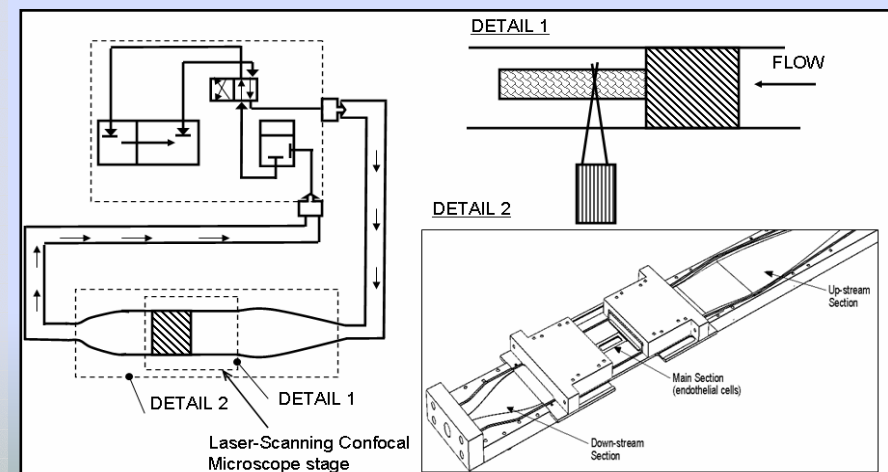
Blood flow causes shear stress on the artery wall to which the endothelial cells respond. This may lead to cell dysfunction and arterial disease.

Objective

A hemo-dynamic flow rig is being used to quantify the surface shear stress - cell response relationship using near-wall flow measurements and simultaneous imaging of cell response.



Hemo-dynamic rig and the micro-LDV probe during experimentation



Hemo-dynamic flow facility plan view

Research To Be Carried Out

- To obtain a 2-D velocity field over endothelial cells (ECs) near the surface under realistic pulsatile conditions.
- To quantify the surface shear stress distribution over the individual ECs close to the surface using micro-optical anemometry.
- Analysis of the response of the ECs on the order of seconds, where vital key responses take place, using LSCM.



Hemo-dynamic rig mounted on the Laser Scanning Confocal Microscope (LSCM) stage

Expected Outcomes

Description of the role of hemo-dynamic forces in the onset and development of an arterial narrowing (stenosis) so we understand how these diseases develop.