

**Eugenia Corvera Poiré**

*Departament de Física Fonamental, Universitat de Barcelona*

## **Vascular alterations. Screening, rerouting, robustness and critical sites for blood supply**

### **Abstract:**

We identify key morphological sites in a tree-like vascular network that are critical for the overall capacity of the network to supply blood to a tissue after vascular alterations. We study two types of alterations: remodeling in the form of anastomosis, and occlusions.

Our results allow us to argue that, to a large extent, the response of the network is determined locally. That is, it depends on the structure that the vessel network has in a small neighborhood around the place where vascular alterations occur. This implies that whenever there is an underlying tree-like network in an in-vivo vasculature, for instance in the mesentery, or in the pial network of the middle cerebral artery, our model is able to interpret how important vascular alterations are for the irrigation of a tissue.

We compare redundant vascular networks with non-redundant ones - that in the absence of obstructions have the same resistance to flow- and find that relatively small occlusions in the lumen of vessels in the non-redundant networks, reduce as much the blood supply as total occlusions do when redundancy is present.

We also observe that redundancy has a screening effect over obstructions and that rerouting of blood flow in the network takes place when small occlusions occur.

**Date:** June 26, 2013

**Place:** Room C1/028

**Time:** 15:00

