Glycocalyx and endothelial (dys) function: from mice to men

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Abstract:
Located on the luminal surface of vascular endothelial cells, the glycocalyx is composed of a negatively charged mesh of proteoglycans, glycosaminoglycans, glycoproteins and glycolipids and harbors a wide array of enzymes that contribute in regulation of leukocyte-thrombocyte adherence, with a principal role in plasma and vessel wall homeostasis. Glycocalyx disruption is accompanied by enhanced sensitivity of the vasculature towards atherogenic stimuli which emphasizes that not only the composition of the glycocalyx is important in facilitating these properties but that the contribution of its physical dimension and barrier properties should also be considered. In addition, similarities found between micro-versus macro vascular beds suggest common structural properties throughout the entire vascular bed that might be of importance in protective strategies against vascular perturbation. Collectively, these data lend support to a potential role of the glycocalyx as a first barrier in protection against atherogenic insults. Therefore, it will be a challenge to determine whether glycocalyx volume measurement, systemically or at the individual capillary level, is a feasible surrogate marker for cardiovascular disease, and whether it may prove to be of use to assess the impact of novel interventions aimed at glycocalyx restoration on atherosclerosis progression.

Key words:
glycocalyx, endothelium, composition, permeability, volume assessment