

Targeting Nanomedicine to Vascular Endothelium

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Extended Abstract

Endothelium, a thin monolayer of highly specialized “epithelium-like” cells lining vascular lumen of blood vessels is the key regulatory interface between blood and tissues that controls numerous vital functions. Endothelial abnormalities are implicated in many disease conditions. Nanocarriers safely delivering therapeutic and reporter agents to endothelium may improve management of these conditions. Drugs and their carriers have no natural affinity to endothelium, but nanocarriers targeted to molecules expressed on the endothelial luminal surface optimize drug delivery to these cells. Endothelial determinants acceptable for this goal must be accessible to circulating carriers and carrier binding must produce no harmful effects, while providing optimal addressing of the drug cargo. Pathological factors modulate endothelial targeting and uptake of nanocarriers. Endowing carriers with an affinity to specific endothelial epitopes enables an unprecedented level of precision of control of drug delivery: binding to selected endothelial cell phenotypes, cellular addressing and duration of therapeutic effects. Using these nanocarriers for endothelial delivery of antioxidant and anti-inflammatory agents provides therapeutic effects unattainable by non-targeted counterparts. These results obtained in animal studies provide a strong support for expedited translational efforts in endothelial nanomedicine.