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Neurovascular interface in stroke: Effects of age

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The major barriers of the brain, the blood-brain barrier (BBB) and the blood-CSF barrier, tightly regulate the transport of molecules, cells and ions between the peripheral circulation and parenchyma. Barrier properties change during brain maturation and aging, affecting susceptibility to and the pathophysiology of various neurodegenerative diseases in age-related manner. Data are emerging that the phenotypic endothelial cell heterogeneity, the more elaborate capillary network in the adult, differences in regional responsiveness of the vessels, pericyte and astrocyte phenotypes and coverage, distinctly modify hemodynamic regulation and BBB integrity after arterial stroke in newborns, children and adults. We will discuss the role of leukocyte-microglial communications in modifying BBB integrity in experimental stroke in three age groups. In particular, we will demonstrate that BBB is strikingly more integrant after perinatal stroke than after adult stroke, in part due to age-dependent expression of extracellular matrix proteins and tight junction proteins. We will then discuss our findings that at least a subpopulation of microglial cells protects both BBB integrity and the neonatal brain based on adverse effects of depletion of microglial cells or inhibition of microglial TGFbeta1 signaling on neurovascular integrity in injured brain. We will also discuss how disruption of monocyte and neutrophil signaling affects BBB structure-functional responses in stroke induced in different age groups.

Biography

Zena Vexler has served as Director of Research at Neonatal Brain Disorders Center, since 2003. She has served on the NIH study sections and chaired Brain 2 and Brain 3 Committees for American Heart Association. She has multi-disciplinary training in chemistry, biochemistry, pharmacology and physiology. For more than 25 years, her research has been centered on the mechanisms of experimental stroke, including cerebrovascular injury and neuro-inflammation.

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