

Effects Of Aging On Endothelium-Dependent Vasodilation In Cerebral Arteries

AMANDA DE JONG, LANDON EVANS, ELISA BOYRD, AND SCOTT A. SPIER

Department of Health & Kinesiology, University of Texas at Tyler, Tyler, TX.

ABSTRACT

Regional cerebral blood flow (CBF) decreases with aging. This reduction may be due to a diminished endothelium-dependent vasodilation in large cerebral arteries with aging in the absence of disease. The posterior communicating arteries (PCoA) supply blood flow to the midbrain areas where age-related regional decreases in blood flow have been observed. Furthermore, the PCoA appear to be clinically relevant in age-related cerebrovascular disorders. However, age-related changes in the vasoreactivity of PCoA have not been investigated in the absence of disease. The purpose of this study was to determine the effect of aging on endothelium-dependent vasodilation of PCoA in rats. Posterior communicating arteries (PCoA) were isolated from the brain of 4 month old ($n = 4$) and 24 month old ($n = 4$) male Fischer 344 rats. The isolated arteries were cannulated and pressurized to 90 cm H₂O via hydrostatic reservoirs. Luminal diameter changes were determined in response to the endothelium-dependent vasodilator, Bradykinin (BK) ($10^{-13} - 10^{-7}$ M) and the direct vascular smooth muscle dilator, sodium nitroprusside (SNP, $10^{-10} - 10^{-4}$ M). Responsiveness to the endothelium-dependent vasodilator BK was diminished in PCoA of aged rats compared to young rats, whereas responsiveness to the endothelium-independent vasodilator SNP was not different between PCoA of young and old rats. These data demonstrate that aging is associated with diminished endothelium-dependent vasodilation in PCoA, whereas vascular smooth muscle responsiveness remains intact. Thus, regional age-related reductions in cerebral blood flow may be related to diminished endothelium-dependent vasodilation in PCoA.