Development and functional analysis of the *in vitro* BBB model derived from stroke-prone spontaneously hypertensive rats.

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Stroke-prone spontaneously hypertensive rat (SHRSP) is widely accepted as an animal model of hypertension and cerebrovascular disease. SHRSP occurs BBB dysfunction even if chronic hypertension and onset of stroke are not well-established. The properties of BBB are maintained by cross-talk between brain endothelial cells and surrounded adjacent cells, such as astrocytes and pericytes. To reveal the detailed mechanism underlay the BBB dysfunction of SHRSP, we constructed an *in vitro* BBB model using brain endothelial cells, pericytes, and astrocytes. Isolated brain capillary endothelial cells (BECs) from SHRSP showed leaky barrier function and altered composition of tight junction proteins (claudin-5 and occludin). The co-culture method of BECs and astrocytes indicated that SHRSP astrocytes had less ability to induce barrier function on BECs than did astrocytes derived from normotensive control rat (WKY/Izm). In comparison using the triple co-culture model, SHRSP model showed a weak barrier function than WKY model. These results suggest that BBB-relate cells in SHRSP have different properties and the defective interactions among these cells. This altered cross-talk may be related to occurrences of cerebrovascular diseases in SHRSP.