Effect of selective serotonin reuptake inhibitors on expression of 5-HT1AR and neurotransmitters in rats with vascular dementia

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ABSTRACT. 5-hydroxytryptamine receptor 1A (5-HT1AR) is closely associated with cognitive functions. Selective serotonin reuptake inhibitors (SSRIs) can protect individuals from brain damage following ischemia/hypoxia. To investigate the function of SSRIs in vascular dementia (VD), we established a rat model of VD, and observed the effect of SSRIs on the expression of 5-HT1AR mRNA and neurotransmitters. Male SD rats (6 months) were randomly assigned

into sham, model, and SSRI groups (N = 30). VD was achieved by permanent ligation of the bilateral common carotid artery. Escitalopram, a highly selective 5-HT reabsorption inhibitor, was *ip* injected into the rats for three consecutive weeks. The Morris water-maze was used to test learning and memory. H&E staining for neuronal injury was conducted on cortical and hippocampal tissues. HPLC was used to determine the levels of dopamine (DA), 5-HT, and norepinephrine (NE). RT-PCR was used to determine expression of 5-HT1AR mRNA. As compared to control rats, model animals demonstrated elongated escape latency, lower platform crossing times, and significant injuries to hippocampal CA1 neurons. This was accompanied by reductions in DA, 5-HT, and NE levels in hippocampal tissues, as well as reduced cortical 5-HT and decreased 5-HT1AR mRNA expression ($P < 0.05$). Escitalopram treatments reduced escape latency, elevated platform crossing times, improved CA1 neuronal damage, increased DA and 5-HT levels in hippocampal and cortical neurons, as well as elevated expression of 5-HT1AR mRNA ($P < 0.05$). Therefore, SSRIs may improve cognitive dysfunction of VD rats, possibly by stimulating expression of neurotransmitters and protecting neurons.

Key words: Vascular dementia; Neurotransmitter;
5-HT selective reuptake inhibitor; 5-HT receptor 1A; Escitalopram