Porphyromonas gingivalis

Systemic organ dysfunction is one of the important issues for the patients with Alzheimer's disease (AD) and their caregivers. Recent evidences suggest that periodontitis is a possible risk factor for progression of AD and lipopolysaccharide derived from Porphyromonas gingivalis (Pg-LPS) which is a major periodontopathic bacteria induces cognitive impairment in mice. However, the precise relationships between the brain exposure of Pg-LPS and systemic organ dysfunction in AD patients are still undetermined.

In a study, Hayashi et al., investigated whether brain exposure of Pg-LPS induced systemic organ dysfunction in a model of AD mouse. They employed 6 (young) and 13 (middle-aged) months-old 5XFAD mice and 6 months-old littermate (LT) mice, and treated with intracerebroventricular (ICV) injection of 2 µg Pg-LPS or saline (vehicle). The animals were monitored cognitive functions (Y maze, nest building, and Morris water maze tests), motor functions (wire hang and rotarod tests), physical condition (symptom score), and blood pressure (BP). Twenty-eight days later, their organs were weighted and the organ damages were examined. Continuous ICV injection of 2 µg/day Pg-LPS increased ionized calcium binding adapter molecule-1 (Iba-1) and cluster of differentiation 3 (CD3) positive cells in periventricular area of 5XFAD mice without enhancement of cognitive impairment, amyloid β protein deposition, expressions of phosphorylated nuclear factor-kappa B (NF-κB) and cyclooxygenase-2 (COX-2). In addition, the Pg-LPS lowered the latency of rotarod test in young 5XAD mice and also reduced symptom score and weight of gastrocnemius muscle in the middle-aged animals. Moreover, the Pg-LPS induced cardiac atrophy in both young and middle-aged 5XFAD mice, and increased Iba-1 positive cells in left ventricle of the young animals. On the other hand, single ICV injection of 2 µg Pg-LPS in 5XFAD and continuous injection of 2 µg/day Pg-LPS in LT mice did not show any positive findings. Our present results demonstrated that continuous brain exposure of Pg-LPS started sarcopenia and cardiac injury without enhancing cognitive impairment in AD model mice [1].

1)
Hayashi K, Hasegawa Y, Takemoto Y, Cao C, Takeya H, Komohara Y, Mukasa A, Kim-Mitsuyama S. Continuous intracerebroventricular injection of Porphyromonas gingivalis lipopolysaccharide induces systemic organ dysfunction in a mouse model of Alzheimer's disease. Exp Gerontol. 2019 Feb 17. pii: S0531-5565(18)30570-9. doi: 10.1016/j.exger.2019.02.007. [Epub ahead of print] PubMed PMID: 30786259.