Jun Cai, M.D., Ph.D.

Assistant Professor
Department of Pediatrics
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Research Activities:

The white matter consists mainly of myelinated axons, which is distributed into some specific areas including spinal cord, prefrontal cortex, corpus callosum, limbic system, and cerebellum etc. It plays an indispensable function not only on motor movement but advanced neuro-behaviors as well, such as self-discipline, judgment, problem solving, emotional management, long-term memory, and coordination. Both extrinsic and intrinsic cues that impact on either the developing process or the developed architecture will lead to the neurological disorders. The research activities in Dr. Cai's lab focus on understanding molecular, genetic and epigenetic regulations of white matter development in the CNS as well as pathological mechanisms in white matter impairment. The myelin-forming process and oligodendroglial-axonal interaction are targeted by use of genetic, molecular and cellular approaches on the mouse models resembling human CNS development and neurological diseases. The study aims: (1) to identify and characterize candidate genes that are specifically expressed in neurons or glias; (2) to investigate the 'molecular switch' in the CNS that are involved in white matter injury; (3) to develop molecular and/or cellular strategies for preventive or therapeutic purpose.

Grants Funded:

Role: PI
Grant Title: Vulnerability of defective myelin to intermittent hypoxia during sleep
Funding Agency: Sleep Research Society Foundation/J. Christian Gillin, M.D. Research Grant
Total Direct Costs Funded: $20,000

Role: Co-I, COBRE supported junior faculty
Grant Title: Molecular determinants of developmental defects (Robert M. Greene, PI) Subproject - Intermittent hypoxia-mediated oligodendrocyte defects in a murine model of gestational sleep apnea
Funding Agency: NIH/NCRR/NGM
Total Direct Costs Funded: $100,000/year

Role: PI
Grant Title: PAF signaling and white matter development in the CNS
Funding Agency: Department of Pediatrics, University of Louisville School of Medicine
Total Direct Costs Funded: $25,000

Publications:

Cai J, Tuong C, Gozal D. A neonatal mouse model of intermittent hypoxia associated with features of apnea in preterm infants. Respiratory Physiology and Neurobiology 178 (2): 210-217 (2011).

Cai J, Tuong C, Zhang YP, Shields CB, Guo G, Fu H, Gozal D. Mouse intermittent hypoxia mimicking apnea of prematurity: effects on myelinogenesis and axonal maturation. Journal of Pathology 226: 495-508 (2012).

Fu H, Kesari S, **Cai J**. Tcf7l2 is tightly controlled during myelin formation. Molecular and Cellular Neurobiology 32(3):345-352 (2012).

Yin X, Zheng Y, Liu Q, **Cai J**, Cai L. Cardiac response to chronic intermittent hypoxia with a transition from adaptation to maladaptation: The role of hydrogen peroxide. Oxidative Medicine and Cellular Longevity 2012:569520 (2012).

Kang SS, Keasey MP, **Cai J**, Hagg T. Loss of neuron-astroglial interaction rapidly induces protective CNTF expression after stroke in mice. Journal of Neuroscience 32(27): 9277-9287 (2012).

Sun WX, Yin X, Wang Y, Tan Y, Cai L, Wang B, **Cai J**, Fu Y. Intermittent hypoxia-induced renal antioxidants and oxidative damage in male mice: hormetic dose response. Dose-Response, in press (2012).

External Professional Activities:

- Ad hoc reviewer, projects for the Blue-Sky program of the French National Research Agency (ANR), 2012
- Editorial Boards, Associate editor, International Journal of Clinical and Experimental Pathology
- Editor, Pediatrics & Therapeutics
- Peer manuscript reviewer for Development, Neurobiology of Disease, Stem Cells and Development, Molecular Biology Reports, Pediatrics Research, Pediatrics & Therapeutics, Neural Regeneration Research, Journal of Clinical Endocrinology and Metabolism.