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The detrimental roles of neutrophil gelatinase-associated lipocalin in ischemic stroke

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Ischemic stroke is a major cause of death and long-term disability worldwide. Tissue plasminogen activator (tPA) is the only drug approved for pharmacological intervention to reverse acute ischemic stroke, but reestablishment of circulation may paradoxically initiate reperfusion injury. Activated immune cells (neutrophils, macrophages) infiltrate into ischemic brain tissue, release free radicals, pro-inflammatory cytokines and proteins, thus causing brain edema, disruption of blood-brain barrier (BBB) and neuronal cell death. Therefore, treatments that can inactivate these immune cells and limit stroke-reperfusion injuries are urgently needed. Our recent results demonstrate that neutrophil gelatinase-associated lipocalin (NGAL) was acutely induced in mice and humans after ischemic stroke and is an important mediator of stroke-reperfusion injury. Increased levels of NGAL were observed in mouse serum as early as 1 hour after transient middle cerebral artery occlusion (tMCAo), reaching peak levels at 23 hours. NGAL was also detected in neutrophils infiltrating into the ipsilateral hemisphere, as well as a subset of astrocytes after tMCAo, but not in neurons and microglia. Cerebral infarctions, neurological deficits, infiltration of immune cells, pro-inflammatory molecules and BBB permeability after tMCAo was significantly reduced in NGAL null mice. The plasma concentration of NGAL was markedly elevated in patients with ischemic stroke. During a four year follow-up, patients with higher levels of NGAL had higher mortality rates. These results demonstrate that NGAL is a neurotoxic factor secreted rapidly in response to cerebral ischemia, suggesting its potential usage as an early stroke biomarker and a novel therapeutic target to reduce stroke-reperfusion injury.

Biography

Yi-Chinn Weng has completed her PhD from Department of Molecular Medicine, University of Texas Health Science Center, San Antonio and Postdoctoral studies from University of California, San Francisco. She has published several research papers in reputed journals including *Nature*, *Proceedings of the National Academy of Sciences*, *Annals of Neurology* and *Journal of Biological Chemistry*.

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