

Immune and Inflammatory Responses in Neonatal Seizures

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Introduction

There would be an important role for inflammation in the neonatal seizure disorders. Also, in status epilepticus and the brain injury consequences of that, inflammatory processes play an important role. IL-6, IL-1b, TNF-a and immune cells increased expression, has been found in seizure disorders [1-5]. The production of cytokines would be induced by epileptic seizures. Such cytokines production will influence seizures and their pathogenesis. After the occurrence of seizures, releasing the HMGB1 protein and IL-1b from macroglia and astrocytes will happen. IL-1 receptor/Toll-like receptor system's activation would cause this signaling process. Src kinase-mediated phosphorylation of NMDA receptor subunit 2B, would be activated by IL-1 receptor/Toll-like receptor signaling. Neurons depolarization and neuronal excitotoxicity and excitability enhancement will happen due to NMDA mediated Ca influx. Seizure onset and recurrence will be promoted by IL-1 receptor/Toll-like receptor signaling activation [6-10]. On the other hand, IL-1R1 gene's deletions would cause the seizures onset to be delayed. Astrocytes stimulation for synaptic glutamate uptake reduction and glutamate releasing, will happen by microglial TNF-a releasing in the brain. Toxic extra-synaptic NMDA glutamate receptors will be activated by glutamate extracellular flooding. Blood-brain barrier's damage also can be caused by inflammation of the brain. After such damage, the blood-brain barrier leakage will happen [11-15]. Also, such blood-brain barrier's damage leads to albumin entrance into the brain. Then albumin causes the glutamate transporter to be down regulated. Inflammatory mediators and epileptic seizures will reinforce each other, and a positive feedback loop will be formed as a consequence [16,17]. Having knowledge about the mechanisms of the immune and inflammatory responses in epileptic seizures is of importance to understand the pathophysiology of such events and finding novel therapeutic agents to better control and treat epileptic seizures specifically in the pediatric patients group.

References

- Mizrahi EM, Kellaway P (1998) Diagnosis and Management of Neonatal Seizures. Lippincott Raven, Philadelphia, USA.
- Ben Ari Y, Holmes GL (2006) Effects of seizures on developmental processes in the immature brain. *Lancet Neurol* 5(12): 1055-1063.
- Rakhade SN, Jensen FE (2009) Epileptogenesis in the immature brain: emerging mechanisms. *Nat Rev Neurol* 5(7): 380-391.
- Saliba E, Henrot A (2001) Inflammatory mediators and neonatal brain damage. *Biol Neonate* 79(3-4): 224-227.
- Mares P, Mikulecka A (2009) Different effects of two N-methyl-D-aspartate receptor antagonists on seizures, spontaneous behavior, and motor performance in immature rats. *Epilepsy Behav* 14(1): 32-39.
- Wasterlain CG, Niquet J, Thompson KW (2002) Seizure-induced neuronal death in the immature brain. *Prog Brain Res* 135: 335-353.
- Noebels JL (2003) The biology of epilepsy genes. *Annu Rev Neurosci* 26: 599-625.
- Grant PE, Yu D (2006) Acute injury to the immature brain with hypoxia with or without hypoperfusion. *Radiol Clin North Am* 44(1): 63-77.
- Sanchez RM, Jensen FE (2001) Maturation aspects of epilepsy mechanisms and consequences for the immature brain. *Epilepsia* 42: 577-585.
- Kohelet D, Shochat R, Lusky A (2004) Risk factors for neonatal seizures in very low birthweight infants: population-based survey. *J Child Neurol* 19(2): 123-128.
- Vezzani A, Balosso S, Ravizza T (2008) The role of cytokines in the pathophysiology of epilepsy. *Brain Behav Immun* 22(6): 797-803.
- Debillon T, Gras Leguen C, Leroy S (2003) Patterns of cerebral inflammatory response in a rabbit model of intrauterine infection-mediated brain lesion. *Brain Res Dev Brain Res* 145(1): 39-48.
- Boylan GB, Young K, Panerai RB (2000) Dynamic cerebral autoregulation in sick newborn infants. *Pediatr Res* 48(1): 12-17.
- Ikonomidou C, Bosch F, Miksa M (1999) Blockade of NMDA receptors and apoptotic neurodegeneration in the developing brain. *Science* 283: 70-74.
- Johnston MV (1995) Neurotransmitters and vulnerability of the developing brain. *Brain Development* 17(5): 301-306.
- Clancy RR (2006) Summary proceedings from the neurology group on neonatal seizures. *Pediatrics* 117(3 Pt 2) S23-S27.
- Aicardi J, Chevrie JJ (1970) Convulsive status epilepticus in infants and children. *Epilepsia A study of 239 cases* *Epilepsia* 11(2): 187-197.

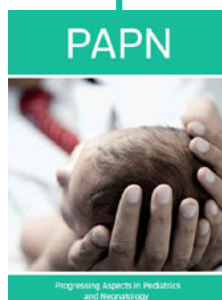


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