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Neuroprotective effect of Erythropoietin

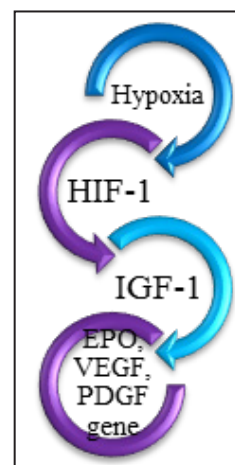
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Statement of the Problem: During the last 25 years in animal, ex-vivo, *in-vitro* and even in some clinical studies, cell protective effect of erythropoietin, a growth hormone used for erythropoiesis, was clarified even though the German Multicenter EPO Stroke Trial revealed that administration of this growth factor might even be hazardous to humans. On the contrary, huge amount of studies thereafter, like the conclusion achieved in 2010 by Elmahdy and colleagues, could elucidate the anti-inflammatory cell-protective potentials of erythropoietin in neurological injuries and disorders recently categorized as neuroinflammatory entities. The neuroprotective effect of this endo-hormone and its safety, if proved clinically might change the fate of many disabled patients in the future.

methodology & Theoretical Orientation: Near 270 articles including reviews and animal, in-vitro, ex-vivo and clinically case-control studies downloaded from science direct and pubmed websites were studied.

conclusion & Significance: It has long been believed that neural cells do not have the potentials to proliferate nor regenerate in case they encounter diverse sorts of insults including of hypoxic, hypoglycemic, oxidative and even apoptotic origin. A growing number of studies have shown that erythropoietin receptor is distributed extensively in the nervous system on the neurovascular unit cells and erythropoietin participates in many cell-protective anti-apoptotic pathways in the central and peripheral nervous systems. These pathways also have significant contributions to plasticity of the neuronal tissues which by itself shows the probable role of this growth factor in even restoring of memory and intelligence in post-injury period. A recent phase II study in infants with moderate to severe hypoxic/ischemic encephalopathy has demonstrated EPO's effect in diminishing MRI brain injury and improving the motor function of the infants after 1 year. It seems to be a must to conduct more sophisticated methodological case control studies to elucidate the magical effects of this endo-hormone.



Recent Publications:

1. Ehrenreich H, Weissenborn K, Prange H (2009) Recombinant Human Erythropoietin in the Treatment of Acute Ischemic Stroke. *Stroke* 40: e647-e656
2. Elmahdy H, El-Mashad A R, El-Bahrawy H, et al (2010) Human recombinant erythropoietin in asphyxia neonatorum: Pilot trial. *Pediatrics* 125, doi:10.1542/peds.2009-2268.
3. Wu Y W, Mathur A M, Chang T. (2016) High Dose Erythropoietin and Hypothermia for Hypoxic-Ischemic Encephalopathy: A Phase II Trial. *Pediatrics*. 137(6): e20160191. doi:10.1542/ped.2016-191
4. Torun YA, Ozdemir M A, Ulger H, et al (2014) Erythropoietin improves brain development in short-term hypoxia in rat embryo cultures. *Brain Dev*. 36(10): 864-869
5. Bogoslovsky T, Bernstock JD, Kenney K, et al: Erythropoietin and its derivatives: mechanism of neuroprotection and challenges in clinical translation. 4th chapter: *New Therapeutics for Traumatic Brain Injury, 2017*, 4th chapter. Pages 57-77

Biography

Reza Nejat is a board certified Anesthesiologist and FCCM. After graduating from Tehran University of Medical Sciences (TUMS) as a GP, he could achieve the ECFMG certification and also board certification in Anesthesiology from Iran University of Medical Sciences. He passed the fellowship programme in critical care medicine at Sina Hospital, TUMS. During this period he was inclined to study molecular medicine in the field of sepsis, acute heart failure and neurocritical care. Administration of EPO to neurologically injured patients has been one of his field of interests and experience for the past 4 years. He was the chief of few hospitals and associate professor in Shahid Beheshti University of Medical Sciences for 8 years. Dr. Nejat has 4 published books in the fields of cardiology, nephrology, fluid and electrolyte, nutrition, metabolism and endocrinology. Recently, he contributed to the chapter of "Acute Heart Failure" in the reference book "Comprehensive Textbook of Therapeutics" studied by post-doc residents of pharmacotherapy. On his website, rezanejat.com, he publishes his articles.

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