

## Tumor Necrotic Factor-alpha (TNF- $\alpha$ ) Promotes Survival of Cortical Neurons in Brain Injury

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### Abstract

**Introduction and objective:** Neuro-inflammation occurs as a sequence of brain injury and is associated with production of cytokines. Cytokines can modulate the function and survival of neurons and astrocytes. Although the pro-inflammatory cytokine TNF- $\alpha$  is thought to be one of the major mediators of neuro-inflammation, its role in brain injury remains ill-defined. The objective of this study is to examine the effect of TNF- $\alpha$  on the neurons and astrocytes in normal brain and stab wound brain injury. **Methods:** Two groups of BALB/c mice were used. The first group (I) was subjected to stab wound brain injury. This group was subdivided into IA and IB groups. The second group of mice (N) was not subjected to injury and subdivided into NA and NB. Groups IA and NA received IP injections of TNF- $\alpha$  every day for five days, whereas groups IB and NB received five IP injections of PBS. Animals were killed 1, 3, 7, and 9 days post treatment. Immunostaining of frozen brain sections for glial fibrillary acidic protein (GFAP) specific for astrocytes, NeuN (specific for neurons) and Fluoro-Jade B (specific for degenerating neurons) were used. Western blotting and ELISA were done from the tissues isolated from the injured sites of group I and non-injured brain (N). **Results:** In group N (NA and NB) there was no significant change in the number of neurons and there was significant increase in the number of astrocytes (astrogliosis) in TNF- $\alpha$  treated group (NA). In group I there was a gradual increase in the number of both astrocytes and neurons with a significant increase in TNF- $\alpha$ -treated group IA. The number of degenerating neurons significantly decreased in TNF- $\alpha$  -treated group IA. In addition, it was found that TNF- $\alpha$  stimulated the expression of GFAP and BDNF in NA and IA groups. **Conclusions:** TNF- $\alpha$  induces astrogliosis in normal and injured brain, and promotes the survival of cortical neurons in stab wound brain injury. The upregulation of BDNF by TNF- $\alpha$  may contribute to the neuronal protection.



### Biography

Ebtesam M. AbdElBasset, MD, PhD (Toronto). Currently, she is working as an Associate professor in the Dept of Anatomy, Faculty of Medicine, Kuwait university. Her research interest includes effect of cytokines and dBcAMP on brain injuries. She has published over 40 papers in international journals and conferences. She is also a Member of neuroscience association and Canadian neuroscience association