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# Use of Alkaline Phosphatase in Critically-Ill Patients

**Zohra R. Malik[1]* and Zareen Razaq[2]**

[1]Corresponding Author, Department of Internal Medicine, Saint John's Episcopal Hospital, New York, USA

[2]Lahore Medical and Dental College, Lahore, Pakistan

## ABSTRACT

Most of the patients admitted to ICU undergo organ damage, with kidney injury, liver damage, respiratory distress and hematological derangements being the most common. We hereby present literature review on the use of Alkaline Phosphatase (ALP) in critically ill patients with severe sepsis causing kidney injury. The possible cause of kidney injury is inflammation and hypoxia. ALP may prevent the effects of inflammation and hypoxia through dephosphorylation of lipopolysaccharide (LPS) and extracellular ATP, the latter being converted to adenosine, an anti-inflammatory and tissue-protective signaling molecule [1]. The anti-inflammatory effects of ALP on LPS-induced systemic inflammation is the proposed mechanism. ALP detoxifies LPS and the dephosphorylated LPS is far less toxic [2]. LPS can be dephosphorylated by ALP as shown by various experiments and this eventually improves survival [2-4]. ALP is proposed to reduce fever and attenuate the systemic cytokine response, serum nitric oxide levels, and prevent liver and lung damage [5, 6]. ALP is also shown through animal experiments to reduce TNF-a response, reduce IL-6 concentration, improve gas exchange during septic shock [4, 7]. An animal experiment was conducted, which showed if we give an ALP inhibitor (L-phenylalanine), the serum LPS levels significantly increase, causing the pathogenesis of septic shock. TLR (toll-like receptor), plays an important role in pathogen recognition and activation of the innate immunity. ALP seems to interact with the LPS-TLR pathway. The LPS induces an increase in NF-kB activity which seems to be attenuated in the cells that were pre-treated with ALP. The pro-inflammatory molecule, Resolvin-E1 reduces LPS induced NF-kB activity [8, 9]. which is mediated through de-phosphorylation and thereby detoxification of LPS. So, if we can attenuate the circulating LPS and cytokine levels by ALP, we can prevent renal hypoxia and AKI. Restoration of ALP might be an evident solution to preventing kidney and other organ injury.

## ARTICLE HISTORY

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**Contact** Zohra Malik ✉ Zohrarazaq@gmail.com Department Of Internal Medicine, Saint John's Episcopal Hospital, New York, United States.