Why dexamethasone can reduce mortality rate among patients with viral infections

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Abstract

As an anti-inflammatory hormone, dexamethasone may minimize proton buildup and down-regulate the production of oxalate. The reduced generation of insoluble and stiff calcium oxalate might account for the substantial drop of mortality rates by dexamethasone amid the current COVID-19 pandemic.

Keywords

Dexamethasone; proton buildup; down-regulate; insoluble and stiff calcium oxalate

Dexamethasone can reduce fever, perhaps via the decrease of proton traffic and proton pool, thus attenuating the production of ATP through the respiratory chain. Oxalate production or traffic may be induced or affected by high proton level respectively, and the insoluble and stiff calcium oxalate can counteract strong acids such as HCl derived from excess of protons. Calcium oxalate is stressful to cells and is the primary component of renal stones which can advance to kidney failure and shorten lifespan [1]. To make matters worse, cancer and other patients might overproduce calcium oxalate to antagonize strong acids resulted from proton stress [2-4]. Calcium oxalate crystals were found in the thyroids of over 85% of the patients 70 years of age and above within 5 hours post-death [5]. The proteins of SARS-CoV-2 are high in valine plus glycine [2,6], while glycine can chelate divalent cations [7]. Valine is also likely to bind calcium and other divalent cations [6,8]. The extensive secondary chemical bonding between calcium and valine and glycine residues in proteins enhances the formation of insoluble calcium salts which might be the trigger of lung stickiness and breathing difficulty in COVID-19 patients.

As an anti-inflammatory agent, dexamethasone can minimize the buildup of protons and might down-modulate the generation of oxalate, and the reduced production of calcium oxalate may account for the substantial reduction of mortality rates by dexamethasone during the COVID-19 pandemic [9]. The beneficial or negative effects of dexamethasone should be comprehensively studied and assessed to further our understanding on the mode of action of this hormone.

Conflict of interest The authors declare that they have no conflict of interest.

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Author Contributions QL conceived the study and supervised the work. All authors contributed to the gathering of references, and contributed to the analysis, interpretation and preparation of the manuscript.

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