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Characterization of Bovine SERPIN- Alpha-1 Antitrypsin (AAT)

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Abstract : Alpha-1-antitrypsin (AAT) is a major plasma serine protease inhibitor (SERPIN). Hereditary AAT deficiency is one of the common diseases in some part of the world. AAT is mainly produced in the liver and functions to protect the lung against proteolytic damage (e.g., from neutrophil elastase) acting as the major inhibitor for neutrophil elastase. α (1)-Antitrypsin (AAT) deficiency is an under recognized genetic condition that affects approximately 1 in 2,000 to 1 in 5,000 individuals and predisposes to liver disease and early-onset emphysema. Not only does α-1-antitrypsin deficiency lead to disabling syndrome of pulmonary emphysema, there are other disorders too which include ANCA (antineutrophilic cytoplasmic antibody) positive Wegener's granulomatosis, diffuse bronchiectasis, necrotizing panniculitis in α-1-antitrypsin phenotype (S), idiopathic pulmonary fibrosis and steroid dependent asthma. Augmentation therapy with alpha-1 antitrypsin (AAT) from human plasma has been available for specific treatment of emphysema due to AAT deficiency. Apart from this several observations have also suggested a role for endogenous suppressors of HIV-1, alpha-1 antitrypsin (AAT) has been identified to be one of those. In view of its varied important role in humans, serum from a mammalian source was chosen for the isolation and purification. Studies were performed on the homogeneous fraction. This study suggests that the buffalo serum α-1-antritrypsin has characteristics close to ovine, dog, horse and more importantly to human α-1-antritrypsin in terms of its hydrodynamic properties such as molecular weight, carbohydrate content, etc. The similarities in the hydrodynamic properties of buffalo serum α-1-antitrypsin with other sources of mammalian α-1-antitrypsin mean that it can be further studied and be a potential source for "augmentation therapy", as well as a source of AAT replacement therapy to raise serum levels above the protective threshold. Other parameters like the amino acid sequence, the effect of denaturants, and the thermolability or thermostability of the inhibitor will be the interesting basis of future studies on buffalo serum alpha-1 antitrypsin (AAT).

Keywords : α-1-antitrypsin, augmentation therapy , hydrodynamic properties, serine protease inhibitor
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