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Commentary

Importance of Electrochemical Biosensors in Glycine Metabolism

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DESCRIPTION

The regulation of the body's overall metabolism, which is necessary for human health, growth, development and survival, is a major function of Amino Acids (AAs). Glycine is the smallest Amino Acid (AA) because it only has one hydrogen atom in its side chain. Glycine makes up about 20% of the AA nitrogen in body proteins and approximately 11.5% of all AAs [1]. As a result, glycine has a strong correlation with a variety of human illness states making it one of the most appealing analyses for clinical applications [2]. While glycine may be endogenously biosynthesized in the human body, especially in the liver and kidneys it was formerly thought of as a non-essential AA. This notion was supported by isotopic investigations that demonstrated how glycine over occurs during bodily metabolism, resulting in glycine changing into various chemicals and moving to various body regions.

However, the quantity of glycine that the body can synthesize on its own is insufficient to support body activity hence glycine is typically classified in present AA classifications as a conditionally necessary (or semi-essential) AA [3]. Nutritionally dietary glycine deficiency is not harmful but a chronic deficiency can have serious impacts on how the body functions including subpar growth weakened immunological responses and other negative effects on health and nutrient metabolism [4]. Furthermore glycine supplementation has been shown to enhance results in a wide range of clinical situations [5]. This is because it may assist to reduce the toxicity of some medications slow the growth of tumors and prevent the infiltration of inflammatory cells, among other things.

The framework of many structural proteins such as collagen fibrils and elastin and common metabolites such as glutathione, creatine, porphyrins, purines, heme and serine are built using glycine as the smallest and the only Non-Chiral Amino Acid (AA) [6]. Glycine also provides the flexibility required for conformational changes in the active sites of some specific enzymes. As a result glycine plays a variety of physiological roles in three essential processes cytoprotection, anti-inflammatory reactions and body growth and development [7].

Since many glycine-related ailments are linked to both its synthesis and catabolism any alteration to any of these processes may result in severe symptoms in the affected person. Until now, efforts have been focused on establishing a link between glycine levels and disease states which is a condition where there is an abnormally high level of glycine in the blood [8]. The glycine is one of the most studied macromolecules for clinical uses given the great variety of glycine activities and their participation in numerous biological processes. The current gold standard analytical method for glycine detection in the clinical field entails sample extraction (typically from blood and/or urine) and chromatographic or fluorometric analyses in centralized laboratories which causes significant delays in the delivery of results as well as high financial costs [9]. As a result there is a definite need for the development of trustworthy Point-Of-Care (POC) glycine detection technologies that can offer real-time information on a patient's health status. The construction of POC glycine platforms is currently being hampered by a number of analytical challenges. As a potential solution, electrochemical bio sensing is proposed. However, glycine has not been routinely detected in these fluids and there is little readily available clinical data addressing the amounts of glycine in humans. Additionally plasma and serum which are blood-derived fluids are frequently used in place of whole blood. Although these two matrices appear to exhibit comparable traits, due to various pre-treatment techniques their AA levels are not the same [10]. Current clinical glycine analysis generally prefers the use of plasma over serum in order to eliminate potential interferences.

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