

Advancing current approaches to diabetes management: a framework to improve the stability of insulin

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Submission Category:

(A) Technical research proposal to solve concrete problems

SDGs Targets/Indicators:

This research project can contribute to the SDG of “Good Health and Well-Being”: with a target (3.8) of “safe, effective, quality and affordable medicines for all”, by developing a novel thermostable formulation of human insulin used in the treatment of diabetes. The pharmaceutical manufacturers can explore the applicability of the developed formulation in their products.

Abstract:

Diabetes mellitus is a chronic illness that leads to high morbidity worldwide, and the prevalence of this deadly disease has increased yearly. Despite the efficacy of insulin therapy for diabetes management, the poor patient adherence can attribute to the complexity of insulin regimen requiring a determined dosage before every meal and the specific storage guidelines. The complex storage requirement, as stipulated by the manufacturer could be overwhelming and too complicated for patients, making them withdraw insulin therapy with a potential health risk. Therefore, patient adherence can be improved by a formulation of thermostable insulin that can withstand temperature fluctuations, requiring a less complex storage condition. Recently, ionic liquids (ILs) have emerged as the promising solvation medium that enhances the thermal stability of proteins. In particular, cholinium aminoate is a class of IL that possesses the desired properties such as biodegradability and low toxicity. By adopting the combined computational and experimental approaches in this project, a formulation based on cholinium-derived IL medium will be developed to thermostabilize insulin. The developed formulation for insulin

will greatly improve the quality of life for patients and reduce the economic burden of the dependence on the cold chain equipment throughout the processes of production, transit and storage of insulin.

Graphical Abstract:

