December 02, 2020

Re: 6-Month Project Update

Dear Supporter,

Thank you for supporting my project, “Bionic Insulin Pump”. I am excited to inform you that this project has some promising progress for our “proof of principle” and we have started our pipeline of improved insulin candidates. Our goal is the same: Developing a smart insulin to relax burden for T1D patients, who currently need to diligently monitor the interstitial glucose concentration and precisely apply complex insulin dosing regimens.

Taking daily insulin to compensate the loss of hormone is the most feasible therapy for today’s type 1 patients. Thus, a “smart” insulin will be a feasible and convenient therapy for them. Currently, we have designed a series of molecules, which are candidates of this “smart insulin”. What we are seeking to is that this kind of insulin exhibits an independent trade-off function with a null-like function in hypoglycemic environment, and automatically activate in hyperglycemic condition. The product we are accessing is an analog without the need for additional glucose-detecting devices such as current glucose monitors or some exogenous binding partner. To reach this goal, we have developed a novel protocol to design, build, and test our candidates. In this study period, several potential analogs have been made and evaluated by cell models to see if they are exhibiting the requested regulatory phenomena and check if they are safe for using. Our results show that we have a prototype analog that could be regulated by a specific monosaccharide. This is a “proof of principle” we need for a general approach.

So right now, based on what we learned from our proof of principle and the design of our prototype, we modified the monosaccharide-binding element in our analogs to improve the way of responses and activities. Our latest result demonstrated that these candidate sets could be specifically activated by addition of glucose specially. Although the basal level activity (the activity under NO glucose condition) is still not optimized, we have obtained significant progress by modifying the length of “tether”, which might improve the switch controlling the inactivated form to an activated conformation.

Besides the development of insulin candidates, we are also working on building a non-fibrillation glucagon for the reservoir of a bi-hormonal pump. Currently we are seeking to exploit an ultrastability, fibrillation-resistance domain to “carry” an active glucagon analog. This project thus offers two shots on goal and promises to advance the creation of a new treatment paradigm in T1D to confer long-term health benefits.

With gratitude,



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