

DiaBeat Move App for Guiding and Enhancing Diabetic Lifestyle

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Abstract— DiaBeat Move application provides guidance for diabetics by tracking all relevant observable variables via the abundant connectivity, and by employing models of glucose-insulin dynamics. Versatile goal tracking is provided as a motivating factor in improving the long-term prospect of diabetics. Both continuous glucose monitors and the finger prick glucose meters are connected to the app.

I. INTRODUCTION

Tight control of the diabetes is becoming possible by incorporating an increasing number of sensors. Many critical sensors, such as those for Blood Glucose (BG), can nowadays get attached via increasingly versatile Bluetooth Low Energy (BLE) to smartphones. Sophisticated health improvement schemes can be designed to provide pervasive and often critical guidance. This paper outlines how a smartphone app, DiaBeat Move, facilitates a comprehensive nutrition, exercise and continuous blood glucose monitoring tracking.

II. DIABEAT APP AND ITS USE

This app builds on coordinated tracking of the energy expended (exercises and metabolism) and consumed (food) throughout daily activities. Interleaving energy expenditure and consumption promotes better understanding of user's needs and allows achieving better fitness level and more appropriate weight management. Further, the nutrient information of a consumed food, paired with precise exercise tracking provides means for better control of postprandial (post meal) blood glucose levels through timed exercises.

Tracking of physical activities such as walking and running relies on the phone inertial sensor data processed by our pedometer algorithm [1]. To assess the suitability of the activity level, the overall daily movements, as well as workout exercises, are tracked and evaluated against user-set goals.

Daily caloric intake is obtained from the food nutrient database of over 5000 items. Daily food calories recommendation is determined based on the user metabolism, weight-loss daily caloric deficit and exercise caloric goal. Users can further track the goal for each of the meals, given the total food caloric goal determined by the tool. Although meal calories goals are long-term goals, they are adjusted based on a particular day specifics.

Further, the impact of the carbs on the post-meal blood glucose is predicted based on the glycemic index (GI) and load (GL), readily available in our database. To remedy the chances of the post-meal blood glucose to reach unhealthy

levels, the tool issues a recommendation with the time-after-meal and severity of the exercises.

DiaBeat Move application incorporates naturally the insulin calculator function. Several common rules and predictions [2] are built to calculate the required insulin dose based on the carbs, the previous day insulin intake and the BG goal following any meals. The carb intake for a given meal is available from food database and the BG data is available from connected sensors.

The advantage of DiaBeat Move is that the exercise can be tuned and correlated to the BG profiles obtained from sensors, in addition to the carbs, calories and the other readily available nutrition data [4]. This type of reporting is shown in Fig. 1. The report also includes numerous “corner cases”, such as those when the CGM exhibits a dropout and does not report the data, while the glucose meter (and other sources) are operational, as well as the re-calibration effects [3].

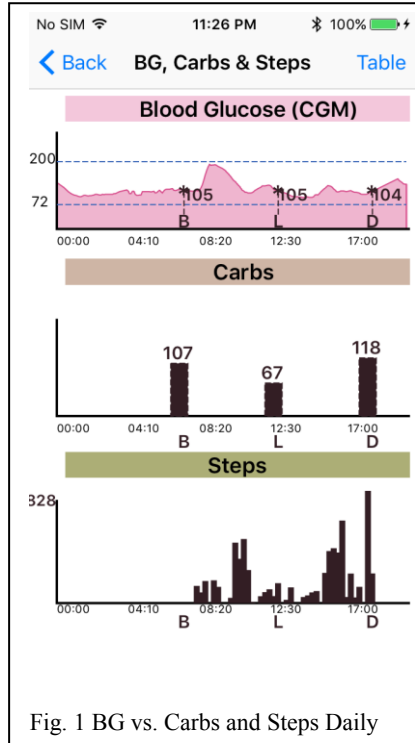


Fig. 1 BG vs. Carbs and Steps Daily

The app sells since mid-2016. It works if there is no motion coprocessor, but it requires Health Kit for coordination with other health apps and devices, such as CGMs. Feedback on the application is positive, as this one application replaces several others. It is listed as one of the top health/fitness apps in Singapore and Thailand. Further, physically active users note that they can fear less of BG lows following exercise due to the comprehensive BG and nutrition tracking.

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