Comparison of glucose data and phenomena from two different measurement methods (GH-Method: Math-Physical Medicine)

By: Gerald C. Hsu
eclaireMD Foundation, USA

Introduction:

This paper discusses glucose measurement results from two different methods, finger piercing and testing strip (*Finger*) and Libre's continuous glucose monitoring system (*Sensor*).

Method:

The author has been collecting a total of 9,490 glucose data by finger measurement, including both fasting plasma glucose (FPG) once a day since 1/1/2014 (1,825 days) and postprandial plasma glucose (PPG) three times a day since 1/1/2012 (2,555 days).

Recently, he has further collected 17,046 glucose data by applying a sensor on his upper arm to collect his glucose values continuously. This sensor measurement is conducted in parallel with his routine finger measurements. During the period of 5/5/2018 to 12/31/2018 (241 days), he has recorded his sensor glucose values about 71 times per day. The measurement rate is approximately every 15 minutes during the day and every hour during the night. In summary, he has collected a total of 964 waveforms - 241 FPG and 723 PPG. Other waveforms generated between meals or from eating snack/fruit are not included in this analysis.

Results:

Sensor's Time of Peak Glucose:
60 minutes after first-bite

PPG rising speed:
33 mg/dL per hour
PPG decaying speed:
20 mg/dL per hour (~ 60% of rising)

Finger's Average FPG/PPG:
110/116 mg/dL (as 100% baseline)

Sensor's Peak PPG & % over Finger:
159 mg/dL & 138% (+43 mg/dL)
Sensor's Average PPG & % over Finger:
135 mg/dL & 117% (+19 mg/dL)

FPG (period - from 00:00 to 07:00):
Average FPG: 112 mg/dL,
Peak (crest): 122 mg/dL,
Valley (trough): 106 mg/dL,
Period of Trough (from 3am to 5am)

Conclusion:

(1) In average, PPG peak occurs one hour after first-bite of meal, not two hours after.
(2) PPG decaying speed is almost twice as slow than its rising speed.
(3) Averaged Sensor's PPG is 16% higher (+19 mg/dL) than the Averaged Finger's PPG.
(4) Peak Sensor's PPG is 36% higher (+42 mg/dL) than the Averaged Finger's PPG.
(5) FPG wave is much calmer than PPG wave. FPG's lowest trough range occurs during the deep sleep stage (from 3am to 5am).