

## BioSense: Developing biobehavioral solutions for the treatment of obesity and diabetes

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Lifestyle interventions aimed at treating diet-induced obesity and diabetes are not metabolically personalized.



Patterns of dietary intake are highly individualized and challenging to assess by self-report. Our research shows they can be captured objectively by measures of fuel metabolism.

**Continuous glucose monitoring systems (CGM) provide a visual representation of meals eaten and their metabolic consequences.** We intend to leverage CGM data to develop innovative biobehavioral solutions for the treatment of obesity and diabetes.

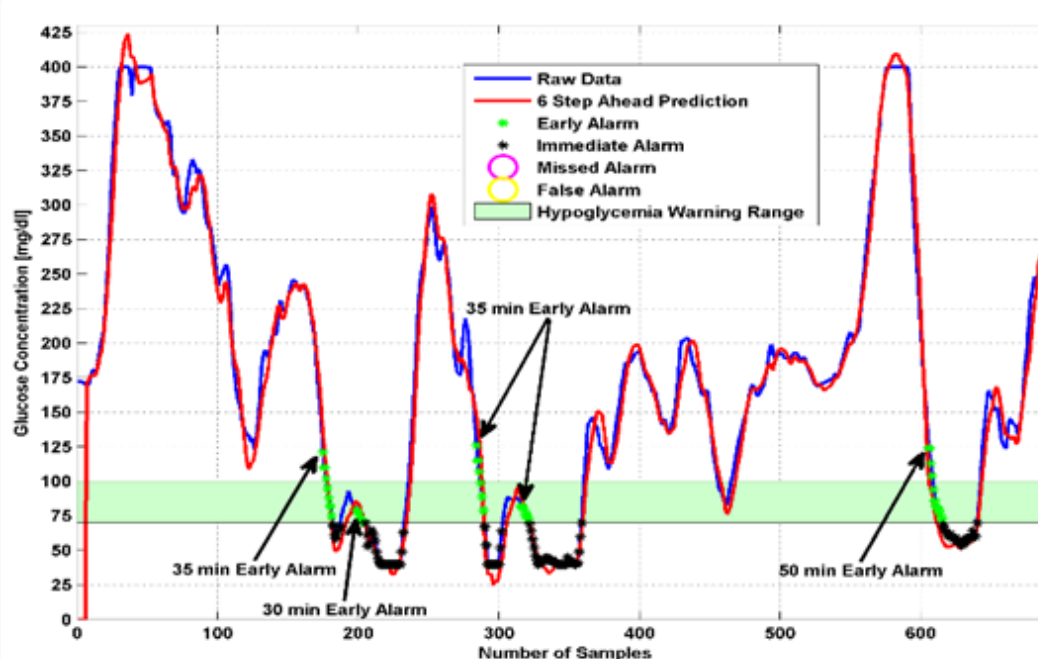
ID	Event Date	BG Peak	Kcal meal	GL meal	Foods eaten	Amount	GI of food	GL of food
SS01	3/27/17	146	521	82.3	caramel, covered apple	1.5 medium	76.5	82.3
SS01	3/28/17	169	198	22.4	Quaker Instant Oatmeal - Flavored	1 packet - prepared	63.6	19.0
					coffee creamer, liquid, regular, flavored	1 TB	66.8	3.4
SS01	3/29/17	144	198	22.4	Quaker Instant Oatmeal - Flavored	1 packet - prepared	63.6	19.0
					coffee creamer, liquid, regular, flavored	1 each - 0.5 FO	66.8	3.4
SS01	3/29/17	144	665	45.9	SONIC, shakes, chocolate	1 small - 16 FO	52.9	45.9

Glycemic index does not adequately predict glycemic responses at the individual level. **By integrating CGM with dietary self-monitoring to record only foods that occur before a hyperglycemic event, the burden of diet tracking is reduced by 82%.**

Novel intervention approaches that integrate diet tracking with measures of glucose metabolism are warranted.

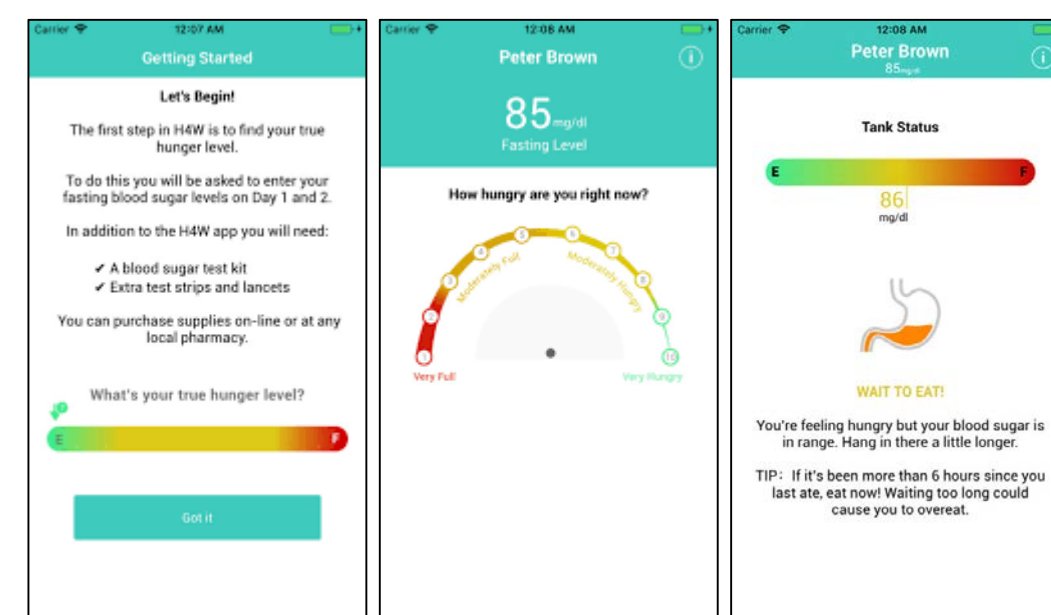
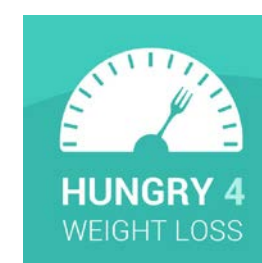


**CGM are wearable devices that are less invasive than glucometers.** Real-time data is made available through public APIs for the design of complementary software systems.



Closed-loop insulin delivery systems are designed to process CGM data in real-time to predict hypoglycemia 30-50 minutes before it occurs. Similar algorithms can be developed to predict hyperglycemia. **Hyperglycemia prediction algorithms can be used to trigger notifications to users to record recent dietary intake.** Software can then be used to detect patterns of intake that cause hyperglycemia and automate dietary recommendations.

The mission of BioSense is to develop and disseminate evidence-based biobehavioral solutions that revolutionize obesity and diabetes treatment paradigms.



**Hungry-4-Weightloss is the first prototype developed by BioSense.**

Here, glucose data guides the self-regulation of energy intake. Users are instructed to eat only when glucose levels approach their own fasting levels. Weight loss results are significant.



*Advancing biomedical discovery and improving health through mobile sensor Big Data*

**The aims of this research match those of the MD2K initiatives.** Using mobile sensor data to positively affect health decision making and just-in-time behavioral interventions.

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