

Quantifying Diabetes

Lessons learned from 100,000+ blood glucose readings

Jana E. Beck

July 18, 2012

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 - = matched to carbohydrates consumed, roughly

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- using an insulin pump since 12/2006:



My Type 1 Diabetes, Cont'd

started using a Dexcom Continuous Glucose Monitor last year:



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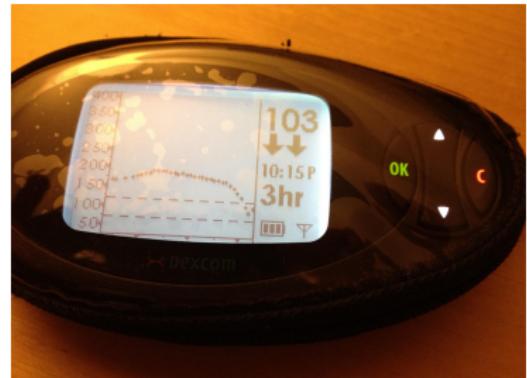
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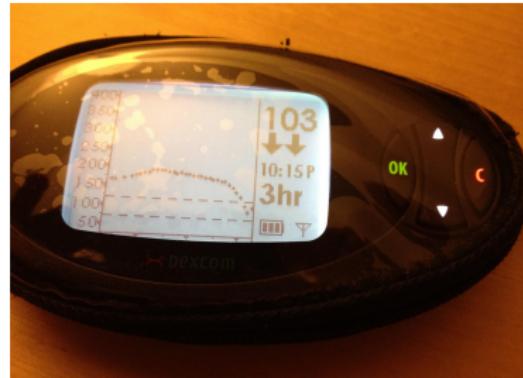
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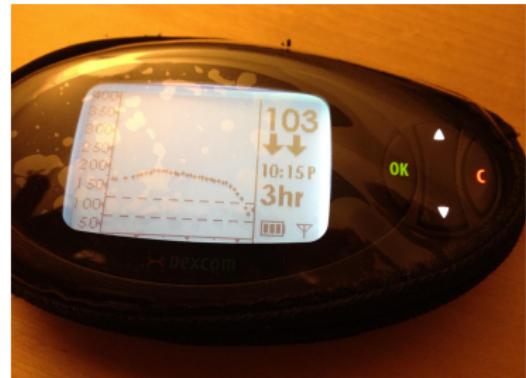
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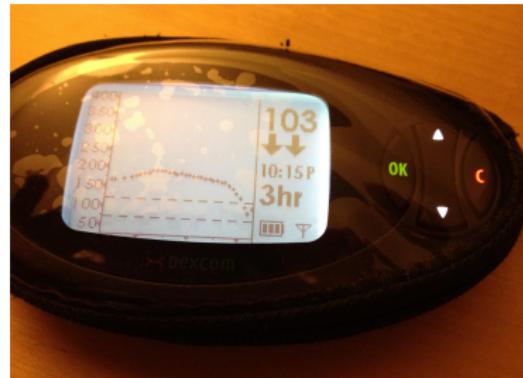
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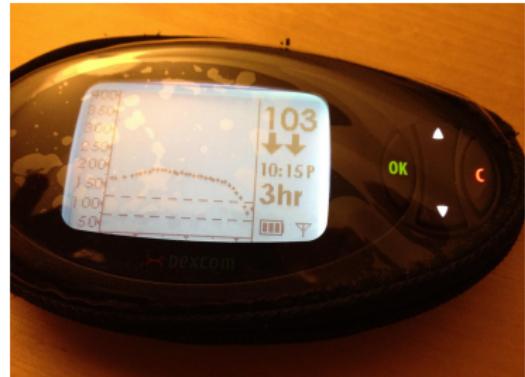
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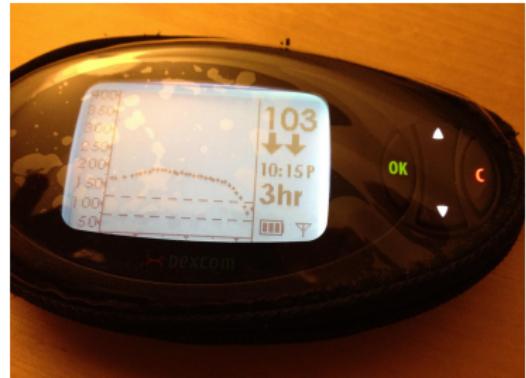
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 - ability to download data!



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 - reduce mean

My Experiment

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- next

My Experiment

- first experience with Dexcom = *shock*
- next = **frustration**

My Experiment, Cont'd

Hypothesis

Carbohydrate restriction is an effective way to improve blood glucose outcomes.

Inspiration

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When I hear a physician saying to a type 1 diabetes patient, “Go ahead and eat whatever you want, just make sure you cover your glucose with insulin,” it’s like telling a firefighter, “Just go ahead and pour as much gasoline as you like on that fire you’re trying to put out, as long as you cover it with enough water.”

— Dr. Peter Attia

Tools

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- in [R](#):
 - built-in non-parametric statistical functions
 - built-in plotting functions: `boxplot()`, etc.
 - [ggplot2](#)

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- **Conclusion:** change in diet resulted in significant (negative) change in blood glucose values

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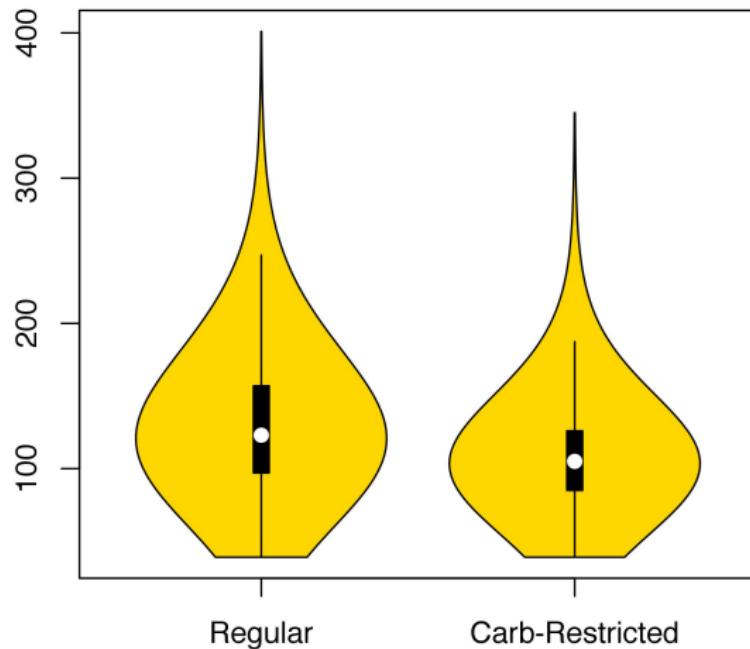
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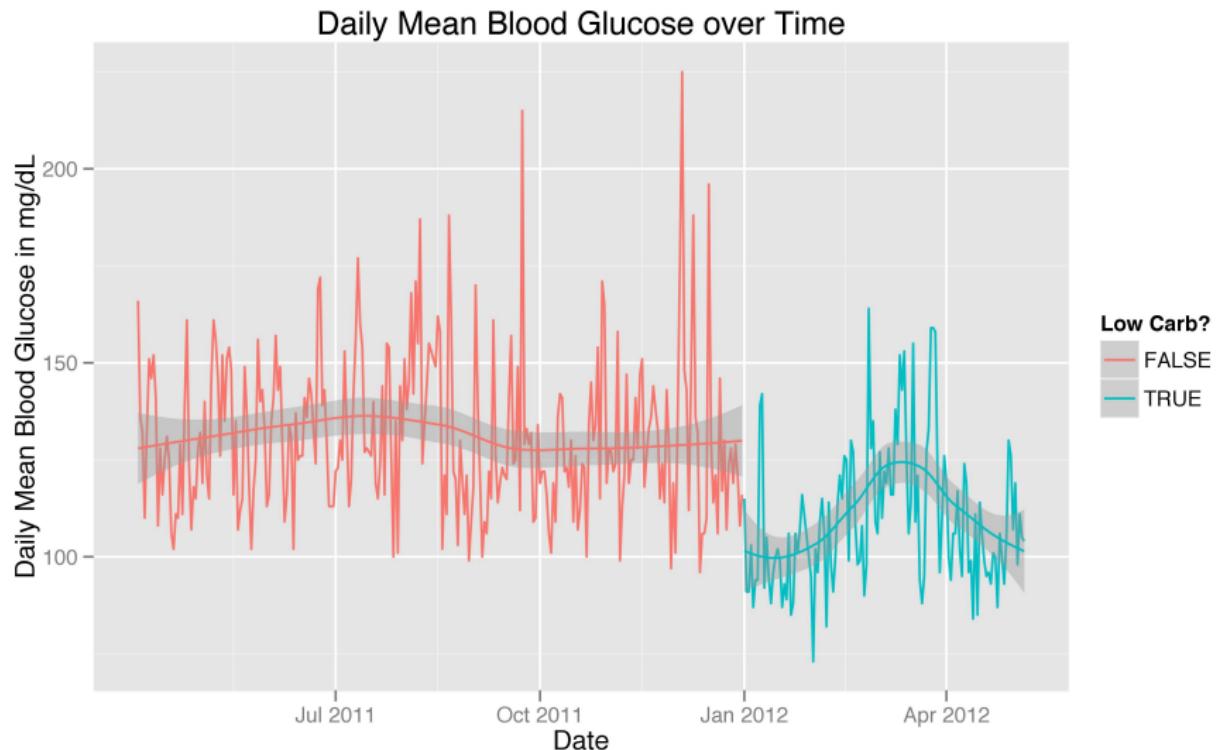
Wilcoxon rank-sum test:

- similar to the Student's t-test, but for non-parametric (= non-normally-distributed) data
- p-value < 2.2e-16
- **Conclusion:** change in diet resulted in significant (negative) change in blood glucose values
- estimate of the median of the difference between a sample from regular diet blood glucose data and a sample from low-carb diet data is **about -19 mg/dL**

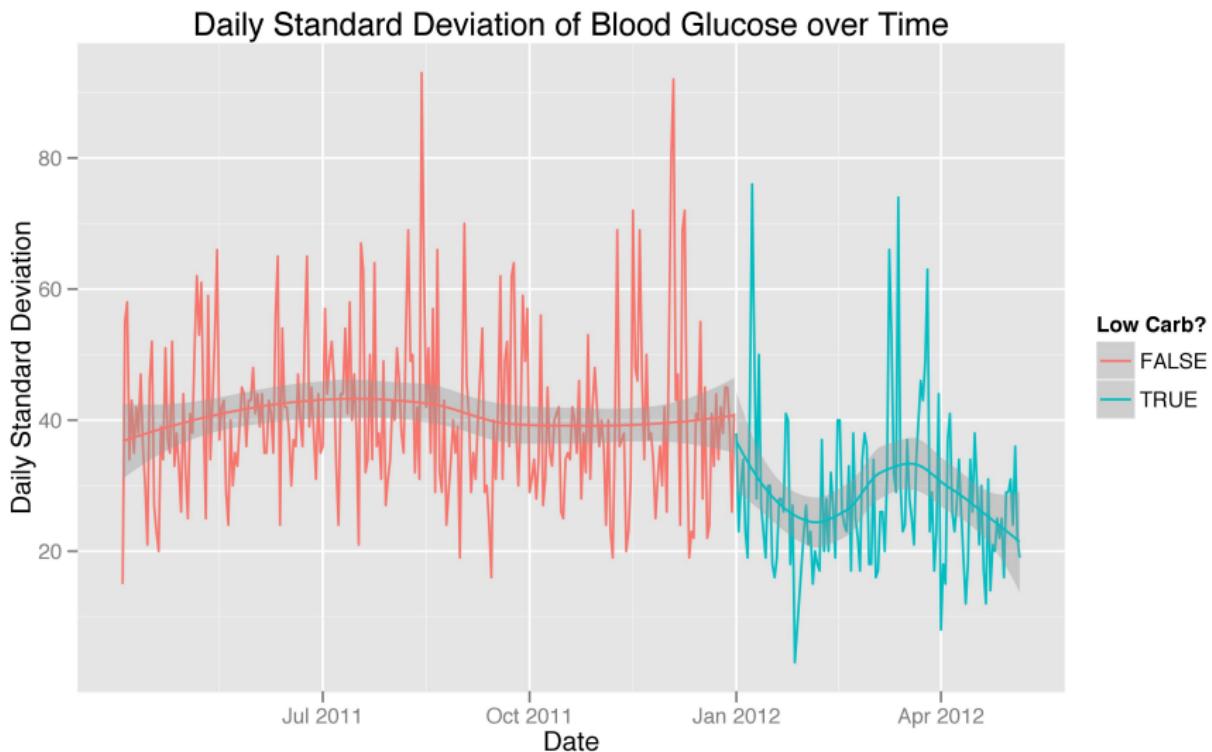
Visualizing Change: Violin Plot



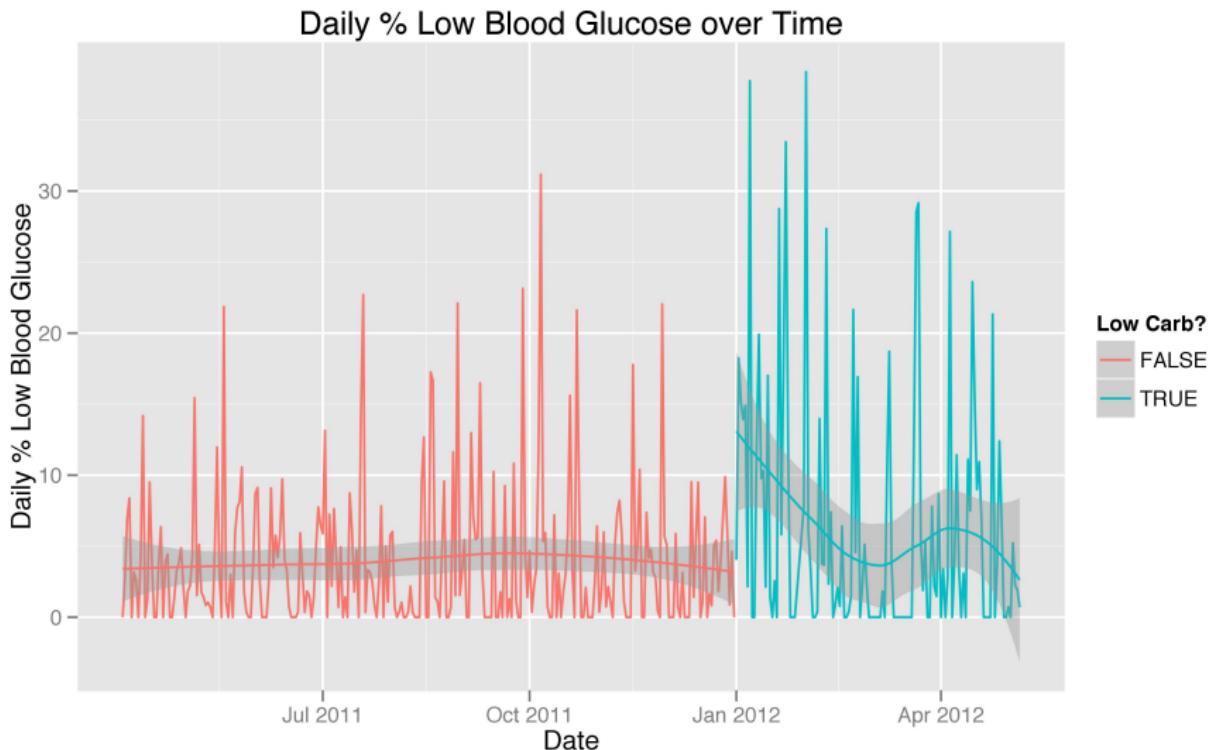
Visualizing Change: Daily Mean over Time



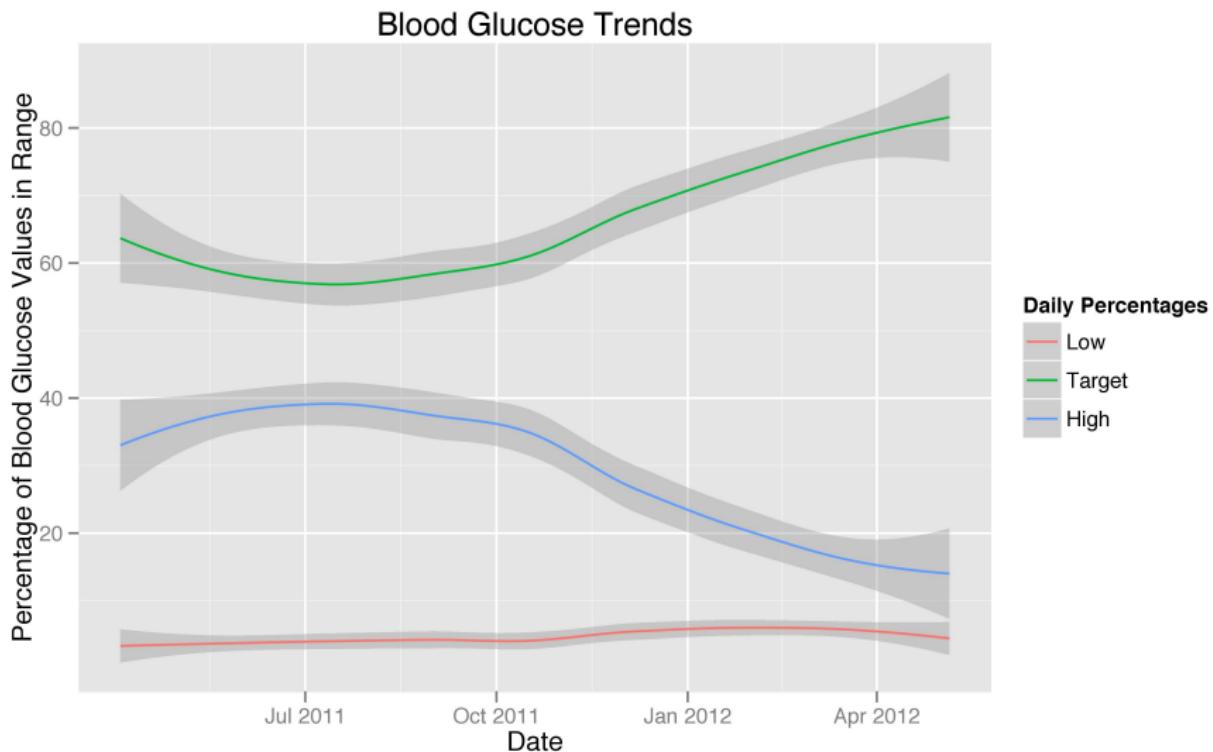
Visualizing Change: Daily Std. Deviation over Time



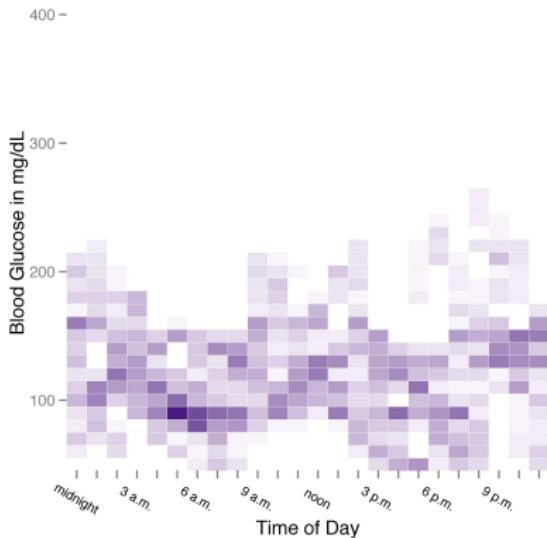
Visualizing Change: Daily % Low over Time



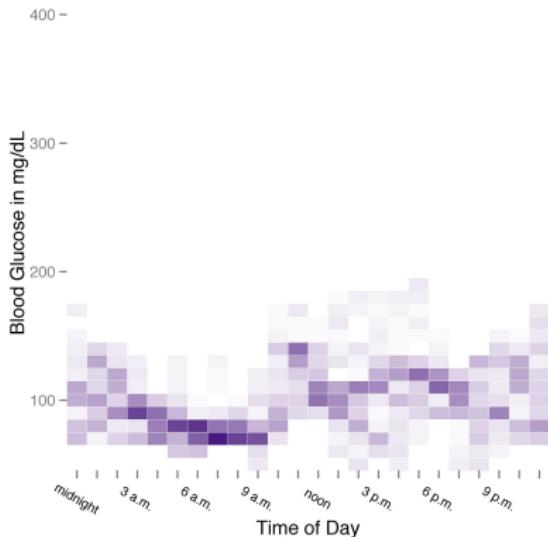
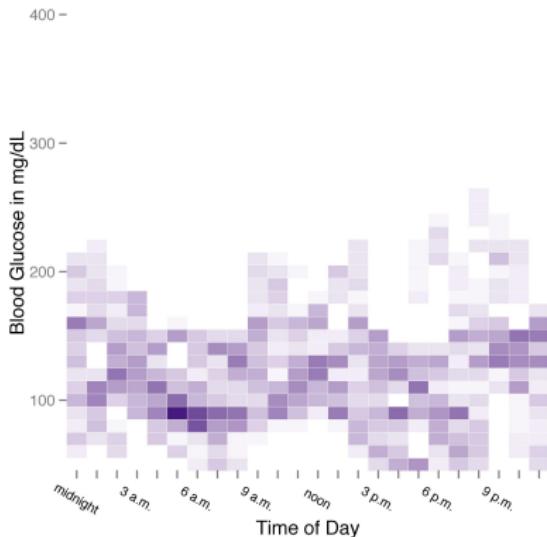
Visualizing Change: Daily Percentages over Time



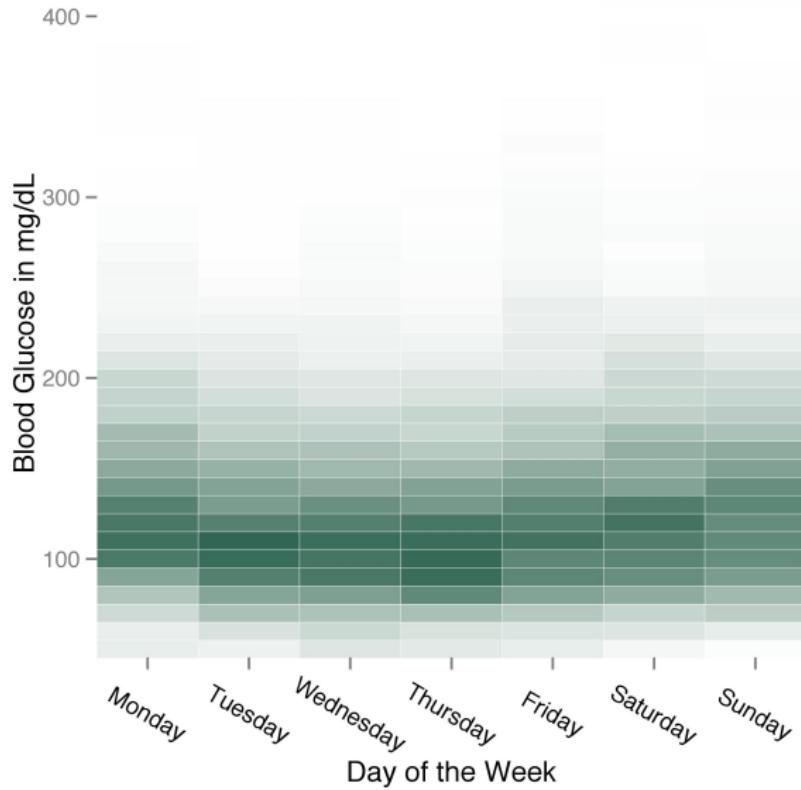
Visualizing Change: Heatmaps



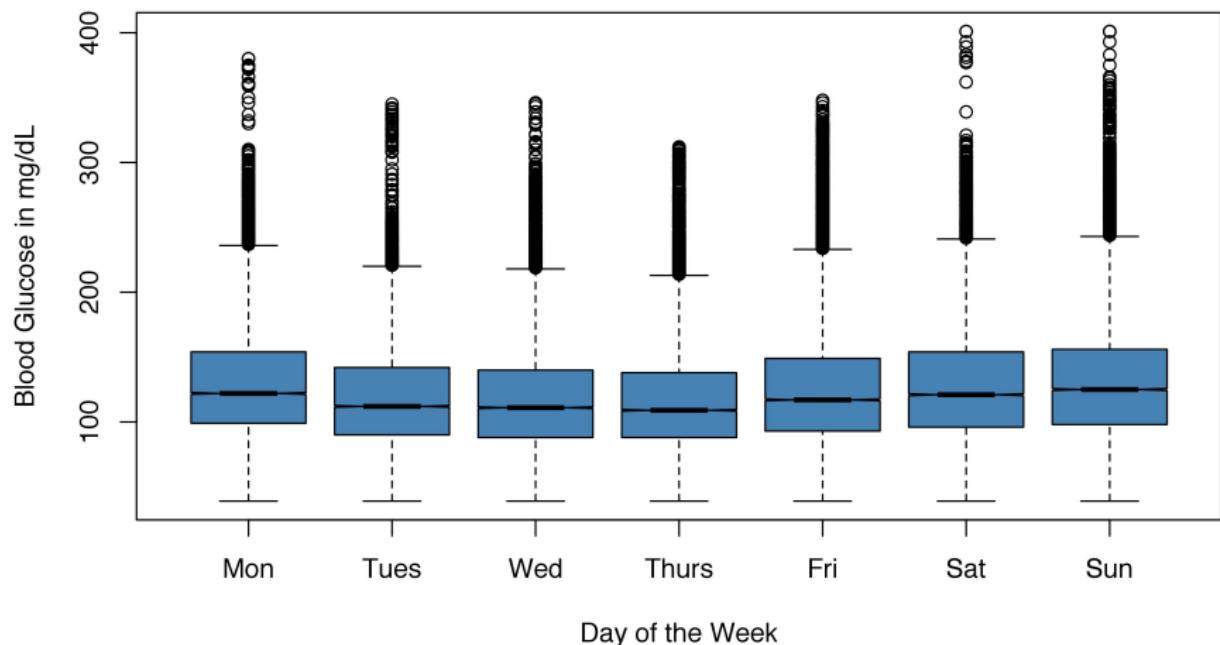
Visualizing Change: Heatmaps



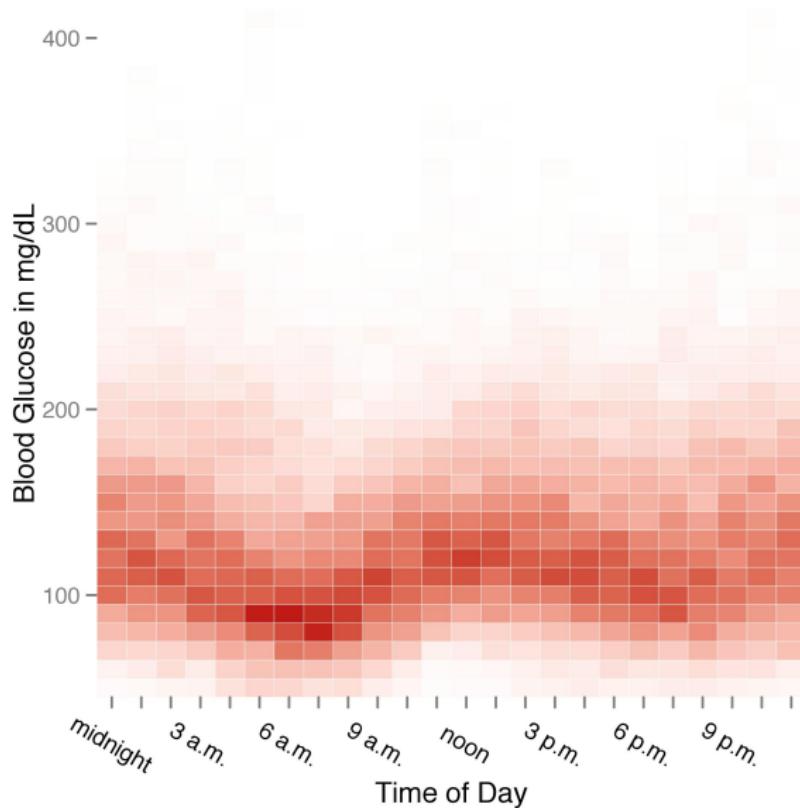
Patterns: Day of the Week



Patterns: Day of the Week Cont'd



Patterns: Time of Day



Thanks!

Contact: jana.eliz.beck@gmail.com

Upcoming Project: <https://github.com/jbeck/iPancreas>
(Description here: <http://jbeck.github.com/iPancreas/>)