

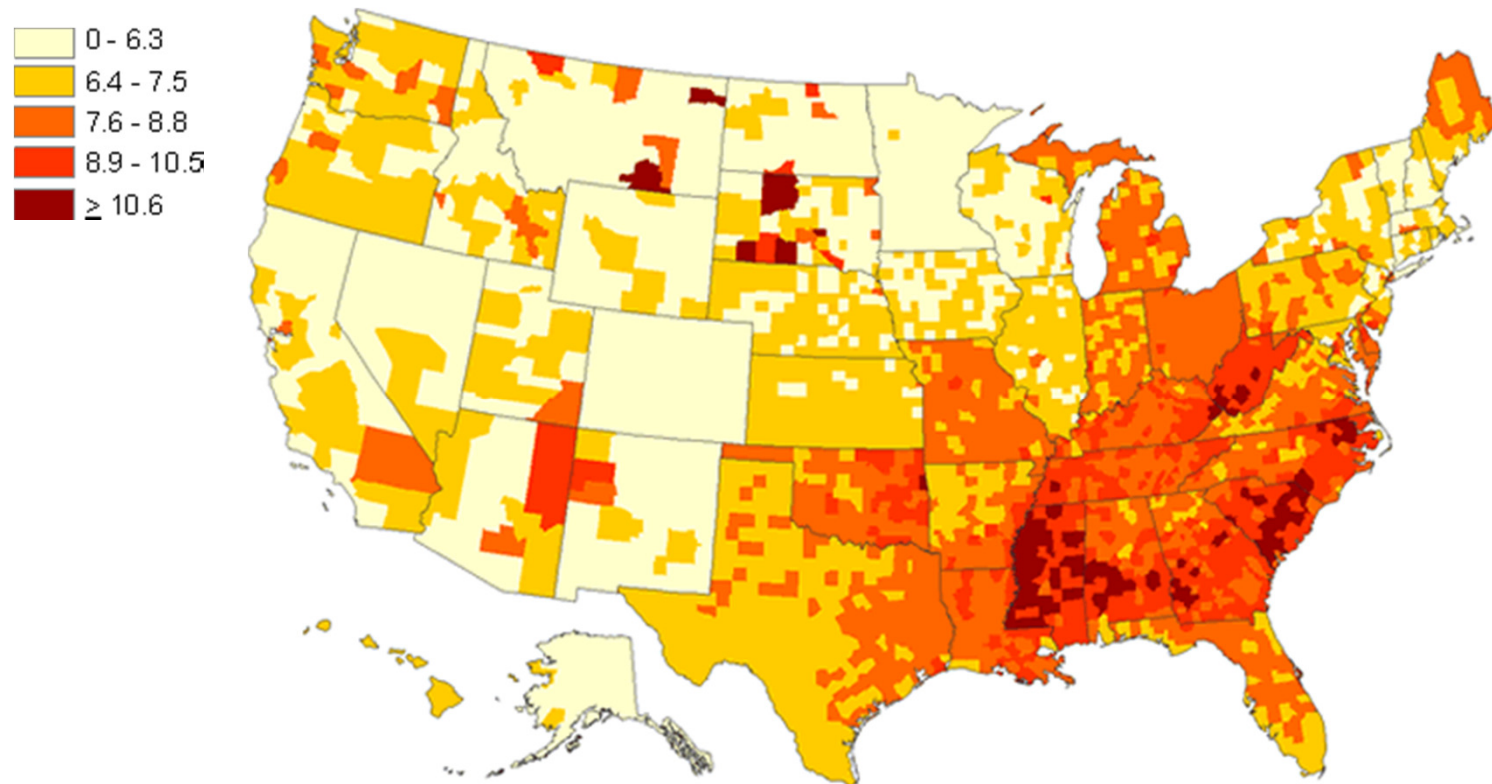
Can We Design an Artificial Pancreas?



- Closed-loop control requires:
 - Actuator: Insulin pump
 - Sensor: Blood glucose sensor technology
 - Control Validation (low tolerance for mistakes):
 - Sensor validation
 - Robustness under uncertainty
 - Insulin / blood glucose dynamic model

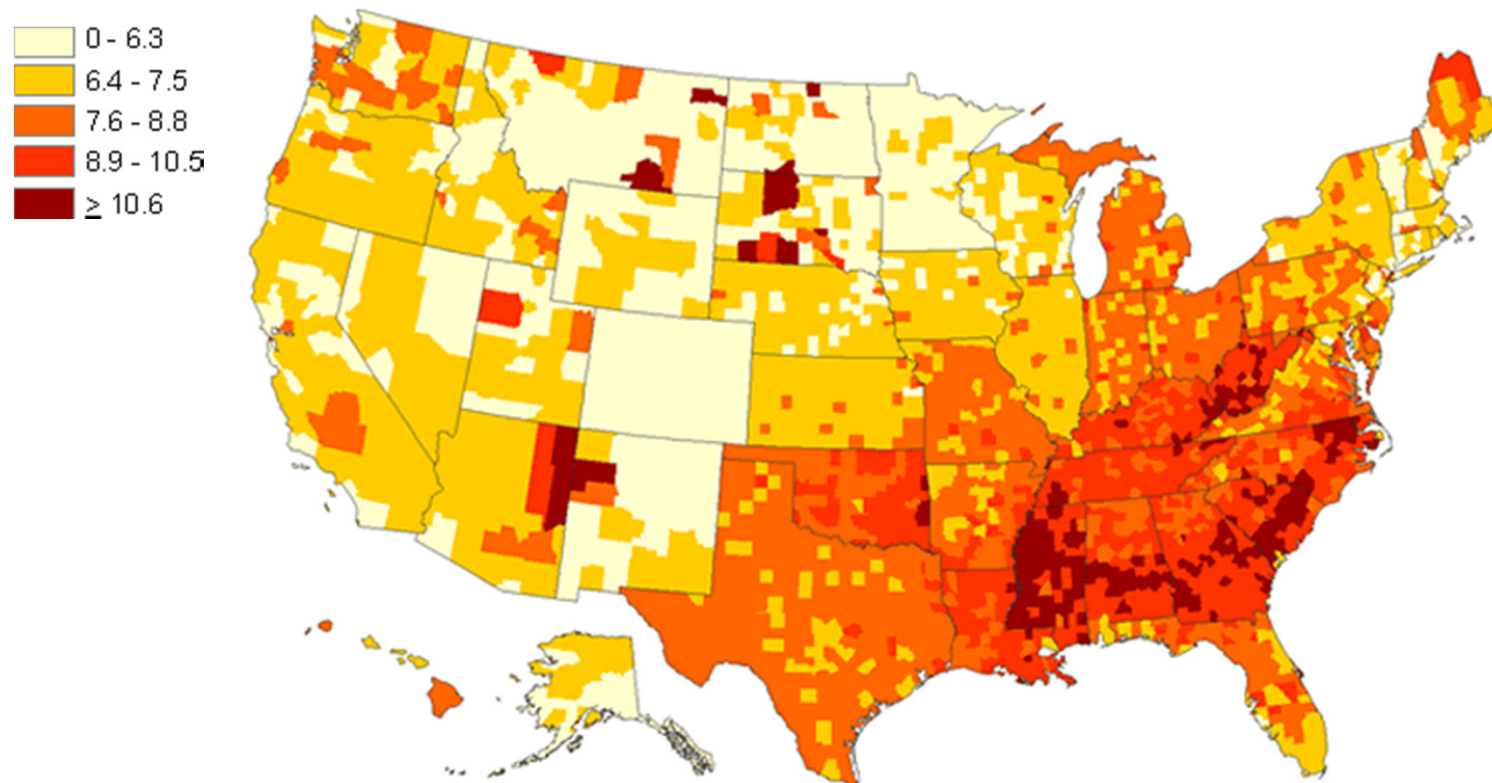
Diabetes Mellitus

- 2004 - CDC Statistics



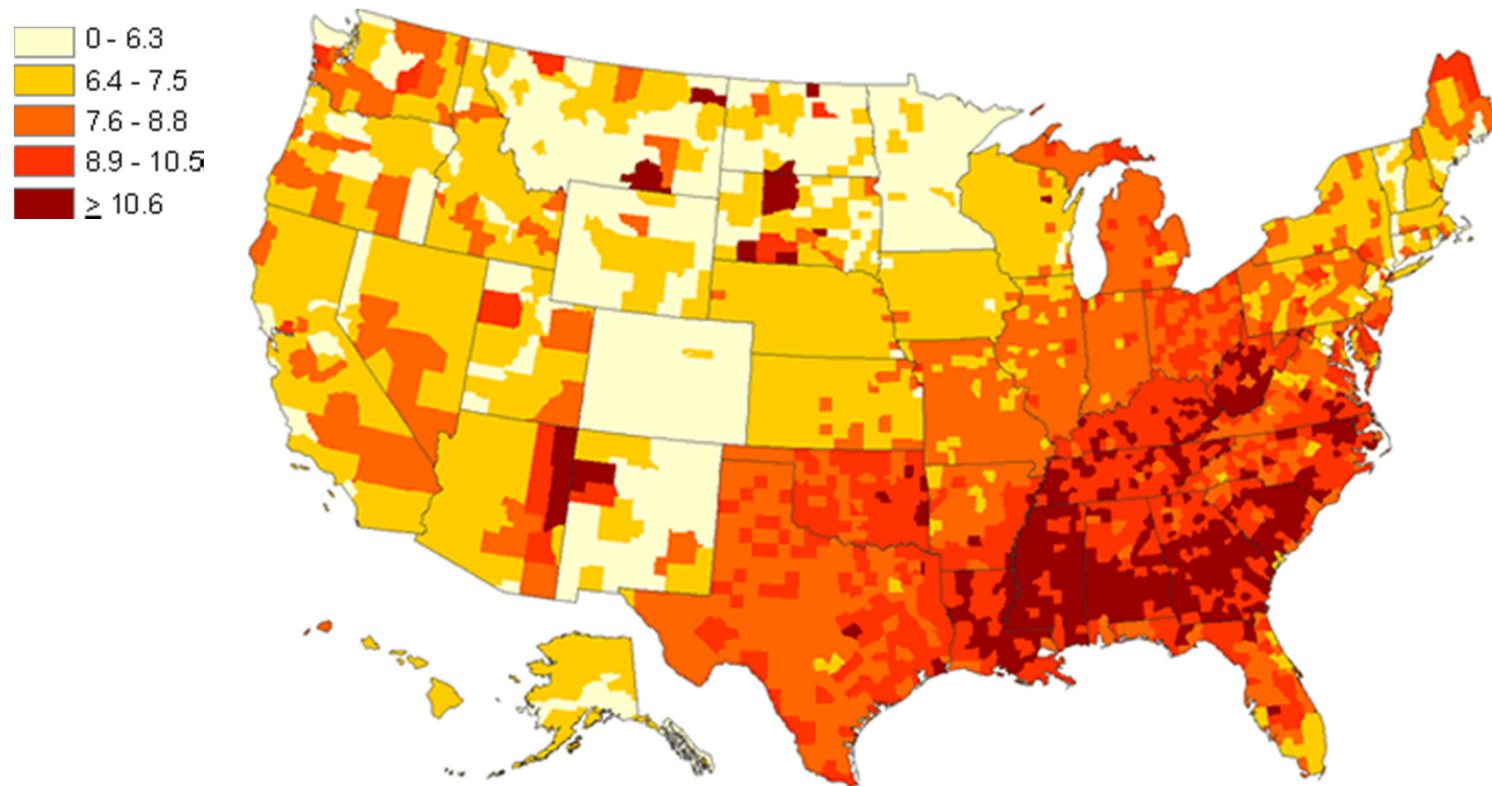
Diabetes Mellitus

- 2005 - CDC Statistics



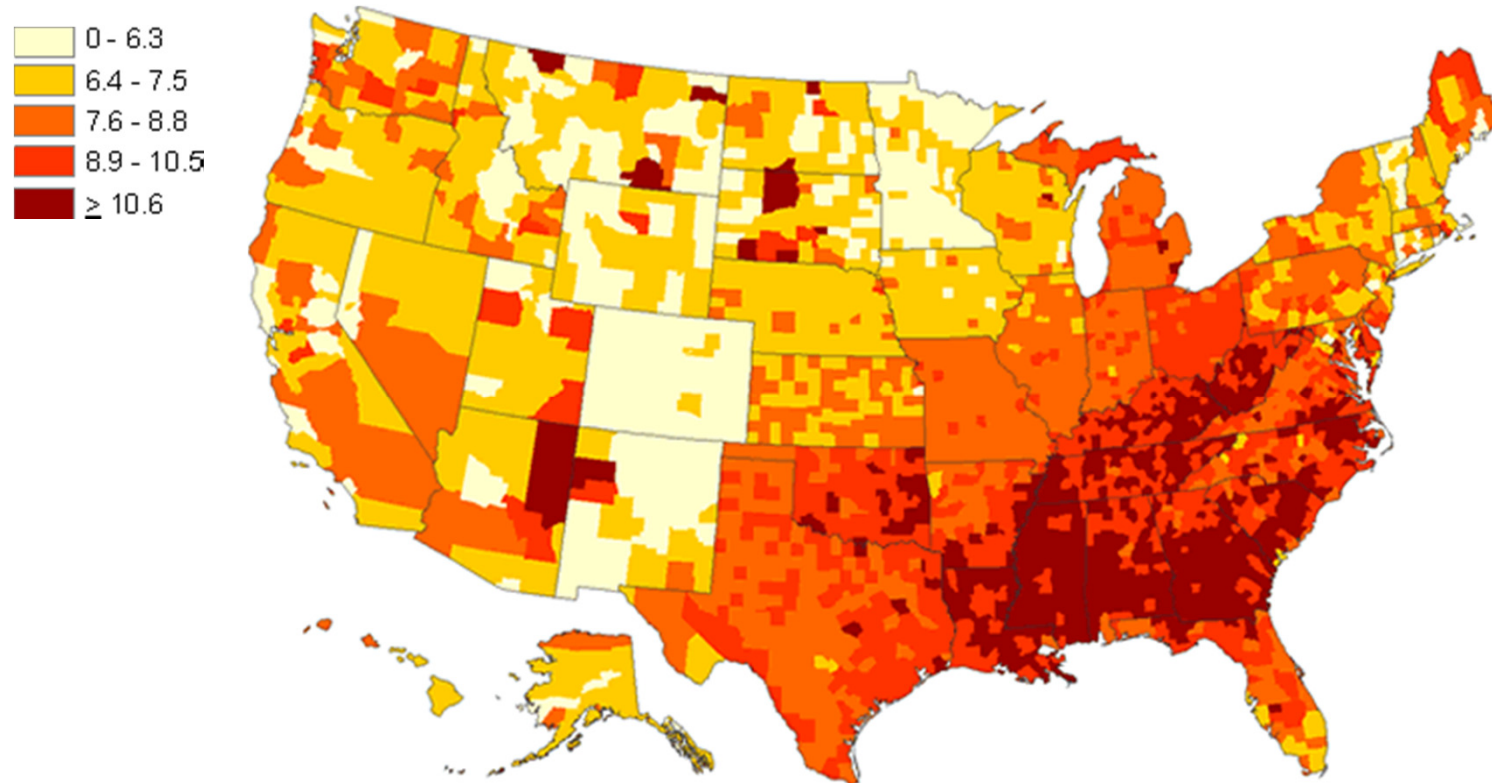
Diabetes Mellitus

- 2006 - CDC Statistics



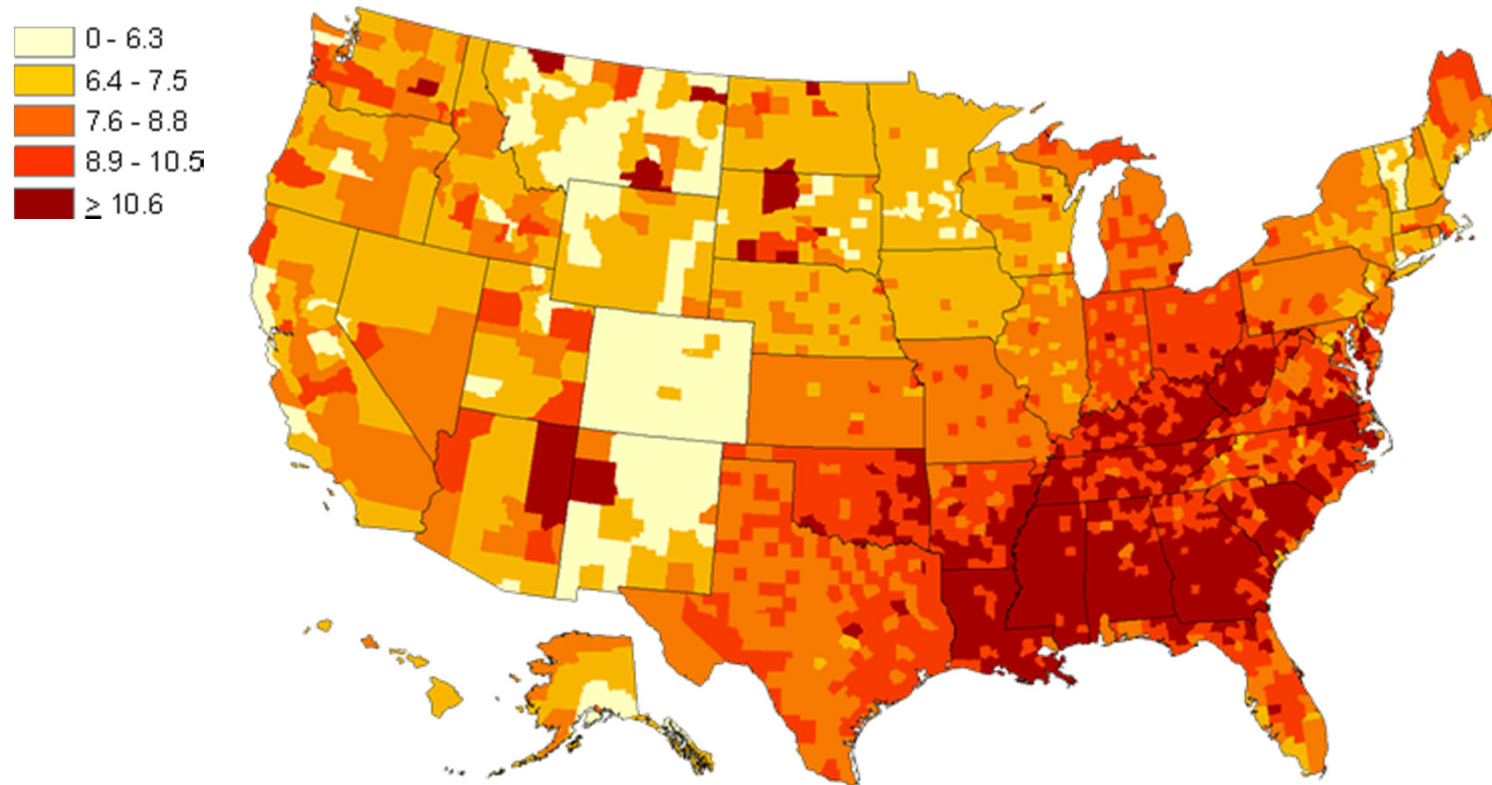
Diabetes Mellitus

- 2007 - CDC Statistics



Diabetes Mellitus

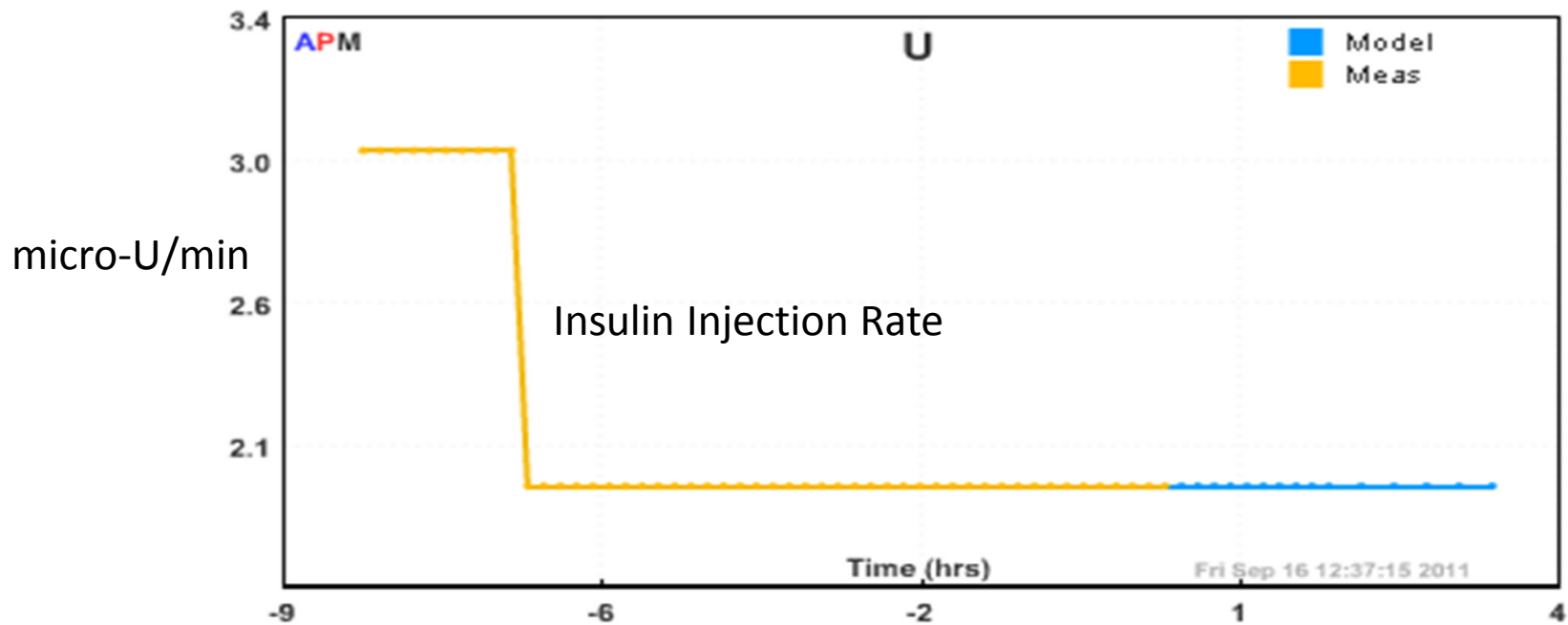
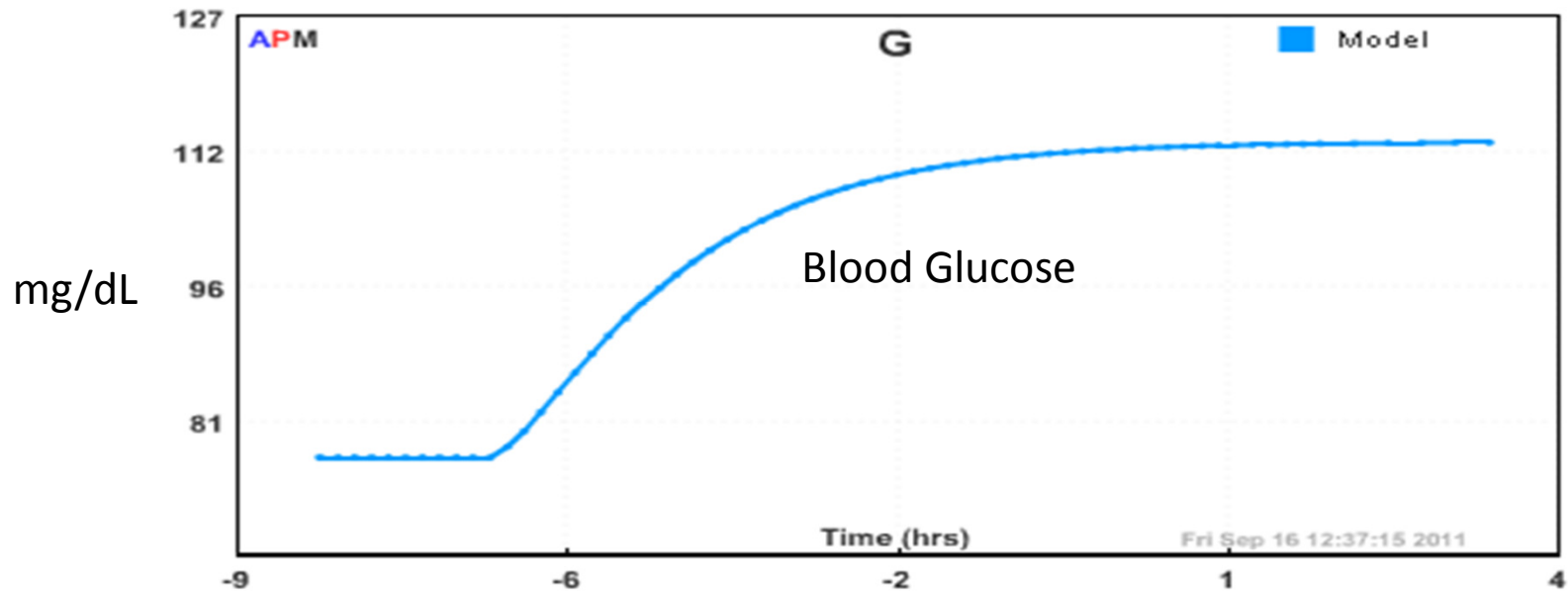
- 2008 - CDC Statistics



Diabetes Mellitus

- 26 million Americans (8.3%)
- 79 million with pre-diabetes (25%)
- 33% with diabetes by 2050 if trend continues

Fit FOPDT Model & Obtain PID Tuning Parameters



Artificial Pancreas Design Considerations

