

DREAM SWEET DREAMS: A NEW FRAMEWORK FOR SLEEP TRACKING AND BODY CHANGE PREDICTIONS

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OUTLINE

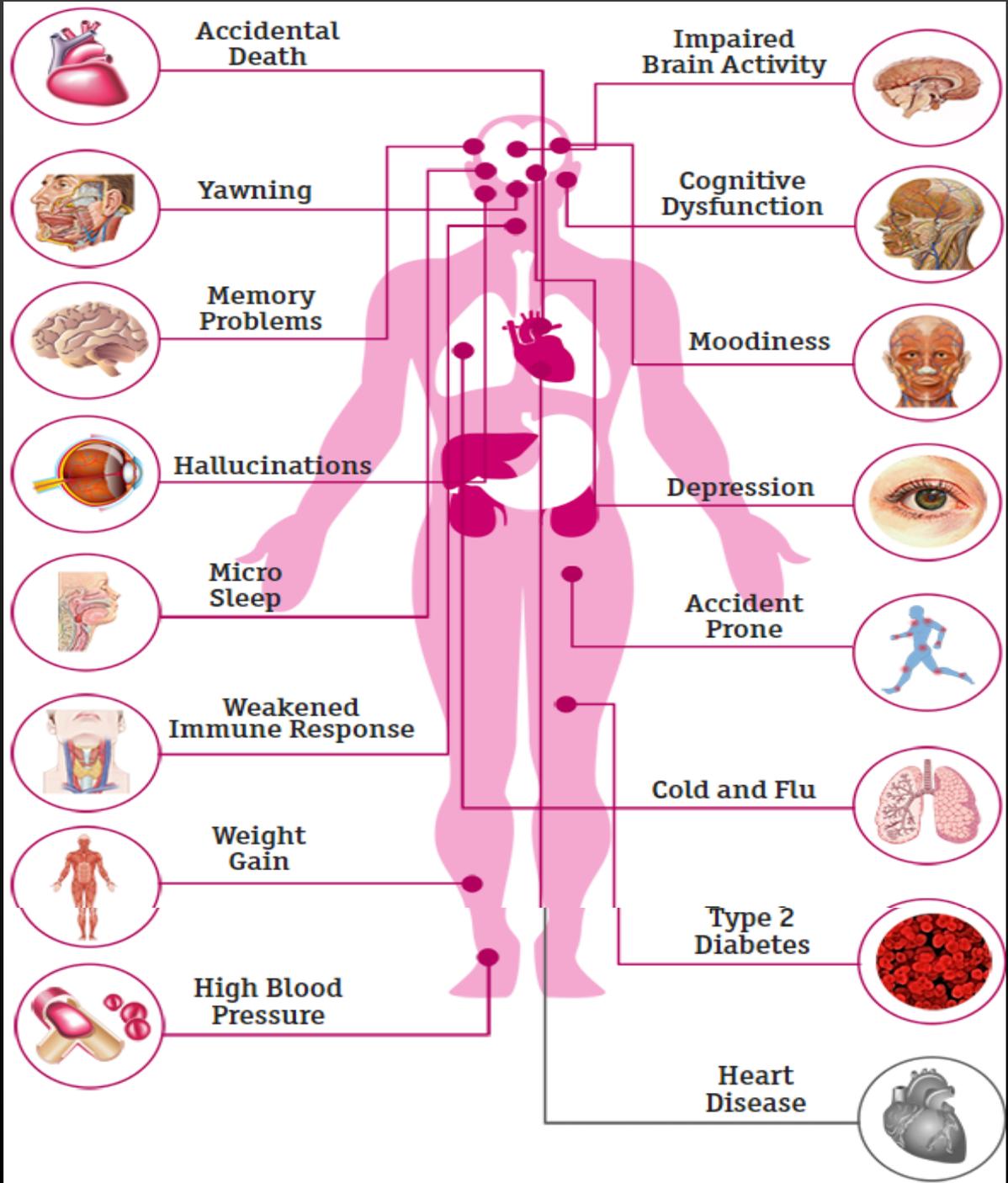
- **Motivations**
 - Why are we interested in this topic ?
 - What are we going to do to pursue this topic ?
- Mysleep platform – snap shots
- **A New Prognosis Health Framework for Sleep**
 - Body change predictions based on generic database and linear regressions
 - Predictions tailored for personalized, precision sleep medicine using neural network
- **Future directions/plans and conclusions**

SLEEP AND CHILDREN DEVELOPMENT

- Sleep is the primary activity of the brain during early development (every living creature needs sleep)
- Circadian rhythms (sleep-wake cycle) regulated by light and dark, start to develop at about six weeks
- Children spend 40% of their time sleeping by the age of two
- Children need on the average of 10 hrs sleep to sustain healthy development by the age of ten.

[national sleep foundation:

<https://sleepfoundation.org/sleep-topics/children-and-sleep>]



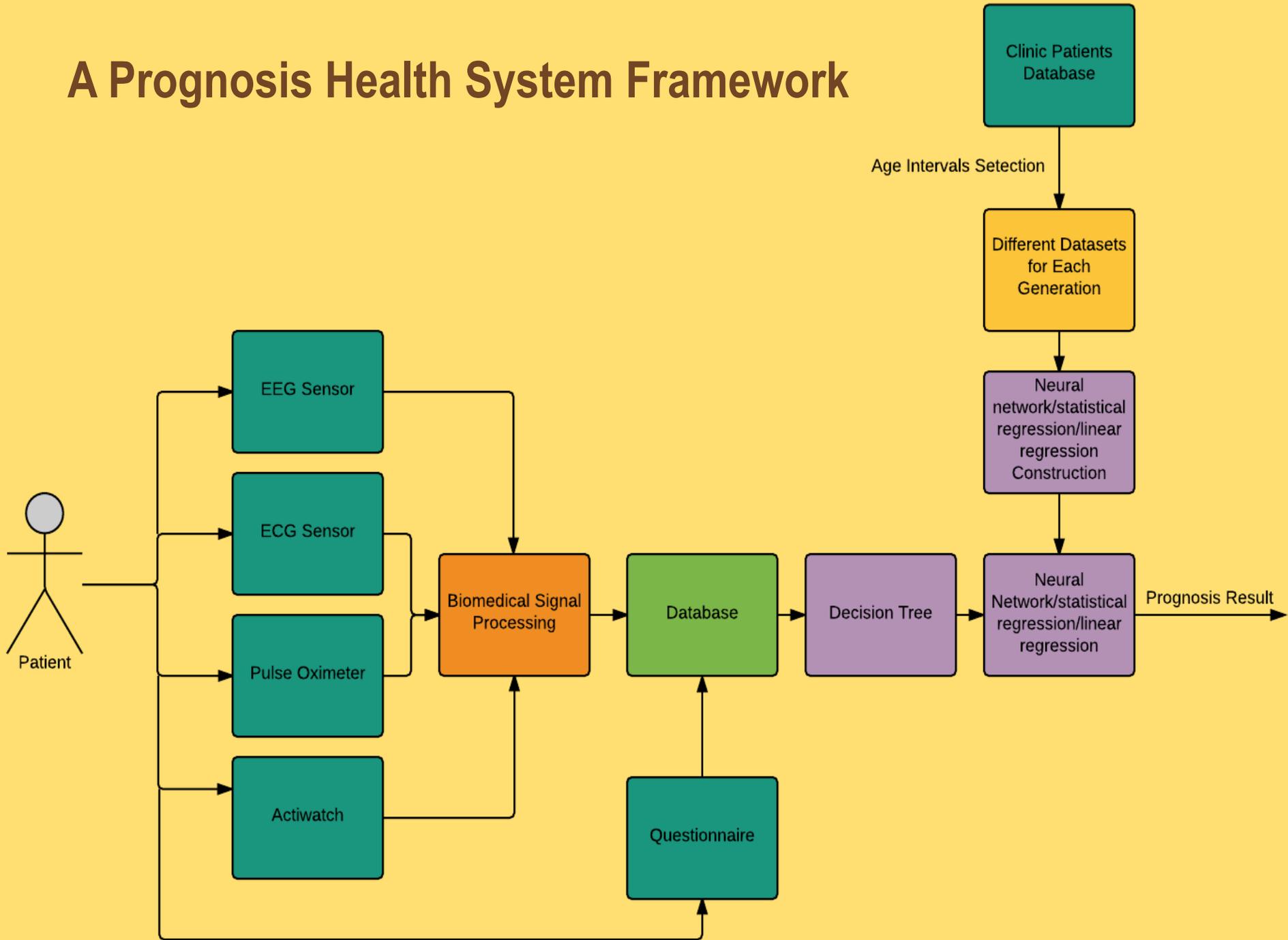
Sleep deficiency caused Body changes

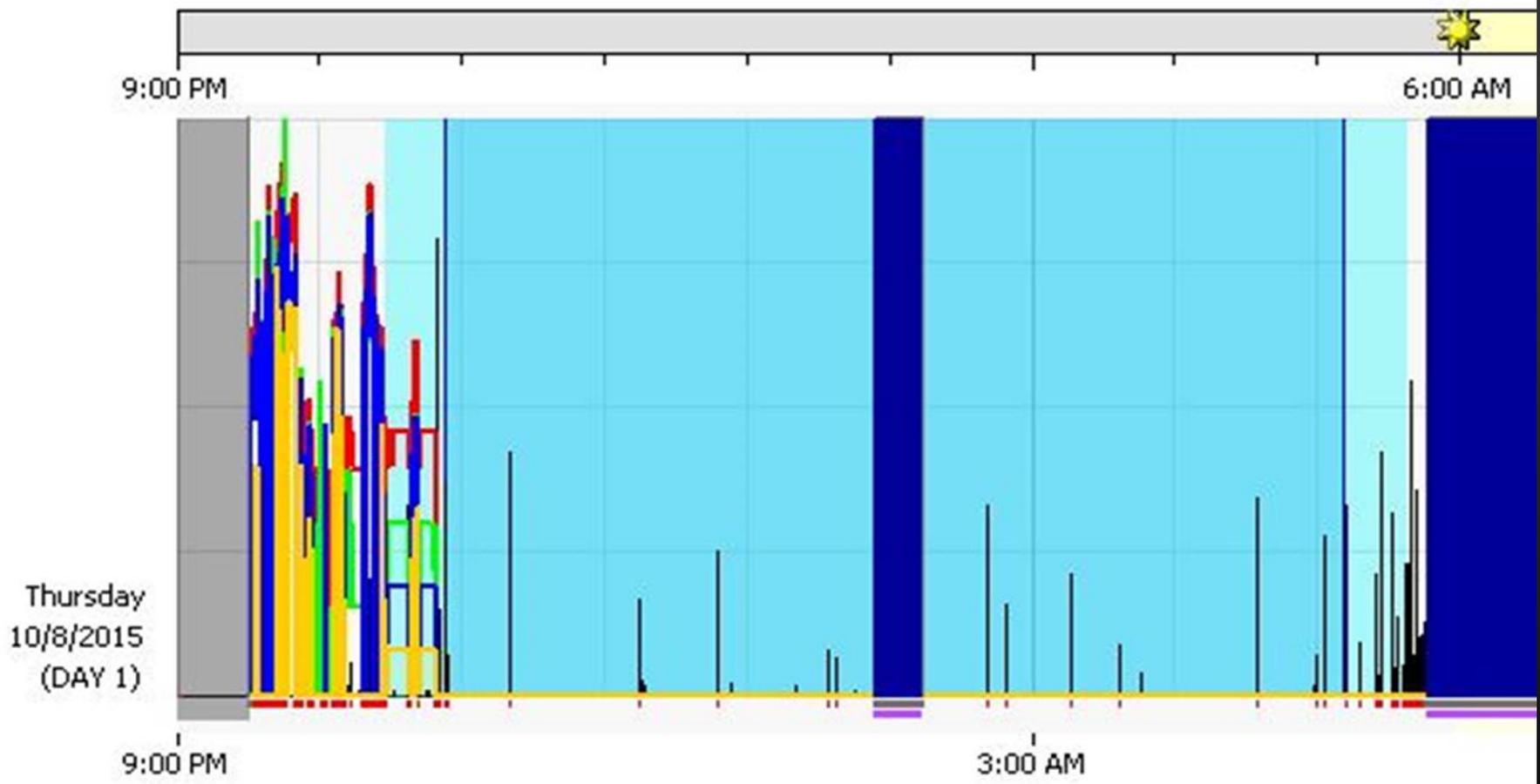
[courtesy of
<http://www.healthline.com/health/sleep-deprivation/effects-on-body>]

WHAT CAN WE DO ?

- Use wearables to establish self sleep tracking/monitoring (with parental access)
 - Can we teach children to manage their time e.g. sleep with wearables?
- Use the collected data to predict future sleep related problems
 - Is it possible to establish a personalized and precision sleep medicine framework ?

A Prognosis Health System Framework



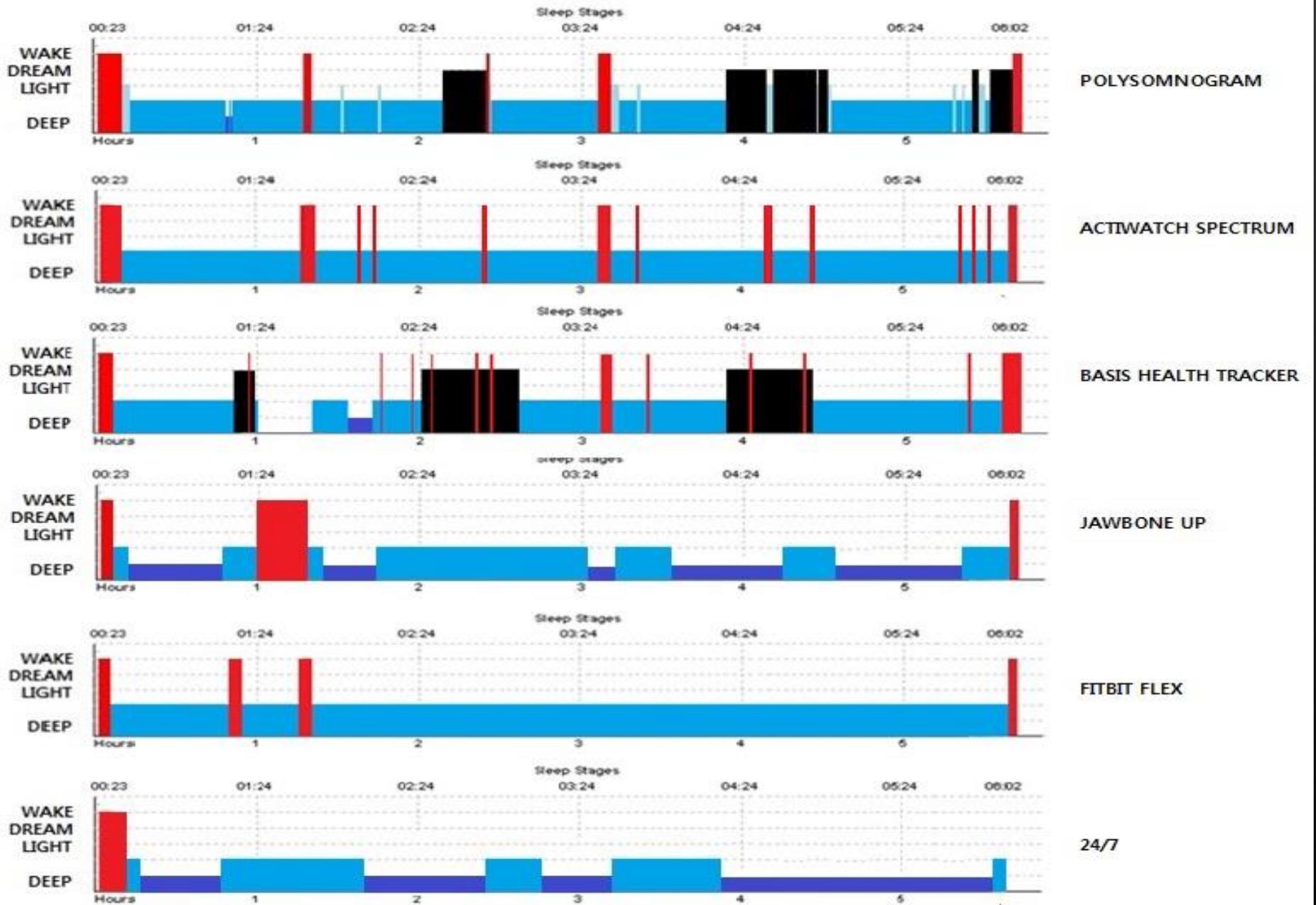


Sleep data was recorded by [Actiwatch](#) and displayed by [Actiwave](#). The light blue sections are sleeping periods. The dark blue sections are [Actiwatch](#) detached periods. Dark black lines during the sleeping periods are body movements.

WHAT ARE THE FEATURES

- Total sleep time
- Number of wakens in sleep
- Wake up time during sleep
- Sleep stages (REM)

Now we compare these features ...



THE RESULTS ?

- We can get good/accurate sleeping hours with both medical devices, and wearables
- We may get REM estimation

Average sleep hours with age information can provide some predictions already

Activity Diary for Thursday, March 16, 2017

I napped today.

I napped during the day from: : AM to :
 AM

Number of caffeinated drinks
(soda, energy drinks, coffee, tea)

I had:

Number of minutes I exercised
for:

- Sleepiness during the day
- (1) 😴 Very sleepy (fell asleep during activity)
 - (2) 😊 Sleepy (struggled to stay awake)
 - (3) 😴 Somewhat sleepy
 - (4) 🙄 Not sleepy

SUBMIT

Last night...

About 1 hour before going to sleep, I did the following activities (Choose all that apply from the options given):

- Watched TV
- Listened to music
- Played video games
- Used my laptop/tablet/computer
- Read
- Homework
- Showered/Took a warm bath
- Played with friends/family
- Snack/dessert
- Texting
- Talked on the phone
- Had caffeinated drink
- Exercised
- Ate a meal
- Other (Fill in reason)

I attempted to fall asleep at: :

Number of minutes it took to fall asleep: (MM)

Number of times I woke up during the night:

Total minutes my sleep was interrupted for across all awakenings: (MM)

My sleep was interrupted by (Choose all that apply from the options given):

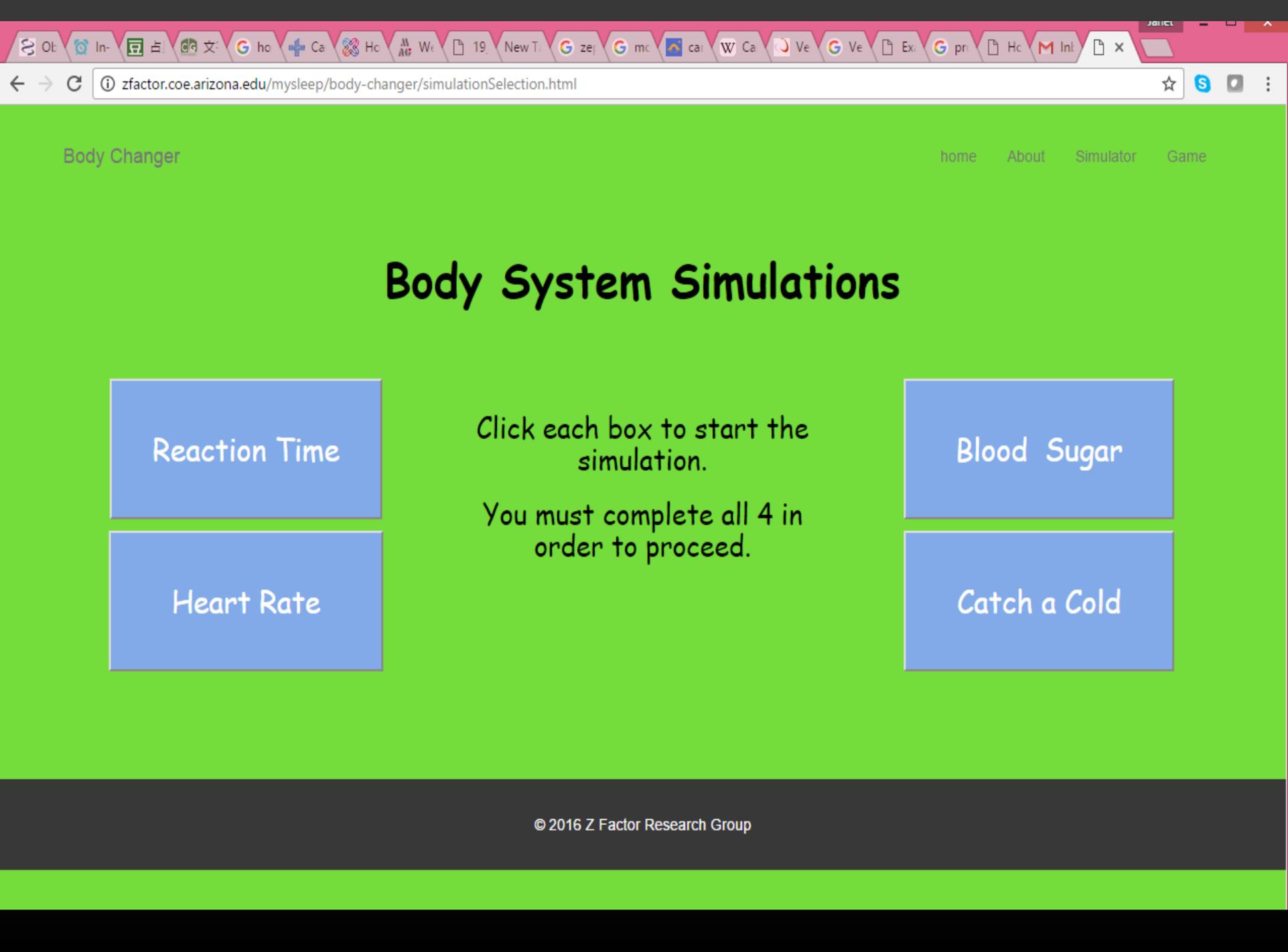
- Noise
- Pets
- Electronics
- Family members
- Dreams
- Worries
- Busy Minds
- Lighting
- Illness
- Bodily pain
- Bathroom
- Temperature (too hot/cold)
- Nothing
- Unknown
- Other (Fill in reason)

Overall, my sleep last night was: (1)Very restless
 (2)Restless
 (3)Fair quality
 (4)Sound
 (5)Very sound

This morning...

I woke up this morning at: :

When I woke up, I felt: (1)Tired
 (2)Somewhat refreshed
 (3)Refreshed



Body System Simulations

Reaction Time

Heart Rate

Click each box to start the simulation.

You must complete all 4 in order to proceed.

Blood Sugar

Catch a Cold

Body Changer

About

Simulation

CFSD16 School



Sleep is a body changer

Directions: Input average weekly hours of sleep and then click Simulate

9-12

8

7

6

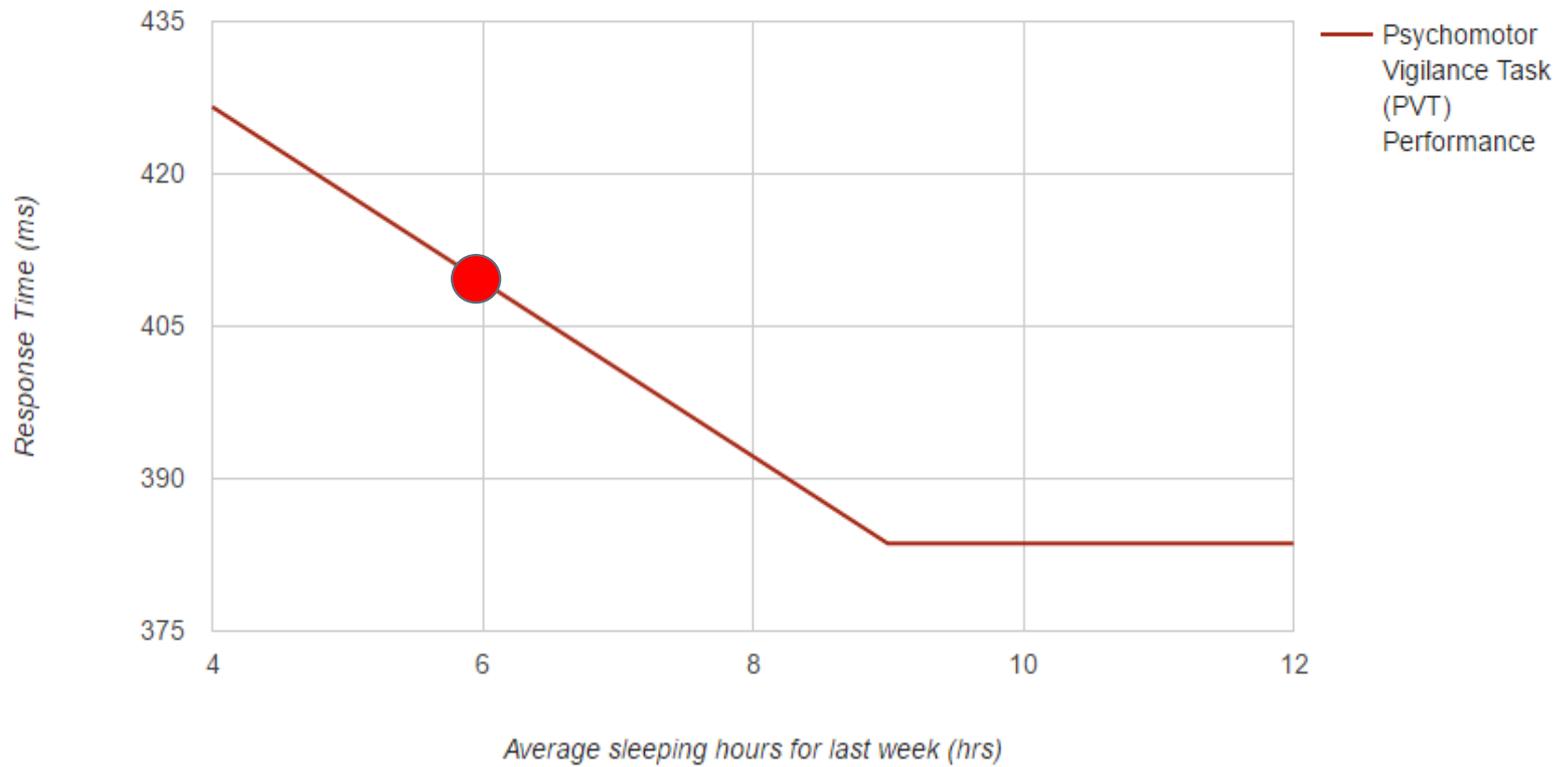
5

4

Simulate

Display Final Graph

REACTION TIME



PROBABILITY TO CATCH COLD

