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## Beyond Basic Exercise Guidelines: Is Sitting Really the New Smoking?

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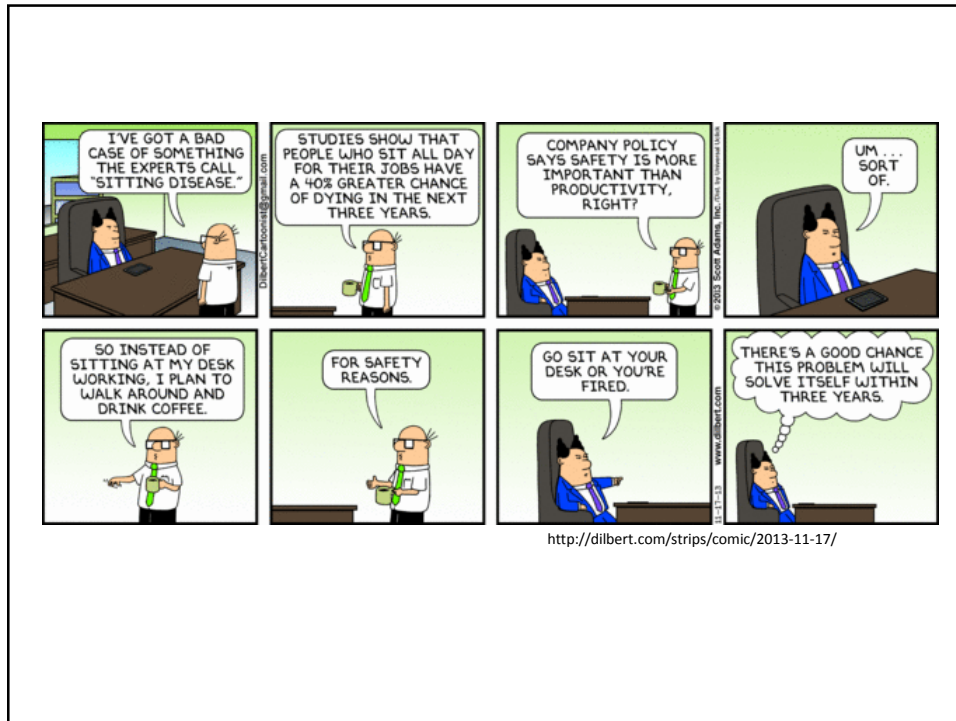
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Beyond Basic  
Exercise  
Guidelines:  
Is sitting really the  
new smoking?

COLLEGE OF  
Saint Benedict  Saint John's  
UNIVERSITY  
Exercise Science and Sport Studies Department

## 150 Minutes Per Week



### **F**requency

5x per week

### **I**ntensity

Moderate to Vigorous

### **T**ime

30 min per session  
(150 min/wk)

### **T**ype

Aerobic (cardio),  
resistance training,  
flexibility and balance  
training



American College of Sports Medicine (2013)

## Typical Day

- Wake up
- Get ready for the day  
(shower, coffee, breakfast, etc.)
- Commute to work
- Work (am)
- Lunch
- Work (pm)
- Commute home
- Prepare/ eat dinner
- Read, watch TV, catch up on work, laundry, drink good wine, etc.

## Typical Day with 30 min of MI Exercise

- Wake up
- Go for a run/walk
- Get ready for the day (shower, coffee, breakfast, etc.)
- Commute to work
- Work (am)
- Lunch
- Exercise during lunch hour
- Work (pm)
- Commute home
- Prepare/ eat dinner
- Walk the dog
- Read, watch TV, catch up on work, laundry, drink good wine, etc.

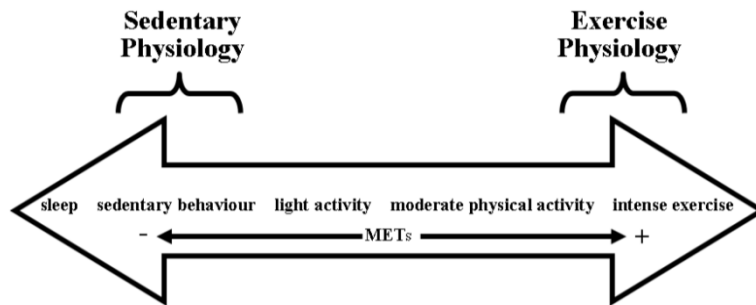
You get in your 150 min/wk!

Good for you.

What are you doing with the other 6,570 min a week you are not exercising or sleeping??



## What is sedentary physiology?



Tremblay et al., 2010

“...any waking [behavior] characterized by an energy expenditure  $\leq 1.5$  METs while in a sitting or reclining posture.”

- SBRN, 2012

## Measuring Sedentary Time

- Daily Recall
- TV viewing time
- TV time + other screen time
- Questionnaire (IPAQ)
- Accelerometer



ActiGraph GT3X+



## So, what happens when we sit a lot?

Mortality  
CVD Risk  
Weight Gain  
Diabetes  
Other Consequences

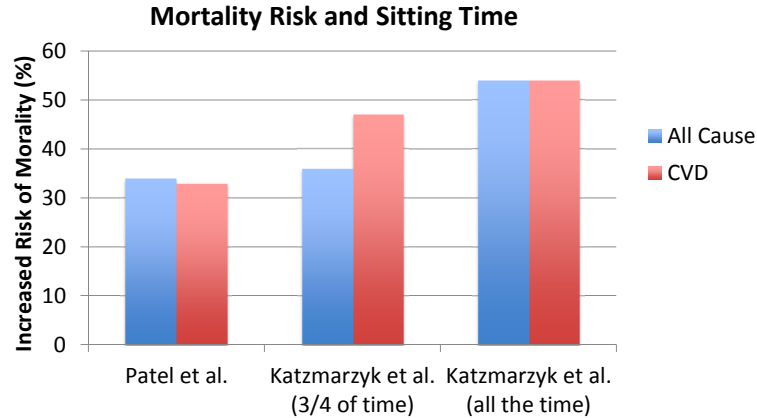
## So, what happens when we sit?

Mortality      CVD Risk      Weight Gain      Diabetes      Other



## So, what happens when we sit?

Mortality      CVD Risk      Weight Gain      Diabetes      Other



## So, what happens when we sit?

Mortality      CVD Risk      Weight Gain      Diabetes      Other

### Mortality Risk and TV Viewing

- 4,500 Scottish men and women over 35 y/o<sup>20</sup>
  - All Cause Mortality = 48% increase in risk with 4+ hr of TV/day
  - CVD Mortality = 125% increase in risk with 4+ hr of TV/day
- 13,000 men and women between 45-79 y/o<sup>23</sup>
  - All Cause Mortality = 5% increase for every hour of TV/day
  - CVD Mortality = 8% increase for every hour of TV/day





## So, what happens when we sit?

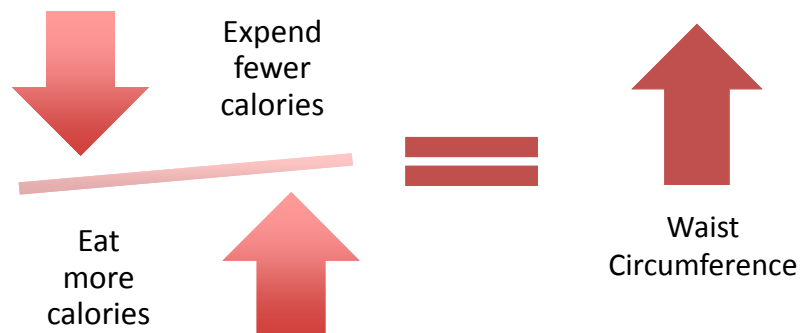
Mortality    **CVD Risk**    Weight Gain    Diabetes    Other

- ✓ Blood lipid levels
  - Increase TC and TG <sup>7,10</sup>
  - Decrease HDL<sup>4</sup> (good cholesterol)
  - Impaired lipid metabolism<sup>2, 8, 24</sup>
- ✓ Endothelial dysfunction <sup>7</sup>
  - Decreased vessel diameter and blood flow
  - Increased blood pressure
- ✓ Increased risk for blood clots <sup>\*\* 11</sup>
  - Increased fibrinogen
- ✓ Increased Inflammation <sup>10</sup>
  - CRP may be a marker for inflammation
  - High levels associated with risk for CVD



## So, what happens when we sit?

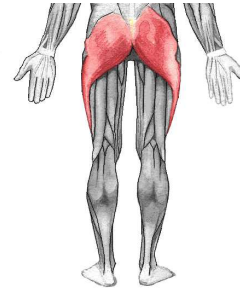
Mortality    CVD Risk    **Weight Gain**    Diabetes    Other



## So, what happens when we sit?

Mortality    CVD Risk    **Weight Gain**    Diabetes    Other

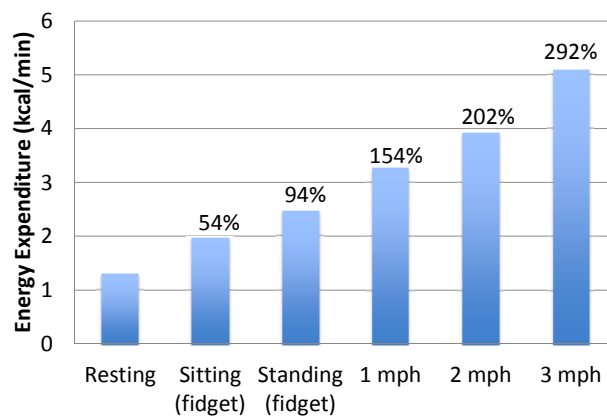
- Canadian adults, over 6 years, experienced a 0.13cm increase in WC for every 15 min increase in sedentary time <sup>18</sup>
- Australian workers sitting >352 min (5.8 hr) in a work day had 6.1 cm greater WC and 1.8 more BMI units than those with <352 min of sitting time <sup>16</sup>
- Over 5 years, an increase in TV viewing time was associated with a .43 cm increase in WC for men and .68 cm increase in women <sup>23</sup>



We engage less muscle mass while sitting.

## So, what happens when we sit?

Mortality    CVD Risk    **Weight Gain**    Diabetes    Other



(Levine et al., 2000)

## So, what happens when we sit?

Mortality    CVD Risk    **Weight Gain**    Diabetes    Other



Not only are you expending fewer calories, but you may find yourself eating more. <sup>3</sup>

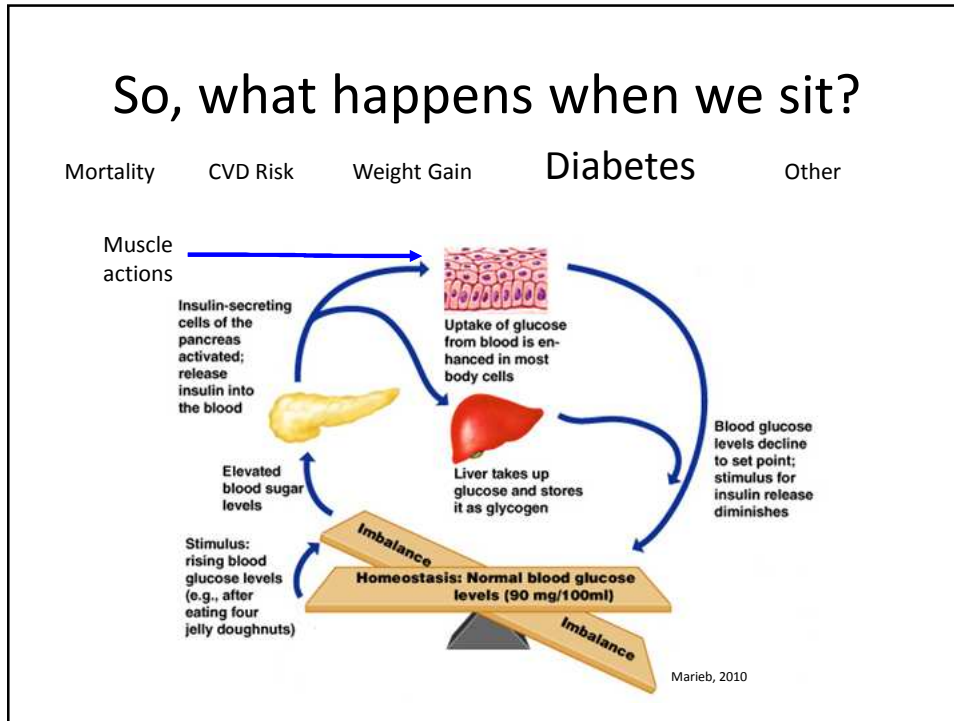
## Knowledge Based Workers ?

TABLE 3. Spontaneous Energy Intake in the Buffet-Type Meal After Each Experimental Condition

	Control Condition	Reading-Writing Condition	Test-Battery Condition
Total energy intake			
kJ	3595 ± 932	4443 ± 1015*	4652 ± 1019*
kcal	860 ± 223	1063 ± 243*	1113 ± 244*
Lipid			
kJ	1676 ± 744	2148 ± 672*	2202 ± 576*
kcal	401 ± 178	514 ± 161*	527 ± 138*
%	46.6 ± 10.1	48.3 ± 10.6	47.3 ± 16.1
Carbohydrate			
kJ	1412 ± 485	1772 ± 501*	1835 ± 677*
kcal	338 ± 116	424 ± 120*	439 ± 162*
%	39.3 ± 8.7	39.9 ± 7.4	39.4 ± 8.1
Protein			
kJ	505 ± 183	522 ± 158	614 ± 229
kcal	121 ± 44	125 ± 38	147 ± 55
%	14.1 ± 4.7	11.8 ± 6.8	13.3 ± 3.9

Data are mean ± SD.

\* Significantly different from control values ( $p < .05$ ).



- ## So, what happens when we sit?
- Mortality    CVD Risk    Weight Gain    **Diabetes**    Other
- ✓ Increased risk for diabetes
  - ✓ Limited muscle actions limit glucose uptake
    - Post prandial blood glucose remains elevated<sup>5</sup>
    - Important implications for T2D management and CVD risk
  - ✓ Insulin sensitivity decreases<sup>5,7,8</sup>
    - As little as 5 days, probably less

## So, what happens when we sit?

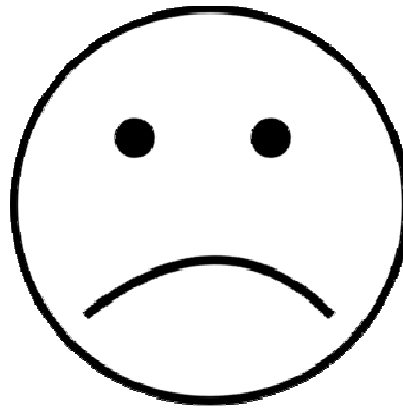
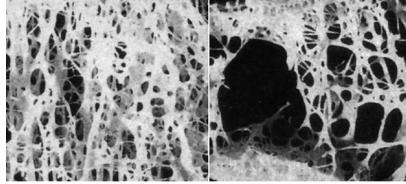
Mortality

CVD Risk

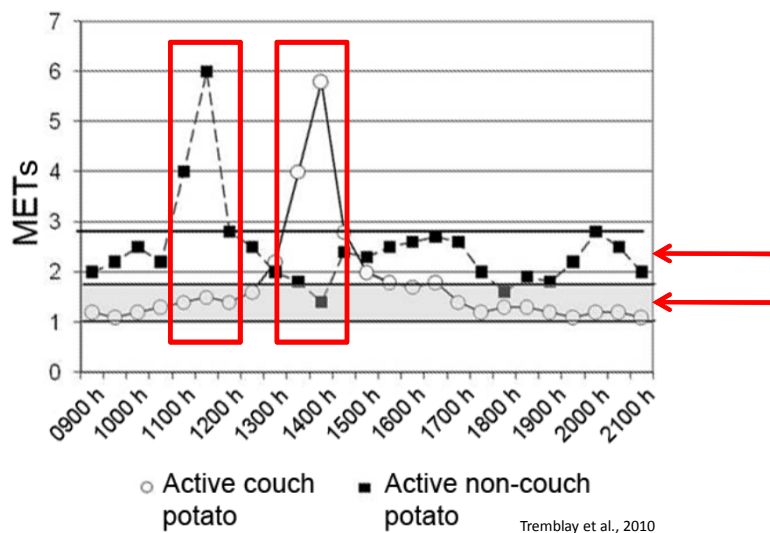
Weight Gain

Diabetes

Other



## ...even if I get my 150 minutes a week?



## Breaks Are Important

Mortality  
CVD Risk  
Weight Gain  
Diabetes  
Other Consequences



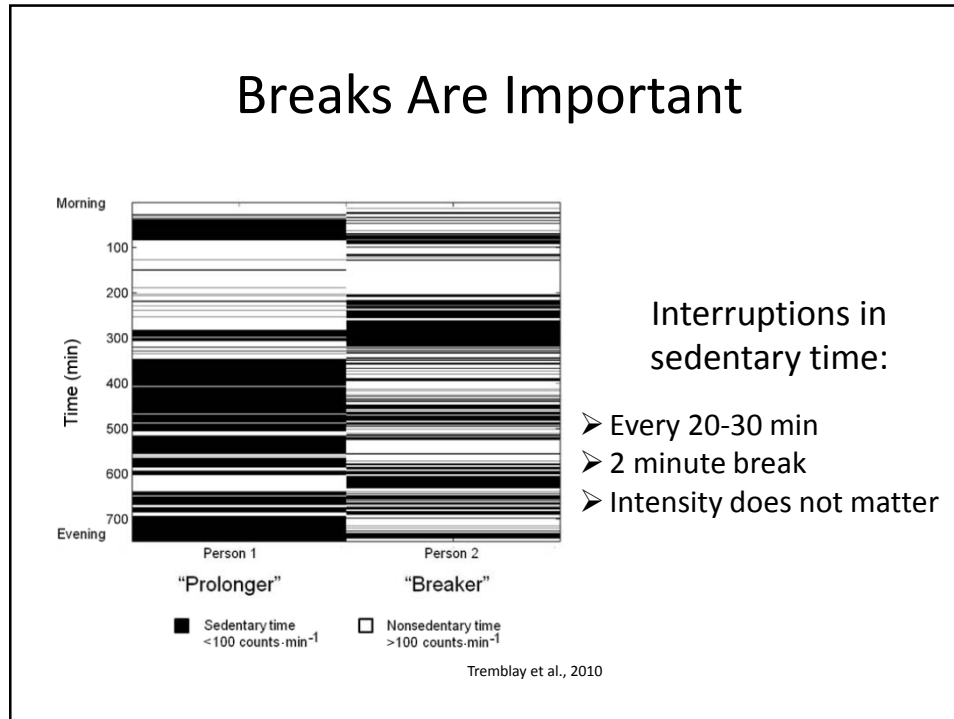
**S** Sedentary behavior frequency

**I** Interruptions in sitting time\*\*

**T** Time (duration of sitting)

**T** Type (TV, driving, computer use)





## Breaks are Important

- CVD Risk
  - More breaks, increased HDL<sup>4</sup>, increased LPL activity, decreased TG<sup>10</sup>
  - Light intensity breaks, fibrinogen decreased, blood viscosity decreased, and blood flow increased<sup>11</sup>
  - Decreased inflammation with highest quartile of sitters<sup>10</sup>
- Weight Gain
  - Standing and walking at a normal pace for 2-5 min an hour resulted in an extra 296-660 kcal burned<sup>21</sup>
  - Successful weight maintenance with decreased TV time<sup>15</sup>
  - Those in highest quartile of interruptions associated with a 5.9 cm lower WC than those in the lowest quartile<sup>9</sup>
  - 0.15cm lower WC for each interruption in sedentary time<sup>4</sup>
- Diabetes
  - Breaks (LI or MI) decreased PP glucose and insulin concentrations<sup>5</sup>
    - 2 min every 20 min for 5 hr- 28 min total
    - Better fasting glucose in highest quartile of sitters<sup>10</sup>
- Other
  - Likely to feel happier and partake in other healthy behaviors

## Work Alternatives



[www.lifespanfitness.com](http://www.lifespanfitness.com)

## Sedentary Time at CSB|SJU

513 students, faculty, and staff

**7.54 hr/day**



**1.16 hr/day**



**4.04 hr/day**





## Sedentary Time at CSB|SJU

- Students
  - Anecdotal: 4-14 hr/day
  - Reported Seated Time: 7.39 hr/day
  - TV/Computer Time: 3.72 hr/day
- Faculty/Staff
  - Reported Seated Time: 7.66 hr/day
  - TV/Computer Time: 6.48 hr/day

## Future Research at CSB|SJU

- Murray 001 Spring 2014
  - Student engagement/focus in class
  - Other healthy behaviors
- Long-term research plans



## Think you don't do a lot of sitting?

- Calculate your sitting time.
  - 24 hour recall
  - Online sitting calculator ([juststand.org](http://juststand.org))



## So, what do you do about it?

### At work:

1. Take breaks or change posture every 20-30 min
  - Set an alarm to go off every 20 min. (on your phone, web based programs)- you will focus better
    - Tomato Timer
    - Focus Booster
    - Pomodoro Timer
2. Encourage colleagues to take breaks
3. Brainstorm while walking
  - Walk on your lunch break or have walking meetings
  - Get a pedometer
4. Get a smaller water bottle so you have to fill it more often
5. Place frequently used office/home items far enough away from where you sit so that you have to stand to get them
6. Try a different commute (if you can)
  - Stand on the bus or train
  - Bike to work
7. Ask about sit-stand workstations



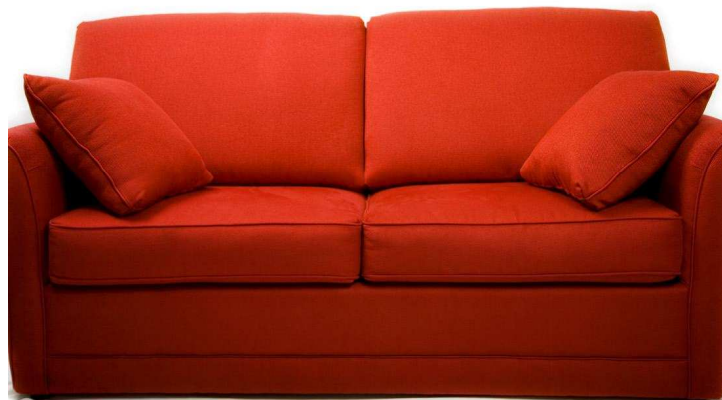
## At Home:

1. Take breaks!
2. Fold the laundry standing
3. Stretch while watching TV
4. Move at every commercial
5. Do your cleaning in small bouts to spread it out
6. Walk around the house while you are on the phone
7. Turn on the tunes and do a little dance while you're cooking
8. Hand wash the dishes
9. Having a get together? Get rid of the chairs (everyone stands around the kitchen counter anyways!)
10. Get out of the car to pick up kids from school

## Starting Tips for Standing

- Make sure your posture is correct
  - Screen at eye level
  - Elbows at 90°
  - Straight neutral posture
- Start standing in small time increments
- First 2 weeks are tough!
- Kick the heels
- Beware of locking knees
- Feel free to move

How much sitting is too much?



How can I move more?

Take Home Point:

Sitting can increase your risk for chronic diseases **EVEN** if you get your daily dose of exercise!

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Thank you.