

# Will Sitting Kill Us?

If So, What Can We Do?  
If Not, Why All the Hype?

By

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# From the Headlines...

## **7 Ways Sitting Will Kill You**

**Are You Sitting Yourself to Death?**



**Sitting kills: 12 quick tips to avoid a premature death.**

**Sitting is the New Smoking- Even for Runners**

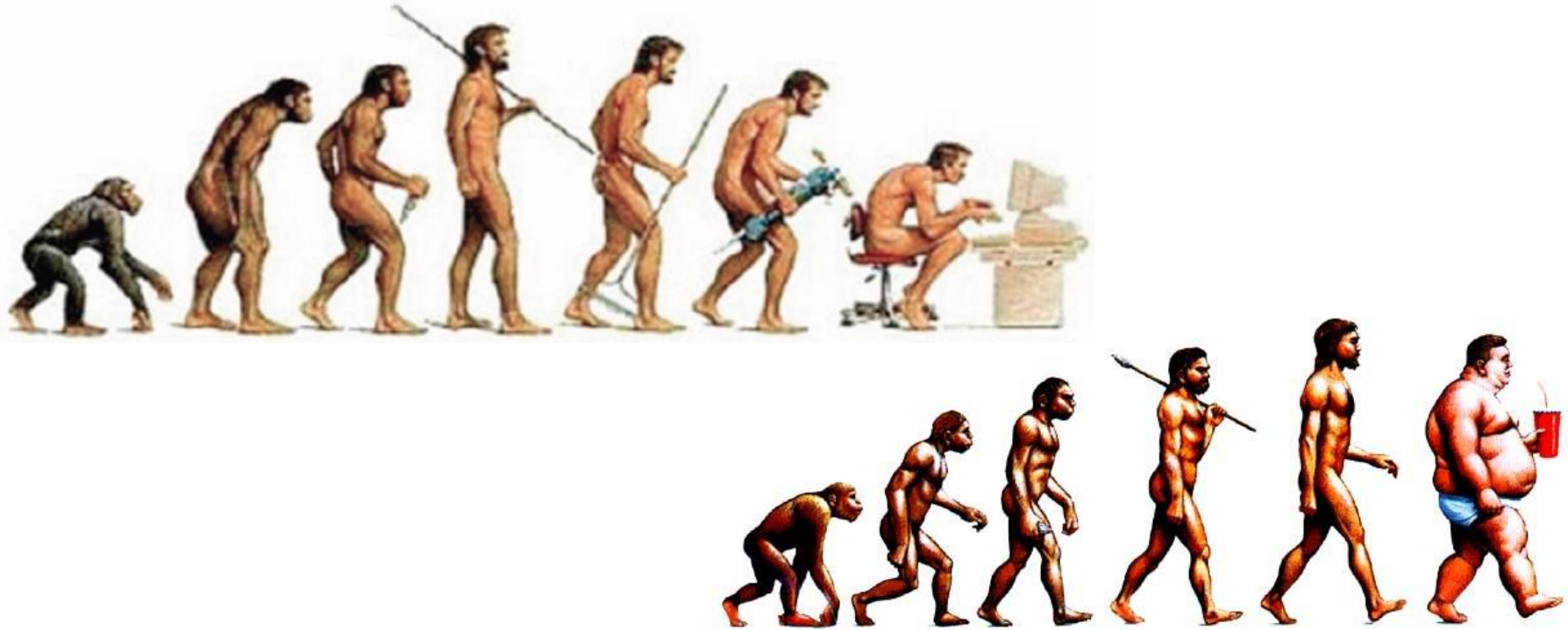
# Overview

- ◆ Is there evidence to support these claims?
- ◆ Are they overkill?
- ◆ What are people and organizations doing to address this growing concern?
- ◆ What might the future bring?

# Theories

- ◆ A long-term pattern of sitting for long durations impacts health and life expectancy
- ◆ Obesity impacts health and life expectancy

# A “Perfect Storm?”



Sources: images.google.com, search for “human evolution”, many sources for this common image; <http://www.smart-diner.com/paleo-diet-information/diseases-of-civilization/>, Image attributed to Primal Recipe; Prevent Lifestyle Diseases



# Evidence

- ◆ Numerous reports in the popular press, most point to several primary sources, including:
  - ◆ Marc T. Hamilton, Deborah G. Hamilton, and Theodore W. Zderic, (2007), Role of low energy expenditure and sitting in obesity, metabolic syndrome, type 2 diabetes, and cardiovascular disease, *Perspectives in Diabetes*.
  - ◆ N Owen, A Bauman, W Brown, (2008), Too much sitting: a novel and important predictor of chronic disease risk?, *British Journal of Sports Medicine*, 43:80-81.
  - ◆ Genevieve N. Heally, David W. Dunstan, Jo Salmon, Jonathan E. Shaw, Paul Z Zimmet, Neville Owen,(2008), Television Time and Continuous Metabolic Risk in Physically Active Adults, *Medicine & Science in Sports & Exercise*, 639-645.
  - ◆ Peter T. Katzmarzyk, Timothy S. Church, Coral L. Craig, and Claude Bouchard, (2009), Sitting Time and Mortality from All Causes, Cardiovascular Disease, and Cancer, *Medicine and Science in Sports & Exercise*, 998-1005.
  - ◆ Peter T. Katzmarzyk, I-Min Lee, (2012), Sedentary behavior and life expectancy in the USA: a cause-deleted life table analysis, *British Medical Journal*, 2:e000828.

# Part of a Public Health Research Agenda

- ◆ Many researchers specifically mention updating public health fitness guidelines, and encouraging the use of exercise interventions at the clinical level, as part of the motivation to investigate sedentary behavior.
- ◆ Example: “We call upon professionals in clinical medicine, exercise science and public health to become more aggressive in implementing exercise treatments for all.”  
*(British Journal of Sports Medicine Editorial, 2008)*

# Hamilton, Hamilton, Zedric (2008)

- ◆ Literature Review
- ◆ Should Inactivity Physiology be considered separate and distinct from Exercise Physiology?
- ◆ Comprehensive review of evidence supporting inactivity as a contributor to various health concerns



# Hamilton, Hamilton, Zedric (2008)

- ◆ “It is easy to forget when studying behaviors (e.g. prolonged sitting) that statistical correlations with risk factors does not prove causation and that interventional studies are required to identify the actual stimuli causing a cellular regulatory mechanism to raise metabolic risk factors”

# Heally et al (2008) Methods

- ◆ Analysis of Australian Diabetes, Obesity and Lifestyle study (1999-2000)
- ◆ Narrowed data set to those who reported 2.5 hrs/week of moderate to vigorous exercise and where otherwise healthy (2031 men, 2033 women)
- ◆ Applied statistical models looking for correlations

# Heally et al (2008) Key Findings

- ◆ Significant associations between TV viewing time and:
  - ◆ For men and woman,
    - ◆ Waist circumference
    - ◆ Systolic blood pressure
    - ◆ 2-h plasma glucose
  - ◆ For women,
    - ◆ Fasting plasma glucose
    - ◆ Triglycerides
    - ◆ HDL-C
- ◆ All associations were stronger for women than for men

# Heally et al (2008) Limitations

- ◆ Cross-sectional study
- ◆ Self-Reported TV time and physical activity (subjective)
- ◆ TV time was the only sedentary behavior investigated
- ◆ “Further research, preferably using objective measures, is required to examine the association of various sedentary behaviors with metabolic risk.”

# Katzmarzyk et al (2009)

## Methods

- ◆ Baseline data drawn from 7278 men and 9735 women who participated in 1981 Canadian Fitness Survey
- ◆ Identified survey participants who died between 1981 and 1993 (1832 deaths)
- ◆ Applied statistical tests looking for associations

# Katzmarzyk et al (2009) Key Findings

- ◆ Compared with survivors, those who died were significantly:
  - ◆ Older
  - ◆ Had higher BMI
  - ◆ Were less physically active
- ◆ Daily time spent sitting was associated with elevated risk for:
  - ◆ All-cause deaths
  - ◆ Cardiovascular disease
- ◆ Association of sitting time and death was independent of leisure time physical activity and BMI



# Katzmarzyk et al (2009)

## Limitations

- ◆ Baseline participants were not screened for pre-existing disease
- ◆ Self-reported sitting behavior (subjective)
- ◆ Sitting time data available only at 1981 baseline

# Katzmarzyk & Lee (2012)

## Methods

- ◆ Meta-analysis of studies that investigated associations between sitting or TV viewing and all-cause mortality (5 articles)
- ◆ Applied statistical models

# Katzmarzyk & Lee (2012) Key Findings

- ◆ Limiting sitting time to <3 hrs/day “may increase life expectancy at birth in the USA by approximately” 2.0 years
- ◆ Limiting TV viewing time to <2 hrs/day “may increase life expectancy at birth in the USA by approximately” 1.38 years
- ◆ “... assuming a causal relationship.”
- ◆ Compared to smoking risk: 2.5 yr reduction for men; 1.8 for women

# Katzmarzyk & Lee (2012)

## Limitations

- ◆ “... confounders associated with both sedentary behaviour and premature mortality may have been unmeasured or inadequately adjusted for in the primary studies ...”
- ◆ Results cannot be applied to individuals within the population, only to the population at large.
- ◆ Subjective data sets – still need to do objective intervention studies

# Sitting “Risk” in Perspective

- ◆ Lots of things have potential to impact health of shorten population life expectancy
- ◆ Average life expectancy has increased dramatically, in parallel with our increased amount of sitting
- ◆ A public health guideline instructing people to change their sedentary behavior, including sitting, is much the same as the current guidelines that we should get moderate to vigorous exercise for at least 150 minutes per week ...
- ◆ How many of us do that?

# In Summary

- ◆ My review of the literature suggests more physical activity is better than less physical activity – no surprise
- ◆ The real challenge is influencing human behavior
- ◆ Moderate to vigorous activity for at least 150 mins/wk is good
- ◆ So is increasing light physical activities – simple movements throughout the day
- ◆ Sitting won't kill you, but if you do it too much, it could impact your health, and therefore your life expectancy, but no one can say for sure



# Are Concerns About Sitting New?

- ◆ Example: Ramazinni (1700's)
  - ◆ "Those who sit at their work suffer from their own particular diseases."
  - ◆ "Those who work standing . . .carpenters, sawyers, carvers, blacksmiths, masons . . .are liable to varicose veins. . . [because] the strain on the muscles is such that the circulation of the blood is retarded."
  - ◆ "Standing even for a short time proves exhausting compared with walking and running though it be for a long time. . . . **Nature delights and is restored by alternating and varied actions.**"

# But, it's NOT Just about Work

- ◆ People sit ...
  - ◆ At home
  - ◆ At leisure
  - ◆ On their way to and from home, leisure and work
  - ◆ And at work



# What Are our Options?

- ◆ Personal behavior changes – it's not just about work
- ◆ Cultural changes
- ◆ Institutional changes – what can we do in the workplace?

# Politics

- ◆ the AMA adopted policy recognizing potential risks of prolonged sitting and encouraging employers, employees and others to make available alternatives to sitting, such as standing work stations and isometric balls.

# Solutions

- ◆ Passive ergonomics design
- ◆ Dynamic ergonomics design
- ◆ Active ergonomics design
- ◆ Work flow design
- ◆ Behavior changes

# Practical Challenges

- ◆ “What’s the best way to sit?”
- ◆ “What’s the best way to stand?”
- ◆ “What’s the best way to move ...”



# Institutional Challenges

- ◆ Culture
- ◆ Cost
- ◆ Change is never easy

# So, In Conclusion, Will Sitting Kill You?

- ◆ Probably not
- ◆ Put the potential risk in perspective
- ◆ But yes, do move more often throughout your day

# Scott Adams -- Dilbert



# Special Thanks to ...

- ◆ Gen Kay
- ◆ Dan MacLeod
- ◆ Rachel Michael
- ◆ Brian Peacock

# Thank You

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