What is “obesity”?  
Based on the BMI  
- Body Mass Index  
Obesity is defined by the BMI

Does not account for muscle mass  
Solely based on weight and height

Does not take into account where fat is located  
- Subcutaneous vs. visceral fat

Contrary to popular belief, BMI is not a particularly great predictor of mortality or morbidity  
- But co-occurs with some of the factors that are

Obesity  
- Obesus  
- Having eaten until fat
• Problems with obesity as a construct
  – Pejorative
  – Imprecise
  – Inaccurate
  • Overeating is not the only cause

• What causes weight gain?

Takeru Kobayashi
The Tsunami

• How much control do you really have over your weight?

The Promises of a $59 Billion Business
WEIGHT LOSS
STRAIGHT AHEAD
• Fat, like other systems, is exquisitely regulated
• Not a simple matter of calories in/calories out

Taubes, 2011, Why we get fat: Knopf

• Our bodies are wired to maintain a certain amount of fat and will go to extreme lengths to preserve it
  – When calories are restricted, we conserve energy
  – When we accumulate excess fat, it tells us that something has gone awry in the system

Taubes, 2011, Why we get fat: Knopf

• What are some of the findings that challenge this belief?
  – You can be on a near-starvation diet and still be fat
  – 95% of weight-loss efforts fail
  – Type of calories, not simply total calories, make a difference

• What makes us fat?

What makes us fat?

Vegetables I eat

Genetics/Epigenetics
Food Choices
Sleep Problems
Exercise
Stress
Trauma

Why We Get Fat

Vegetables I eat

Bacon
• Higher rates in ethnic groups because of differences in:
  – Behaviors that contribute to weight gain;
  – Individual attitudes and cultural norms related to body weight;
  – Access to affordable, healthful foods and safe locations to be physically active

• Earlier report claimed 400,000 deaths per year due to obesity
• Based on NHANES data in 2000, number 111,909 deaths due to obesity
• Impact of obesity on mortality has decreased over time perhaps due to improved health care

• What about fat and disease?

• Underweight and obesity (>35) were associated with the highest mortality
• Overweight was not related to increased mortality

Flegal et al., JAMA 2005, 293(15): 1861-1867


National Center on Health Statistics 2011

• Only severe obesity was a significant mortality risk.
• Overweight, in some cases, can actually be protective.

Flegal et al. JAMA 2005, 293(15): 1861-1867

• Metabolic syndrome
  – Insulin resistance
  – High LDL and VLDL cholesterol
  – High triglycerides
  – Visceral obesity

Haffner & Taegtmeyer, Circulation 2003; 108: 1541-1545

• Foods that are bad for us are widely available, cheap, tasty, and served in large quantities.

• Food problems
  – Insulin
  – Satiety mechanisms

Not only a problem in the U.S.

• Overriding Satiety Mechanisms
  – Bottle feeding
  – Baby food
• These foods drive up insulin levels and override our satiety mechanisms

**ATE 4 BOXES OF THIN MINTS**

**NOT FEELING THIN AT ALL**

• Insulin is the principle regulator of fat metabolism

Taubes, 2011, Why we get fat: Knopf

• Types of fat
  – Fatty acids we burn for fuel
  – Triglycerides we store as fat
• Insulin promotes flow of fatty acids into fat cells so they can be bundled into triglycerides

Taubes, 2011, Why we get fat: Knopf

• Insulin resistance precedes weight gain

Bacon 2008, Health at every size.

• Insulin increases inflammation
• Inflammation enhances insulin resistance

King, J Periodontol 2006; 77(9): 1527-1534
Taubes, 2011, Why we get fat: Knopf

• 133 older adults, 57 with metabolic syndrome
• Patients with metabolic syndrome had
  – More inflammation (ESR & CRP)
  – More depression
  – Worse cognitive function
• Metabolic syndrome and inflammation independently associated with depression

• 921 men and women from Finland
• In women, depressive symptoms associated with increased risk of metabolic syndrome
• Metabolic syndrome in childhood predicted higher depressive symptoms in adulthood

Pulkki-Raback et al., Health Psychol 2009; 28: 108-116

• Chronic stress leads to poor food choices
• Stress enhances maladaptive metabolic responses to unhealthy foods
  – Post-pranial lipemia (abnormally high lipids after a meal)
• Both increase inflammation

Kiecolt-Glaser, Psychosom Med 2010; 72: 365-369

The Role of Sleep
• Meta-analysis of sleep duration and obesity (36 studies, N=634,513)
• Children and adults
• Short sleep duration (< 5 hours) related to obesity worldwide

Cappuccio et al., Sleep 2008; 31: 619-626

• Short sleep duration related to metabolic syndrome in middle-aged adults
• Short sleep duration was related to abdominal obesity, elevated fasting glucose, and hypertriglyceridemia

Hall et al., Sleep 2008, 31(5): 635-643

• Even short periods of sleep deprivation can elevate cortisol and glucose levels, and increase insulin resistance

McEwen, Biological Psychiatry 2003; 54: 200-207.
• Sleep disorders, such as primary insomnia and obstructive sleep apnea, increase inflammatory markers, such as CRP, IL-6 and TNF-α

Suarez & Goforth. 2010 In Psychoneuroimmunology of Chronic Disease: American Psychological Association

• Subclinical sleep disorders also increase risk for CVD, hypertension, Type-2 diabetes, metabolic syndrome and all-cause mortality

Suarez & Goforth. 2010 In Psychoneuroimmunology of Chronic Disease: American Psychological Association

• Population study from Sweden (N=10,756)
• Snoring and witnessed sleep apneas increased risk of diabetes in women, not men
• Women who snored, 58% increase in diabetes
• Witnessed sleep apnea increased diabetes risk three times
  – Adjusted for age, BMI, and waist circumference

Valham et al., Sleep Med 2009; 10: 112-117

• Study of Black and White adults (N=187)
• Blacks had shorter sleep duration and lower sleep efficiency
  – 25 minutes to fall asleep (vs.16 minutes)
  – 3.6% SWS (vs. 6.8%)
• Difference persisted even after controlling for SES

Mezick et al. Psychosom Med 2008; 70: 410-416

• Study of 97 Black and White adults
• Perceived unfair treatment (or both groups) was associated with
  – Poorer sleep quality
  – More daytime fatigue
  – Shorter sleep duration
  – Small proportion of REM
• Blacks had lower sleep time and poorer sleep efficiency

Beatty et al. Health Psychol 2011; 30(3): 351-359

• Also a difference based on SES
• Low SES was associated with:
  – Longer sleep latency
  – More waking after sleep onset
  – Poorer sleep quality

Mezick et al. Psychosom Med 2008; 70: 410-416
• Study of 4,641 middle-aged women (Mean age=52 years)
  • Childhood physical and sexual abuse doubled the odds of both depression and obesity

Rohde et al., Child Abuse Negl 2008; 32: 878-887

• Nine-fold increase in risk of cardiovascular disease in women maltreated as children in the National Comorbidity Study

Batten et al. J of Clinical Psychiatry 2004; 65: 249-254

• Meta-analysis of 24 studies (N=48,801)
  • Physical and sexual child abuse increased the risk of metabolic disorders including obesity and diabetes
  • Effects appeared to be stronger for women


• Data from Nurses’ Health Study II shows physical and sexual abuse in childhood/teens increased the risk of Type 2 diabetes
  – Adjusted for age, race, body type at 5, parental education, and parental history


• Severity of abuse increased symptoms
  • 50% increase in risk for severe physical abuse
  • 69% increase in risk for repeated forced sex


• BMI also influenced by past abuse
  – Physically and sexually abuse girls had higher BMIs
  – Trajectories grew wider as the girls grew
  – Particularly for those who experienced repeated forced sex

• Dunedin Multidisciplinary Health and Development (N=1,037)
• At 32 years, those who experienced adverse childhood experiences (low SES, maltreatment or social isolation) had higher rates of:
  – Major depression
  – Systemic inflammation
  – Having at least 3 metabolic risk markers


• Study of 177 Blacks and 822 whites, ages 35-86
• Composite of early life adversities and 5 measures of inflammation
• Early-life adversity predicted higher levels of inflammation for blacks, but not whites

Slopen et al., Psychsom Med 2010; 72: 694-701

• Fat Hatred

• Facebook
• Health practitioners are among the most insidious players in this fat-hating drama as they have legitimized the cultural mandate for thinness by reframing it as a health concern.


• The neuroscience of social rejection

• The pain of social rejection is thought to be adaptive in that it makes us want to avoid it and therefore be part of a group


• Social pain is processed in the same part of our brains, and is experienced in the same way, as physical pain


• Social pain or losses during childhood can predispose people to chronically elevated psychic pain for the rest of their lives


• Rejection or negative social evaluation is associated with increases in stress hormones, increased cardiovascular response, and greater proinflammatory cytokines


• 296 African Americans (M age=73), self-reported experiences of discrimination were associated with elevated C-reactive protein levels


• Anterior Cingulate Cortex

• The separation-distress panic/grief system appears to be located in similar areas of the brain across all mammals

– Anterior cingulate cortex

Integrating Pain Perspectives

The separation-distress panic/grief system appears to be located in similar areas of the brain across all mammals.
• Perceived discrimination African Americans
  – You are treated with less courtesy other people
  – You are treated with less respect than other people
  – You receive poorer service than other people at restaurants and stores
  – People act as if they think you are not smart


• The key emotional component of a response to threats against the “social self”
• It leaves people feeling exposed, vulnerable, and “defective”

Persons et al., AIDS Patient Care & STDs 2010; 24(9), 571-580

• Prolonged social threat increases the risk of adverse health outcomes
• Shame results when a person concludes that they have lost social value and are at risk for rejection by the community

Dickerson et al., Psychosom Med 2004; 66: 124-131

• Larger people experience more cynical mistrust, which increases inflammation
• Obesity is associated with low-grade inflammation, with elevated levels of C-reactive protein, IL-6, TNF-α

Rafii et al., Arch Internal Med 2007; 167(2): 174-181; Schmatz et al., J Perinatology 2010; 30: 441-446

The Pima Indians of the Gila River

Prevalence 50%
Prevalence 8%

Taubes, 2008; Good calories, bad calories. Knopf

U.S. Diabetes Prevalence by Ethnic Group

Men and Women, Age 45-74 Years

% with Diabetes

European | Cuban American | Japanese American | African American | Mexican American | Puerto Rican | Pima Indian


G. Lewis, Lewis Brain Behav Immun 2010; 24(3): 438-443

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How does breastfeeding help?

- Bottle-feeding, regardless of the type of milk, affects infants’ self-regulation of milk
- Study of 1205 infants
  - 27% of EBF infants emptied bottle or cup in late infancy
  - 54% of infants fed by bottle and breast
  - 68% of infants fed by bottle only

- Reset hypothesis
- During gestation
  - Visceral fat accumulates
  - Insulin resistance increases
  - Lipid and triglyceride levels increase
- Breastfeeding helps reverse, or reset, these changes
- For maternal metabolism, pregnancy ends with weaning, not birth

- Study of 139,681 postmenopausal women (Mean age=63)
- Lifetime history of lactation of more than 12 months related to lower
  - Hypertension
  - Diabetes
  - Hyperlipidemia
  - Cardiovascular disease
  Schwartz et al., Obstet Gyn 2009; 113: 974-82

- Cohort analysis of 2,516 parous, midlife women (SWAN study)
- Increased breastfeeding duration lowered prevalence of metabolic syndrome in a dose-response way
  Ram et al., Am J Obstet Gynecol 2008; 198:268e1-268e6
• 85,585 and 73,418 parous women (Nurses’ Health Study I & II; Mean age=50)
• Longer duration of lactation reduced risk of Type-2 diabetes
• Each additional year decreased risk by 15% – Independent of BMI, diet, exercise or smoking
• Did not decrease risk for women with gestational diabetes
  Stuebe et al., JAMA 2005; 294:2601-2610

• Data from Longitudinal Study of Australian Children (N=3075)
• Breastfeeding initiation
  – 95% for BMI 20-24
  – 93% for BMI 25-30
  – 87% for BMI >30
• Breastfeeding at 6 months
  – 64% for BMI 20-24
  – 54% for BMI 25-30
  – 44% for BMI >30
  Donath & Amir, Mat Child Health Austr 2008; 4: 163-170

• Birth cohort study of 1,803 mothers in Perth, Australia
• Prepregnancy BMI >25 related to decreased breastfeeding initiation and duration in Hispanic women
• More likely to formula feed and breast-milk feed
• This was not true for BMI >30 African American women
  – 587 Hispanic women, 640 African American women
  Kugyelka et al., J Nutr 2004; 134: 1746-1753

• Review of 12 studies
• Pre-pregnancy BMI predicted lower rates of breastfeeding initiation in BMI >25
• 9/12 studies found delayed lactogenesis II or failure to initiate in BMI >25
• 1/12 found that high BMI women with labor complications were less likely to initiate breastfeeding
  Wojcicki, J Wom Health 2011; 20: 341-347

• Prospective study of 688 mothers, pregnancy to 3 months postpartum
• Found significantly lower rates of breastfeeding initiation in women BMIs >26
• Depression, anxiety, stress, and self-esteem did not mediate the relationship between BMI and initiation rates
  Mehta et al., 2011 Breastfeeding Med. 6(6): 369-376
• Study of 431 mothers
• LG-II significantly delayed in mothers BMI >25
• Also delayed after c-section and labor >14 hrs
• Multivariate model:
  maternal BMI; age >30;birthweight >3600; absence of nipple discomfort 0-3 day pp; infant not feeding well >2 times/first 24 hours
• Postpartum edema significant alternate model


• Study of 40 women (23 BMI < 26; 17 BMI >26)
• Hypothesized that high BMI women would have a lower prolactin response to suckling at 2 and 7 days
  -- Due to higher progesterone concentrations in fat
• Significant difference at Day 2, but not at Day 7
• No significant difference in progesterone levels at either point

Rasmussen & Kjolhede, Pediatrics 2006; 113: e465-e471

• Meta-analysis of 11 studies
• C-section 1.5 times more likely in overweight women; 2.25 times more likely in obese women
• Elective c-section for
  -- Overweight (OR=1.35)
  -- Obese (OR=1.87)
• Emergency c-section
  -- Overweight (OR=1.64)
  -- Obese (OR=2.23)


• Women with BMIs
  >50 significantly more likely to have c-sections
  -- 49% c-section rate; 34% scheduled c-sections


• We need more research on why BMI>30 women have lower breastfeeding initiation rates
• Need to include measures of trauma, perception of birth, body image

How shall we then treat?
• Targeted interventions for higher-BMI women have not improved rates
  – Possibly creating self-fulfilling prophecies and/or shaming high-BMI women

Antsey & Jevitt, Clin Lact 2011; 2(3), 11-16

Please stop weight bullies...
Health is for every body.
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Being a healthy woman isn’t about getting on a scale or measuring your waistline. We need to start focusing on what matters—on how we feel, and how we feel about ourselves.

Michelle Obama