OBESITY EPIDEMIC
VIM
MAY 8, 2012
B.C.

IT'S OBVIOUS, THE WAR ON POVERTY HAS BEEN WON!

WHY DO YOU SAY THAT, JOHNNY?

BECAUSE WE HAVE A WAR ON OBESITY.
BMI

- BMI = Body Mass Index
- BMI = Weight in lbs. \( \times 703 \)
  Height in inches\(^2\)

BMI < 18 Underweight
BMI 19-24 Normal
BMI 25-29 Overweight
BMI 30-39 Obese
BMI > 40 Morbid Obesity
OBESITY

- 35% of U.S. adults are overweight BMI >25-30
- 26% of U.S. adults are obese BMI >30
- 64% of U.S. adults are overweight or obese
- 2% are Morbidly obese BMI >40
- 13% of children 6-11 are overweight
BMI

• Male 5’10” 175 lbs = BMI 25

• Female 5’6” 154 lbs = BMI 25

• Male 5’10” 210 lbs = BMI of 30

• Female 5’6” 185 lbs = BMI of 30
Evolution?
Obesity Trends* Among U.S. Adults
BRFSS, 1985
(*BMI ≥30, or ~30 lbs. overweight for 5’ 4” person)

Source: Behavioral Risk Factor Surveillance System, CDC.
Obesity Trends* Among U.S. Adults
BRFSS, 1986
(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)

Source: Behavioral Risk Factor Surveillance System, CDC.
Obesity Trends* Among U.S. Adults
BRFSS, 1987

(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)

[Map showing obesity trends across the United States]

Source: Behavioral Risk Factor Surveillance System, CDC.
Obesity Trends* Among U.S. Adults

BRFSS, 1988

(*BMI \geq 30, or \sim 30 lbs. overweight for 5’ 4” person)

Source: Behavioral Risk Factor Surveillance System, CDC.
Obesity Trends* Among U.S. Adults

BRFSS, 1989

(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)

Source: Behavioral Risk Factor Surveillance System, CDC.
Obesity Trends* Among U.S. Adults
BRFSS, 1990
(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)

Source: Behavioral Risk Factor Surveillance System, CDC.
Obesity Trends* Among U.S. Adults
BRFSS, 1991
(*BMI ≥30, or ~30 lbs. overweight for 5’ 4” person)

No Data           <10%          10%–14%       15%–19%

Source: Behavioral Risk Factor Surveillance System, CDC.
Obesity Trends* Among U.S. Adults
BRFSS, 1993
(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults
BRFSS, 1994
(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)

Source: Behavioral Risk Factor Surveillance System, CDC.
Obesity Trends* Among U.S. Adults
BRFSS, 1995

(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)

Source: Behavioral Risk Factor Surveillance System, CDC.
Obesity Trends* Among U.S. Adults
BRFSS, 1996

(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)

No Data           <10%          10%–14%           15%–19%

Source: Behavioral Risk Factor Surveillance System, CDC.
Obesity Trends* Among U.S. Adults
BRFSS, 1997
(*BMI ≥ 30, or ~ 30 lbs. overweight for 5’ 4” person)

Source: Behavioral Risk Factor Surveillance System, CDC.
Obesity Trends* Among U.S. Adults
BRFSS, 1998
(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)

Source: Behavioral Risk Factor Surveillance System, CDC.
Obesity Trends* Among U.S. Adults
BRFSS, 1999
(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)

Source: Behavioral Risk Factor Surveillance System, CDC.
Obesity Trends* Among U.S. Adults
BRFSS, 2000

(*BMI ≥30, or ~30 lbs. overweight for 5’ 4” person)

Source: Behavioral Risk Factor Surveillance System, CDC.
Obesity Trends* Among U.S. Adults
BRFSS, 2001

(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)

Source: Behavioral Risk Factor Surveillance System, CDC.
Obesity Trends* Among U.S. Adults
BRFSS, 2002
(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)

Source: Behavioral Risk Factor Surveillance System, CDC.
Obesity Trends* Among U.S. Adults
BRFSS, 2003

(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)

Source: Behavioral Risk Factor Surveillance System, CDC.
Obesity Trends* Among U.S. Adults
BRFSS, 2004
(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)

Source: Behavioral Risk Factor Surveillance System, CDC.
Obesity Trends* Among U.S. Adults
BRFSS, 2005

(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)

Source: Behavioral Risk Factor Surveillance System, CDC.
Obesity Trends* Among U.S. Adults
BRFSS, 2006
(*BMI \geq 30, or \sim 30 lbs. overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults
BRFSS, 2007
(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)

Source: Behavioral Risk Factor Surveillance System, CDC.
Obesity Trends* Among U.S. Adults
BRFSS, 2008

(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)

Source: Behavioral Risk Factor Surveillance System, CDC.
Obesity Trends* Among U.S. Adults

BRFSS, 2009

(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)

Source: Behavioral Risk Factor Surveillance System, CDC.
County Level Estimates of Diagnosed Diabetes — State Maps
Number and Percentage of U.S. Population with Diagnosed Diabetes, 1958-2009

- Percent with Diabetes
- Number with Diabetes

CAUSES OF OBESITY

- Obesity occurs when caloric intake exceeds energy expenditure.
- Number of fat cells tend to increase:
  - Between ages 12-18 mos.
  - Between ages 12-16 yr.
  - Women during pregnancy
  - Adults exceeding > 60% of ideal weight
CAUSES OF OBESITY

HEREDITY: Tendency is inherited from your biological mother.

- Abnormal protein or hormone such as leptin may be involved
- Obese individuals may have abnormal mitochondrial energy utilization
- Abnormal gene may lead to decreased heat production
CAUSES OF OBESITY

- AGE: Metabolism slows down with advancing age.
- GENDER: Men have a higher basic metabolic rate.
- FOOD: 9 cal/gm for fat
- ACTIVITY: The greater the activity the greater the energy expenditure
CAUSES OF OBESITY

- **BODY WEIGHT**: Heavier individuals require more calories to maintain their weight.

- **MEDICATIONS**: Certain meds for inflammation, seizures, and mental illness tend to increase appetite and decrease metabolic rate.
Microbiome and Obesity

• The western low fiber diet changes the microbiome.

• Changing the bacterial dominance in the intestines of laboratory animals has been shown to increase or decrease the amount of calories they absorb from the same meal by 20%, a possible contributing factor to the obesity epidemic.

McDade-Ngutter, National Institutes of Health Gastrointestinal Microbiota and Advances in Prebiotic and Probiotic Research Conference Summary, Gastroenterology 2009; 136:1473-75
Low-fat, high-polysaccharide (CHO) diet

High-fat, high-sugar (Western) diet

Changes in gut microbial ecology:
- reduction in Bacteroidetes and proportional increase in Firmicutes
- dramatic fall of overall diversity
- bloom of a single class of Firmicutes: the Mollicutes

Alterations of metabolic potential:
- enrichment for phosphotransferase systems: import and fermentation of simple sugars
- enrichment for genes encoding beta-fructosidases
- depletion for motility genes, e.g. bacterial chemotaxis, motility proteins, flagellar assembly

Consequences:
- increased capacity to import “Western-diet”-typical carbohydrates
- increased capacity to metabolize imported sugars to short-chain fatty acids
Gut Flora Affects Weight
OBESITY

- Gaining 10 lbs. increases the risk of Hypertension, Heart Attack, and Stroke.
- Gaining 11-18 lbs. doubles the risk of type II diabetes.
- Women who gain more than 20 lbs. after age 18 double their risk of postmenopausal breast cancer and increase the risk of colon, endometrial, kidney, and gall bladder cancer.
American Diet

The American diet tends to be highly processed, dense in calories, and poor in nutrition.

This results in spikes of blood sugar and fats increasing coronary artery disease.

It is low in fiber and antioxidants.
Calorie Counting

- Denny’s French toast: 1145 calories
- McDonald’s bacon, egg, & cheese biscuit: 480 calories
- ½ cup of nuts: 450 calories
- Krispy Kreme donut: 340 calories
- Coca-cola 16 oz.: 200 calories
- 2 small chocolate chip cookies: 200 calories
- 1 tbsp. oil: 125 calories
Calorie Counting

Double cheese burger, soda, fries, and a dessert contain about 2,200 calories.
Alcohol Calorie Calculator

- Beer: 149 cal./12 oz.
- Gin, Vodka, Whiskey: 65 cal./oz.
- Red wine: 80 cal./4 oz.
- White wine: 75 cal./4 oz.
- Martini: 140 cal.
- Manhattan: 165 cal.
- Margarita: 168 cal.
Calorie Counting

- 200 extra calories/day would add 20 lbs./year
- 30 min. of aerobic exercise can burn 200 calories
I've been in a weight-loss program for 6 weeks.

No kidding? How much have you lost?

$500.00
“You’re getting pretty big yourself!”

“You are getting pretty big yourself”
The study, released in August 2011 in the journal Obesity, suggests that by the year 2030, nearly every American will be overweight or obese.
Metabolic Syndrome Components

Metabolic Syndrome consists of excess abdominal body fat, high triglycerides, low HDL, and often hypertension.
# Diagnosing the Metabolic Syndrome

## Risk Factor

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Defining Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal obesity</td>
<td>Waist circumference</td>
</tr>
<tr>
<td></td>
<td>&gt;40 in (&gt;102 cm)</td>
</tr>
<tr>
<td></td>
<td>&gt;35 in (&gt;88 cm)</td>
</tr>
<tr>
<td>Triglycerides</td>
<td>≥150 mg/dL</td>
</tr>
<tr>
<td>HDL-C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;40 mg/dL</td>
</tr>
<tr>
<td></td>
<td>&lt;50 mg/dL</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>≥130/85 mmHg</td>
</tr>
<tr>
<td>Fasting glucose</td>
<td>≥110 mg/dL</td>
</tr>
</tbody>
</table>

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Causes of the Metabolic Syndrome

- Genetic makeup
- Life style choices of food intake and level of physical activity

Central abdominal obesity

- The sequence begins with the body becoming resistant to the effects of insulin
Adverse Cardiometabolic Effects of Visceral Adipocytes

Inflammation
- ↑ IL-6
- ↑ CRP
- ↑ TNF
- Adipsin
- RBP4
- ↓ Adiponectin

Hypertension
- Angiotensinogen
- Insulin
- FFA
- Resistin
- Leptin
- Lactate
- ↑ Plasminogen activator inhibitor-1 (PAI-1)

Atherogenic dyslipidemia
- Insulin resistance & Type 2 diabetes

Atherosclerosis

Thrombosis

Metabolic Syndrome

• Insulin resistance and Type2 Diabetes
• Increased blood clotting
• Increased blood pressure
• Increased inflammation
The Effects of Insulin Resistance

- Elevated blood sugar
- Damage to the arterial linings
- Increased triglyceride levels
- Decreased HDL-C
- Small dense LDL-C
Characteristics of Plaques Prone to Rupture

- T lymphocyte
- Macrophage foam cell (tissue factor+)
- "Activated" intimal SMC (HLA-DR+)
- Normal medial SMC

"Vulnerable" plaque

"Stable" plaque

Minor luminal irregularity: IVUS findings

The Cleveland Clinic Intravascular Ultrasound Research Laboratory
Coronary stenosis severity prior to MI

HEALTHY LIFESTYLE

1) Eat a low fat diet high in fruits, vegetables, whole grains. Limit simple sugar. Limit salt intake. Drink lots of water. A glass of red wine is OK

2) Fish high in omega-3 such as salmon, trout, tuna, and herring
   Nuts with omega-3 such as almonds and walnuts

3) Engage in regular aerobic exercise

4) Reduce your stress. Begin each day with prayer and meditation.

5) Stay plugged in and connected to family, friends, and groups
Don't Ever Give Up
TREATMENT

LIFE STYLE MODIFICATION

- Diet: Low fat, low salt, fruits & veggies
- Limit simple sugar  Use whole grains
- Minimal alcohol intake
- Exercise: Endurance  30 min./aerobic
- Flexibility
- Strength
Healthy Diet

- Fruits and vegetables—especially deeply colored. 3-5 servings. High in fiber and antioxidants
- Avoid saturated and trans fat
- Whole grain and legumes. Avoid simple sugar
- Fish high in omega-3 such as salmon, trout, tuna, and herring
- Nuts with omega-3 such as almonds and walnuts
- Alcohol: 1 drink/day for women
  2 drinks/day for men
AHA RECOMMENDATIONS

- Exercise: A minimum of 5 days/wk of aerobic exercise at moderate intensity for a total of 30 minutes.

- Strengthening Activity: At least 2 days/wk using 8-10 exercises involving the major muscle groups using 8-12 repetitions.

- Flexibility: At least 2 days/wk.
Goals of Weight Loss

1. Reduce body weight in the short term

2. Maintain a lower body weight for the long term

3. Prevent further weight gain — minimum goal

Further Goals of Weight Loss

1. Rate of weight loss
   - 10% reduction in body weight in 6 months of therapy
   - Rate is 1–2 lbs per week
EXERCISE

Walking at moderate intensity for 30-45 min./day decreases the risk of type II diabetes by 30-40%.

Walking briskly 3-4 hours/week can result in a 40% decrease in colorectal cancer.
TREATMENT

Treat to goal:
- LDL-C--<100
- BP--<130/85
- TRIGLYCERIDES--<150
- HDL-->40 IN MEN
  >50 IN WOMEN
TREATMENT

Medication:
- Phentermine (Adipex-P) is a central adrenergic agonist that decreased appetite
- Sibutramine (Meridia) inhibits uptake of serotonin and norepinephrin which decreases appetite and increases thermogenesis
- Orlistat (Xenical) decreases fat absorption in the intestine
- Cost: About $100/month
TREATMENT

Gastric Bypass

- For patients with BMI’s >40 or 35 with obesity related comorbidities.
- More than 50% excess weight loss in 90% of patients.
- Number of operations have doubled between 2001-2003.
Obesity is associated with an increased risk of cancer of the pancreas that may relate to insulin resistance.
The Effects of Insulin Resistance

- Increased salt retention leading to high BP
- Prothrombotic state
- Proinflammatory state
Role of adipose tissue in atherogenesis

FAST Food

Fast FOOD