Obesity in Health and Disease

M. Kathleen Figaro, MD, MS
Clinical Fellow
Division of Endocrinology
Vanderbilt University Medical Center
September 16, 2010

Outline

- Framework for the problem; why are we obese?
- Obesity and overweight prevalence
- Treatment strategies and options
- Impact of weight management strategies
- What can we do as policy makers and providers?
Framework to Evaluate Obesity

- Obesity arises from a complex interaction of biological, cultural, economic, environmental, and historical factors
- Economic, environmental, cultural issues important influences in developing an “obesogenic” milieu
- Complexity of obesity, barriers to weight loss suggest complex nature of multilevel interventions needed to address issue

Figure 2
Policy-related influences on food and nutrition

Euro Heart Network:
**Determinants of Health/Obesity**

- Social/Environmental influence (20%)
- Individual behavior (beliefs/attitudes) (40%)
- Access to Care (10%)
- Genetics (30%)


**Why We are Obese**

- More food available, we eat more
- Worse food available
- Public policy does not prioritize obesity but profit
- We are in an “obesogenic” environment
- Our genes
General Obesity Statistics

- 72.5 million American adults now obese
- Nine states with adult obesity rates of 30% or more
  - Mississippi, with adult obesity rate of 34.4%, is nation's fattest state
- Non-Hispanic black women have highest obesity rate, 41.9%
- Overall, blacks and Latinos more likely than whites to be obese
- The more education people have, less likely they are to be obese

Prevalence of Obesity for Adults Aged 20–74 Years in United States

Gain in Body Weight over the Years

Average weight gain between 20–40 years of age 0.91 kg/year, 100 Kcal excess energy consumed per day

Data from CARDIA and NHANES studies

Tennessee Statistics

- Current measures of health?
  - 32% Adult obesity rates (2nd)
  - 21% Obesity among children 10–17 years (5th)
  - 31% Adult physical inactivity (4th)

Courtesy of Dr. Veronica Gunn
Obesity Definition

- Grade 1, commonly called “overweight,” BMI of 25–29.9 kg/m²
- Grade 2 overweight, or obesity, BMI of 30–39.9 kg/m²
- Grade 3 obesity, BMI 40–59.9 kg/m²
- Grade 4 obesity, super morbid obesity, BMI > 60 kg/m²
- Children between 2 and 20 years of age,
  - BMI between 85th % and 94th % = overweight
  - BMI ≥ 95th % = obesity

Central or Visceral Obesity

- Central obesity more pathologic than peripheral
- Visceral fat increases inflammation, subsequent risk of cardiovascular morbidity and mortality
- Two major disease processes associated with visceral adiposity: diabetes and heart disease
- Risk for both conditions termed “the metabolic syndrome”
  - Abdominal obesity
  - Insulin resistance
  - glucose intolerance/hyperinsulinemia
  - Hypertension
  - Hypertriglyceridemia
Obesity and Prediabetes: Risk Factors for Diabetes

- Development of diabetes strongly related to high glucose states; impairment in insulin
- Other factors independently associated with development: age, family history, waist-to-hip ratio, BMI, blood pressure, and lipid levels
- None of above as good alone at discriminating who will progress to diabetes as measuring glucose levels

Obesity: Risk for (Pre-)Diabetes

Impaired maternal glucose may “program” children to become obese/insulin resistant.

In addition, “obesogenic” environment, compared to none, led to:
- More calorie intake
- Trans fat intake
- Blunted satiety response
- More television viewing

Chandler–Laney. Effect of pre- and post-natal environments on childhood body composition. ENDO 2010 Clinical Session S-41

Prevalence of Obesity

- Increasing among adults
- Increasing among children
- Increases risk for diabetes
- Occurs with mismatch between calories in and out; mostly in middle age but also among children
Current Health Care System Response to Obesity

- **Inadequate response**, doesn’t target societal influences on health and obesity
  - Focuses on individual effort
  - Allows life expectancy to actually decrease with current obesity rates
  - Ineffectively improves obesity outcomes
  - Therefore….obesity must be tackled with a life cycle approach


---

Obesity Treatment Options

- Lifestyle, lifestyle, lifestyle
- Medications
- Exercise
- Support, patience, relationship
- Surgery if all above fail
Lifestyle: Very–Low Calorie Diets
Healthy Solutions option

- 9-yr period, followed patients who lost 100 pounds in program
- Patients regained ½ in first 30 months
- Severely obese maintained approximately one-half of weight loss for 5 years
- Program safe enough for elderly and chronically ill patients

Anderson, Am. Coll Nutrition, 2005

Lifestyle: Diabetes Prevention Program

- 3,234 mean age 51 years – mean BMI 34 kg/m²
- 45% of participants from minority groups
- 20% – 60 years of age
- Randomized three intervention groups, intensive nutrition and exercise counseling, Metformin or placebo
- Follow-up of 2.8 years; compared to control group:
  - 58% relative reduction in lifestyle group
  - 31% relative reduction in Metformin group
  - 50% lifestyle group achieved goal of 7% weight loss

DPP, NEJM, 2002
Troglitazone in Prevention of Diabetes (TRIPOD)

- 235 Hispanic women with previous gestational diabetes
- Randomized receive either placebo or troglitazone (withdrawn; thiazolidinedione class)
- Follow-up of 30 months
  - Annual incidence of type 2 diabetes in two groups was 12.3 vs 5.4%
  - Troglitazone treatment associated with a 56% relative reduction in progression to diabetes
  - After washout period of >8 months, preventive effects of drug still observed

Exercise Treatment of Obesity: women

- 27 sedentary women
- 22– to 40 yrs of age
- Walking program, 40 weeks. No dietary intervention
- 4x per week
- 72% of HR max
- 3 mph
- No change in weight

Exercise Treatment of Obesity: Men

- 6 males, 16 weeks
- 3.2 mph 10% grade
- 90 min
- 1100 kcal per session, no dietary intervention
- 5.9 kg fat weight lost
- Gain lean mass 0.2 Kg


Exercise Dose–Response for Weight Loss

- Change in body weight, kg
- Months
- <150 min/week
- > 150 min/week
- > 220 min/week

Gastric Bypass (GBP)

- Prevention or resolution of diabetes observed after weight loss with GBP
- In 87 patients followed up for 16 years, who underwent jejunoileal GBP, none developed diabetes, compared with 7–10% in control group
- Patients treated with GBP; 47% resolution of diabetes compared to 17% in matched-control group; 2–year incidence of T2DM reduced 30–fold
- Corrects abnormal fasting plasma glucose and insulin concentrations, as well as A1C

Greenway, Arch Surg, 2002

Treating Obesity

- Must control number of calories above all
- Exercise works, but need at least 200–300 minutes per week for significant help
- Medications work, but not as well as lifestyle changes
- Gastric bypass works; mostly the same way as the above
Community-based Interventions

- The Robert Wood Johnson Active Living by Design (ALBD) program promotes community-based improvements in policy, environmental, promotional, activities designed to alter social and physical environments to promote physical activity.

ALBD Goals: Buffalo, NY Example

- Increase community awareness of benefits of active living
- Increase access to opportunities for physical activity
- Enhance policy and organizational supports
- Improve built and natural environments to support active living in campus and its surrounding neighborhoods
Modern society structured to make unhealthy eating easiest kind to do

Public policies do not make healthy eating and active living easy thing

Individuals have incentive to do easiest and most pleasurable activity whenever they can, given the complexity and stress of life

Individual programs may not be as useful as community–based programs
Policy-Based Thinking for Providers

- Society creates effective policies for default environment of wellness/weight control
- Coordination across states; national approach
- Priority attention to children and adolescents
- Support for lower socioeconomic population groups
- Public health considerations a priority when making economic policy, as well as agriculture, transport and urban/community planning policies

Specific Strategies

- Nutrition taught in classes for younger children, especially geared towards the poor
- More recess, less soda in schools
- Simple, cheap, physical activity encouraged both in and out of school
- Discourage television viewing
- Concentrate on poor and on children since this will likely make the most impact
Contact Information:

M. Kathleen Figaro, MD, MS
Clinical Fellow
Division of Diabetes, Endocrinology and Metabolism
Ph: 615–335–6246
Fax: 615–936–1667
Email: kathleen.figaro@vanderbilt.edu

Resources

- Robert Wood Johnson Foundation: [www.RWJF.org](http://www.RWJF.org)
- Healthiest Nation Alliance: [www.healthiestnation.org](http://www.healthiestnation.org)