ASPN Multi-Disciplinary Symposium

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Carolinas Weight Management and Wellness

Weight management for Hypertensive Children

Disclosures:
I declare that I have no actual, potential, or perceived vested interests in relation to this program.

CWW Pediatric / Adolescent team members

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Preventable deaths in US

- High blood pressure is responsible for ½ million deaths in US
  - (1 in 5 deaths)
- Overweight–obesity is responsible for ¼ million deaths in US
  - (1 in 10 deaths)
- Physical inactivity is responsible for just under ¼ million deaths in US
  - (1 in 10 deaths)
- High dietary salt intake is responsible for 100,000 deaths in US
- Low dietary omega-3 fatty acids is responsible for 75,000 deaths in US

Danaei G et al. The preventable causes of death in the United States: comparative risk assessment of dietary, lifestyle, and metabolic risk factors. PLoS medicine 2009;6(4).1-23.

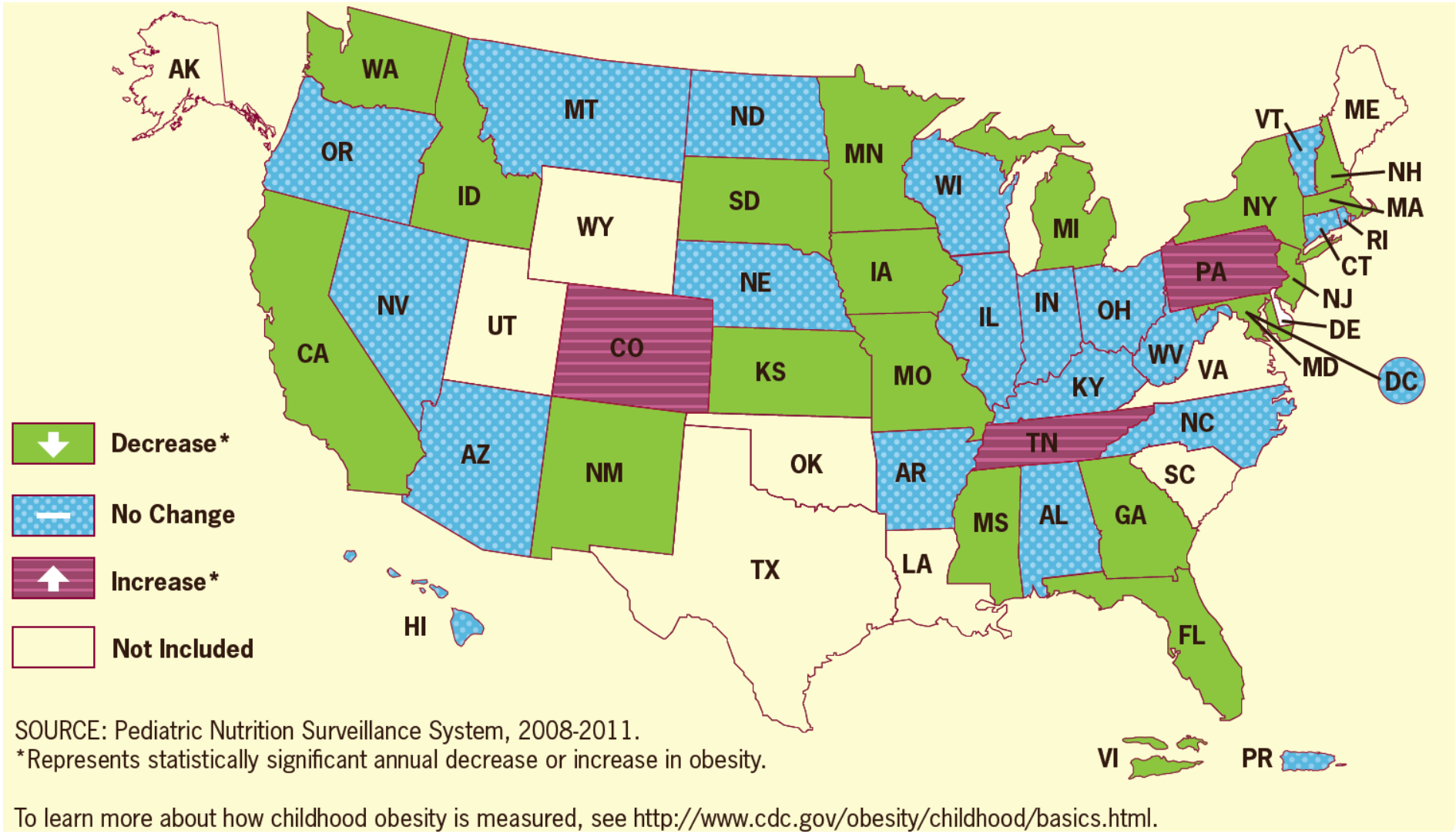
Updates in obesity

- The American Medical Association officially recognized obesity as a chronic disease

- Adult obesity rates in the United States
  - Leveled off in the past year
  - First time in 30 years

- 3 out of 4 of adults overweight
- 1 out of 3 are obese

Updates in pediatric obesity



19/40 states showed obesity rates down 1 % in low-income preschoolers

1 in 8 preschoolers is obese

Prevalence of obesity in US children and adolescents

Category	Definition	Children	Adolescents Ages 12-19
Overweight	BMI > 85th % ile	32 %	34 %
Obese	BMI > 95th % ile	17 %	18 %
Severe Obese	BMI > 99th % ile	4 %	4 %

Ogden et al. Prevalence of Obesity and Trends in Body Mass Index Among US Children and Adolescents, 1999-2010. JAMA; Jan 17, 2012: E1-E8.

Skelton JA et al. Prevalence and Trends of Severe Obese US Children & Adolescents. Academic Pediatrics 2009; 9:322–9.

Severely obese adolescents become obese adults

- 100 % of adolescents with severe obesity (BMI > 99 $^{th\ \%\ ile}$) became obese adults (BMI > 30 kg/m^2)

- 65 % of adolescents with severe obesity (BMI > 99 $^{th\ \%\ ile}$) became severely obese adults (BMI > 40 kg/m^2)

Freedman D et al. CV Risk factors and Excess Adiposity Among Overweight Children/Adolescents: The Bogalusa Heart Study. J Pediatrics 2007; 150: 12-7.

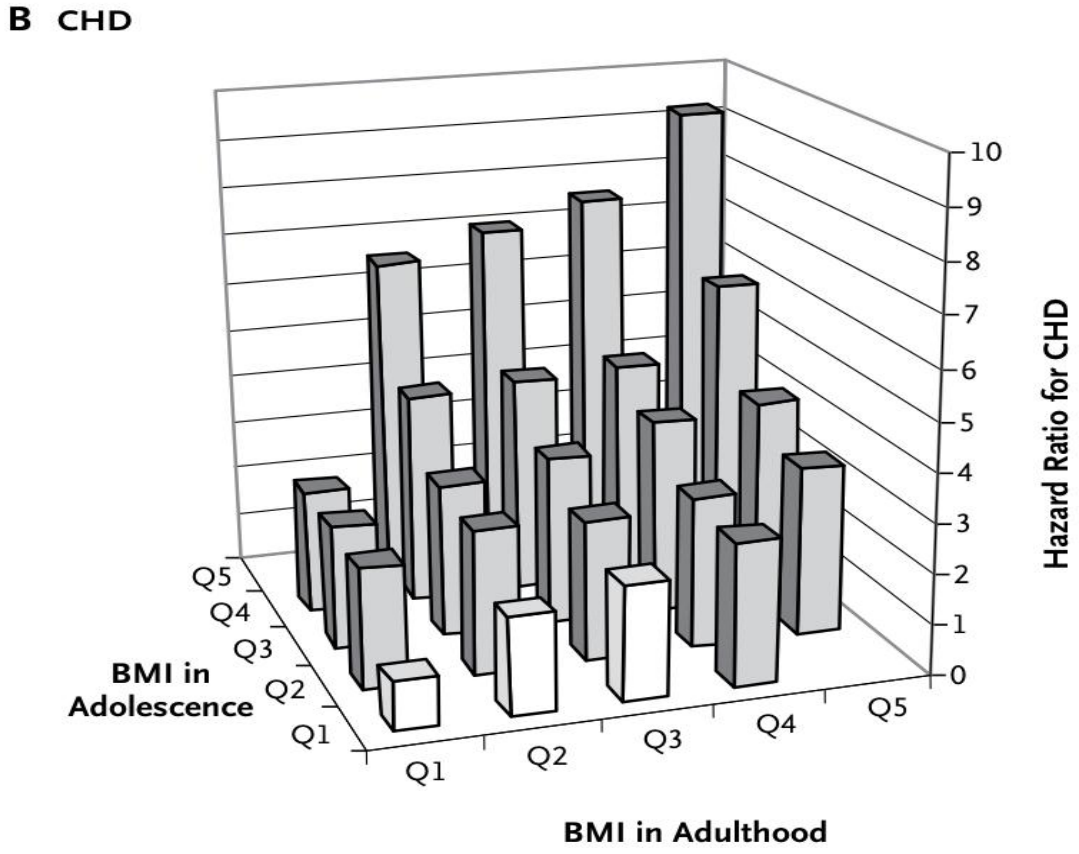
Adolescent obesity increases the risk of cardiovascular disease in young adulthood

- Prospective study of 37,674 healthy young men
  - Mean age 17 years (adolescence)
  - Mean age 30 years (adulthood)
- Followed for for 650,000 person years
  - mean follow up 17.5 years

- Elevated BMI in adolescence was a substantial risk factor for coronary heart disease in young adulthood

Tirosh A et al. Adolescent BMI trajectory and risk of diabetes vs coronary disease. NEJM. 2011; 36:14:1315-25

Association of high BMI in adolescence and adulthood and coronary heart disease



- Coronary heart disease detected by angiography:
- 50 % coronary stenosis
- in 1 or more artery

Tirosh A et al. Adolescent BMI trajectory and risk of diabetes vs coronary disease. NEJM. 2011; 36:14:1315-25.

Carolinas HealthCare System

Association of high BMI in adolescence and adulthood and coronary heart disease

- Cohort of 227,000 adolescents (14–19 years in 1963–1975)
- Followed (8 million person-years):
  - mean follow up 35 years
- 9,650 deaths observed:
  - mean age death: 40 years in males, 43 years in females
  - # 1 cause of death was ischemic heart disease

- Relative risk of ischemic heart disease death for BMI > 95 th % ile compared to 25 - 74 th % ile (reference)
  - 2.9 (95 CI 2.3-3.6) for males
  - 3.7 (95 CI 2.3-5.7) for females

Bjørge T et al. BMI in Adolescence in Relation to Cause-specific Mortality: A Follow-up of 230,000 Norwegian Adolescents. American Journal of Epidemiology. 2008. 168 (1).30-37.

Increase in stroke rates in young

Table 1 Demographics for first-ever strokes age ≥20 years[a]

	1993/1994	1999	2005	*p* Value
No.	1,942	2,034	1,916	
Sex (female)	1,107 (56.3)	1,173 (58.2)	1,055 (55.2)	0.21
Race (black)	354 (17.3)	354 (15.4)	399 (19.0)	0.02
Average age at stroke, y (SEM)	71.2 ± 0.19	72.1 ± 1.40	69.2 ± 0.51	<0.0001
20-44 years old at time of stroke	88 (4.1)	111 (4.6)	140 (6.4)	0.0002
20-54 years old at time of stroke	227 (12.9)	303 (13.3)	393 (18.6)	0.002

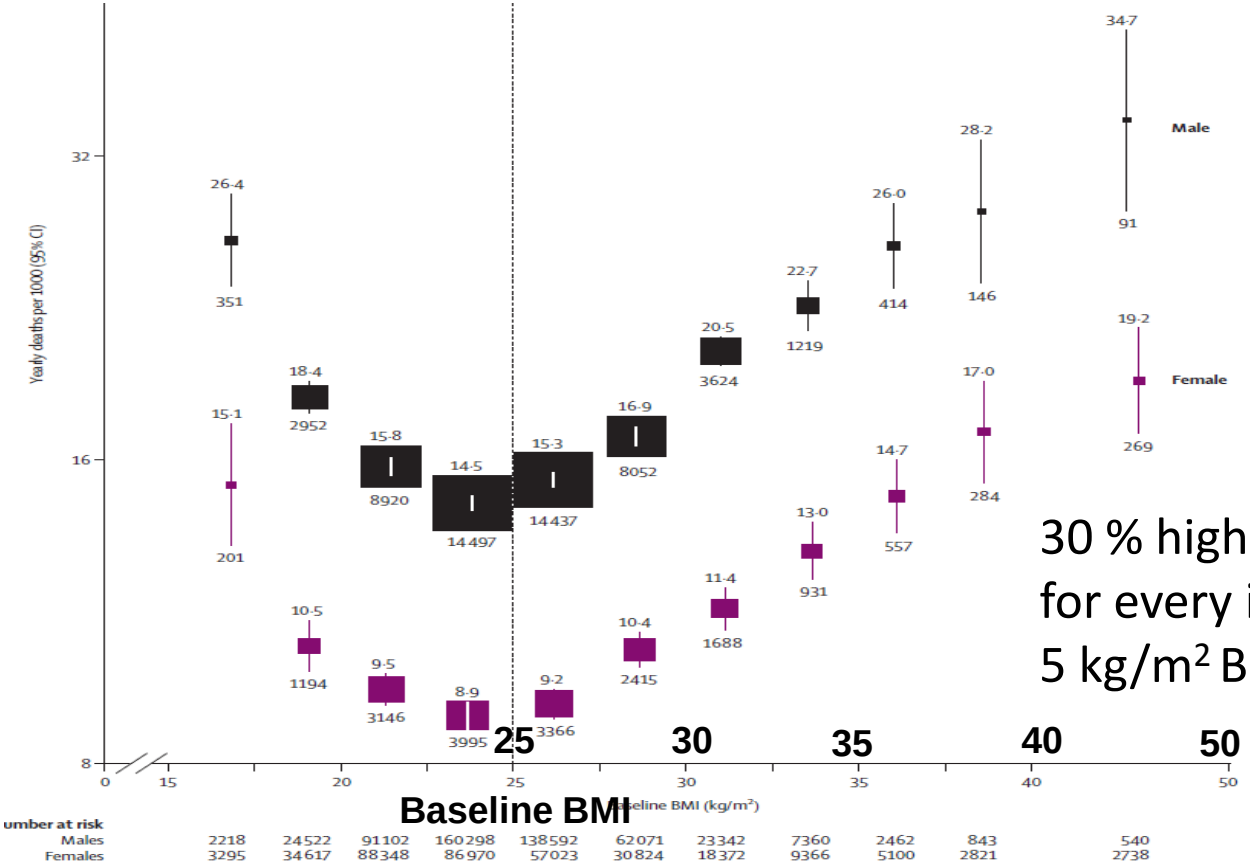
- A trend towards increasing stroke incidence at younger age
- Thought to be due to increasing rates of obesity, HTN, diabetes in youth

Kissela BM et al. Age at stroke : Temporal trends in stroke incidence in a large biracial population. Neurology 2012;79:1781–1787

Adult mortality increases with increasing BMI > 25 kg/m²

Deaths/yr

Per 1,000



30 % higher mortality for every increase in 5 kg/m² BMI points

BMI 40–45 kg/m² median survival is reduced by 8–10 years

Prospective Studies Collaboration. BMI and cause-specific mortality in 900,000 adults: Lancet 2009; 373; 1083-96.

CV risk factor prevalence in obese adolescents

Pre HTN/HTN

25 % obese

10 % normal

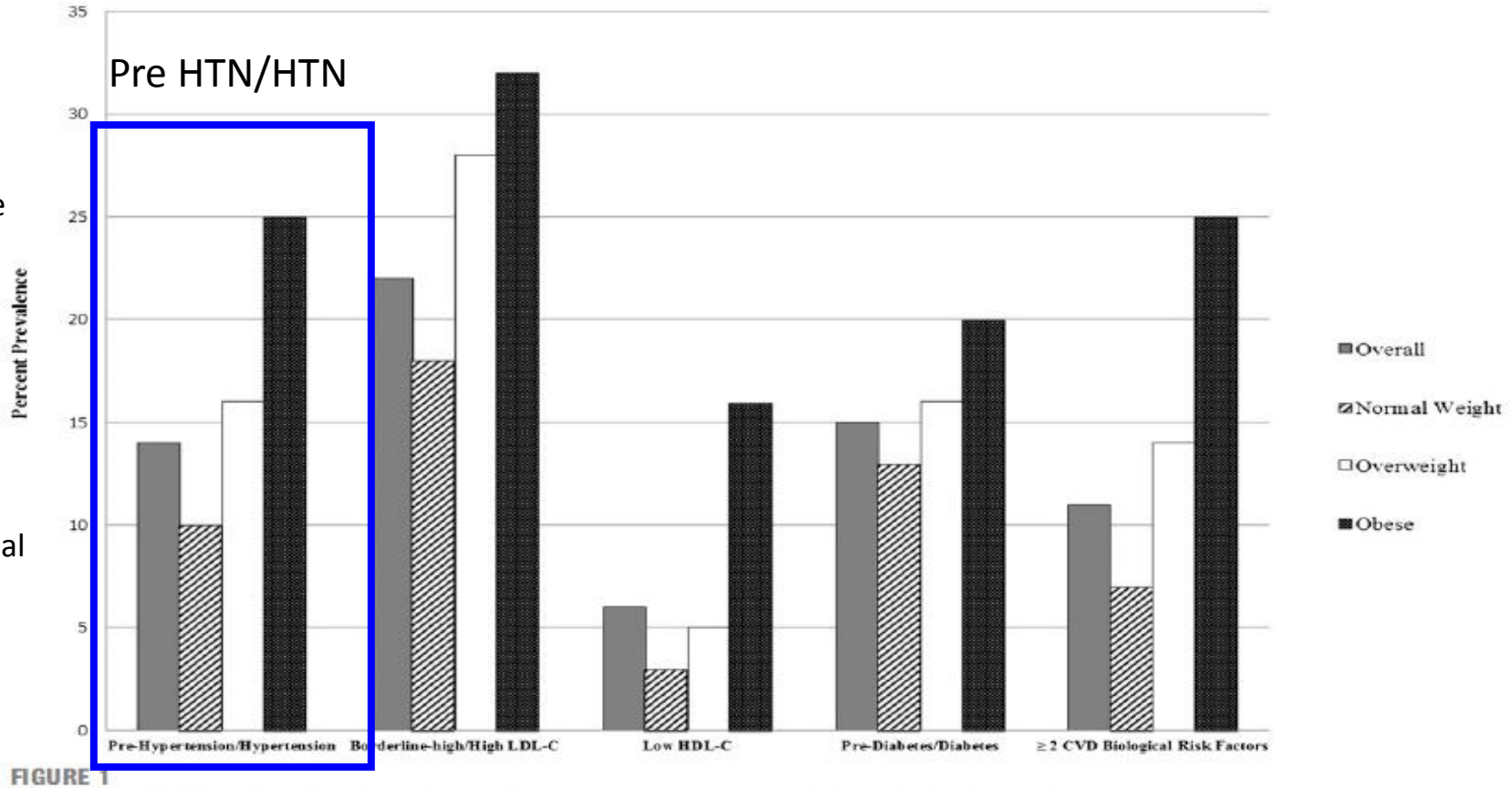


FIGURE 1

Prevalence of CVD risk factors among US adolescents, NHANES 1999–2008 ($N = 3383$). Based on the 2000 Centers for Disease Control gender-specific growth charts for the United States. Available at: www.cdc.gov/growthcharts. Overweight and obesity are defined as having a BMI within the 85th to <95th percentile or ≥95th percentile, respectively. Normal weight was defined as having an age- and gender-specific BMI >5th to <85th percentile.

May AL et al. Prevalence of CV disease risk factors in US adolescents, 1999-2008. Pediatrics 2012; 129:1035-1041.

Co-morbidities in severely obese adolescents

- 35 % chronic back pain
- 30 % gastroesophageal reflux disease
- **25 % hypertension**
- 25 % non alcoholic fatty liver disease
- 25 % obstructive sleep apnea
- 20 % orthopedic complications (Blount's, SCFE, OA)
- 20 % asthma
- 15 % hyperlipidemia
- 15 % diabetes type 2
- **12 % metabolic syndrome**
- 10 % polycystic ovarian syndrome
- 10 % menstrual irregularities
- 8 % pseudotumor cerebri

Messiah S et al. Changes in weight/comorbidities in adolescents undergoing bariatric surgery: 1 yr BOLD database. Surg Obes Relat Dis. 2012

Metabolic syndrome in adolescents

- Central (abdominal) obesity
  - High blood pressure
  - Associated atherogenic dyslipidemia (high TG, Low HDL)
  - Impaired fasting glucose
- Associated with insulin resistance and type 2 diabetes
- Associated with high ALT and fatty liver disease/fibrosis
- Pro-thrombotic and pro-inflammatory profile (high CRP)
- Leading to increased risk of cardiovascular disease and death

Jones JL et al. Mediterranean style low glycemic load diet improves variables of metabolic syndrome in women. Journal of Clinical Lipidology. 2011.

Our program goals

- Co-morbidity identification and treatment
- Tailor dietary recommendations to co-morbidity
- Promotion of individual lifestyle-behavioral changes
- Multidisciplinary team approach for BMI reduction
  - Physician
  - Dietitian
  - Exercise physiologist
  - Psychosocial
- Long term follow up and management

Body Mass Index (BMI)

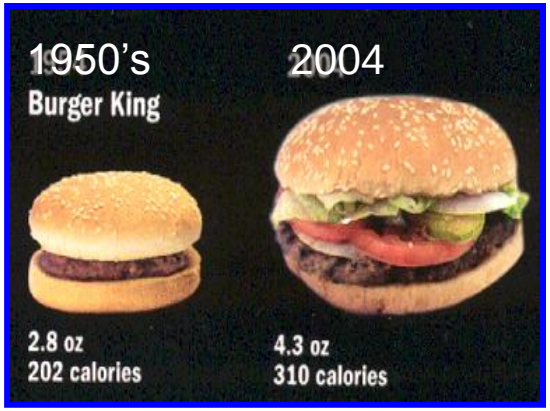
BMI reduction

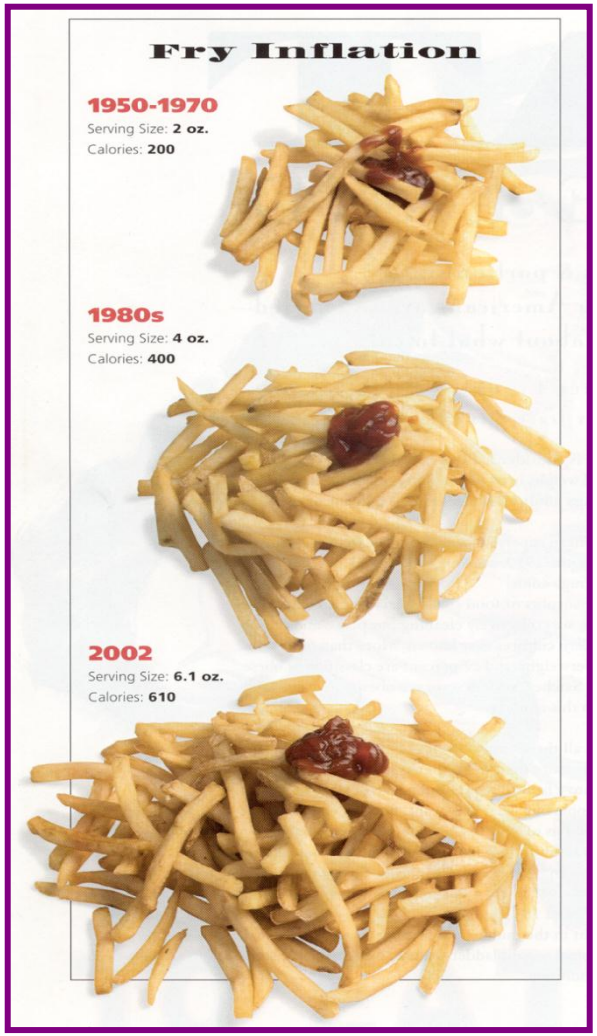
Body Mass Index (BMI)

- Total calorie deficit of 50 to 100 calories per day
- Leads to a 2 to 5 kg (5-11 lbs) weight loss over 1 year time
  - Decrease calorie dense foods (fats, sugars)
  - Decrease portion sizes
  - Eliminate sugar sweetened beverages
  - Decrease snacking
  - Increase fruits and veggies
  - Increase whole grains (fiber)
  - Choose lean (unprocessed) meats
  - Encourage activity (daily routines)
  - Focus on family activities that incorporate exercise
  - Gradually increase intensity, frequency, duration
- Long term follow up and management

Portion distortion

Sugared beverages
10 % total calorie intake





Fast Food
10 % of total calorie intake

140 calories

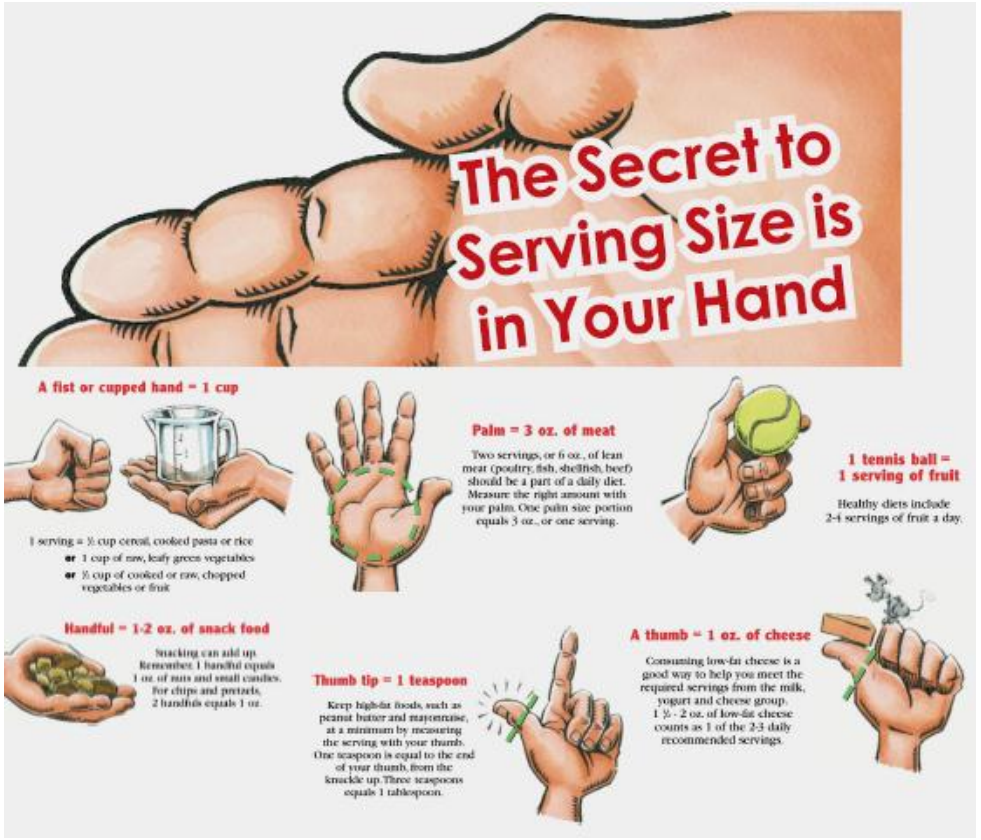
350 calories

Snacking
25 % of a child's total calorie intake

Reduction of food portion sizes

Portion Size by Age

Food Group	6-9 years 1400-1600	10-13 years 1800	14-18 years 2000
Grains 1 slice of bread, 1 cup of ready to eat cereal or 1/2 cup cooked rice, pasta or cereal	1 serving per meal	1 serving per meal	1-2 servings per meal
Vegetables 1/2 cup cooked or 1 cup raw. Limit starchy vegetables to 1 serving per day (1/2 cup)	1-2 servings per meal	2 servings per meal	2 servings per meal
Fruits 4 ounces of 100% fruit juice (limit to 1 serving daily), 1/2 cup sliced fruit; 1/4 cup dried fruit	2 servings per day	2 servings per day	2-3 servings per day
Dairy 1 cup of lowfat milk or yogurt, 1.5 ounces of reduced fat cheese	2 servings per day	2 servings per day	2-3 servings per day
Protein Choose lean meats, eggs, nuts, beans and legumes	2 ounces per meal 15-20g Protein per meal	2-3 ounces per meal 20g Protein per meal	2-3 ounces per meal 20g Protein per meal

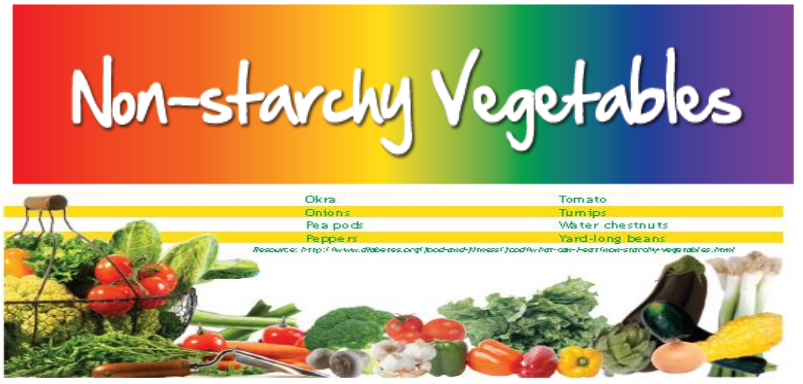


Elimination of sugar sweetened beverages

Nutrition specific guidelines with hypertension

- There is a direct relation between salt intake and CV risk
- Reduced salt intake is associated with a reduction in CV mortality

Age	Na recommendation
4-8 years	1,200 mg daily
8-17 years	1,500 mg daily
Adults	2,400 mg daily



Nutrition specific recommendations for metabolic syndrome

- Lower total fat and saturated fat intake
- Increase intake of PUFA (DHA and EPA)
- Lower sugar intake in the diet

- Monitor vitals and biochemical improvements
  - waist circumference
  - systolic and diastolic blood pressure
  - plasma triglycerides
  - low-density lipoprotein cholesterol

Jones JL et al. Mediterranean style low glycemic load diet improves variables of metabolic syndrome in women. Journal of Clinical Lipidology. 2011.

Exercise in obese hypertensive adolescents

- Children and adolescents encouraged to participate in regular, non competitive aerobic physical activity
- Goal is 60 minutes active play a day
  - Reduces both systolic and diastolic pressures
  - Reduction of 5-12 mm Hg
- Temporary restriction of athletes with Stage 2 HTN
  - SBP >99th %ile for age + 5 mmHg based on sex, age, Ht
  - Until a normal BP is achieved
  - Concern for reports of CVA during maximal exercise
    - Significant increase in SBP and DBP
  - Strenuous dynamic exercise not recommended
    - Increase in SBP, decrease in DBP

Council on Sports Medicine and Fitness Executive Committee. Policy Statement Athletic Participation by Children and Adolescents who have systemic hypertension. Pediatrics. 2010

Substances to avoid in hypertensive adolescents

- Alcohol
- Tobacco
- Drugs of abuse (cocaine, amphetamines)
- Stimulants (ephedra)
- Caffeine (coffee, cola, teas)
- Energy drinks (Monster energy, Red Bull)
- Exogenous androgens
- Growth hormone
- Other medications that may increase BP

Council on Sports Medicine and Fitness Executive Committee. Policy Statement Athletic Participation by Children and Adolescents who have systemic hypertension. Pediatrics. 2010

Pediatric obesity decreases quality of life

- Obese youth report lower QOL
  - social functioning
- Parents of obese youth report lower QOL
  - social QOL
- Compared with other chronic conditions
  - CF, Type 1 DM, epilepsy, IBD, sickle cell disease ($P < .001$)

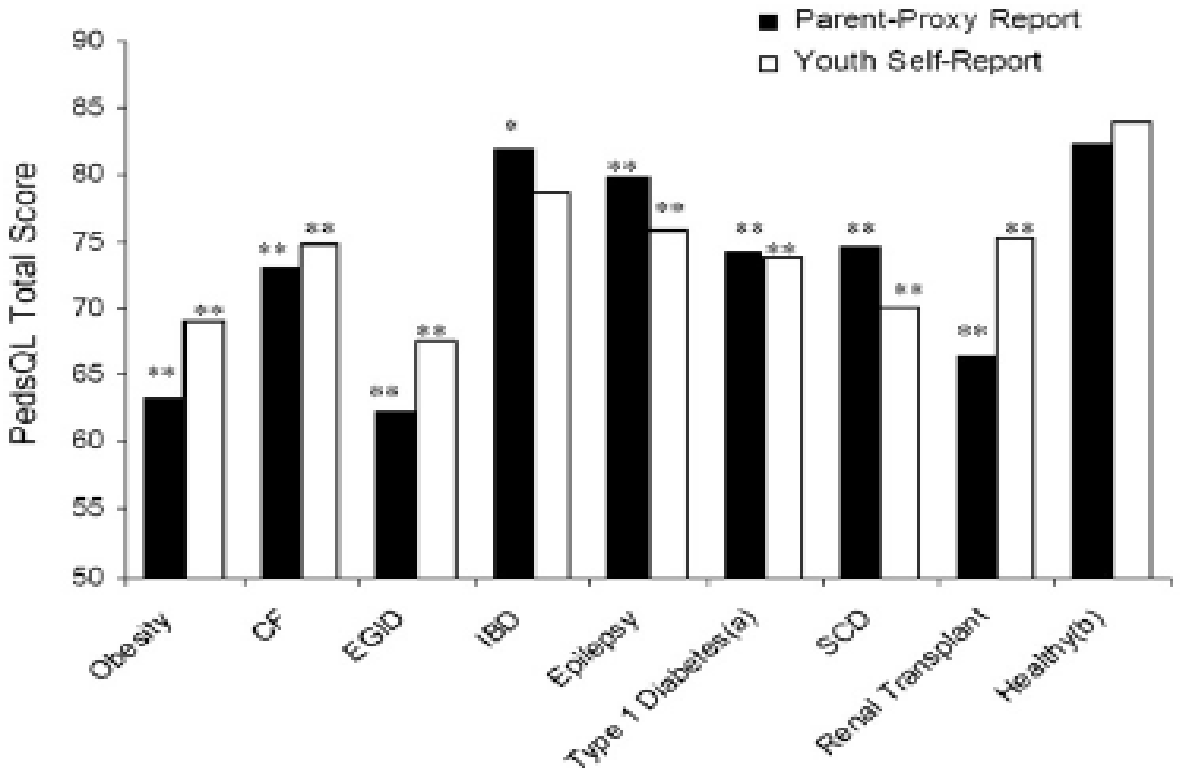


Figure. PedsQL total scores comparing chronic conditions with healthy comparison group. *$P < .05$, **$P < .01$. (a) Type 1 diabetes total score does not include Physical Symptoms subscale; (b) healthy comparison group.[18]

Ingerski L et al. Health-Related Quality of Life Across Pediatric Chronic Conditions. J Pediatr 2010; 156: 639-44.

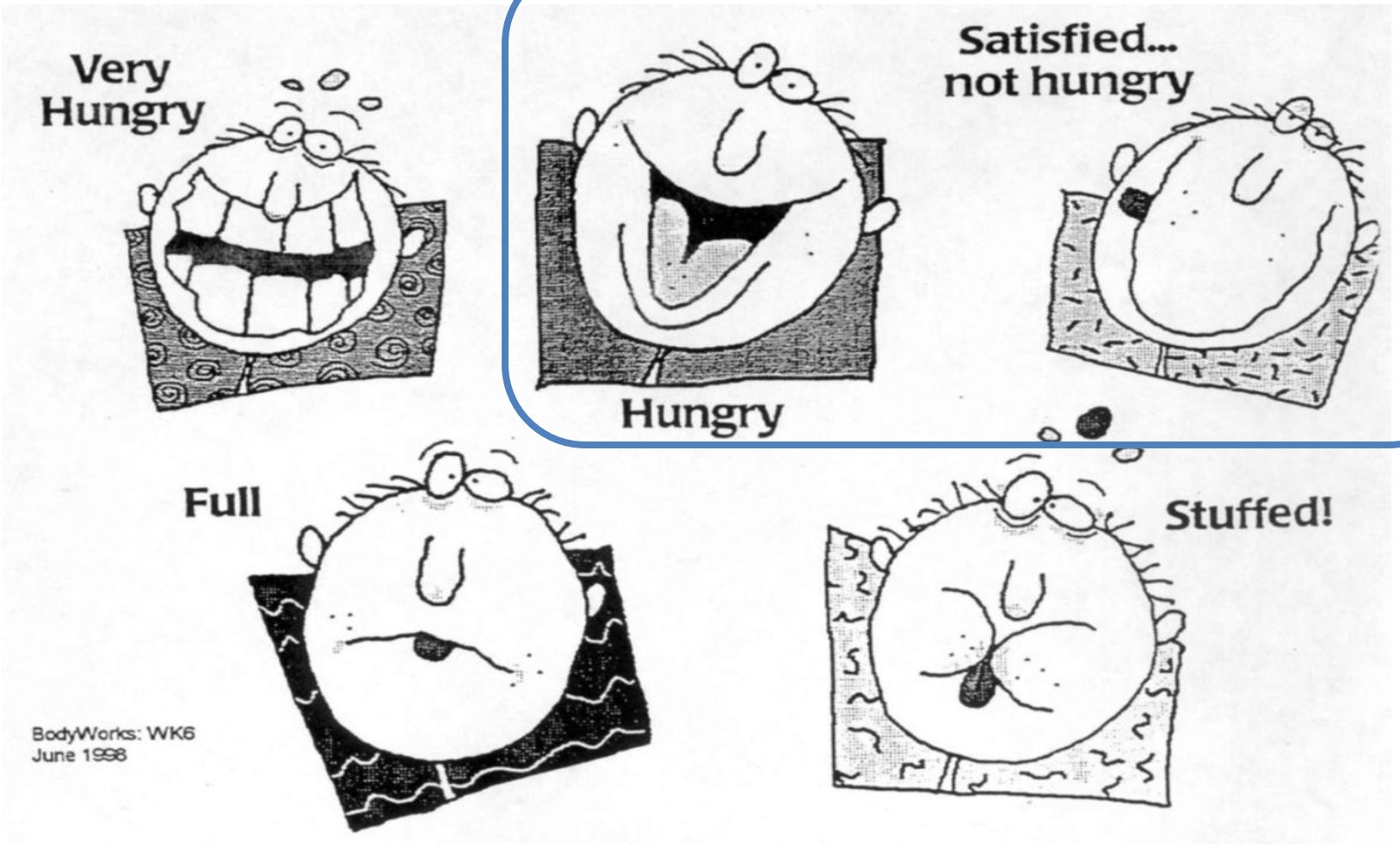
Psychosocial concerns in obese adolescents

- 10 % psychosocial impairment
- 50 % anxiety symptoms
- 30 % depression

- 9 % alcohol usage
- 5 % tobacco usage

Messiah S et al. Changes in weight/comorbidities in adolescents undergoing bariatric surgery: 1 yr BOLD database. Surg Obes Relat Dis. 2012

Eating from internal cues



Medscape

Boredom Eating

What is boredom eating?
- Boredom eating occurs when someone eats in response to feelings of boredom.

Call your pediatrician and/or a psychologist if your child:
- Eats when feeling bored.
- Does not know the difference between physical hunger and boredom hunger.
- Habit of eating at certain times (times of boredom or low activity).

Methods to help your child reduce boredom eating include:
- Be more aware of boredom.
- Use a hunger scale to identify appropriate times to eat.

0 Stomach feels very empty.
1
2
3 Stomach feels hungry.
4
5
6
7 Stomach feels satisfied.
8
9
10 Stomach feels uncomfortably full.

- Help your child understand the difference between boredom and hunger.
- Ask your child if he/she is hungry or bored when he/she asks for a snack.
- Identifying activities that frequently lead to boredom.
- Break bad habits of eating at times of low activity.
- Help your child develop a list of fun, fun activities and post it on the refrigerator and/or cabinet.
- Remind your child to engage in a fun activity when bored.
- Encourage your child to engage in a social or physical activity with friends and/or family members when bored.
- Eliminate foods that you know your child likes to snack on when bored.
- Remindyour child to take a 20-minute break before seconds so that the body knows that it is full.

For more information regarding these handouts contact:
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Source: J Pediatr Health Care © 2013 Mosby, Inc.

Medscape

Emotional Eating

What is emotional eating?
- Emotional eating is eating in response to stressful emotions.
- Emotional eaters sometimes eat a lot of food to feel better, but sometimes the portions are normal but unhealthy. These unhealthier foods contain greater levels of tryptophan which make people feel more peaceful and less stressed. This may lead to a cycle of using food to feel better.

Call your pediatrician and/or a psychologist if your child:
- Eats when feeling upset or unhappy.
- Craves sweet, fatty food or has a large appetite.
- Has a difficult time describing feelings to other people.
- Does not know how hunger is different from negative mood.
- Uses food to reduce emotional stress.
- Has depressed mood.

Treatments of emotional eating include:
- A team of doctors, psychologists, and other specialists.
- Cognitive behavioral therapy.
- Family therapy.

To help your child reduce emotional eating, encourage your child to:
- Identify negative emotions and determe the reasons for the emotions.
- Use a hunger scale to identify appropriate times to eat.

0 Stomach feels very empty.
1
2
3 Stomach feels hungry.
4
5
6
7 Stomach feels satisfied.
8
9
10 Stomach feels uncomfortably full.

- Learn the difference between boredom and hunger.
- Express feelings in an appropriate way.
- Seek out social support when feeling negative emotions.
- Engage in a pleasurable activity when feeling stressed out.
- Practice relaxation exercises and deep breathing to help with stress reduction.
- Do a physical activity to help release brain chemicals that decrease stress and improve mood.
- Take a 20-minute break before eating seconds so that the body knows that it is full.

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Summary

- Childhood - adolescent obesity is a chronic disease
- Associated with cardiovascular morbidity
- Leading to early adulthood mortality
- Associated with a decreased quality of life and psychosocial comorbidities
- A multi-disciplinary behavioral-lifestyle program is recommended
- Disease specific recommendations and interventions should be incorporated into weight loss management goals

Thank you

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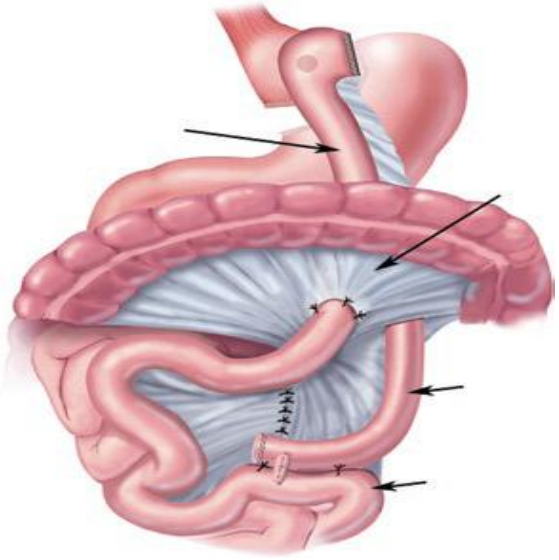
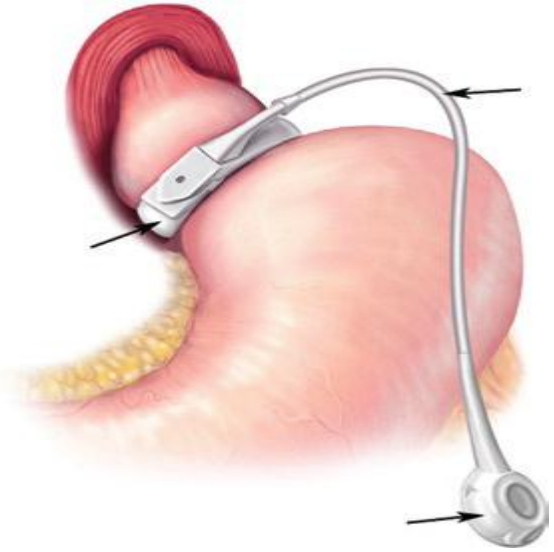
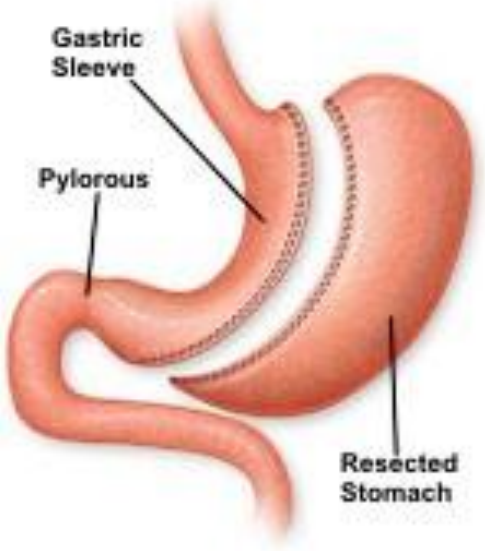
Bariatric procedures



Laparoscopic Roux-en-Y Gastric Bypass (RYGB)



Laparoscopic Adjustable Gastric Banding (LAGB)



Laparoscopic Sleeve Gastrectomy (LSG)

Long term weight loss in adults: Lifestyle versus surgery

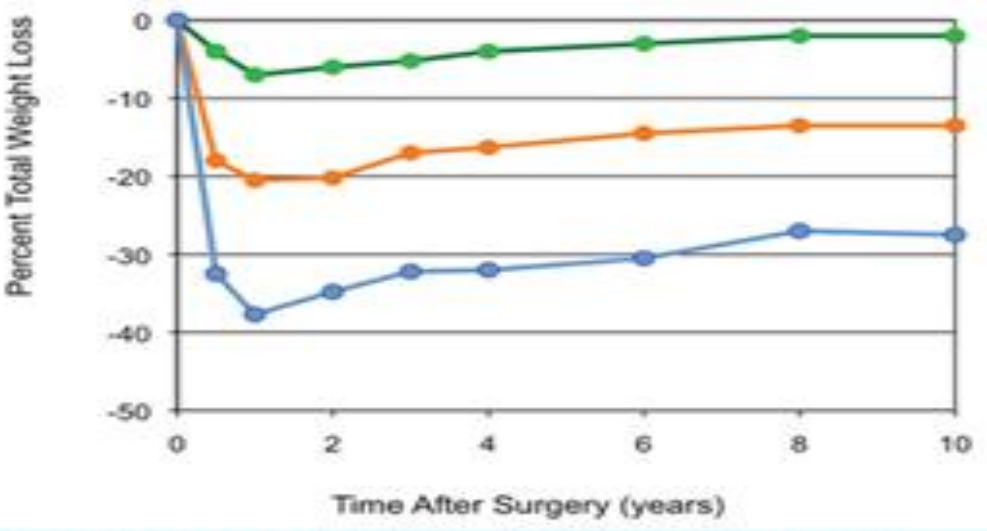


FIGURE 1. Relative effectiveness of obesity treatments

Comparison of short and long-term weight loss after lifestyle modification, adjustable gastric banding, and Roux-en-Y gastric bypass. Lifestyle modification outcomes data are from the results of the NIH-sponsored Diabetes Prevention Program (Knowler WC, Fowler SE, Hamman RF, et al. 10-year follow-up of diabetes incidence and weight loss in the Diabetes Prevention Program Outcomes Study. *Lancet.* 2009 November 14; 374(9702): 1677–1686.), which revealed that even this modest weight loss was associated with a 50-percent reduction in the development of type 2 diabetes over a four-year period. Surgery outcomes data are from the results of the Swedish Obesity Subjects (SOS) study (Sjöström L, Narbro K, Sjöström CD, et al; Swedish Obese Subjects Study. Effects of bariatric surgery on mortality in Swedish obese subjects. *N Engl J Med.* 2007;357(8):741–752.). Although longer-term data are not available for lifestyle modification, a recent report from the SOS study revealed that RYGB-associated weight loss remained stable between 10 and 20 years after surgery (Sjöström L, Peltonen M, Jacobson, P, et al; Bariatric Surgery and Long-term Cardiovascular Events. *N Engl J Med.* 2012;307(1):56–65.).

1 year outcomes in adolescents undergoing bariatric surgery (BOLD database)

- 890 adolescents at baseline, 259 at 1 year follow up (30 %)
- Age 11-19 years (ave 18.5 yrs)
- 75 % F/25 % M
- 68 % white, 14 % Hispanic, 11 % black, 6 % other
- 51 % RYGB
  - Mean BMI 50.7 kg/m^2 ↓ to 33 kg/m^2 (-35 % BMI reduction)
  - Mean weight loss = 48 kg (- 33 % weight reduction)
  - Better improvement in co-morbidities at 1 year
  - Higher rate of readmissions with RYGB over band
- 49 % Lap Band
  - Mean BMI 46 kg/m^2 ↓ to 39 k/m^2 (-14 % BMI reduction)
  - Mean weight loss = 20 kg (- 15 % weight reduction)

Messiah S et al. Changes in weight/comorbidities in adolescents undergoing bariatric surgery: 1 yr BOLD database. Surg Obes Relat Dis. 2012

Short term outcomes post roux-en-Y gastric bypass (RYGB) in adolescents

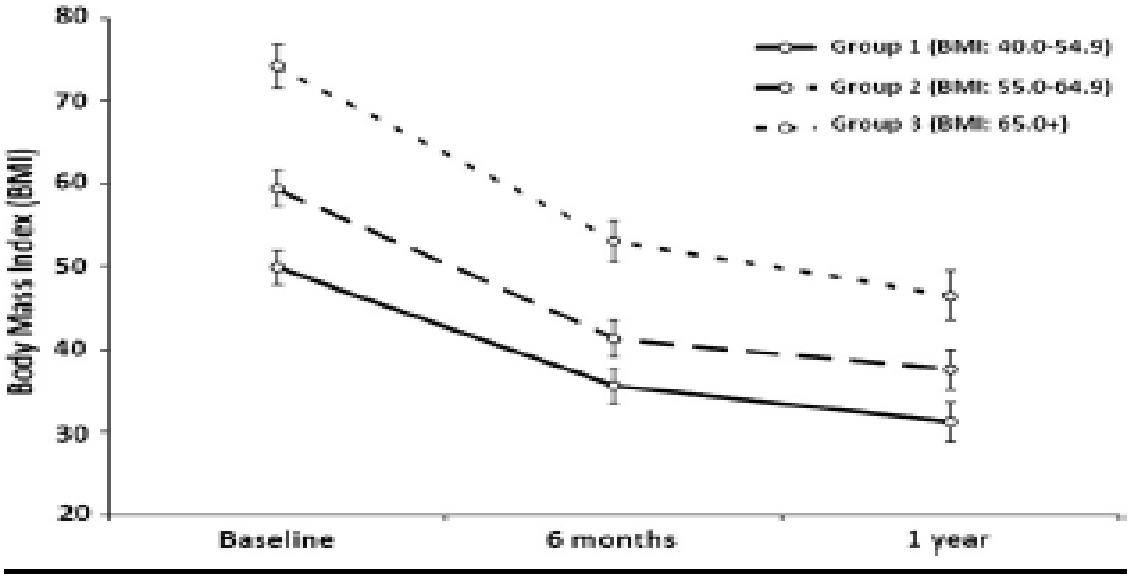


Figure 3. BMI by Pre-operative BMI Classification and Follow-up Visit.

Inge et al. Baseline BMI is a Strong Predictor of Nadir BMI after Adolescent Gastric Bypass. J Pediatr 2010;156:103-8.