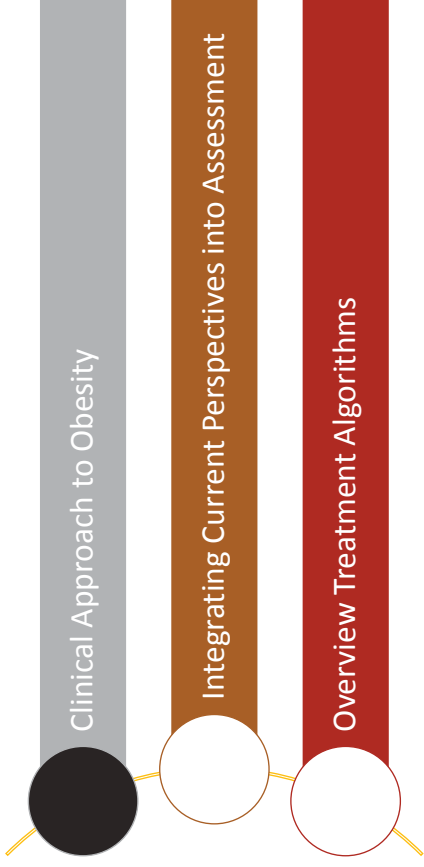


PEDIATRIC MEDICAL OBESITY

GITANJALI SRIVASTAVA, MD, FACP, FAAP
CELEBRATION HEALTH, CELEBRATION, FLORIDA

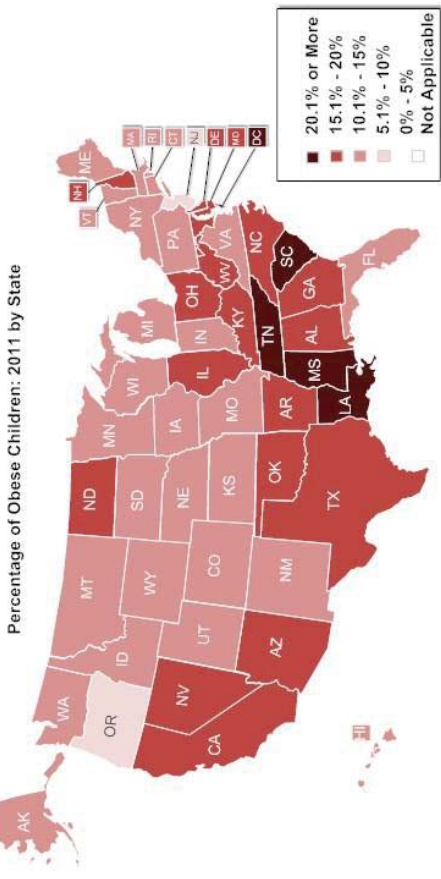


Agenda



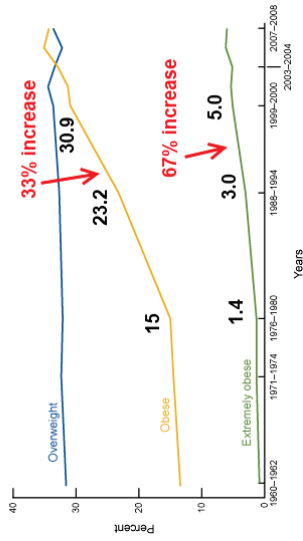
- I have no disclosures.
- I am a Pediatric and Adult Obesity Medicine specialist.

Obesity by the Numbers



Disproportionate Rise in Severe Obesity

Trends in overweight, obesity, and extreme obesity among adults aged 20–74 years: United States, 1960–2008



Obesity is Counterintuitive

- NOT only in America
- Did NOT start in the past 30 years
- NOT a problem of eating too much
- NOT a single disorder
 - >100 clinically meaningful subtypes
 - This recognition is essential to solving the problem
- Hides in plain sight
 - NOT recognized by most physicians and or the public

Disproportionate Rise in 6-11 years old

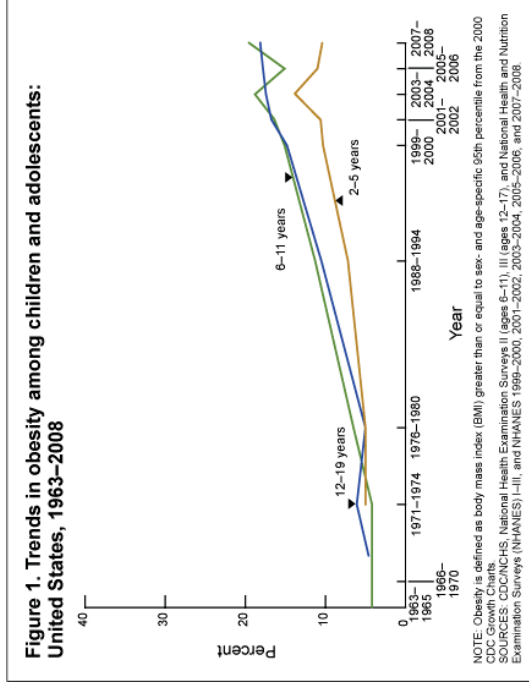


Figure 1. Trends in obesity among children and adolescents: United States, 1963–2008

NOTE: Obesity is defined as body mass index (BMI) greater than or equal to sex- and age-specific 95th percentile from the 2000 CDC Growth Charts. SOURCES: COJINCHHS, National Health Examination Surveys II (ages 6–11), III (ages 12–17), and National Health and Nutrition Examination Surveys (NHANES) I–III, and NHANES 1999–2000, 2003–2004, 2005–2006, and 2007–2008.

Obesity

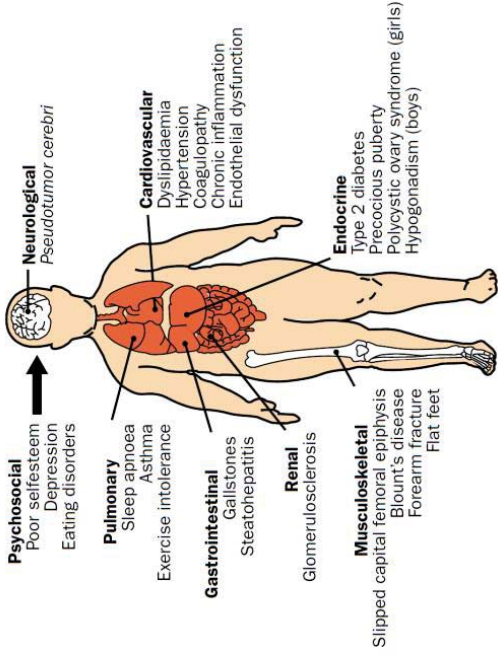
Historical view

- Lifestyle choice
- Characterological flaw (willpower, psychology)

Current perspective

- Complex physiology
- Epidemic from changes in modern environment
- Widely recognized as a disease
- Huge burden of associated illness –
 - a cause of more than 60 medical disorders (incl. 12 types of cancer)
- Devastating effect on quality and efficacy of life

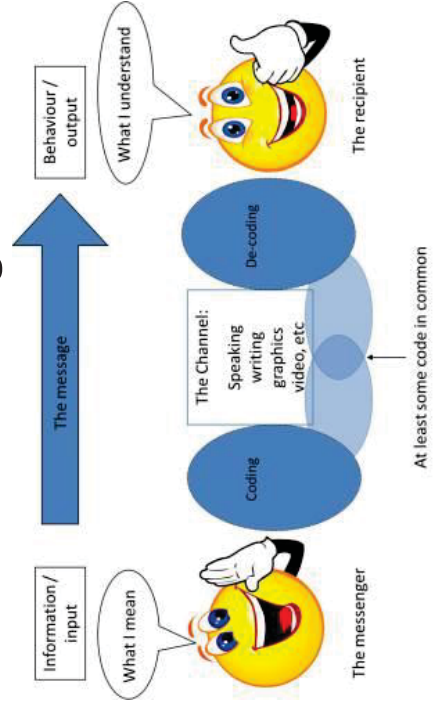
COMPLICATIONS OF CHILDHOOD OBESITY



Disease Management Results in Strong Therapeutic Alliances

- In most cases:
 - Acne
 - Asthma
 - Cancer
 - Renal Failure
 - Cold sores
 - CHF
 - Conjunctivitis
 - COPD
 - Depression
 - Diabetes
 - Diverticulosis
- Gallstones
- GERD
- Gout
- Hepatitis
- Dyslipidemia
- Migraines
- Influenza
- OSA
- PCOS
- Tobacco use

Building a Therapeutic Relationship in Disease Management

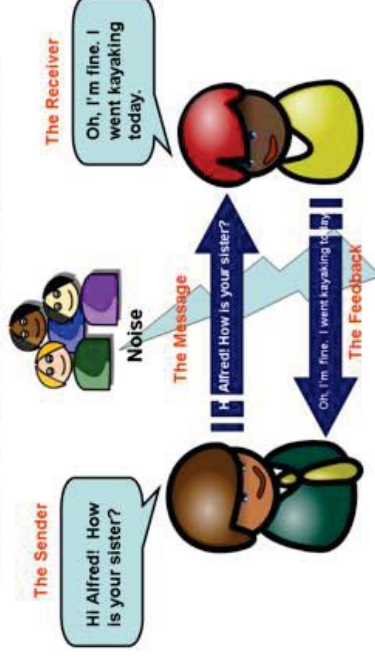


But WHAT ABOUT OBESITY?...

- In most cases:
 - Acne
 - Asthma
 - Cancer
 - Renal Failure
 - Cold sores
 - CHF
 - Conjunctivitis
 - COPD
 - Depression
 - Diabetes
 - Diverticulosis
- Gallstones
- GERD
- Gout
- Hepatitis
- Dyslipidemia
- Migraines
- Influenza
- OSA
- **Obesity?**
- PCOS
- Tobacco use

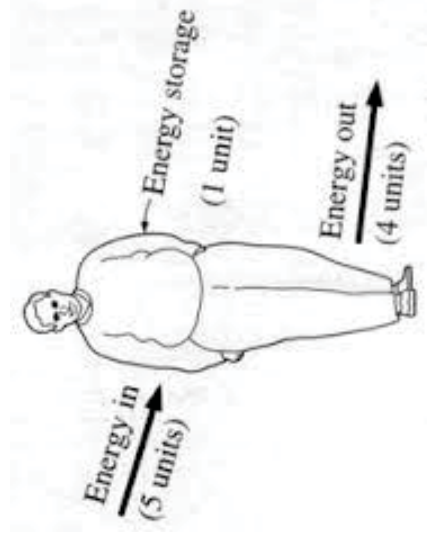
Therapeutic Process in Obesity Care: Uncertainty and negative outcomes

Barriers to the Communication Process



The noise in this diagram could be any barrier to communication. It is not limited to audible sounds.

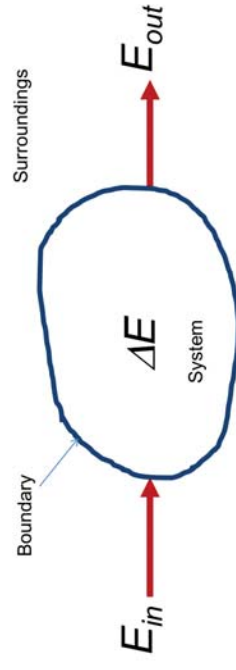
Energy Balance: A Lay Person's View:



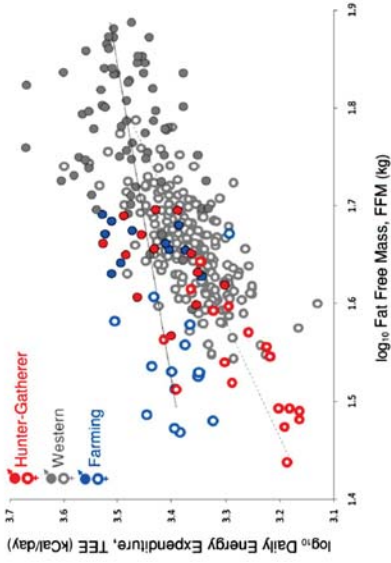
EVALUATION and RECOMMENDATIONS

- Based on understanding of
 - 1. The disease process
 - 2. The appropriate application of available therapies

Energy Balance: The Obesity Medicine View



Hunter-Gatherer Hadza and Westerners Have Equal Daily Energy Expenditure



“We hypothesize that human daily energy expenditure may be an evolved physiological trait largely independent of cultural differences.”

Pontzer et al. PLoS One 2012

The Normal Physiology of Acid-Base Balance

Kidney injury

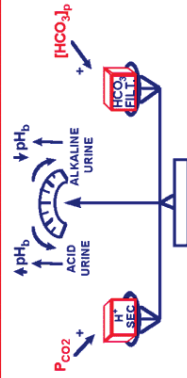
NH₄⁺ cannot be secreted leading to uremic acidosis

pH decreases

Why did pH decrease? **NOT** a problem of too much acid or too little base, but **PERTURBATION in ACID-BASE REGULATION** leading to decrease in pH and imbalance

Body has complex homeostatic pathways.

ACID-BASE BALANCING BY THE KIDNEY

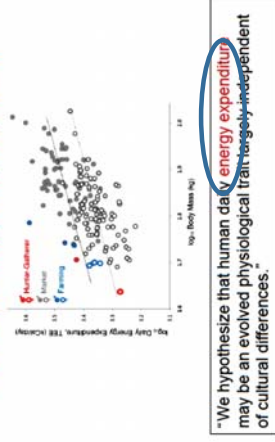


The response of the kidney to acid-base imbalances is governed by the relative magnitudes of proton secretion and HCO₃ filtration because these two factors affect the rates of acid and alkali excretion.

Case Scenario: What happens in kidney failure?

Back to the Hunter-Gatherers....Energy Balance is REGULATED

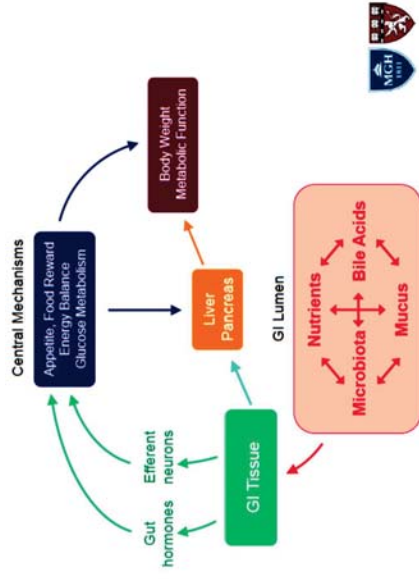
Hunter-Gatherer Hadza and Westerners Have Equal Daily Energy Expenditure



Thus daily energy balance is likely an evolved physiological trait largely independent of cultural differences.

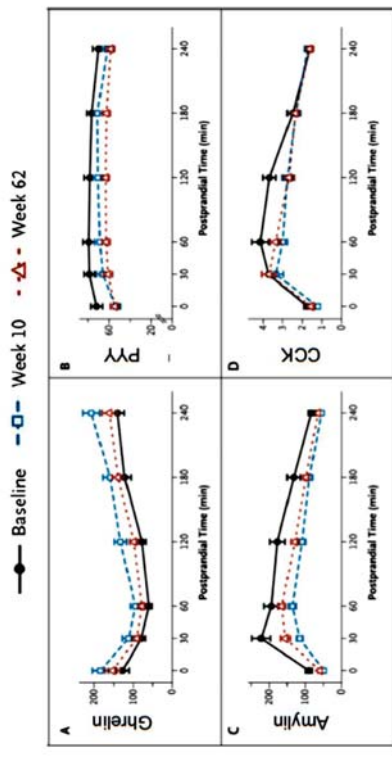
Energy balance is regulated.

GI Regulation of Metabolic Function



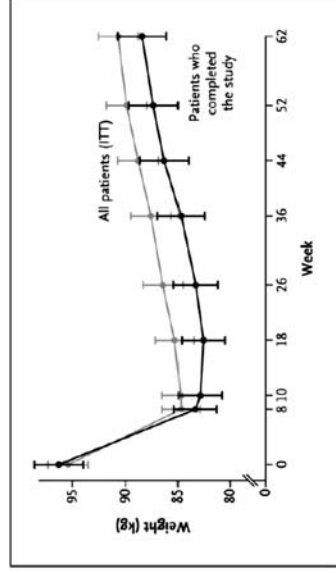
Slide, Courtesy of LMK

Gut Hormone Changes Persistently Oppose Diet-induced Weight Loss



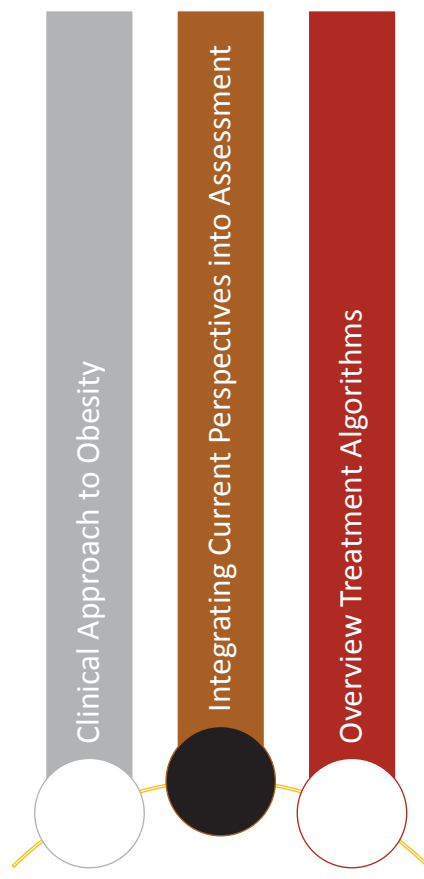
Sumithran et al. NEJM 2011; 365:1597-1604.

Weight Loss Curve

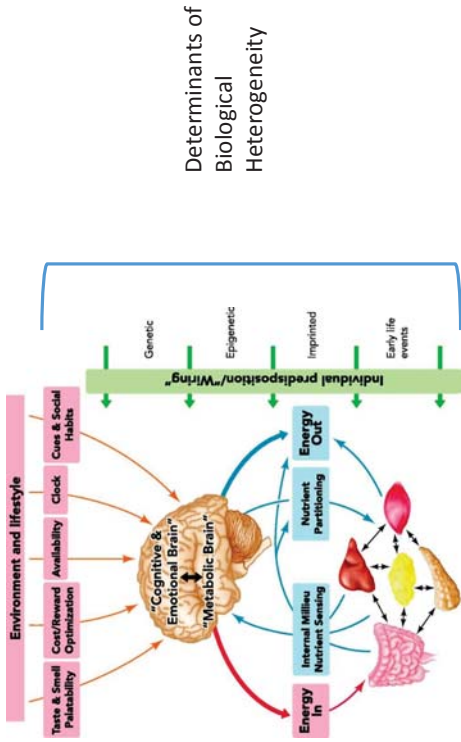


Sumithran et al. NEJM 2011; 365:1597-1604.

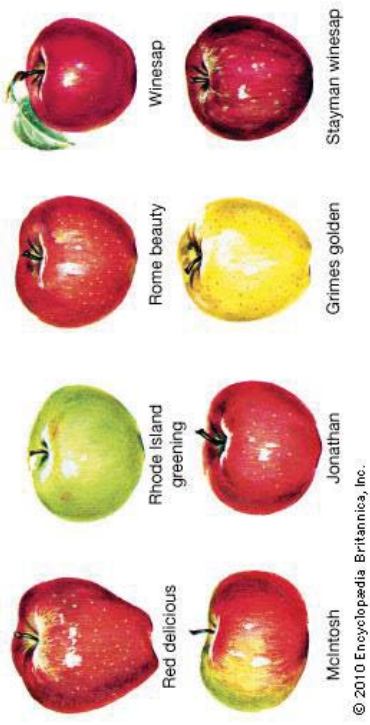
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Complex and Regulated System Gives Rise to A Heterogeneous Disease



NOT Apple vs Pear, But rather "WHAT KIND OF APPLE?"



Biological Heterogeneity Yields Clinical Heterogeneity

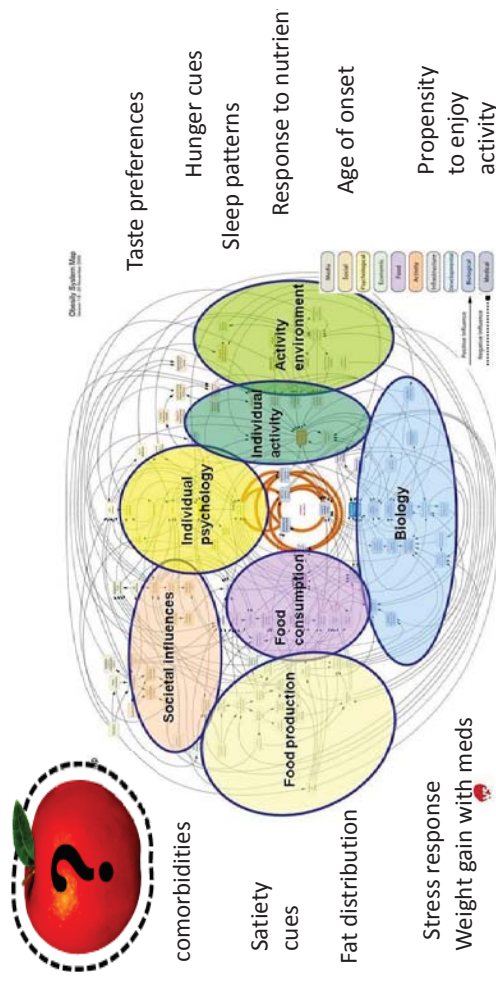
TYPES OF OBESITY - Are you an Apple or a Pear ??

Apple/Android

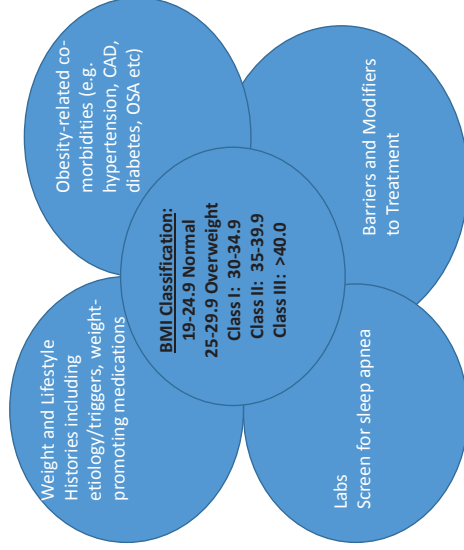
- Excess Fat on the Abdomen
- Common in Men
- Significant correlation with Metabolic Syndrome.

Pear/Gynoid

- Excess Fat on the thighs and buttocks
- Common in Women
- Non significant correlation with Metabolic Syndrome.



Cardiometabolic Assessment of the Patient with Overweight or Obesity



ORIGINAL ARTICLE

The Edmonton Obesity Staging System for Pediatrics: A proposed clinical staging system for paediatric obesity

Stasia Hadjiyannakis MD^{1,2}, Annick Buchholz PhD CPsych^{2,3}, Jean-Pierre Chanoine MD PhD⁴, Mary M Jettha MD^{5,6}, Laurie Caboury PhD RPsych⁶, Jill Hamilton MD⁷, Catherine Birken MD MSc⁷, Katherine M Morrison MD⁸, Laurent Legault MD⁹, Tracey Bridger MD¹⁰, Stephen R Cook MD MPH¹¹, John Lyons PhD¹², Anya M Sharma MD PhD¹³, Geoff DC Ball PhD RD^{5,6}

S Hadjiyannakis, A Buchholz, J-P Chanoine, et al. The Edmonton Obesity Staging System for Pediatrics: A proposed clinical staging system for paediatric obesity. *Paediatr Child Health* 2016;21(1):21-26.

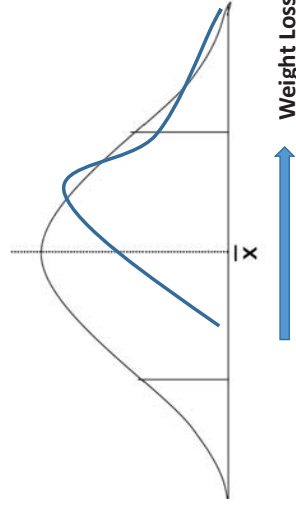
Le système d'Edmonton pour évaluer le stade d'obésité en pédiatrie : un système clinique proposé pour évaluer l'obésité juvénile

EOSS-P: Edmonton Obesity Staging System – Pediatrics Staging Tool

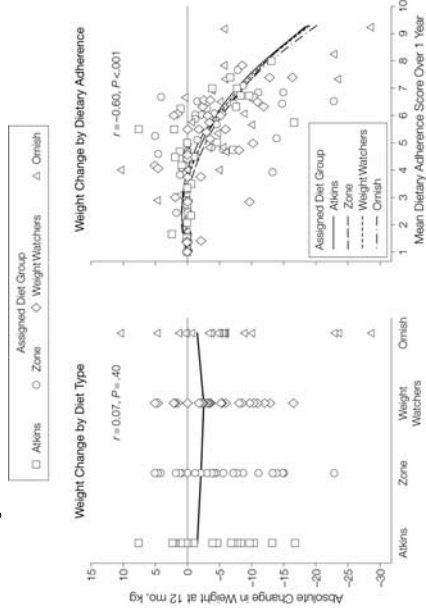
Stage 0	<ul style="list-style-type: none"> • Metabolic: No metabolic abnormalities • Mechanical: No functional limitations • Mental: No psychopathology • Milieu: No parental, familial or social environment concerns
Stage 1	<ul style="list-style-type: none"> • Metabolic: Mild metabolic abnormalities (i.e. IGT, pre-hypertension, mild lipid abnormalities, mild fatty infiltration of liver/elevation in transaminases) • Mechanical: Mild bio-mechanical complications (i.e. OSA not requiring PAP therapy, mild MSK pain not interfering with ADL, GERD) • Mental: Mild psychopathology, ADHD, LD, mild body image pre-occupation, occasional emotional/binge eating, bullying, mild developmental delay • Milieu: Minor problems in relationships, minor limitations in caregivers ability to support child's needs
Stage 2	<ul style="list-style-type: none"> • Metabolic: Moderate metabolic complications requiring pharmacotherapy (i.e. Type 2 Diabetes, Hypertension, lipid abnormalities, PCOS, moderate to severe fatty infiltration of liver) • Mechanical: Moderate bio-mechanical complications (i.e. OSA requiring PAP therapy, GERD, MSK pain limiting activity, moderate limitations in ADLs) • Mental: Moderate mental health issues (i.e. major depression, anxiety, frequent bingeing, significant body image disturbance, moderate developmental delay) • Milieu: Moderate problems in relationships, significant bullying at home or at school, significant limitations in caregivers ability to support child's needs
Stage 3	<ul style="list-style-type: none"> • Metabolic: Uncontrolled metabolic complications (i.e. TZDM (+ complications/ not meeting glycemic targets), uncontrolled hypertension, FSGS, markedly elevated liver enzymes and/or liver dysfunction, symptomatic gall stones, marked lipid abnormalities) • Mechanical: OSA requiring PAP therapy and suppl. oxygen, limited mobility, shortness of breath sitting/sleeping • Mental: Uncontrolled psychopathology, school refusal, daily binge eating, severe body image disturbance • Milieu: Severe problems in relationships, caregivers unable to support child's needs (may include exposure to family violence), dangerous environment (home, neighbourhood or school)

PEDIATRIC MEDICAL OBESITY

Heterogeneity in obesity translates to variation in treatment response.



Weight loss response to DIETS is broadly distributed.



Dansinger 2005
JAMA

Weight loss response to SURGERY is broadly distributed.

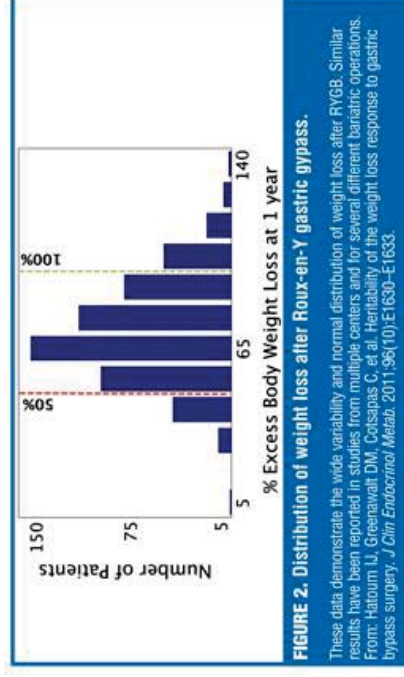
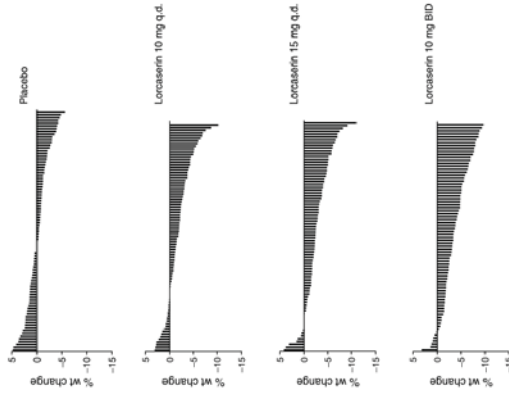


FIGURE 2. Distribution of weight loss after Roux-en-Y gastric bypass.

These data demonstrate the wide variability and normal distribution of weight loss after RYGB. Similar results have been reported in studies from multiple centers and for several different bariatric operations. From: Hatoun IJ, Greenwald DM, Coatspas C, et al. Heritability of the weight loss response to gastric bypass surgery. *J Clin Endocrinol Metab*. 2011;96(10):E1630-E1633.

Weight loss response to DRUGS is broadly distributed.



Smith et al 2009 Obesity

Patients need realistic weight loss goals.

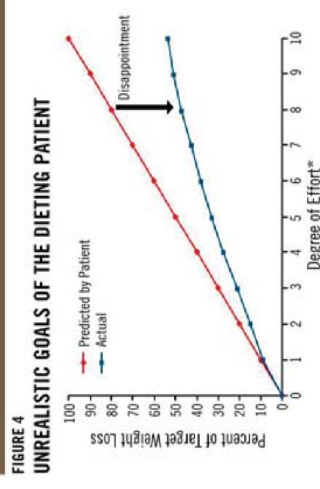


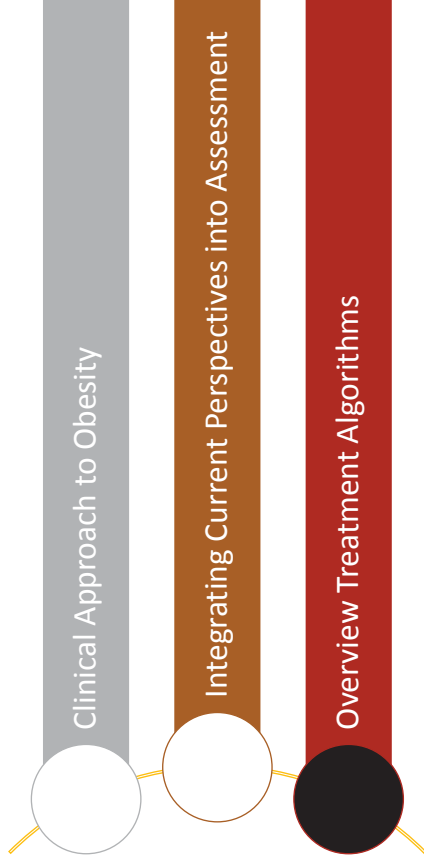
FIGURE 4 UNREALISTIC GOALS OF THE DIETING PATIENT

* Zero-zero effort; 10=100% effort. Effort consists of behavioral, cognitive, nutritional, and lifestyle changes based on different components, with the constant being degree or intensity. Gage D. *Primary Psychiatry*. Vol 14, No 5. 2007.

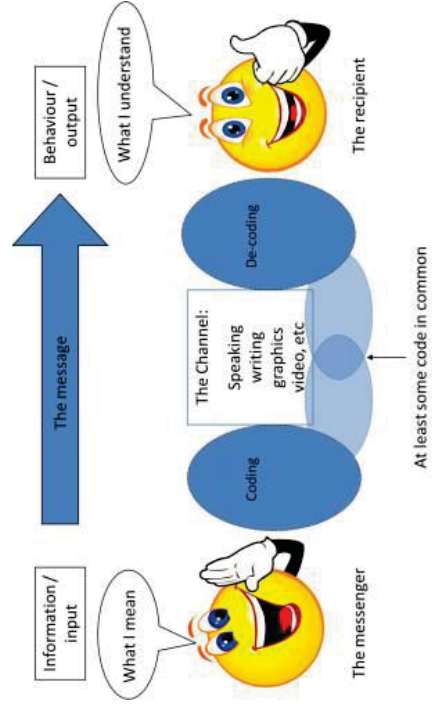
Keeping patients engaged and managing expectations is an important part of the therapeutic obesity alliance.



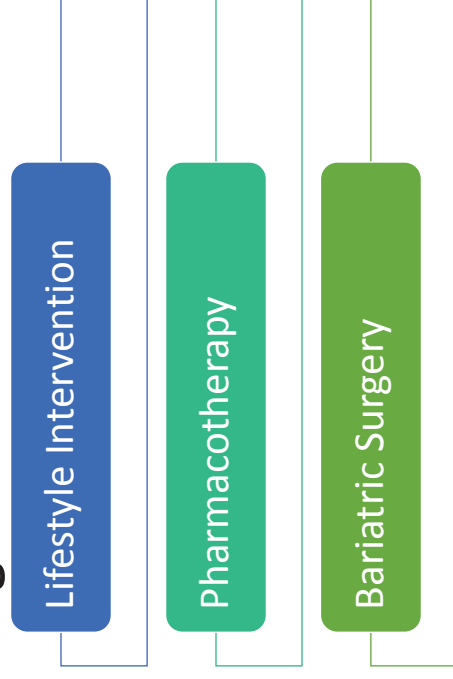
Agenda



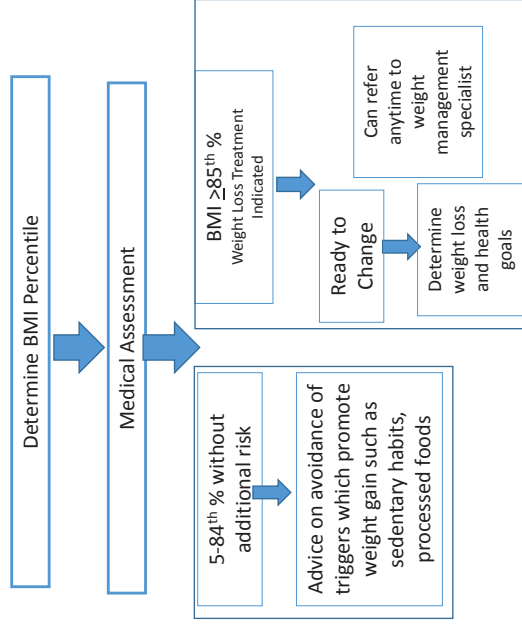
Managing expectations is key to therapeutic alliance in obesity care.



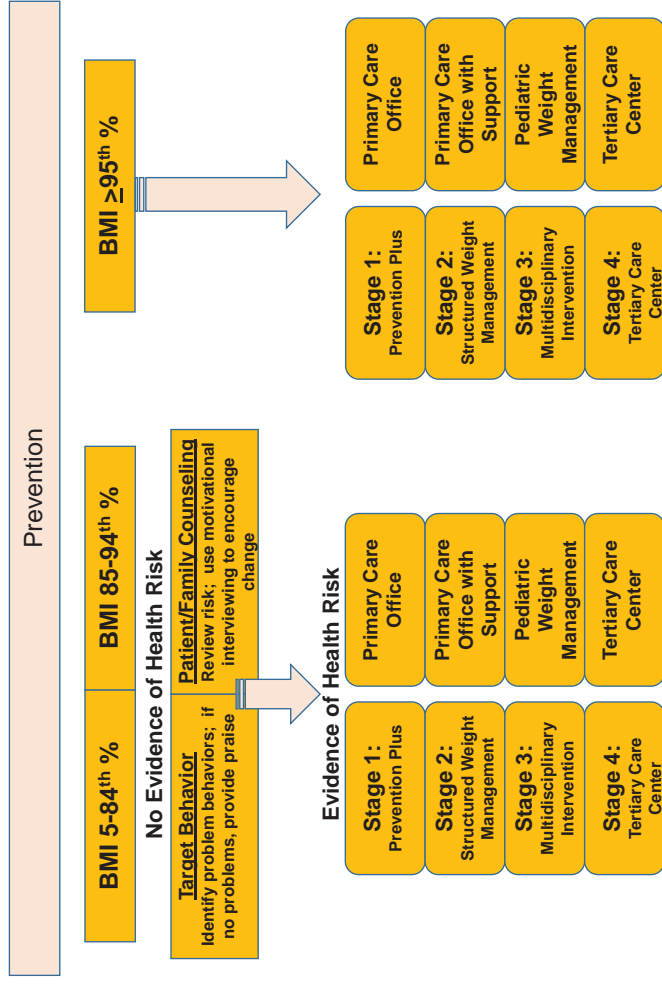
Pediatric Obesity Treatment Strategies



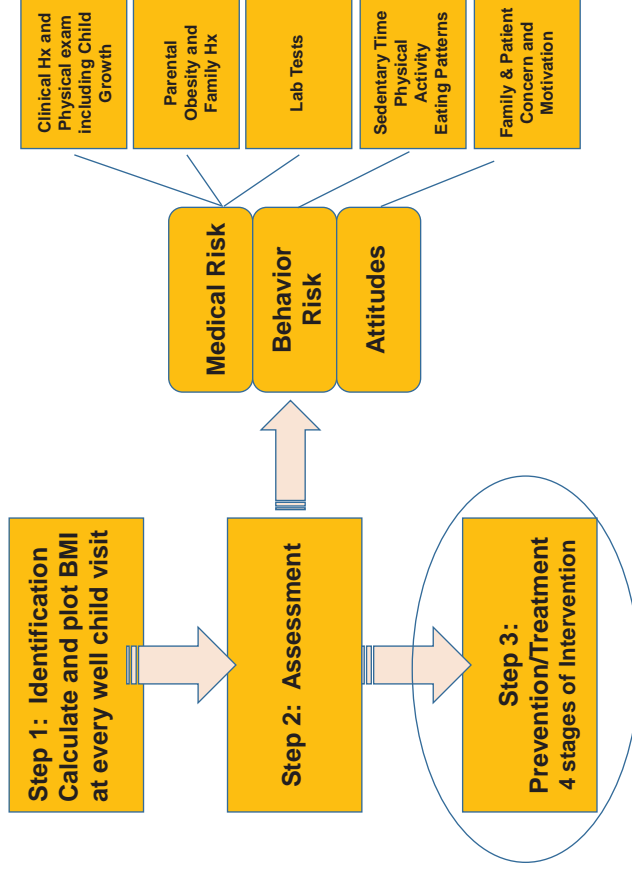
Disease Management Model for the Pediatric Patient with Overweight or Obesity Age ≥ 2



Steps to Prevention and Treatment of Obesity in Children



Steps to Prevention and Treatment of Obesity in Children



PEDIATRIC MEDICAL OBESITY

Pediatric obesity medications

- Prescribed by trained pediatric obesity specialists
- Drugs reserved for patients with severe obesity or those with severe comorbidities who have not responded to lifestyle treatments
- These patients may go on to have adolescent bariatric surgery
- Strict monitoring for side effects

From: Perioperative Outcomes of Adolescents Undergoing Bariatric Surgery: The Teen-Longitudinal Assessment of Bariatric Surgery (Teen-LABS) Study
 JAMA Pediatr. 2014;168(1):47-53. doi:10.1001/jamapediatrics.2013.4296

Obesity Pharmacotherapy

Name	Side Effects	Contraindications	Double Benefits
Psyllium Husk	Bloating, diarrhea		Dyslipidemia, alleviation of constipation, anti-inflammatory
Metformin	GI Upset	Renal insufficiency, age <10 years	Metabolic syndrome, weight gain related to psych meds
Phentermine	Rise in BP/HR, palpitations, dry mouth, constipation	Heart issues, stroke, glaucoma	Sleep apnea
Topiramate	Peripheral neuropathy, cognitive effects, kidney stone	Caution use with antidepressants, seizure meds, glaucoma risk	Emotional eating/stress eating
Lorcaserin	Headaches, URI symptoms, serotonin syndrome, priapism	depression	Prediabetes, safe in cardiovascular disease
Liraglutide	GI upset, nausea/vomiting	Gastroparesis, thyroid CA, pancreatitis risk	Diabetes, hypothalamic obesity
Bupropion-naltrexone	Nausea/headaches, depression flare up	Depression, pain medications	Anxiety/depression/addicti on behavior

Adolescent Bariatric Surgery

BMI ≥35 plus one of the following serious comorbidities:	BMI ≥40 plus presence of other comorbidities:
T2DM	Mild OSA (≥5 events/hr)
Moderate-Severe OSA (AHI > 15 events/h)	HTN
Pseudotumor cerebri	Insulin resistance
Severe steatohepatitis	Prediabetes
	Dyslipidemia
	Impaired quality of life or ADLs

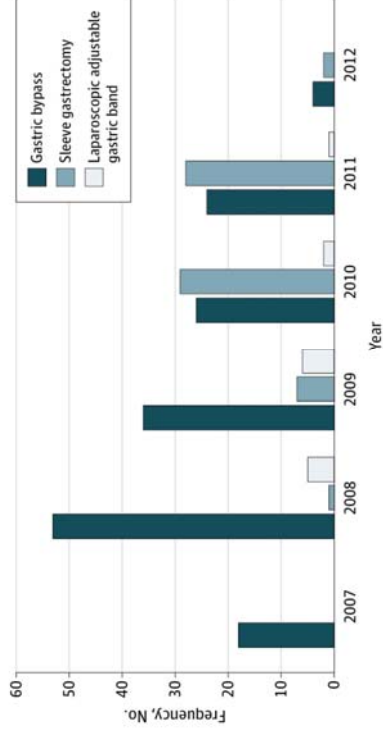
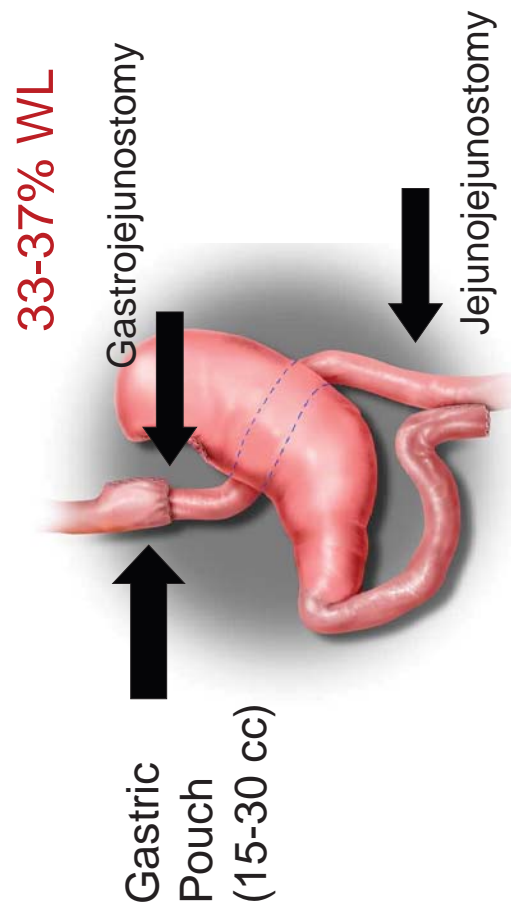


Figure Legend: The graph shows the trend in use of the 3 surgical procedures over time.



Proposed Disease Management Model for Severe Pediatric Obesity

