I have no disclosures.

I am a Pediatric and Adult Obesity Medicine specialist.
Disproportionate Rise in Severe Obesity

Disproportionate Rise in 6-11 years old

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

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
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
- Obesity?
- PCOS
- Tobacco use

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

Energy Balance: A Lay Person’s View:

### Energy Balance: The Obesity Medicine View

**EVALUATION and RECOMMENDATIONS**

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

Body has complex homeostatic pathways.

ACID-BASE BALANCING BY THE KIDNEY

Case Scenario: What happens in kidney failure?

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

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

Energy balance is regulated.
GI Regulation of Metabolic Function

Gut Hormone Changes Persistently Oppose Diet-induced Weight Loss

Weight Loss Curve

Agenda

Clinical Approach to Obesity

Integrating Current Perspectives into Assessment

Overview Treatment Algorithms
Complex and Regulated System Gives Rise to a Heterogeneous Disease

Determinants of Biological Heterogeneity

Heatmap Apple vs Pear, But rather “WHAT KIND OF APPLE?”

© 2010 Encyclopedia Britannica, Inc.

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

Weight and Lifestyle Histories including etiology/triggers, weight-promoting medications

Obesity-related co-morbidities (e.g., hypertension, CAD, diabetes, OSA etc)

BMI Classification:
- 19-24.9 Normal
- 25-29.9 Overweight
- Class I: 30-34.9
- Class II: 35-39.9
- Class III: >40.0

Labs
Screen for sleep apnea

Barriers and Modifiers to Treatment

Heterogeneity in obesity translates to variation in treatment response.

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

Sadia Hadiyuramai MD,1, Annick Buchholz PhD CHC2,3, Jean-Pierre Chanoine MD PhD4, Mary M Jetha MD5,6, Laurie Gaboury PhD RPh6,7, Jill Hamilton MD7, Catherine Brilken MD MSc5, Katherine M Morrison MD5,7, Laurent Legault MD, Tracey Bridger MD7, Stephen R Cook MD MPH8, John Lyons PhD7, Anya M Sharma MD PhD9, Coop DC Ball PhD MD1,2

Le système d’Edmonton pour évaluer le stade d’obésité en pédiatrie : un système clinique proposé pour évaluer l’obésité juvénile
Weight loss response to DIETS is broadly distributed.

Weight loss response to DRUGS is broadly distributed.

Patients need realistic weight loss goals.
Keeping patients engaged and managing expectations is an important part of the therapeutic obesity alliance.

Managing expectations is key to therapeutic alliance in obesity care.

Agenda
- Clinical Approach to Obesity
- Integrating Current Perspectives into Assessment
- Overview Treatment Algorithms

Pediatric Obesity Treatment Strategies
- Lifestyle Intervention
- Pharmacotherapy
- Bariatric Surgery
Disease Management Model for the Pediatric Patient with Overweight or Obesity Age >2

Determine BMI Percentile

Medical Assessment

BMI > 85th %

Weight Loss Treatment Indicated

BMI > 95th %

Evidence of Health Risk

Stage 1: Prevention Plus

Primary Care Office

Stage 2: Structured Weight Management

Primary Care Office with Support

Stage 3: Multidisciplinary Intervention

Pediatric Weight Management

Stage 4: Tertiary Care Center

Primary Care Office

No Evidence of Health Risk

BMI 5-84th %

Target Behavior

Identify problem behaviors; if no problems, provide praise

BMI 85-94th %

Patient/Family Counseling

Review risk; use motivational interviewing to encourage change

Steps to Prevention and Treatment of Obesity in Children

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

Ref: Barlow et al. Pediatrics 2007
**Obesity Pharmacotherapy**

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

**Adolescent Bariatric Surgery**

<table>
<thead>
<tr>
<th>BMI ≥35 plus one of the following serious comorbidities:</th>
<th>BMI ≥40 plus presence of other comorbidities:</th>
</tr>
</thead>
<tbody>
<tr>
<td>T2DM, Moderate-Severe OSA (AHI &gt; 15 events/hr), Pseudotumor cerebri, Severe steatohepatitis</td>
<td>Mild OSA (≥5 events/hr), HTN, Insulin resistance, Prediabetes, Dyslipidemia, Impaired quality of life or ADLs</td>
</tr>
</tbody>
</table>

---

From: Perioperative Outcomes of Adolescents Undergoing Bariatric Surgery: The Teen–Longitudinal Assessment of Bariatric Surgery (Teen-LABS) Study


---

**Figure Legend:**
Surgical Procedure Type by Year: The graph shows the trend in use of the 3 surgical procedures over time.

---

Pratt et al Obesity 2009
Wasserman H et al Pediatrics Annals 2014

---

Sugerman et al J Gastrointestinal Surg 2003

---

33-37% WL
Proposed Disease Management Model for Severe Pediatric Obesity

**Pediatric Obesity with Risk Factors/Ready to Make Change**

**Physician Directed Therapy**
- **Weight loss goals**: Weight Stability AND improvements in health targets over 12 weeks, for >99th BMI % targets and age >6, no more than 1-2 lbs/week
- Option to add on adjunctive pharmacotherapy if completed growth/development

**Pharmacological Directed Therapy**
- **Weight loss goals**: Weight Stability AND improvements in health targets over 12 weeks, for >99th BMI % targets, no more than 1-2 lbs/week
- Can also refer for Stage 3-4 Intervention

**Surgical Weight Loss Therapy**

**Lifestyle & Pharmacological Augmentation of Surgical Wt. Loss**

- Surgical Criteria: BMI ≥35 with comorbidity or BMI ≥40
- Refer to Stage 4 Intervention