

# Tackling Pediatric Obesity in Primary Care Practice

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# Disclosures

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I will be discussing off-label use of medications

No funding

# Outline

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- Pediatric Weight Loss Goals
- Intensive Health Behavior and Lifestyle Treatment (IHBLT)
- Anti-obesity Medications
- Bariatric Surgery

# Terminology



## Body Mass Index (BMI)

- $\text{Weight (kg)} / \text{Height (m)}^2$

### Adult: $\geq$ age 18

- 25 to 29.9 = **overweight**
- $\geq 30$  = **obesity**
  - 30-34.9 = mild obesity
  - 35-39.9 = moderate obesity
  - 40-49.9 = severe obesity
  - $\geq 50$  = extreme obesity

### Pediatric: $<$ age 20

- 85<sup>th</sup> to 95<sup>th</sup> %tile BMI = **overweight**
- $\geq 95^{\text{th}}$  %tile BMI = **obesity**
  - **95-96%tile** = mild obesity
  - **97-98 %tile** = moderate obesity
  - **99-100%tile** = severe obesity

# Prevalence of overweight & obesity

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2017-2020 combined National Health and Nutrition Examination Survey (NHANES) data

- About 1 in 6 children and adolescents ages 2 to 19 (16.1%) have overweight
- Almost 1 in 5 children and adolescents ages 2 to 19 (19.7%) have obesity
  - Ages 2-5: 12.7% (>1 in 8)
  - Ages 6-11: 20.7% (>1 in 5)
  - Ages 12-19: 22.2% (> 1 in 5)
- About 1 in 16 children and adolescents ages 2 to 19 (6.1%) have severe obesity

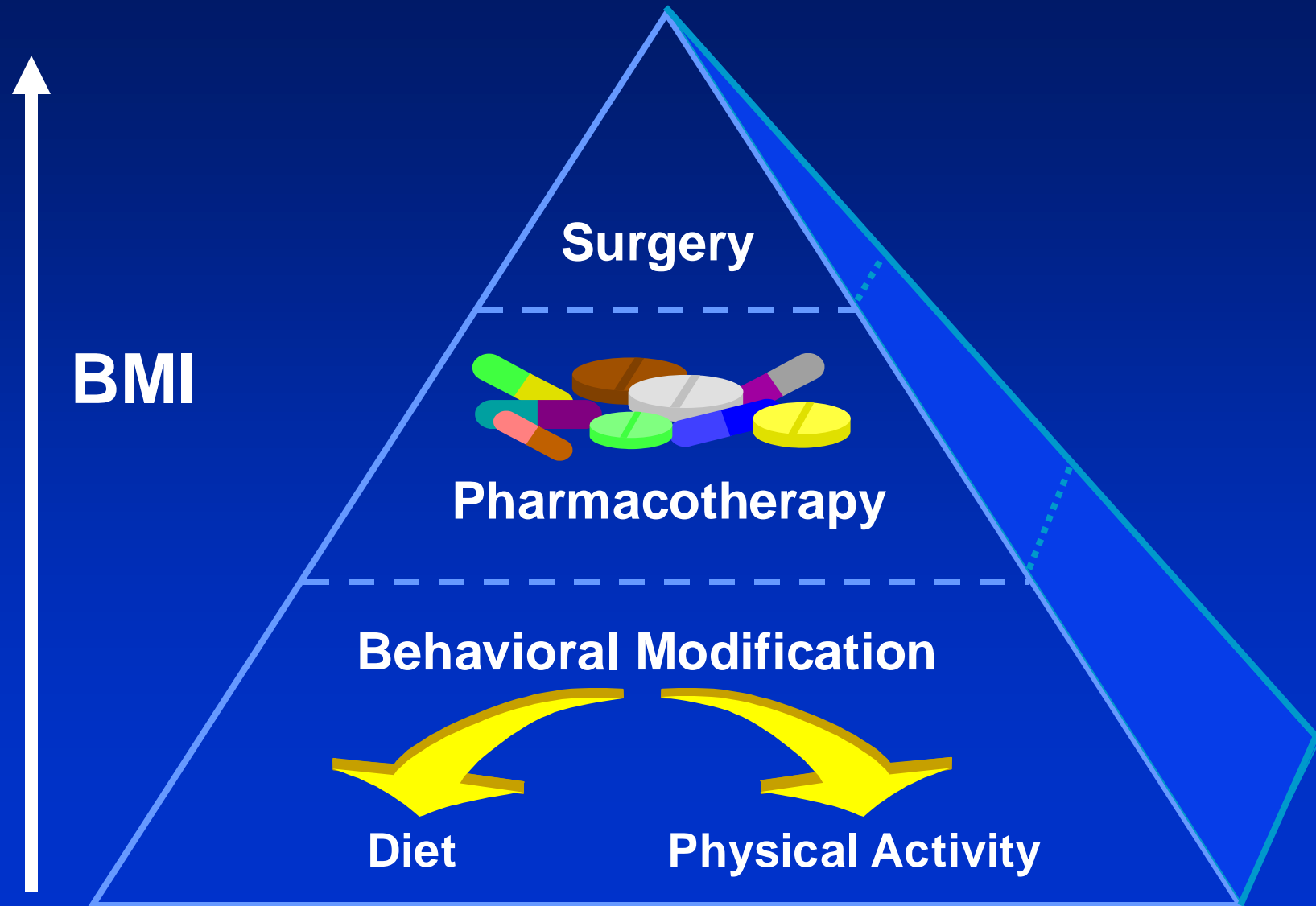
# Pediatric Weight Loss Goals



- **Normal weight** (BMI 5-84%): maintain weight
- **Overweight** (BMI 85-94%) **no risk factors**: maintain weight
- **Overweight** (BMI 85-94%) **+risk factors**: maintain/slow down gain
- **Obesity** (BMI 95-99%):
  - Age 2-5 maintain weight or slow down gain
  - Age 6-11: Gradual weight loss of 1 lb/month
  - Age 12-18: Weight loss up to 2 lbs/week
- **Severe obesity** (BMI >99%)
  - Age 2-5: Weight loss up to 1 lb/month
  - Age 6-11: Weight loss of 2 lbs/week
  - Age 12-18: Weight loss of 2 lbs/week

Ref: Barlow et al. Pediatrics 2007

# Obesity Treatment Pyramid



# AAP recommendations

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- Pediatricians and other PCPs should use **motivational interviewing (MI)** to engage patients and families in treating overweight and obesity
- **Intensive Health Behavior and Lifestyle Treatment (IHBLT)** is the foundational approach to achieve body mass reduction or the attenuation of excessive weight gain in children aged 6 years and older with overweight and obesity
- **Refer as soon as possible to IHBLT**
  - No evidence to support either watchful waiting or unnecessary delay of appropriate treatment of children who have already developed obesity

# 5-2-1-0 Rule

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## Enjoy-

FIVE or more vegetables  
& fruits every day

## Power down-

no more than TWO hours  
of screen time a day

## Play actively-

at least ONE hour each day

## Choose healthy-

ZERO sugar-sweetened drinks

- Children less than age 2 should have no screen time

# Pharmacotherapy

- May offer to children ages 8 through 11 years with obesity and additional complications as an adjunct to health behavior and lifestyle treatment
- Children  $\geq$  age 12 can use pharmacotherapy for the sole indication of obesity
- Needs to be considered as a potentially lifelong treatment. There can be significant rebound weight gain after stopping meds.



# Anti-obesity Medications

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- **Metformin**:  $\geq$  age 10 with diabetes or PCOS  
(off-label for insulin resistance and pre-diabetes)
- **Bupropion**:  $\geq$  age 18 with depression  
(off-label for younger ages)
- **Phentermine**:  $\geq$  age 16 with obesity
- **Topiramate**:  $\geq$  age 12 with migraines
- **Qsymia**:  $\geq$  age 12 with obesity
- **Orlistat**:  $\geq$  age 12 with obesity
- **Liraglutide**:  $\geq$  age 12 with obesity
- **Semaglutide**:  $\geq$  age 12 with obesity
- **Tirzepatide**:  $\geq$  age 18 with obesity

# metformin

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- Increases insulin sensitivity
- Approved for  $\geq$  age 10 with diabetes or PCOS
- “Off-label” use for weight loss
  - Theoretically, decreasing insulin resistance can result in a decrease in lipogenesis and increase in lipolysis, thus promoting weight loss
  - Consider for antipsychotic-induced weight, PCOS, and prediabetes
- **Dose:** Start 500 mg daily x2 weeks, then 500 mg bid, titrate as needed to 1000 mg bid; OR start metformin XR 500 mg daily x2 weeks, then 1000 mg XR qd, titrate as needed to 2000 mg XR daily
- Check baseline liver & kidney function and monitor with dose changes. Check B12 after 6-12 months.
- **Side effects:** nausea, vomiting, abdominal cramping or pain, diarrhea, flatulence, LH/dizziness, metallic taste

# Metformin in antipsychotic-induced weight gain

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- Improving Metabolic Parameters in Antipsychotic Child Treatment (IMPACT): Randomized 24-week clinical trial
  - Youth aged 8-19 years with overweight/obesity psychiatrically stable
  - DSM-IV diagnosis of severe mental illness (schizophrenia spectrum disorder, bipolar spectrum disorder or psychotic depression)
  - Developed substantial weight gain following treatment with a second generation antipsychotic

Randomized to

1. metformin (MET) n= 49
2. antipsychotic switch (aripiprazole) or, if already exposed to that drug, perphenazine or molindone; SWITCH n=31
3. Continued baseline antipsychotic (CONTROL) n=47

All participants received healthy lifestyle

BMI z-score decreased significantly with MET ( $-0.09 \pm 0.03$ ,  $p=0.002$ ) and SWITCH ( $-0.11 \pm 0.04$ ,  $p=0.003$ ), while it increased in CONTROL (week 24:  $+0.04 \pm 0.03$ )

# bupropion (Wellbutrin®)

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- noradrenaline and dopamine reuptake inhibitor
- Approved for  $\geq$  age 18 with depression; commonly used off-label for younger ages
- “Off-label” use for weight loss
- Dose: 100 mg tid, SR 150 mg bid, XL 300 mg qd
- Can be used in combination with naltrexone in patients age 18 and over (Contrave®)
- Useful adjunct for depression or smoking cessation
- Contraindicated if seizure disorder, eating disorder, or alcoholism
- Side effects: dry mouth, insomnia, agitation, headache, nausea, dizziness, constipation, abdominal pain, diarrhea

# phentermine (Adipex-P®, Ionamin®)

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- Anorexiant: decreases appetite, increases satiety, increases energy expenditure
- Sympathomimetic; stimulates release of norepinephrine
- Approved for age 16 and over; off-label  $\geq$  age 12
- FDA-approved for 3 months use; off-label for long-term use.
- Dose: Start 15 mg daily; max dose 37.5 mg daily
- Side effects: palpitations, tachycardia, HTN, headache, jitteriness/nervousness, LH/dizziness, insomnia, dry mouth, constipation, diarrhea
- Monitor monthly for 3-6 months, then space out.
- Taper dose to avoid rebound weight gain

# topiramate (Topamax®)

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- Anti-epileptic, found to have side effect of weight loss. Approved for migraines.
- Approved for  $\geq$  age 12 with migraines
- “Off-label” use for weight loss and binge eating
- Dose: Start 25 mg qhs and increase by 25 mg every 2-4 weeks to max 200 mg qhs
- Check baseline BMP, LFTs, and CBC and monitor with dose changes
- Side effects: paresthesias, memory problems, fatigue, somnolence, dizziness, difficulty concentrating, depression, renal stones, acute angle glaucoma, metabolic acidosis, leukopenia, hepatotoxicity

# Phentermine/topiramate (Qsymia®)

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- **Synergistic**; Combination treatment more effective than either agent alone
- Approved for  $\geq$  age 12 with obesity
- **Dose**: Start 3.75 mg/23 mg PO qam x14 days, then increase to 7.5 mg/46 mg qam; max dose 15 mg/92 mg PO qam
- Can also use the generic meds in combination
- D/C if BMI change  $<5\%$  after 12 weeks on max dose. Taper dose to avoid rebound weight gain.

# orlistat (Xenical®, Alli®)

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- Inhibits gastric and pancreatic lipases, reducing fat absorption
- Approved for  $\geq$  age 12 with obesity
- **Dose:** 120 mg tid with meals or up to 1 hour after
- Monitor for vitamin ADEK deficiencies
- Take a daily multivitamin at least 2 hours apart from orlistat
- **Side effects:** diarrhea, oily stools, flatulence, fecal leaking, nausea, abdominal cramping
- Rare cases of severe liver injury
- **Efficacy:** 54 week study, age 12-16, BMI decreased by 0.55 with orlistat but increased by 0.31 with placebo ( $P = 0.001$ ) —Chanoine et al, JAMA 2005

# GLP-1 agonists

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- Activate GLP-1 (glucagon like peptide 1) receptor:
  - Increases insulin secretion → decreases blood sugar
  - Decreases glucagon secretion → decreases blood sugar
  - Delays gastric emptying → slower release of glucose
  - Increases satiety
- Contraindications:
  - Multiple endocrine neoplasia type 2 (MEN-2)
  - Personal or family history of medullary thyroid cancer
  - Insulin-dependent diabetes
  - Diabetic ketoacidosis
  - Pregnant

# Liraglutide (Saxenda®)

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- Activates GLP-1 (glucagon like peptide 1) receptor:
- Approved for  $\geq$  age 12 with obesity
- **Dose:** start 0.6 mg SC daily x1 week, then may increase dose by 0.6 mg/day q week until maximum dose 3 mg SC daily.
- Re-titrate from 0.6 mg SC qd if tx interrupted for >3 days
- **Common side effects:** nausea, vomiting, diarrhea, constipation, dizziness, headache, fatigue, hypoglycemia
- **Serious side effects:** gallstones, pancreatitis, renal failure, medullary & papillary thyroid cancer, SI
- D/C if BMI change <1% after 12 weeks on max dose.

# Study: Saxenda® in teens

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- RCT with 56-wk treatment and a 26-wk follow-up
- Adolescents (12-17 years) with obesity (BMI  $\geq 30$  and BMI  $\geq 95\%$ tile)
- Both groups received lifestyle therapy
- Randomly assigned (1:1) to either liraglutide (3.0 mg) or placebo SC once daily
- Teens treated with liraglutide lowered their BMI-for-age by 0.23, vs none for placebo
- Reduction in BMI of  $\geq 5\%$ : 51/113 (45%) liraglutide and 20/105 placebo (19%)
- Reduction in BMI of  $\geq 10\%$ : 33/113 (29%) liraglutide and 9/105 placebo (8.5%)

# Semaglutide (Wegovy®)

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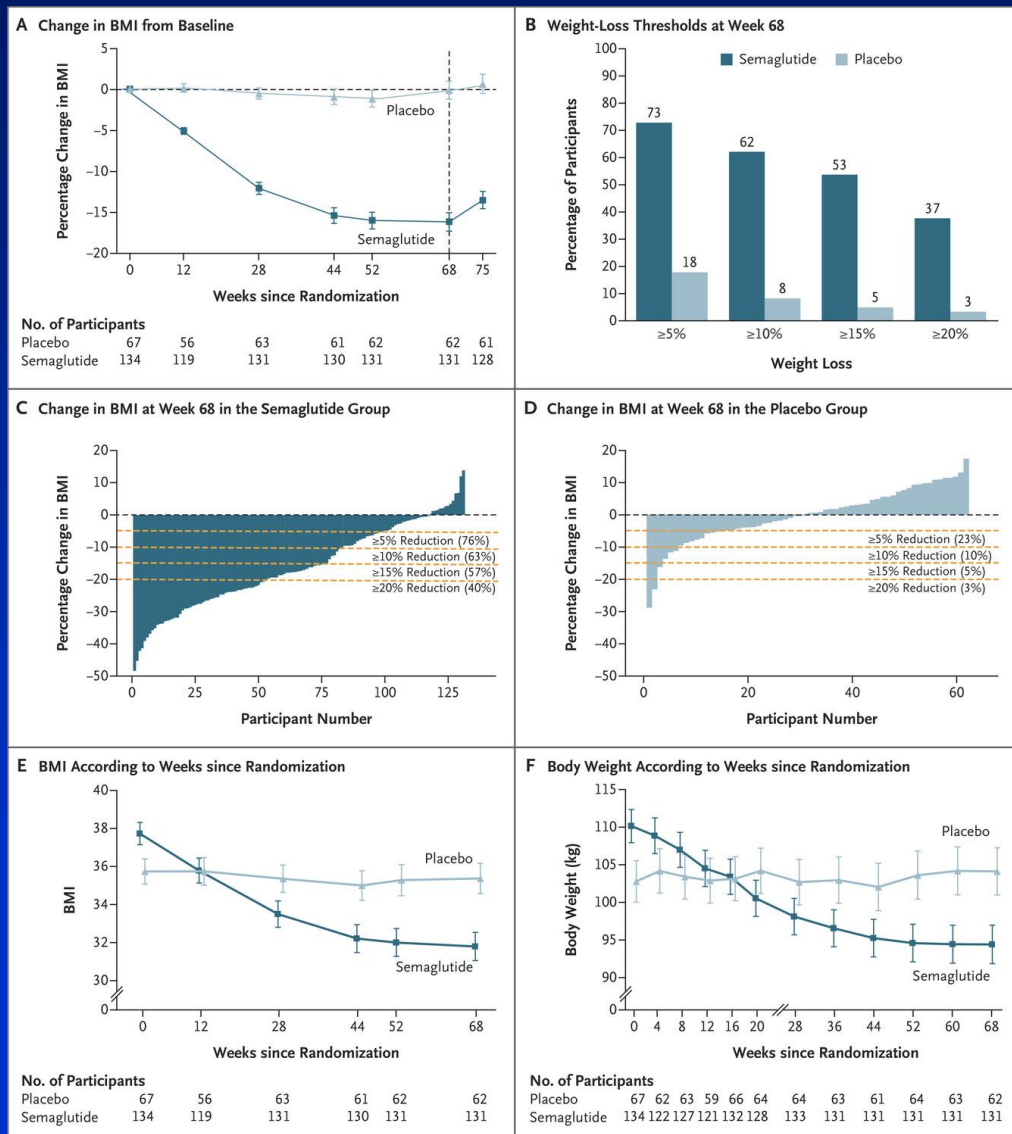
- Activates GLP-1 (glucagon like peptide 1) receptor
- Approved for  $\geq$  age 12 with obesity
- **Dose:** start 0.25 mg SC weekly x4 weeks; may increase every 4 weeks until max 2.4 mg SC weekly. (0.5, then 1.0, then 1.7, then 2.4)
- **Common side effects:** nausea, vomiting, diarrhea, constipation, dizziness, headache, fatigue, bloating, belching, gas
- **Serious side effects:** gallstones, pancreatitis, renal failure, medullary & papillary thyroid cancer, SI

# Study: Semaglutide in teens

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- RCT with 68-wk treatment and a 26-wk follow-up
- Adolescents (12-17 years) with obesity (BMI  $\geq 95\%$ tile) or with overweight (BMI  $\geq 85\%$ tile) and at least one comorbidity. 201 participants.
- Both groups received lifestyle therapy
- Randomly assigned (2:1) to either semaglutide (dose escalation up to 2.4 mg) or placebo SC once weekly
- The mean change in BMI from baseline to week 68 was  $-16.1\%$  with semaglutide and  $0.6\%$  with placebo
- 5% TBW loss: 73% semaglutide vs 18% placebo
- 10% TBW loss: 62% semaglutide vs 18% placebo
- 15% TBW loss: 53% semaglutide vs 5% placebo
- 20% TBW loss: 37% semaglutide vs 3% placebo

# Semaglutide in teens



# Tirzepatide (Zepbound®)

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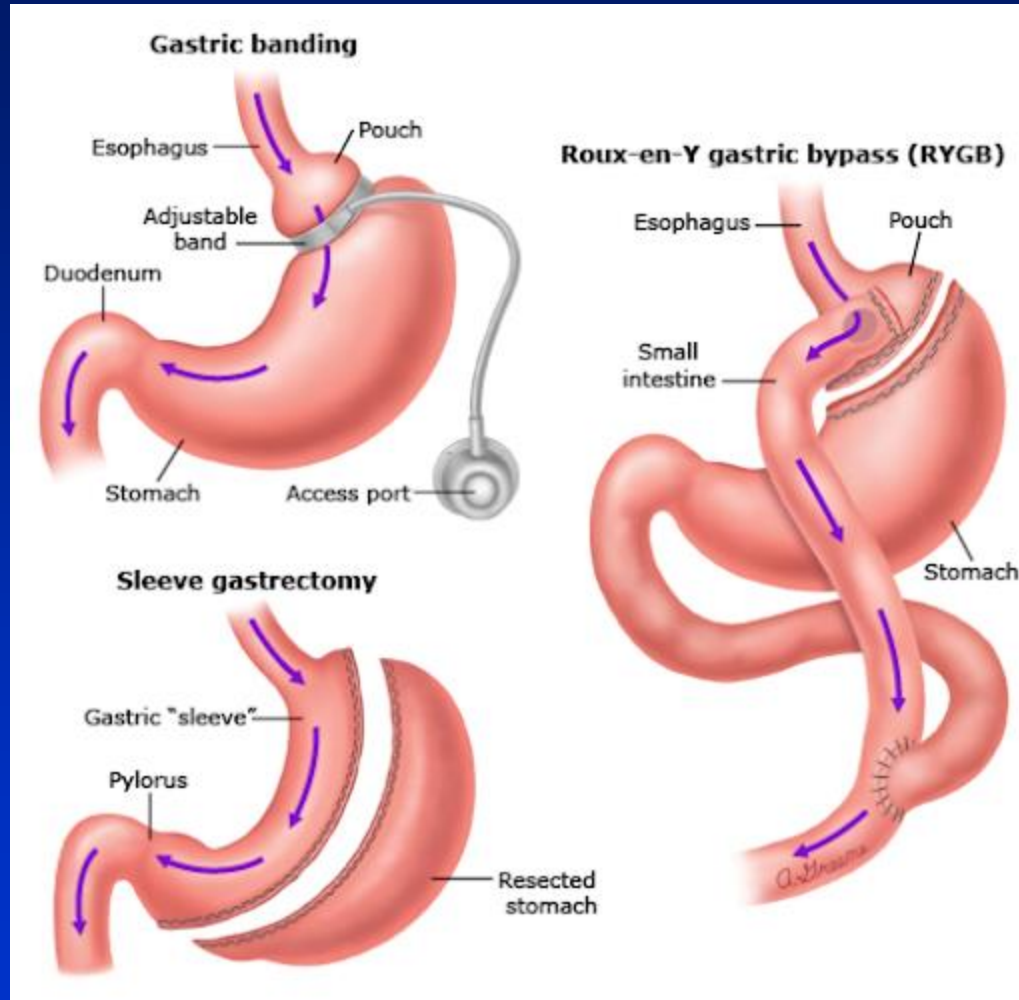
- Dual agonist: Activates **GIP** (glucose-dependent insulinotropic polypeptide) and **GLP-1** (glucagon like peptide 1) receptor
  - Decreases appetite and caloric intake
- Approved for **≥ age 12** with obesity
- **Dose:** start 2.5 mg SC weekly x4 weeks; may increase by 2.5 mg every 4 weeks until max 15 mg SC weekly. (5, 7.5, 10, 12.5, 15)
- **Common side effects:** nausea, vomiting, diarrhea, constipation, dizziness, fatigue, dyspepsia, GERD, gas, hypoglycemia
- **Serious side effects:** gallstones, pancreatitis, renal failure, medullary & papillary thyroid cancer

# Study: Tirzepatide

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- RCT with 72-wk treatment of 2539 adults with obesity (BMI  $\geq 30$  kg/m<sup>2</sup>), or with overweight (BMI of  $\geq 27$  kg/m<sup>2</sup>) with at least 1 weight-related comorbidity, excluding type 2 diabetes.
- Both groups received lifestyle therapy
- Randomly assigned to 5mg, 10mg, 15 mg, or placebo
- More than half of adults taking Zepbound 10 and 15 mg lost  $\geq 20\%$  of their body weight; 15 mg best
- 5% TBW loss: 90.9% tirzepatide vs 34.5% placebo
- 10% TBW loss: 83.5% tirzeptide vs 18.8% placebo
- 20% TBW loss: 56.7% tirzepatide vs 3.1% placebo
- Changes in HDL cholesterol, SBP, and triglycerides for pooled Zepbound were significant at  $P < 0.001$  for superiority vs placebo.

# Metabolic Bariatric Surgery



# New ASMBS Pediatric Metabolic and Bariatric Surgery Guidelines

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- Age >10 years
- >120% of 95th percentile BMI with comorbidity (Class II obesity)
- >140% of 95th percentile BMI irrespective of comorbidity (Class III obesity)

No evidence to support inclusion criteria for Tanner Stage or skeletal maturity

Earlier intervention leads to better outcomes

# MBS: Indications & Contraindications

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## Indications:

1. BMI  $\geq 35$  kg/m<sup>2</sup> or  $\geq 120\%$  of the 95th %tile with one comorbid condition
  - OSA (AHI  $> 5$  events/hour)
  - Type 2 diabetes
  - NASH
  - HTN (on medications)
  - PCOS
2. BMI  $\geq 40$  kg/m<sup>2</sup> or  $\geq 140\%$  of the 95th %ile

## Contraindications:

- Pregnant or breast-feeding adolescents (and those planning to become pregnant within 2 years of surgery)
- Unresolved substance abuse and/or eating disorder
- Untreated psychiatric disorder
- Suicidal attempt in the last year

# Teen-LABS Study

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Longitudinal Assessment of Bariatric Surgery, funded by NIDDK

- gastric band, gastric sleeve, or gastric bypass
- 240 teens, ages 13 to 19, were enrolled in Teen-LABS between 2006 and 2012. 161 teens in the study had bariatric surgery at five medical centers.

Major improvements were observed 3 years after surgery:

- Weight: Teens lost 26% of their body weight.
- Heart Health: Improvements in blood pressure, cholesterol levels, and kidney function.
- Type 2 Diabetes: 95% of teens with type 2 diabetes experienced disease reversal.
- Similar benefits to adults
- 60% maintained a 20% or more reduction in body weight for at least five years after surgery.

Takeaway: Bariatric surgery can be effective for teens with severe obesity, especially when lifestyle changes alone are insufficient.

# Summary

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- Use the 5-2-1-0 rule for counseling
- Begin Intensive Health Behavior and Lifestyle Treatment (IHBLT) in kids age 6 and over with overweight and obesity
- Offer pharmacotherapy for age  $\geq 12$ 
  - Several meds offer teens a 10-20% TBW reduction
- Bariatric surgery is highly effective for teens with a majority maintaining 20% TBW loss

# Question 1

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Which of the following should be a weight loss goal in a 4 year old boy with a BMI in the 94th percentile?

- A. Weight maintenance
- B. BMI less than 85th percentile
- C. Lose up to 1 lb per month
- D. Lose up to 2 lbs per month

# Question 1

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Which of the following should be a weight loss goal in a 4 year old boy with a BMI in the 94th percentile?

- A. Weight maintenance
- B. BMI less than 85th percentile
- C. Lose up to 1 lb per month
- D. Lose up to 2 lbs per month

## Question 2

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A 5 year old boy has a BMI in the 75th percentile on his well child visit. Primary intervention should include:

- A. No further intervention at this time
- B. At least 2 hours of physical activity daily
- C. No more than 2 hours of computer time
- D. At least 3-4 servings of yogurt or cheese daily

## Question 2

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A 5 year old boy has a BMI in the 75th percentile on his well child visit. Primary intervention should include:

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- B. At least 2 hours of physical activity daily
- C. No more than 2 hours of computer time
- D. At least 3-4 servings of yogurt or cheese daily

## Question 3

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A 14 year old boy returns with his parents for a follow up visit. He had a BMI in the 95th percentile 2 months ago with no weight related comorbidities. At that visit, you discussed the 5-2-1-0 message. He has gained 5 lbs since then. What is the next best step?

- A. Continue current care and reassess in 1 month
- B. Refer to dietitian
- C. Offer pharmacotherapy
- D. Refer for bariatric surgery
- E. B and C
- F. B and D

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- C. Offer pharmacotherapy
- D. Refer for bariatric surgery
- E. B and C
- F. B and D

## Question 4

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Which of the following patients most likely meets criteria for adolescent bariatric surgery?

- A. 17 yr old girl BMI 41 with HTN who has trialed several months of intensive lifestyle intervention
- B. 17 yr old boy BMI 35 with T2DM who has completed 6 months of intensive lifestyle intervention
- C. 13 yr old boy BMI 41 with severe OSA and Tanner Stage 3
- D. 13 yr old girl BMI 41 with clinical depression and recent binge eating
- E. A and C
- F. A, B, and C
- G. A, B, C, and D

## Question 4

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Which of the following patients most likely meets criteria for adolescent bariatric surgery?

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B. 17 yr old boy BMI 35 with T2DM who has completed 6 months of intensive lifestyle intervention

C. 13 yr old boy BMI 41 with severe OSA and Tanner Stage 3

D. 13 yr old girl BMI 41 with clinical depression and recent binge eating

E. A and C

F. A, B, and C

G. A, B, C, and D

# Resources

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- We Can!  
[wecan.nhlbi.nih.gov](http://wecan.nhlbi.nih.gov)
- KidsHealth  
[www.kidshealth.org](http://www.kidshealth.org)
- Take Charge of Your Health! A guide for Teenagers!  
[www.win.niddk.nih.gov/publications/take\\_charge.htm](http://www.win.niddk.nih.gov/publications/take_charge.htm)
- Helping Your Overweight Child  
[Helping Your Child Who Is Overweight - NIDDK \(nih.gov\)](http://www.niddk.nih.gov/health/publications/helping_your_child_who_is_overweight)

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