Pharmacotherapy for the Treatment of Childhood Obesity & Type 2 DM

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Pediatric Update
March 3, 2026

Phoenix Children's

I have nothing to disclose

Objectives

1. Recognize the role of genetic testing to evaluate children with early onset obesity

2. Explain that weight loss pharmacotherapy is an adjunct to intensive health behavior and lifestyle treatment

3. Identify appropriate pharmacotherapy options for children and adolescents with obesity and/or type 2 DM

Agenda

1. Introduction
   - Obesity definition
   - Obesity classes
2. Treatment of Children and Adolescents with Obesity
   - AAP 2023 Clinical Practice Guideline
   - Review specific Key Action Statements
3. Pharmacotherapy for Children and Adolescents with Obesity
4. Pharmacotherapy for Children and Adolescents with Type 2 DM
5. Conclusions

Introduction

What is obesity?

- Imbalance or disorder between energy intake and energy expenditure due to an alteration of the energy regulatory system leading to accumulation of excess body fat
  - Disorder of fat mass regulation like diabetes is disorder of glucose regulation
  - “Overeating does not cause obesity – obesity causes overeating”
- Physiologically complex but important to understand

https://apollosugar.com/conditions/endocrine-conditions/obesity-weight-management/what-is-energy-balance-and-obesity/

Fox, C. K. (2023). Managing Pediatric Obesity Using Advanced Therapies Practical Guide for Pediatric Health Care Providers (1st ed. 2023.). Springer International Publishing. https://doi.org/10.1007/978-3-031-37380-0

Obesity is a multifactorial and complex disease

- Genetics - 40-70% heritable
  - Polygenic obesity (>100 genes) – most common, but is “not their destiny”
  - Monogenic obesity (single gene mutation) - 7% of children with early onset (<5 yrs) obesity
  - Syndromic obesity
  - Hedonic obesity: dysregulation of the reward pathway causing overeating
- Epigenetics
  - Changes in gene expression (not the code)
  - Prenatal environments (maternal obesity, GDM, etc.)
- Environmental and social exposures
  - Diet, physical activity, sleep
  - Psychological factors: depression, stress, anxiety, ADHD, binge eating disorder (BED)

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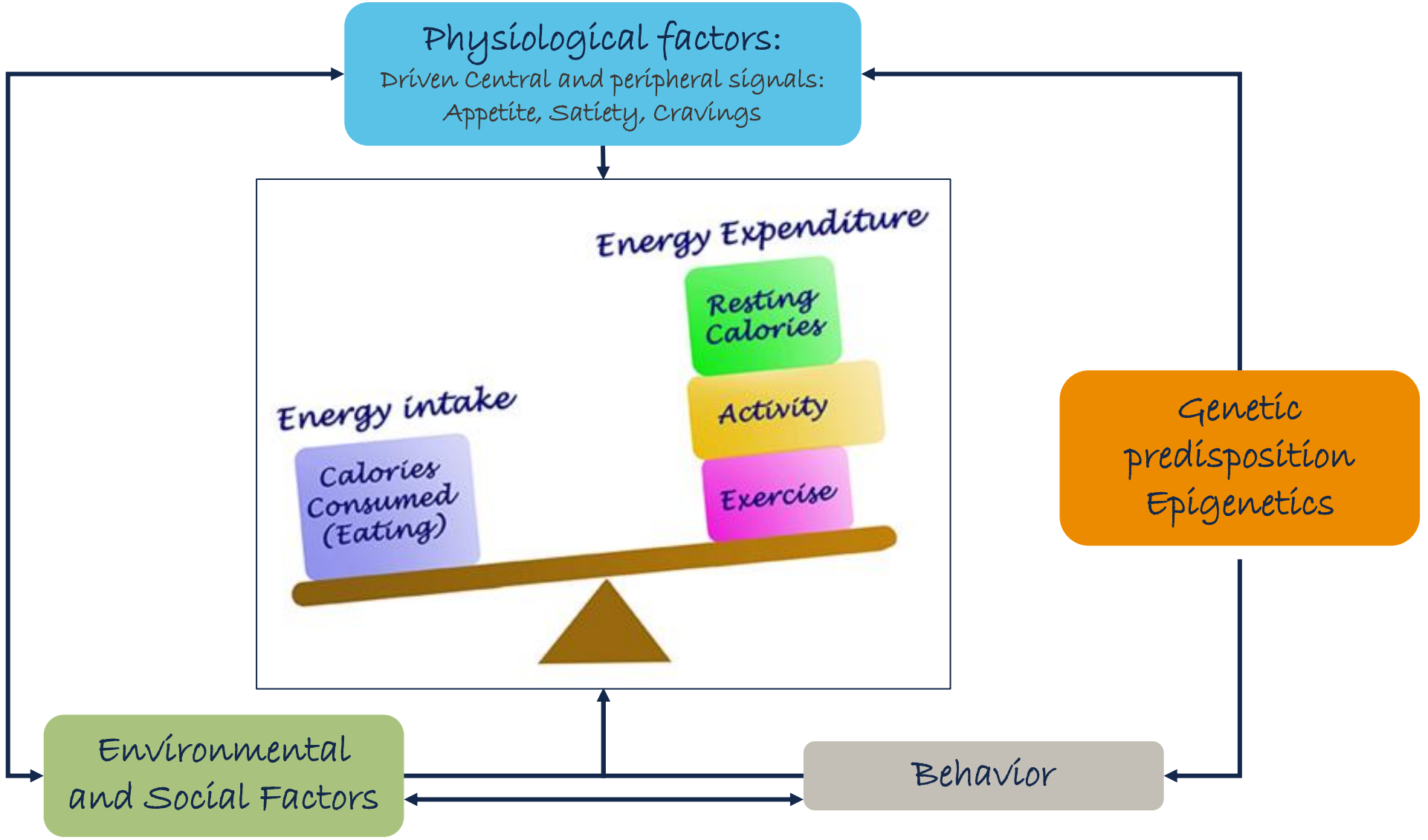
Obesity results from interactions between physiological factors, genetic predispositions, epigenetics, and environmental influences



Kelly AS. Current and future pharmacotherapies for obesity in children and adolescents. *Nat Rev Endocrinol.* 2023;19(9):534-541. doi:10.1038/s41574-023-00858-9

Obesity Classes

Class 1 obesity

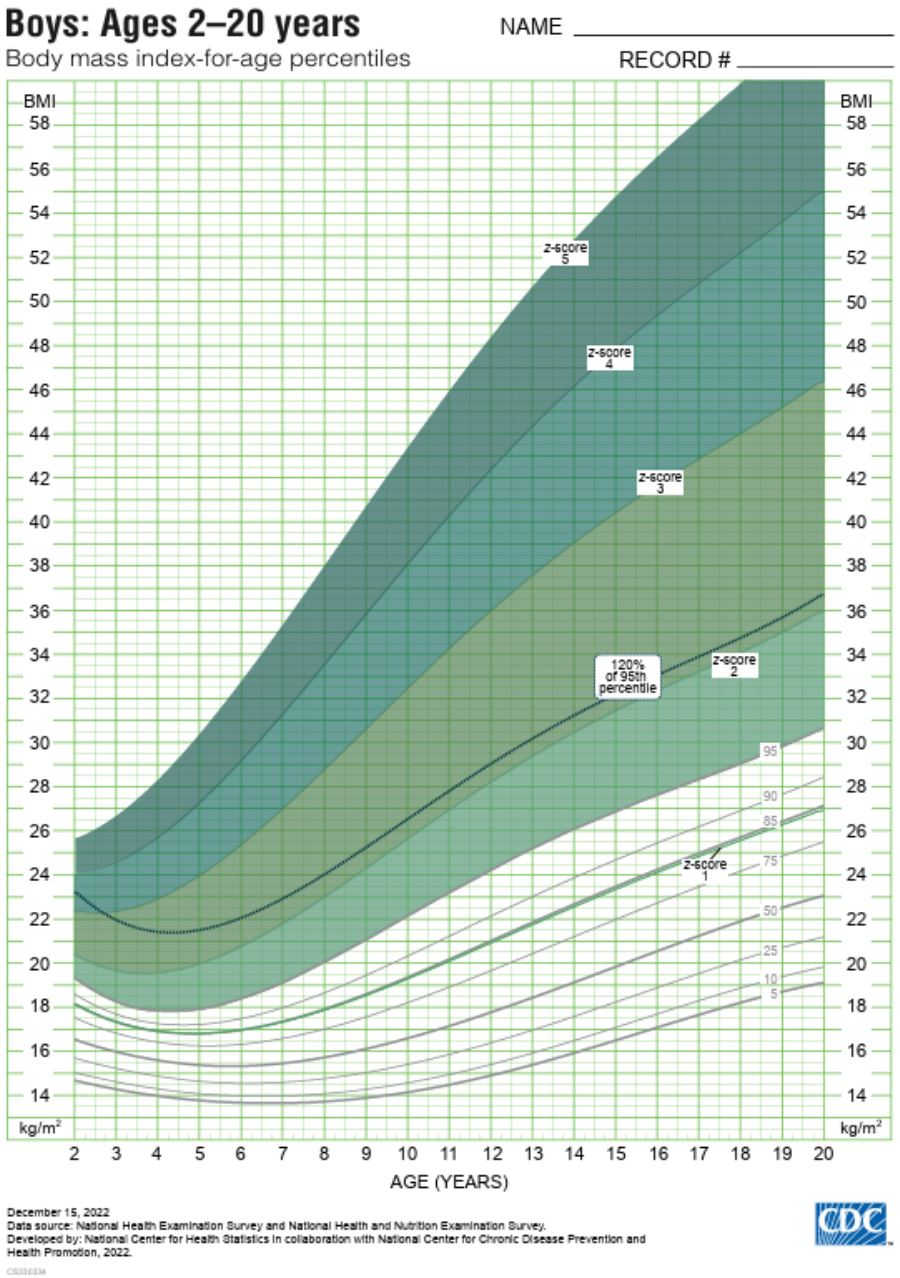
- ≥95% to <120% of the 95th percentile
- BMI ≥30 kg/m² to <34 kg/m²
- Z-score ≥+1.6

Class 2 obesity

- ≥120% to <140% of the 95th percentile
- BMI ≥35 kg/m² to <39 kg/m²
- Z-score ≥+2.0

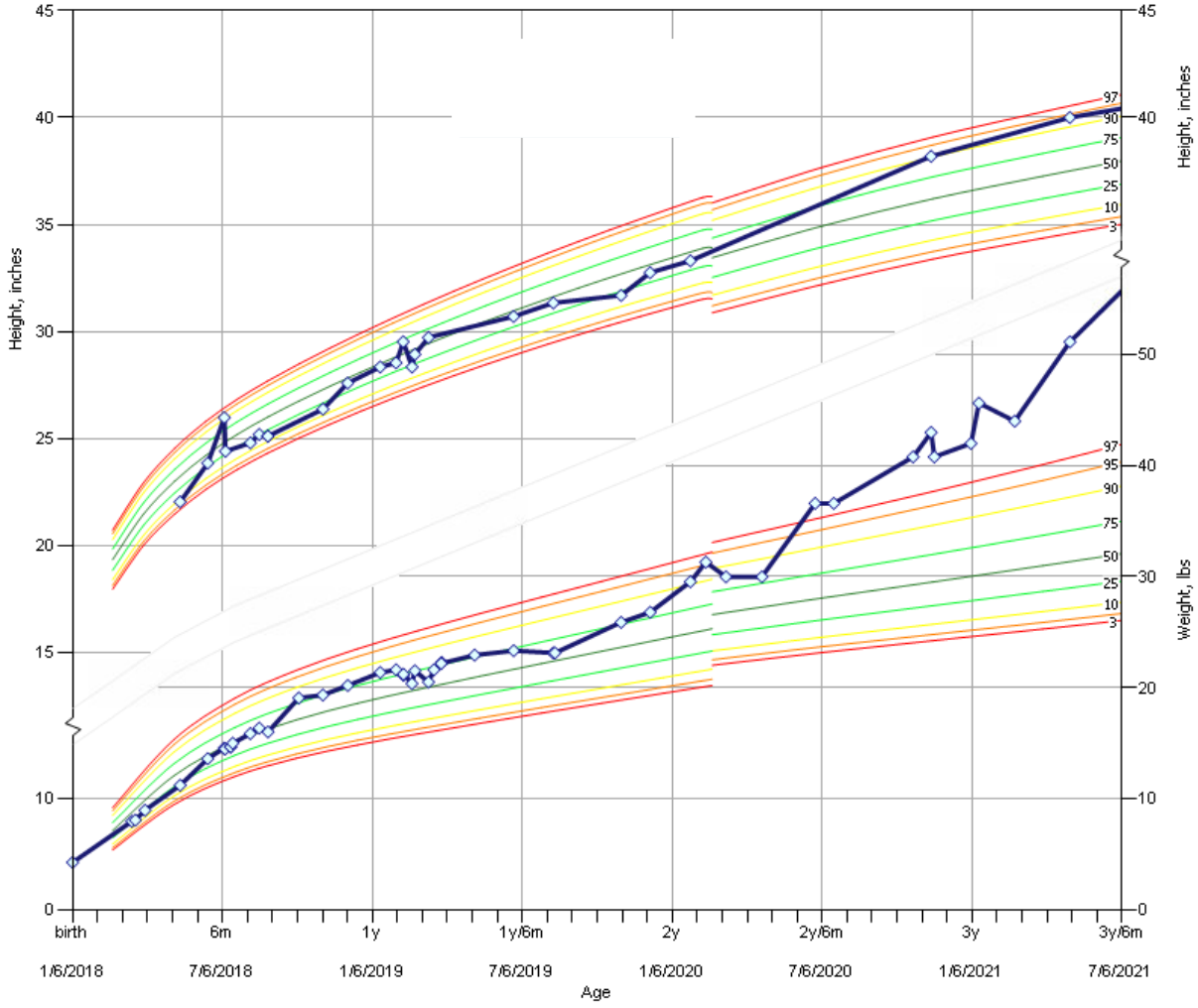
Class 3 obesity

- ≥140% of the 95th percentile
- BMI ≥ 40 kg/m²
- Z-score ≥+3.0



Question 1

- 3 yr 9 mo female is referred by GI to Endocrine for elevated BMI. GI sees her for dysphagia s/p laryngeal cleft repair and chronic constipation. Review of growth shows increased weight gain and growth velocity after starting after 2nd birthday. Mom reports that patient is always hungry and gets aggressive over food, and this behavior worsened in last 6 months. She now eats in the middle of the night. She has good energy and is active physically. PMH is significant for 33 weeks prematurity, RAD, and seizure disorder, but no developmental delay. Which of the following is the best test to order now for this patient?



Question 1

Which of the following is the best test to order now for this patient?

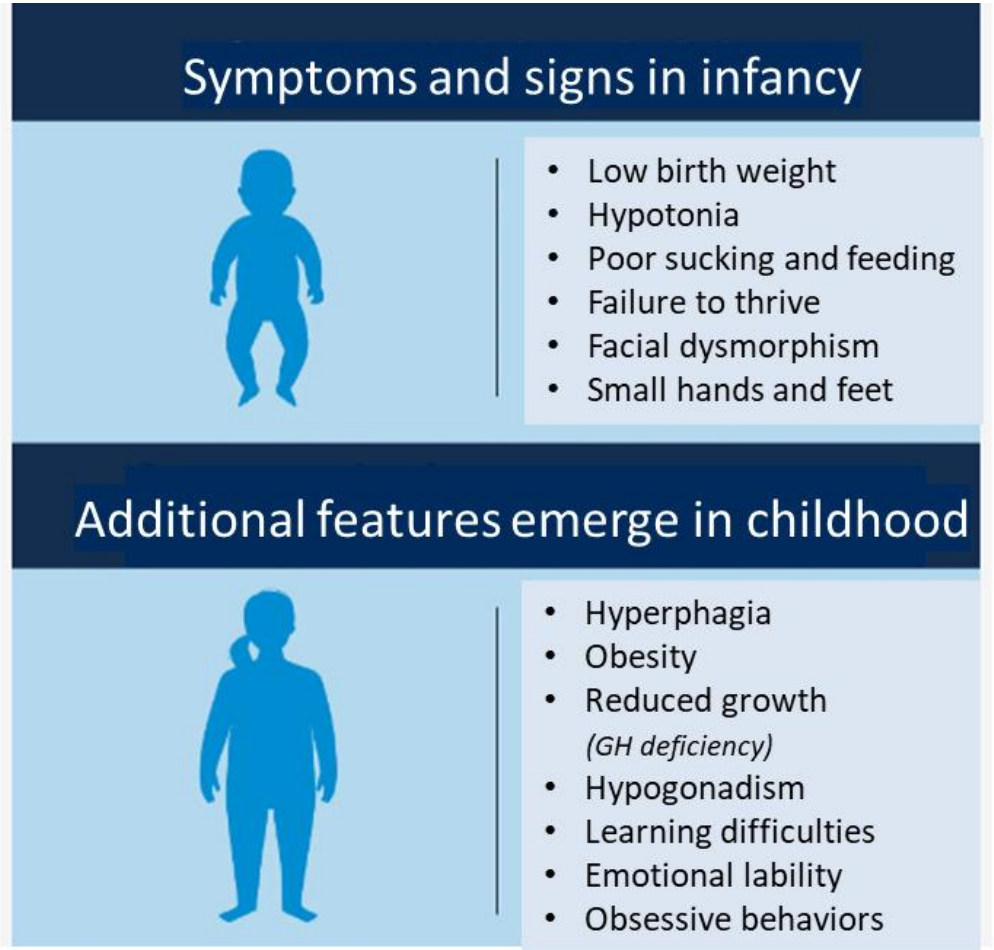
1. Midnight salivary cortisol
2. Genetic obesity panel
3. Thyroid hormone levels
4. Growth factors

Which of the following is the best test to order now for this patient?

Genetic Obesity Syndromes

- Consider genetic testing:
  - Early onset obesity (<5 years) with clinical features of genetic obesity syndromes
    - Hyperphagia
    - And/or FH extreme obesity
    - Linear growth usually normal
- Prader-Willi Syndrome
  - h/o FTT as infant
  - Hyperphagia and obesity late
- MC4R mutations (non-syndromic)
  - Most common: 1 in 100 persons with obesity
  - Tall stature

Infancy and childhood clinical features of PWS



Farooqi IS. Genetic Obesity Syndromes. [Updated 2024 Dec 15]. In: Feingold KR, Adler RA, Ahmed SF, et al., editors. Endotext [Internet]. South Dartmouth (MA): MDText.com, Inc.; 2000-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK279064/

Obesity Gene Testing

To be eligible for testing through the Uncovering Rare Obesity program, patients must be located in the United States or its territories, and be:

≤18 years of age with a BMI in the **≥97th** percentile

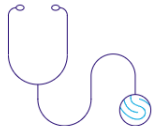
OR

≥19 years of age with a BMI **≥40** and a history of childhood obesity

OR

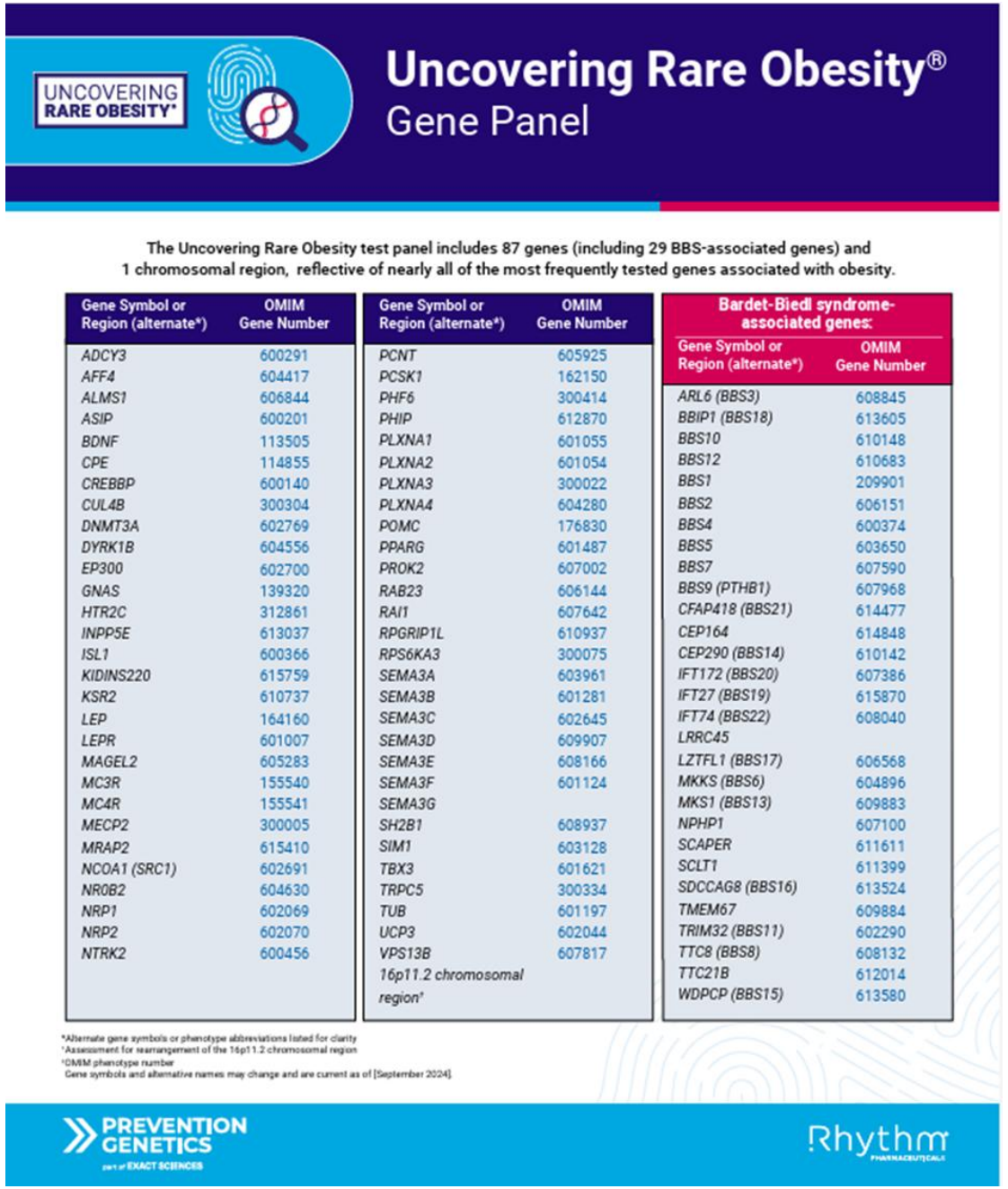
An immediate family member of select, previously tested patients

OR



Showing clinical symptoms that suggest Bardet-Biedl syndrome (BBS), as the test may help provide additional evidence to support diagnosis

- Includes 87 genes
- Mouth swab done in clinic
- At Phoenix Children's, we do about 5-12 tests per month
- Turnaround time about a month
- FREE



UNCOVERING RARE OBESITY®

Uncovering Rare Obesity® Gene Panel

The Uncovering Rare Obesity test panel includes 87 genes (including 29 BBS-associated genes) and 1 chromosomal region, reflective of nearly all of the most frequently tested genes associated with obesity.

Gene Symbol or Region (alternate*)	OMIM Gene Number
ADCY3	600291
AFF4	604417
ALMS1	606844
ASIP	600201
BDNF	113505
CPE	114855
CREBBP	600140
CUL4B	300304
DNMT3A	602769
DYRK1B	604556
EP300	602700
GNAS	139320
HTR2C	312861
INPP5E	613037
ISL1	600366
KIDINS220	615759
KSR2	610737
LEP	164160
LEPR	601007
MAGEL2	605283
MC3R	155540
MC4R	155541
MECP2	300005
MRAP2	615410
NCOA1 (SRC1)	602691
NR0B2	604630
NRP1	602069
NRP2	602070
NTRK2	600456

Gene Symbol or Region (alternate*)	OMIM Gene Number
PCNT	605925
PCSK1	162150
PHF6	300414
PHIP	612870
PLXNA1	601055
PLXNA2	601054
PLXNA3	300022
PLXNA4	604280
POMC	176830
PPARG	601487
PROK2	607002
RAB23	606144
RAI1	607642
RPGRIP1L	610937
RPS6KA3	300075
SEMA3A	603961
SEMA3B	601281
SEMA3C	602645
SEMA3D	609907
SEMA3E	608166
SEMA3F	601124
SEMA3G	
SH2B1	608937
SIM1	603128
TBX3	601621
TRPC5	300334
TUB	601197
UCP3	602044
VPS13B	607817
16p11.2 chromosomal region†	

Bardet-Biedl syndrome-associated genes: Gene Symbol or Region (alternate*)	OMIM Gene Number
ARL6 (BBS3)	608845
BBIP1 (BBS18)	613605
BBS10	610148
BBS12	610683
BBS1	209901
BBS2	606151
BBS4	600374
BBS5	603650
BBS7	607590
BBS9 (PTHB1)	607968
CFAP418 (BBS21)	614477
CEP164	614848
CEP290 (BBS14)	610142
IFT172 (BBS20)	607386
IFT27 (BBS19)	615870
IFT74 (BBS22)	608040
LRRC45	
LZTFL1 (BBS17)	606568
MKKS (BBS6)	604896
MKS1 (BBS13)	609883
NPHP1	607100
SCAPER	611611
SCLT1	611399
SDCCAG8 (BBS16)	613524
TMEM67	609884
TRIM32 (BBS11)	602290
TTC8 (BBS8)	608132
TTC21B	612014
WDPCP (BBS15)	613580

*Alternate gene symbols or phenotype abbreviations listed for clarity
†Assessment for rearrangement of the 16p11.2 chromosomal region
‡OMIM phenotype number
Gene symbols and alternative names may change and are current as of [September 2024].

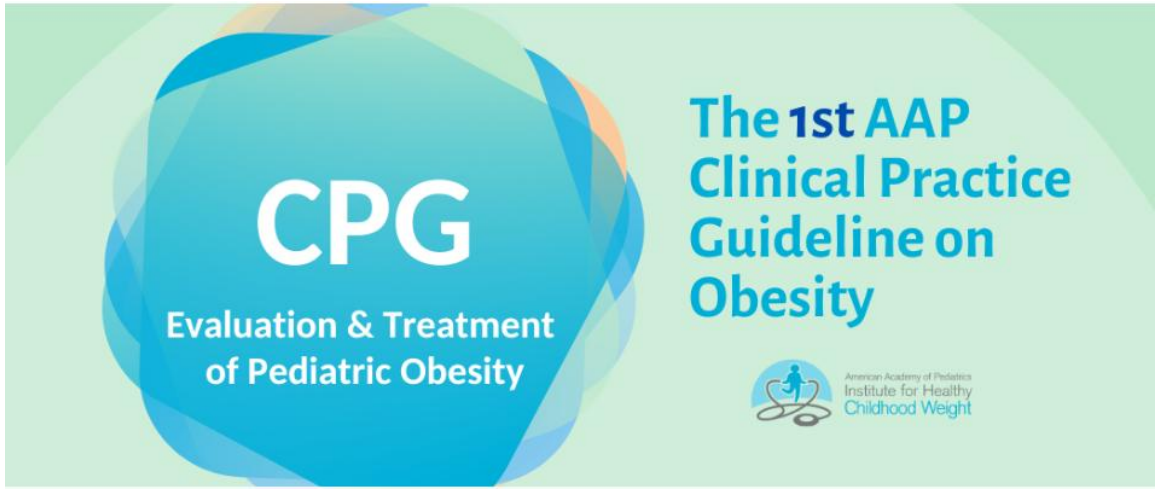
PREVENTION GENETICS part of EXACT SCIENCES

Rhythm PHARMACEUTICALS

Treatment of Children and Adolescents with Obesity

2023 AAP Clinical Practice Guideline

- First AAP clinical practice guideline (CPG) outlining evidence-based evaluation and treatment of children and adolescents with overweight and obesity
- The CPG includes 13 Key Action Statements (KASs) and evidence-based recommendations.
  - The KASs are supplemented by Consensus Recommendations based on expert opinion.
- Does not include the prevention of obesity
- Also does not include guidance for overweight and obesity evaluation and treatment of children <2 years



Clinical Practice Guideline for the Evaluation and Treatment of Children and Adolescents With Obesity

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Four Modalities for Treatment of Childhood Obesity

TREATMENT

P&PHCPs *should* treat overweight/obesity & comorbidities concurrently (KAS 4) following the principles of the **medical home** and the **chronic care model,** using a **family-centered** and **non-stigmatizing** approach that acknowledges obesity's **biologic, social, and structural drivers.**(KAS 9)

Components of Comprehensive Treatment	Overweight			Obesity		
	<6y	6 to <12y	≥12y	<6y	6 to <12y	≥12y
Motivational Interviewing[f] (KAS 10)	✓	✓	✓	✓	✓	✓
Intensive Health Behavior and Lifestyle Treatment[g] (KAS 11)	⚖	✓	✓	⚖	✓	✓
Weight Loss Pharmacotherapy[h] (KAS 12)						✓
Offer referral to Comprehensive Pediatric Metabolic & Bariatric Surgery programs[i] (KAS 13)						✓[i]

Hampl SE, et al. Pediatrics. 2023

Treatment: IHBLT

- KAS 11. Provide or refer children ≥ 6 (consider for children 2 through 5) with overweight and obesity to intensive health behavior and lifestyle treatment (IHBLT)
- Health behavior and lifestyle treatment is more effective with greater contact hours; the most effective treatment includes 26 or more hours of face-to-face, family-based, multicomponent treatment over a 3- to 12-mo period.
- A key distinction from prior recommendations is for pediatricians and other PHCPs to refer as soon as possible to IHBLT.

Treatment: Medications for Obesity

- KAS 12. Pediatricians and other PHCPs should offer adolescents ≥ 12 with obesity weight loss pharmacotherapy, according to medication indications, risks, and benefits, as an adjunct to health behavior and lifestyle treatment.
- Consider weight loss pharmacotherapy for children ages 8 through 11 with obesity.

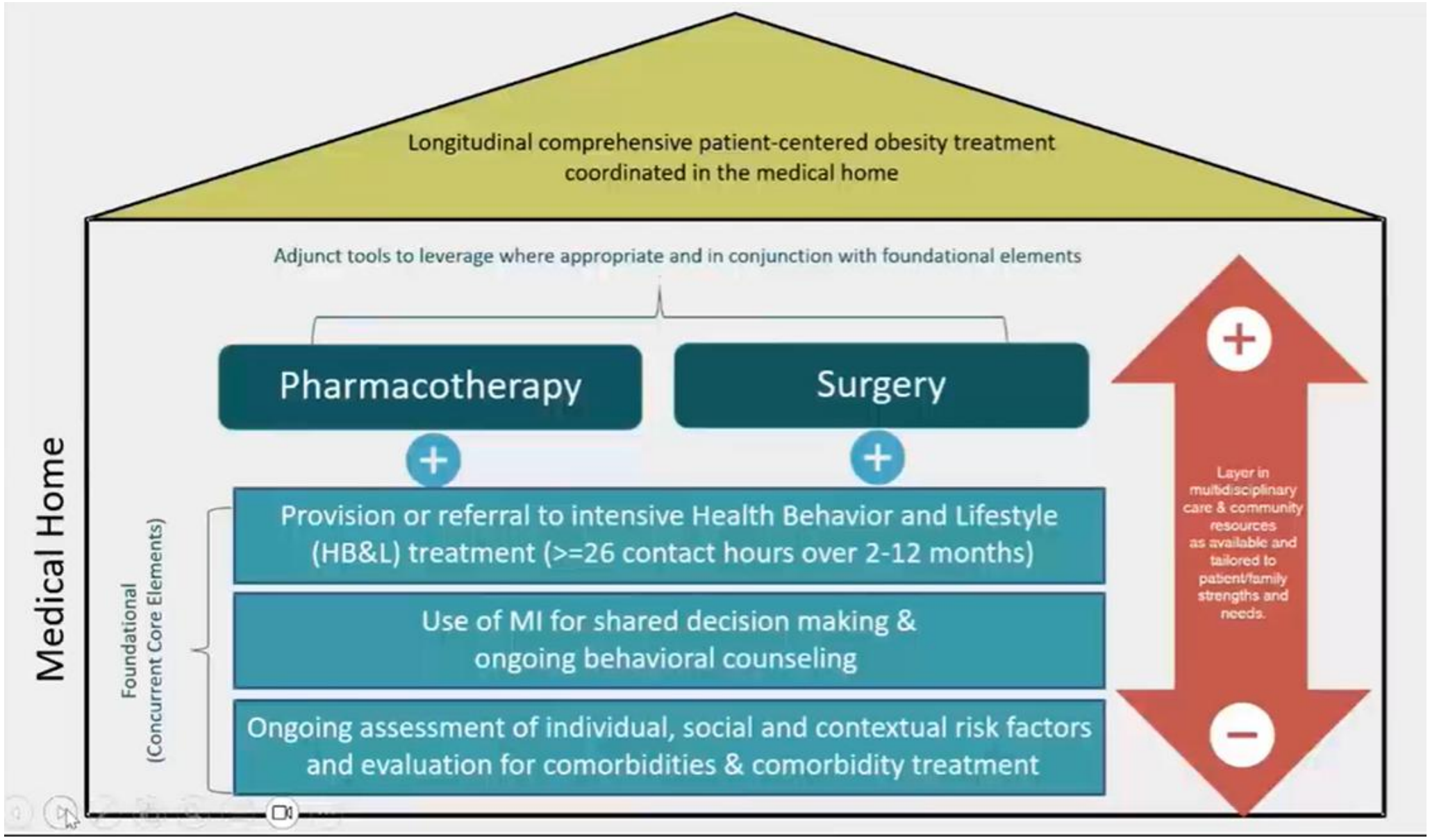
Treatment: Metabolic and Bariatric surgery

- KAS 13. Pediatricians and other PHCPs should offer referral for adolescents 13 yo and older with severe obesity (BMI ≥ 120% of the 95th percentile for age and sex) for evaluation for metabolic and bariatric surgery to local or regional comprehensive multidisciplinary pediatric metabolic and bariatric surgery centers

TABLE 20 Criteria for Pediatric Metabolic and Bariatric Surgery[733]

Weight Criteria	Criteria for Comorbid Conditions
Class 2 obesity, BMI ≥ 35 kg/m^2 or 120% of the 95th percentile for age and sex, whichever is lower	Clinically significant disease; examples include but are not limited to T2DM, IIH, NASH, Blount disease, SCFE, GERD, obstructive sleep apnea (AHI >5), cardiovascular disease risks (HTN, hyperlipidemia, insulin resistance), depressed health-related quality of life.
Class 3 obesity, BMI ≥ 40 kg/m^2 or 140% of the 95th percentile for age and sex, whichever is lower	Not required but commonly present.

AHI, apnea-hypopnea index.



https://www.aap.org/en/patient-care/institute-for-healthy-childhood-weight/

Pharmacotherapy for Children and Adolescents with Obesity

Medications for Obesity

- Target the peripheral and central signals that regulate energy balance and appetite
  - They enable individuals to adhere to a healthy lifestyle
- There is no evidence to use medications for obesity as monotherapy
  - Intensive health and behavioral lifestyle treatment remain important
- GLP-1 RAs have multiple significant clinical benefits
  - Substantial BMI reduction
  - Improved glycemic control
  - Decreased risk in major adverse cardiovascular and renal events
  - Decrease in food noise and addictive behavior

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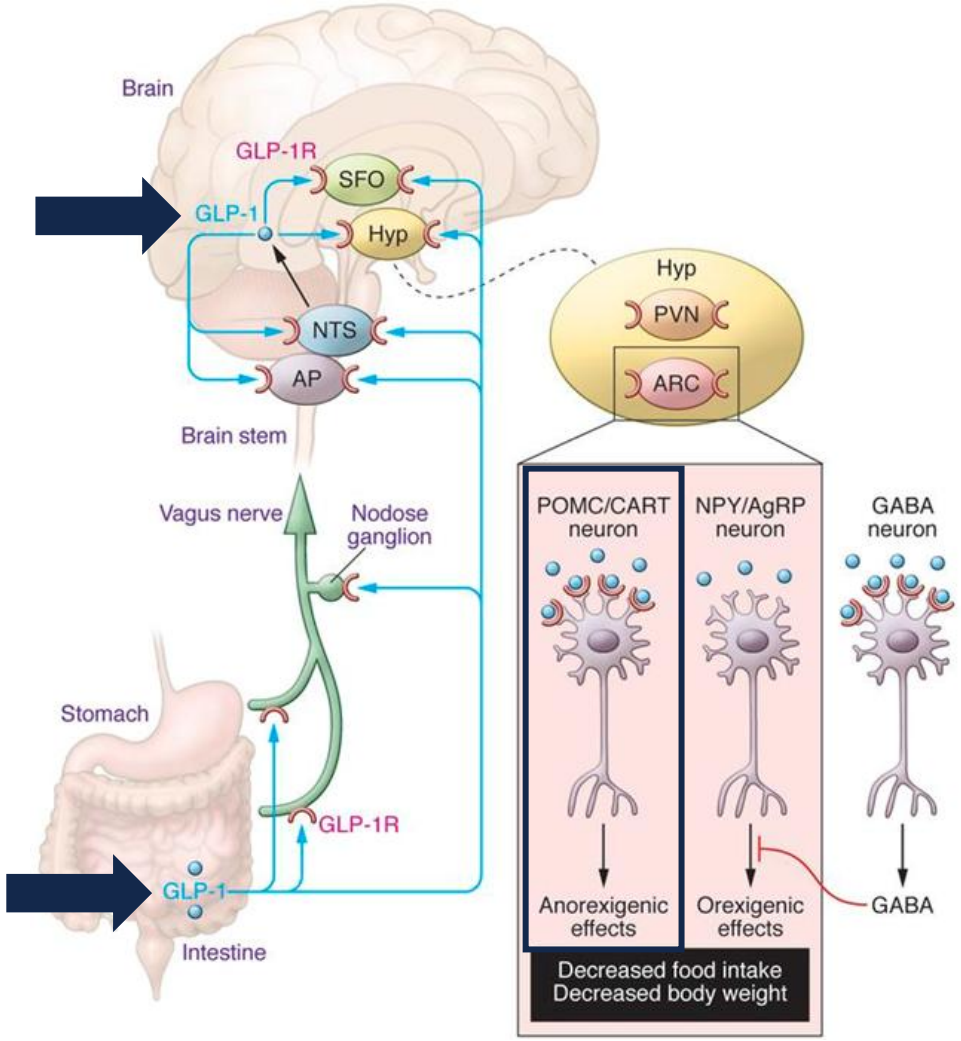
Kelly A. Nature Reviews Endocrinology | Volume 19 | September 2023 | 534–541
Chen, Bandy et al. "GLP-1 programs the neurovascular landscape." *Cell metabolism* vol. 36,10 (2024): 2173-2189. doi:10.1016/j.cmet.2024.09.003

GLP-1 Receptors Regulate Energy Balance



- GLP-1 neurons, mainly in the caudal nucleus of the tractus solitarius (NTS), play a key role for maintaining proper energy balance
  - They project to brain regions involved in both homeostatic and hedonic regulation of food intake

- GLP-1 RAs act on both central and peripheral pathways to suppress appetite, reduce food intake, and improve energy balance. This leads to central appetite suppression and delayed gastric emptying.

J Clin Invest DOI: 10.1172/JCI78371

Treatment Goals and Considerations

- Goal of treatment may not be BMI normalization, rather improved health and quality of life
- Both physical and psychological health:
  - Physical health means that the patient is free of obesity-driven comorbidities and is not limited by their obesity (or “body size”) to do whatever they want.
  - Psychological health means that the patient feels comfortable in their body and is generally content
- Patient and family or parent alignment
- Heterogeneity of responses
- Assess disordered eating behaviors, body image, mental health, quality of life and social support
- Recognize and address weight stigma

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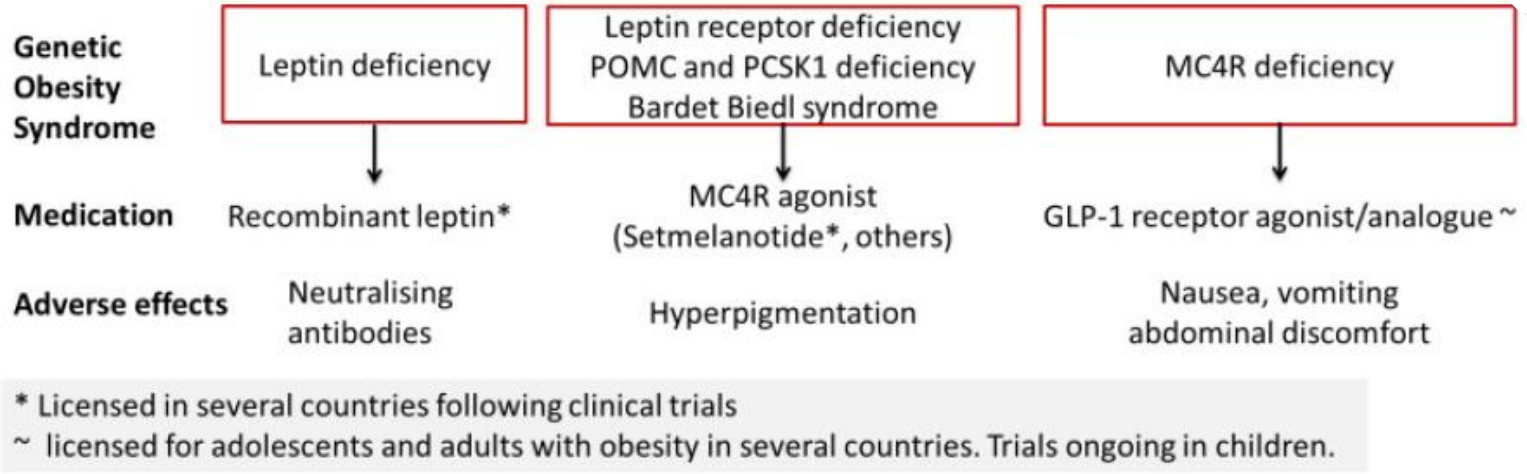
Drug	Approval Date	Age (yr)	FDA Indication	Mechanism
Phentermine	1959	≥17	Obesity	Sympathomimetic amine that decreases appetite, approved for short term (12 weeks) use only
Topiramate	1996	≥2 ≥12	Epilepsy Migraines	Modulation of the neurotransmitter GABA and carbonic anhydrase inhibitor
Phentermine/topiramate (Qsymia)	2012 adults 2022 peds	≥12	Obesity	Sympathomimetic amine plus topiramate
Lisdexamfetamine	2015	≥6 ≥18	ADHD Binge eating	Non-catecholamine sympathomimetic amine
Orlistat	1999	≥12	Obesity	Blocks intestinal lipase to reduce fat absorption
Liraglutide	2014 adults 2020 peds	≥12	Obesity, T2D	GLP-1 receptor agonist, increases satiety and decreases rate of gastric emptying
Semaglutide Wegovy Ozempic	2021 adults 2023 peds	≥12 ≥18	Obesity T2D	GLP-1 receptor agonist, increases satiety and decreases rate of gastric emptying
Oral semaglutide Rybelsus Wegovy Pill	2018 adults 2025 adults	≥18 ≥18	T2D, CVD Obesity	GLP-1 receptor agonist, increases satiety and decreases rate of gastric emptying
Tirzepatide Zepbound Mounjaro	2023	≥17 ≥18	Obesity, OSA T2D	GLP-1 and GIP dual receptor agonist, increases satiety and decreases rate of gastric emptying
Setmelanotide	2020	≥2	Genetic obesity (PCSK1/LEPR/POMC deficiency, BBS)	α-melanocortin stimulating hormone analogue, improves signaling through MC4R pathway

Pharmacotherapy for Specific Conditions

Genetic Obesity Syndromes



On anti-psychotic

- Metformin

Prader-Willi Syndrome

- Diazoxide choline controlled-release (DCCR) (Vykat) – quality of life benefit

Farooqi IS. Genetic Obesity Syndromes. [Updated 2024 Dec 15]. In: Feingold KR, Adler RA, Ahmed SF, et al., editors. Endotext [Internet]. South Dartmouth (MA): MDText.com, Inc.; 2000-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK279064/

Drug	Age (yr)	FDA Indication	Wt Loss	Cost	Based on clinical practice and experience
Phentermine	≥17	Obesity	5%	$	Often 1st choice, off-label, ok to start at age 8
Topiramate	≥2 ≥12	Epilepsy Migraines	5%	$	Often 2nd choice or as add-on to phentermine
Phentermine/topiramate (Qsymia)	≥12	Obesity	8%	$$	More affordable if prescribed separately
Lisdexamfetamine	≥6 ≥18	ADHD Binge eating	5%	$$	Not always covered by insurance without ADHD diagnosis
Orlistat	≥12	Obesity	5%	$	Bad side-effects, low adherence
Liraglutide	≥12	Obesity	8%	$$$	Daily injection
Semaglutide Wegovy Ozempic	 ≥12 ≥18	 Obesity T2D	16%	$$$	Weekly injection Best known
Oral semaglutide Rybelsus Wegovy Pill	 ≥18 ≥18	 T2D, CVD Obesity	 15%	$$	Daily pill
Tirzepatide Zepbound Mounjaro	 ≥17 ≥18	 Obesity, OSA T2D	 17-18%	$$$	Weekly injection Most effective
Dulaglutide (Trulicity)	≥10	T2D ONLY	5-8%	$$$	Covered by AZ MEDICAID
Setmelanotide (McIvree)	≥2	Genetic obesity (PCSK1/LEPR/POMC deficiency, BBS)	≥10%	$$$$	Rare diagnoses Awaiting FDA approval for hypothalamic obesity diagnosis

Question 2

- 17 yo female has been followed in the Endocrine Weight Management clinic has continued to gain weight resulting in class 3 obesity despite healthy lifestyle and daily liraglutide injections. Semaglutide has recently been approved by the FDA for patients 12 years and older with obesity, so she agrees to stop liraglutide and start semaglutide weekly injections. Which of the following is NOT a contraindication to prescribing semaglutide?

Question 2

- Which of the following is NOT a contraindication to prescribing semaglutide?

1. Pancreatitis
2. Family history of medullary thyroid carcinoma (MTC)
3. Pregnancy
4. Family history of MEN2 (Multiple Endocrine Neoplasia type 2)

Which of the following is NOT a contraindication to prescribing semaglutide?

Prescribing GLP-1 RAs

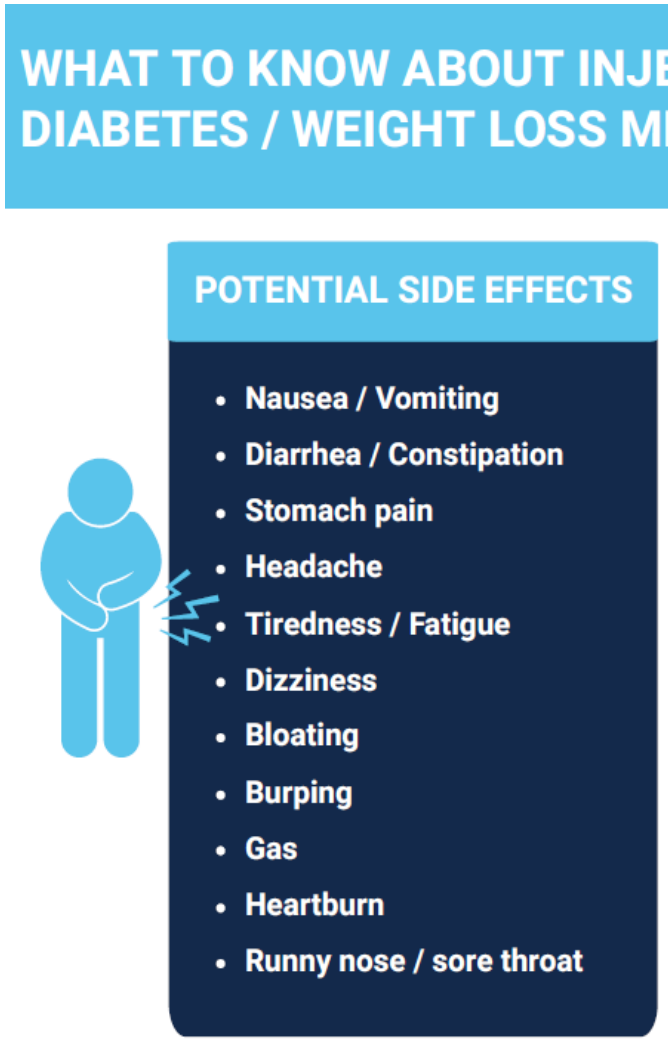
Dose titration:

Drug	Trade Name	Indication	Dosing
Injectable semaglutide	Wegovy	Obesity	0.25 mg/wk x 4 wks 0.5 mg/wk x 4 wks 1.0 mg/wk x 4 wks 1.7 mg/wk x 4 wks 2.4 mg/wk
Oral semaglutide	Wegovy Pill	Obesity	1.5 mg qd x 1 month 5 mg qd x 1 month 9 mg qd x 1 month 25 mg qd
Liraglutide	Saxenda	Obesity	0.6 mg/day x 7 d 1.2 mg/day x 7 d 1.8 mg/day x 7 d 2.4 mg/day x 7 d 3.0 mg/day
Dulaglutide	Trulicity	T2D	0.75 mg/wk x 4 wks 1.5 mg/wk x 4 wks 3.0 mg/wk x 4 wks 4.5 mg/wk

- Contraindications:
  - Family history of MTC
  - Family history of MEN2
  - Prior hypersensitivity reaction
  - pregnancy
- Caution:
  - Pancreatitis
  - Gallbladder disease
  - Thyroid C-cell tumors

Stefater-Richards, Margaret A et al. “GLP-1 Receptor Agonists in Pediatric and Adolescent Obesity.” *Pediatrics* vol. 155,4 (2025): e2024068119. doi:10.1542/peds.2024-068119

Education on GLP-1 RAs: Potential Side Effects

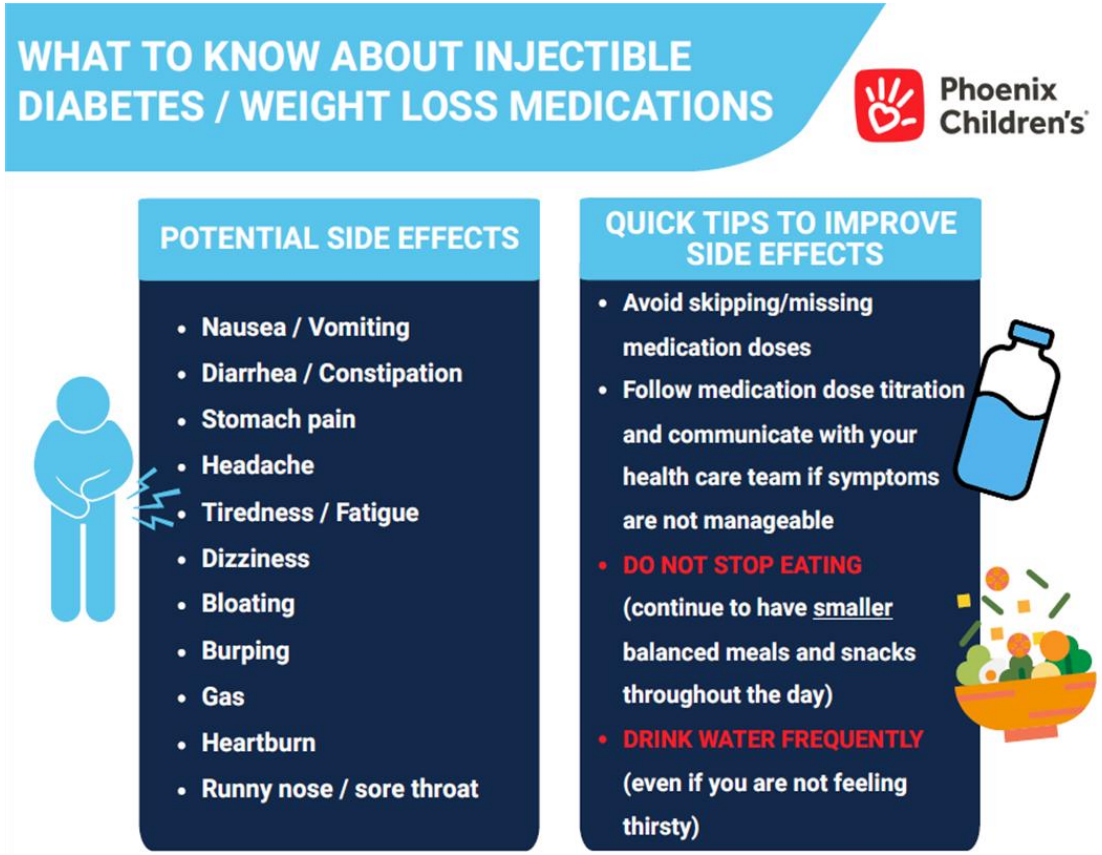


- Symptoms present or worse usually 24 hrs after injection, not chronic
- In semaglutide adolescent trial, N/V led to discontinuation of 5% of participants
- Cholecystitis reported in 4% of participants
- Risk of pancreatitis
- NO hypoglycemia

Stefater-Richards, Margaret A et al. “GLP-1 Receptor Agonists in Pediatric and Adolescent Obesity.” *Pediatrics* vol. 155,4 (2025): e2024068119. doi:10.1542/peds.2024-068119

Nutrition Considerations When Taking GLP-1 RAs

- Due to early satiety and increased satiation
  - Discuss appropriate portion sizes
  - Avoid meal skipping
  - Practice mindful eating
- Due to increased risk of sarcopenia – loss of muscle mass
  - Eat protein-rich foods
  - Exercise regularly
- To minimize N/V
  - Eat small, frequent meals
- To prevent constipation
  - Drink water
  - Increase fiber intake



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Education on GLP-1 RAs: Symptom Management

TIPS DEPENDING ON SYMPTOMS

Stomach Pain / Cramping

- Take medication 1-2 hours before or after a large meal
- Eat slowly, chew food well
- Avoid overeating, especially meals high in fat
- Avoid carbonated drinks
- Limit gas producing vegetables:
  - Beans, cabbage, cauliflower, broccoli, brussels sprouts
- Drink low sugar fluids frequently
- Avoid food and drinks with sugar alcohols
- If symptoms increase with dairy consumption, try lactose free alternative

Nausea / Vomiting

- Take medication 1-2 hours before or after a large meal
- Eat slowly, take about 1/2 of your normal portion (if still hungry after 20-30 minutes eat a little more)
  - Avoid very sweet, greasy/fried, acidic, or spicy foods
- Avoid skipping meals
- Try drinking small sips of liquids frequently - water, soups, smoothies, electrolyte drinks (avoid beverages with added sugar)
- Avoid laying down after meals

Constipation

- Increase fiber rich foods - look for 3-4 grams per serving
  - Grains such as whole wheat breads and pasta, brown rice, and oats
  - Fruits and vegetables - eat the edible skins like from apples or pears (juice does not have fiber)
  - Beans, nuts, and seeds also have high amounts of fiber
- Increase water - aim for at least eight, 8 oz cups or 64 oz per day
- Over the counter fiber supplements can also be considered

Diarrhea

- Staying hydrated is very important - try drinking lots of fluids (avoid sugary drinks and juices)
- Offer small, frequent, and bland meals/snacks throughout the day
- Eat slowly and chew food well
- Choose fiber foods wisely
  - Increase soluble fiber:
    - Oatmeal, apple sauce, pears, peaches, banana, peeled apples
  - Caution insoluble fiber:
    - leafy greens, fruit/vegetable peels, skins, and seeds

Information obtained from NCM 6/2023

Behavior Health Considerations Before Prescribing GLP1-RAs

- Children and adolescents with obesity are at risk for
  - depression, anxiety, social and peer difficulties, bullying and teasing
  - disordered eating behaviors (DEB) or eating disorders (ED)

- Important to screen for DEBs and EDs, but also ARFID
  - These may need to be treated first before prescribing GLP1-RAs

Stefater-Richards, Margaret A et al. “GLP-1 Receptor Agonists in Pediatric and Adolescent Obesity.” *Pediatrics* vol. 155,4 (2025): e2024068119. doi:10.1542/peds.2024-068119

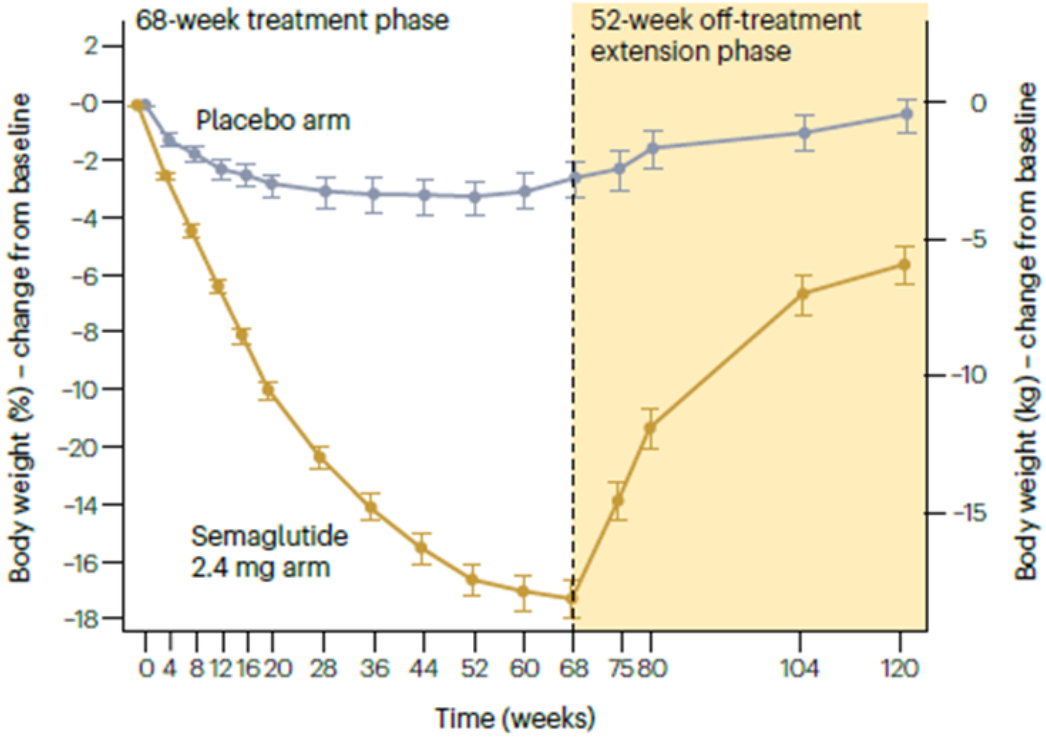
Potential Pitfalls and Considerations for Semaglutide

- Insurance limitations
  - Out-of-pocket costs are high
- Long-term safety data in adolescents is limited
- Potential for excessive loss of lean mass
  - Direct comparative data in adolescents are limited
- Current evidence and guidelines recommend ongoing therapy to maintain BMI reduction due to high risk of weight regain after stopping semaglutide

Type of semaglutide	Oral daily pill	Weekly Injectable
Lower doses	1.5 mg, 5 mg $149/month	0.25 mg, 0.5 mg $199/month
Higher doses	9 mg, 25 mg $199/month	1.7 mg, 2.4 mg $299/month

There is weight regain after discontinuation of medications for obesity

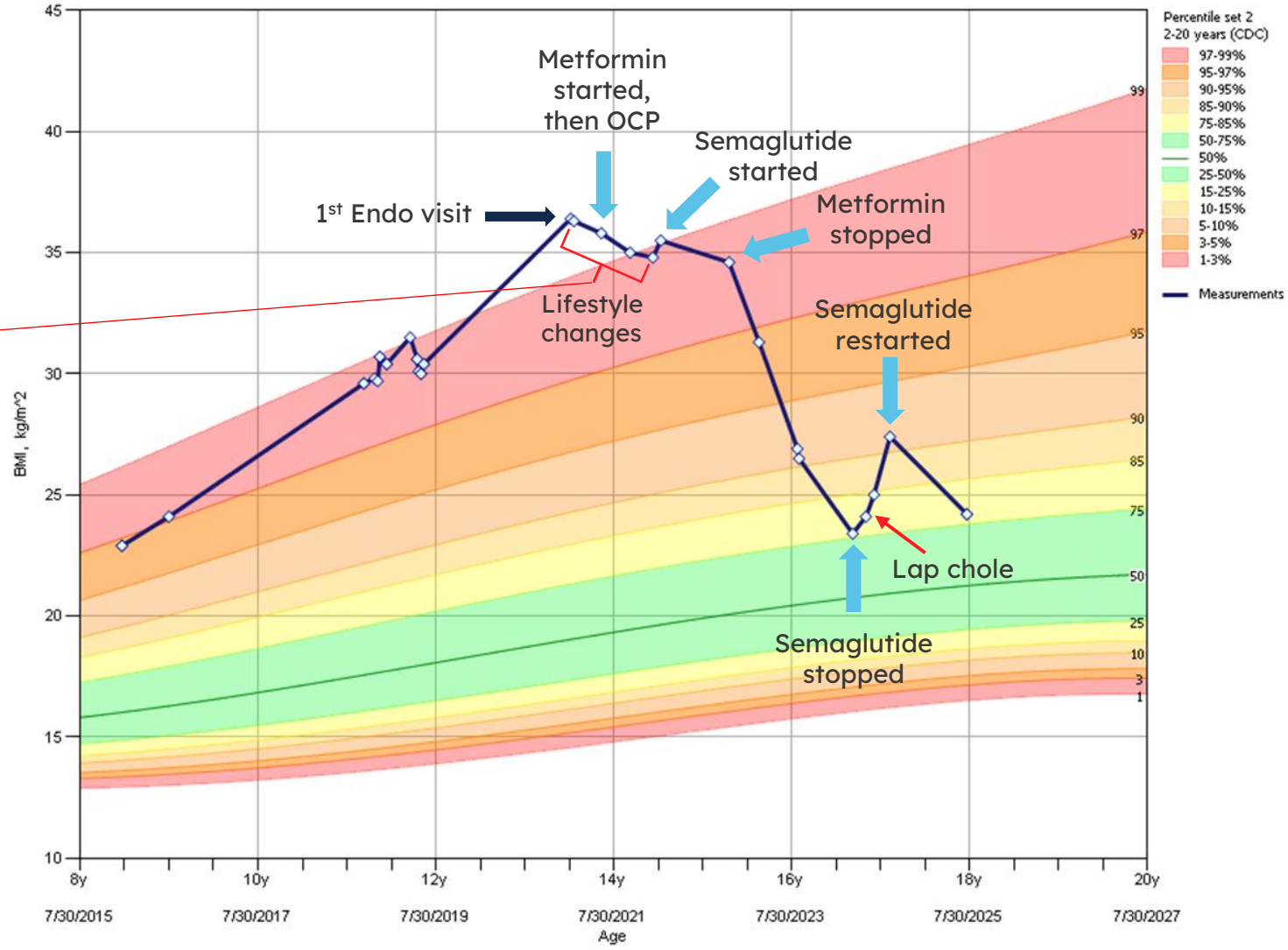
- Neuroendocrine adaptations drive weight regain after stopping medications for obesity
  - Liked HTN, once meds are stopped, high BP returns
- Clinical trials (STEP 4, SURMOUNT-4) show that discontinuing GLP-1 or GIP/GLP-1 agonists leads to rapid regain of lost weight, often reversing metabolic improvements



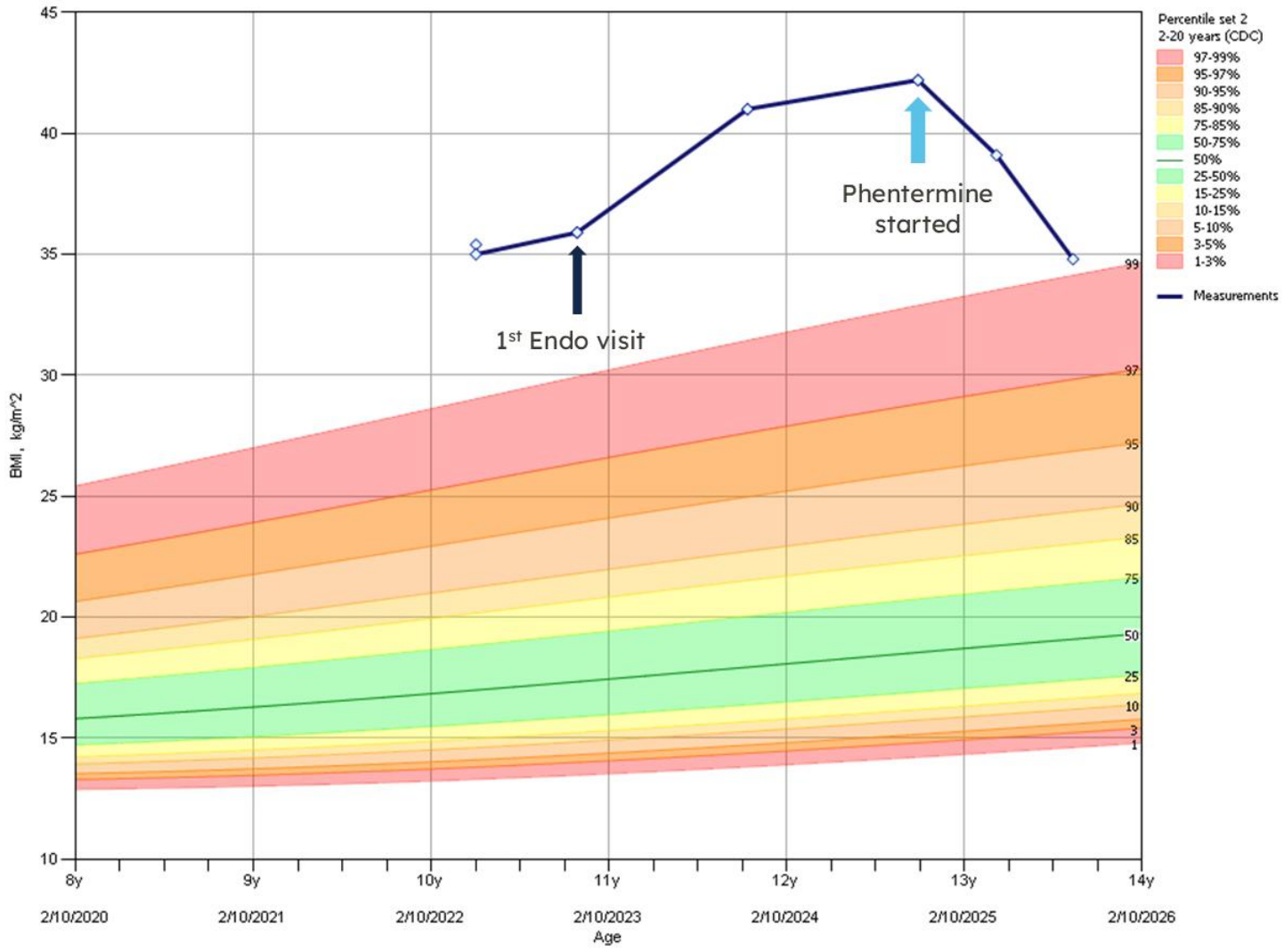
Wilding, John P H et al. “Weight regain and cardiometabolic effects after withdrawal of semaglutide: The STEP 1 trial extension.” *Diabetes, obesity & metabolism* vol. 24,8 (2022): 1553-1564. doi:10.1111/dom.14725

Case: Loss of 74 lb or 32% body weight over 4 years on semaglutide and healthy lifestyle

3.9 % weight loss with lifestyle changes alone over 8 months



Case: Loss of 27 lb or 12% body weight over 10 months on phentermine



Pharmacotherapy for Children and Adolescents with Type 2 DM

Type 2 DM in Children and Adolescents

- Prevalence increased from 34 to 67 per 1,000 from 2001 to 2017, meaning it doubled
- Risk factors include social disparities, obesity, positive family history, female sex, and maternal GDM
- Type 2 DM in children and adolescent is different from Type 2 DM in adults
  - More rapid decline in β-cell function
  - More rapid development of diabetes complications
  - From the TODAY study, most individuals with type 2 DM diagnosed in childhood or adolescence had microvascular complications by young adulthood

American Diabetes Association Professional Practice Committee for Diabetes*; 14. Children and Adolescents: Standards of Care in Diabetes—2026. Diabetes Care 1 January 2026; 49 (Supplement_1): S297–S320. https://doi.org/10.2337/dc26-S014

Question 3

- 11 yo female is seen in Endocrine Weight Management/T2D clinic referred by PCP for concerns of diabetes. Mom reports that the increased weight gain started before age 5, so it has been chronic and not acute. Both parents and MGM have type 2 DM. She had onset of menses at age 10. She denies any symptoms of hyperglycemia. She has mild snoring during her sleep at night. She was born full term with no complications and no prior surgery or hospitalization. She lives with Mom and sister (Dad passed away last year from T2D and liver cirrhosis); she is in the 5th grade. She is well-appearing.
- Vitals:
  - Wt 257 lb (116 kg), Ht 61.3 in, BMI >99th percentile
  - BP 119/47, HR 100, RR 19
- POC HbA1c 11%
- Which of the following is the best next step?

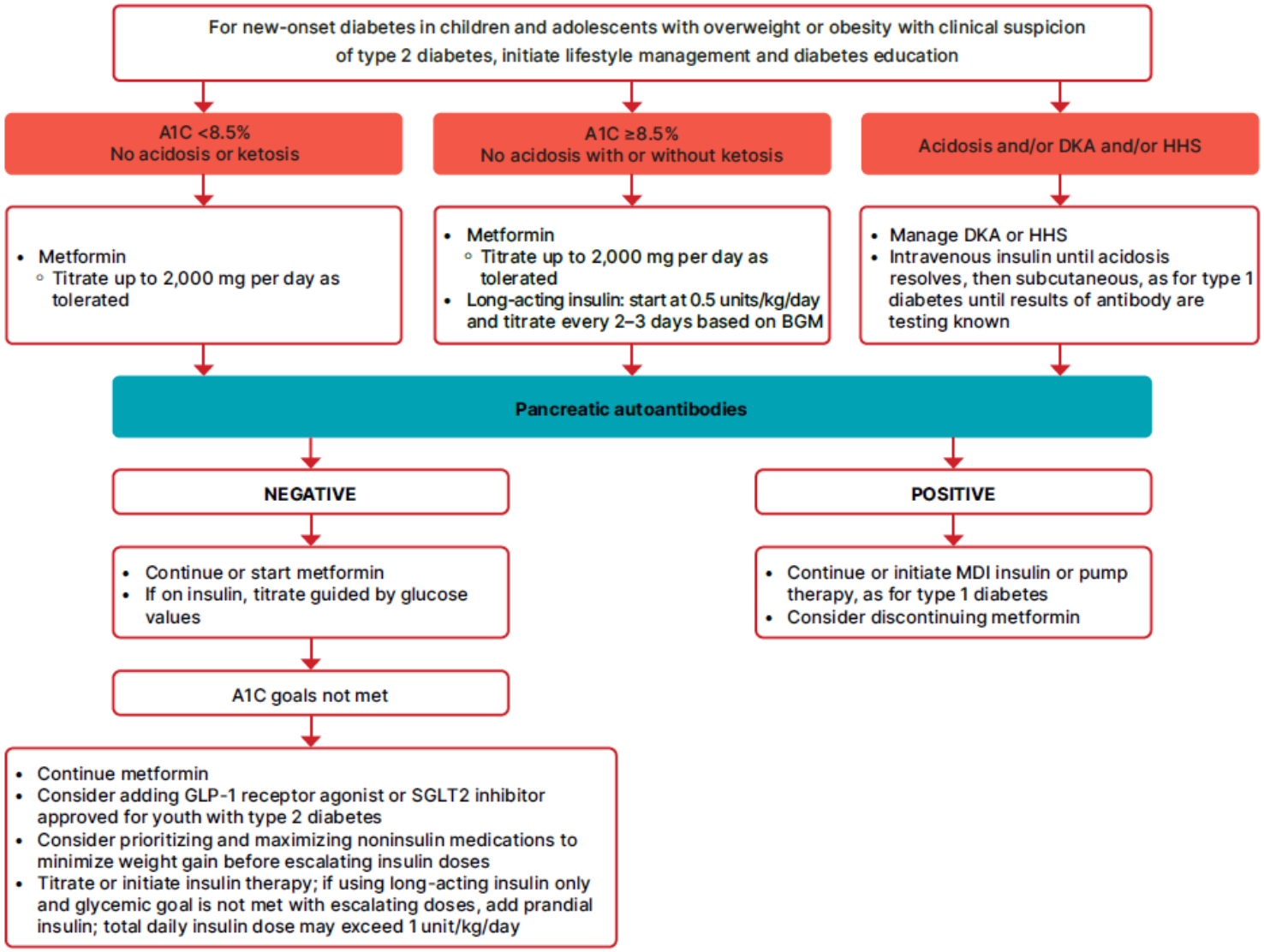
Question 3

Which of the following is the best next step?

1. Recommend healthy lifestyle
2. Recommend healthy lifestyle and start metformin
3. Recommend healthy lifestyle and start a medication for obesity
4. Admit to start insulin therapy and provide diabetes education including healthy lifestyle

Which of the following is the best next step?

Management of New-Onset Diabetes in Youth with Overweight or Obesity with Clinical Suspicion of Type 2 DM



American Diabetes Association Professional Practice Committee for Diabetes*; 14. Children and Adolescents: Standards of Care in Diabetes—2026. Diabetes Care 1 January 2026; 49 (Supplement_1): S297–S320. https://doi.org/10.2337/dc26-S014

SGLT-2 Inhibitors for Treatment of Type 2 DM

Emplaglifozin (Jardiance)

- FDA approved for patients with T2D ≥10 in June 2023
- Oral medication - starting dose 5 mg
- Max dose 10 mg

Dapaglifozin (Farxiga)

- FDA approved for patients with T2D ≥10 in June 2024
- Oral medication - starting dose 10 mg
- Max dose 25 mg

Mechanism of action: increase urinary glucose excretion
Primary side effects: increased urination, dehydration, UTI/Yeast infection, and most serious is DKA

- Mitigation strategies (good hygiene practices and increased water consumption)
- Use caution when prescribing these medications to patients with HbA1C>10%. Consider urine ketones before initiation in this patient population.

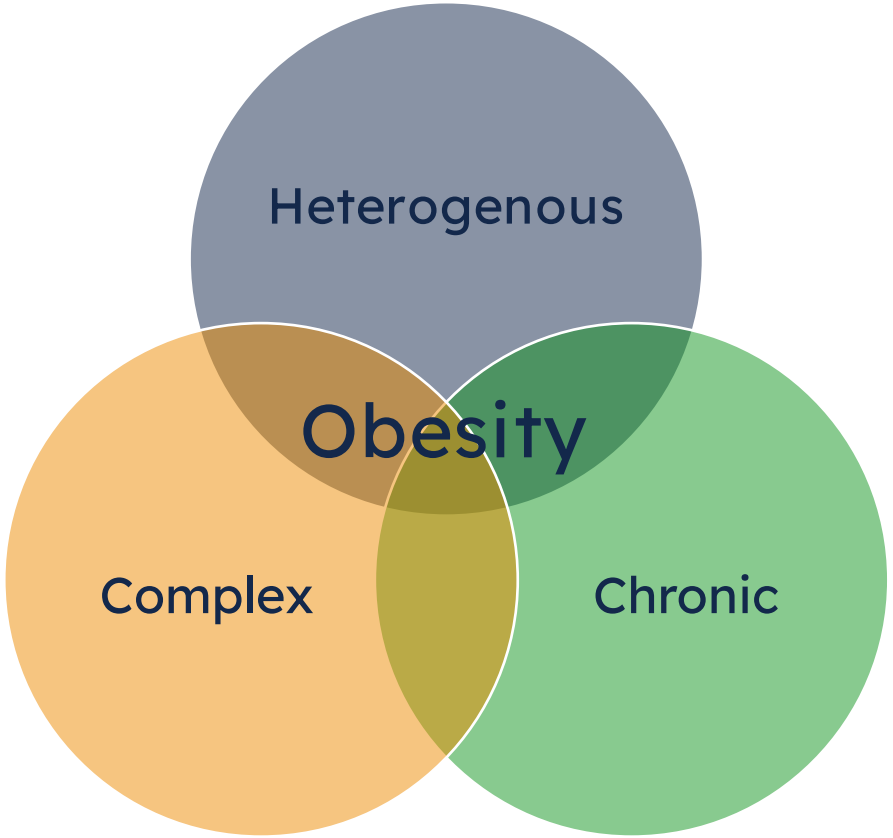
Potential additional benefits: Not initially thought to have “weight loss” benefit, data supports significant weight loss comparable to GLP1 RAs in conjunction to healthy lifestyle. They are also renal and CV protective in children as in adults

Summary of Pharmacotherapy Treatment for Children and Adolescents with Type 2 DM

- HbA1c <8.5% - metformin as 1st line treatment
  - GLP1 RAs
    - Liraglutide (daily injection)
    - Dulaglutide (weekly injection)
    - Extended-release exenatide (Bydureon Bcise) (weekly injection)
    - Note: semaglutide (Wegovy and Ozempic) and tirzepatide (Mounjaro and Zepbound) are NOT options as they are indicated for obesity, not T2D, or adults
  - SGLT2is
    - Emplaglifozin or dapaglifozin
    - Combination empaglifozin + metformin (Synjardy)
  - 90-day metformin therapy required before insurance approves GLP-1 RAs or SGLT2is
- HbA1c ≥8.5% - INSULIN

Conclusions

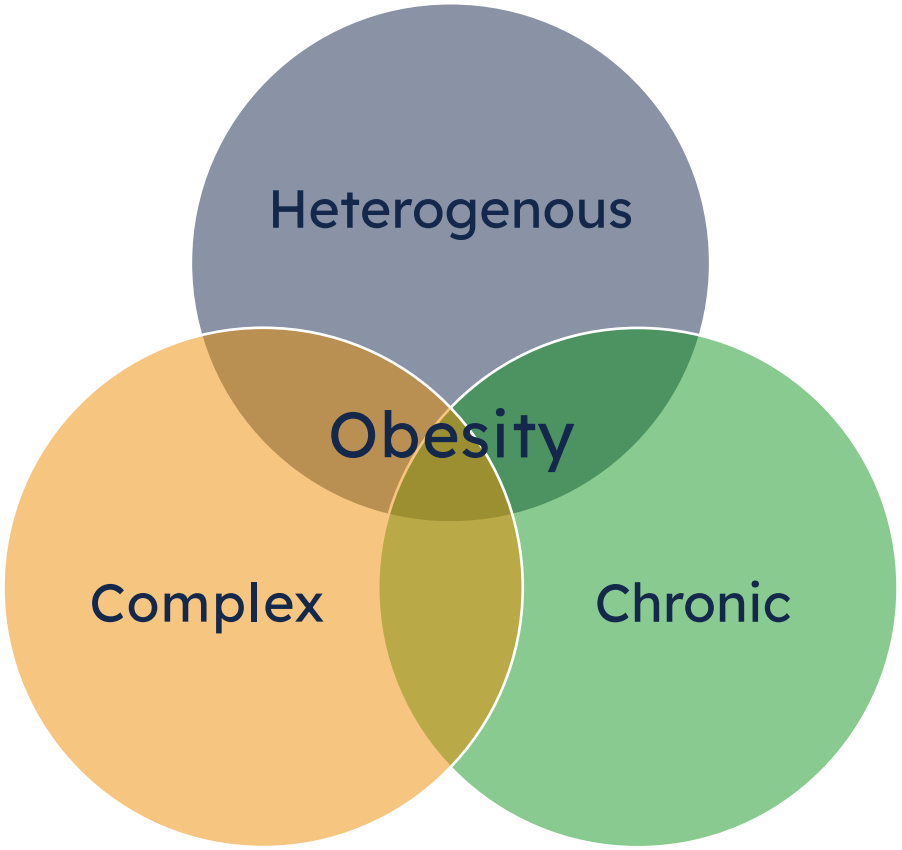
Obesity is a heterogenous disease



- Different contributing factors and complications for each individual
- Variability in response to treatment
  - Failing to achieve a 5% reduction in BMI while in the treatment arm:
    - 55% of patients on liraglutide
    - 5 up to 60% of patients on phentermine/topiramate
    - 27% of patients on semaglutide
- Important to have a personalized or precision medicine approach

Fox, C. K. (2023). Managing Pediatric Obesity Using Advanced Therapies Practical Guide for Pediatric Health Care Providers (1st ed. 2023.). Springer International Publishing. https://doi.org/10.1007/978-3-031-37380-0

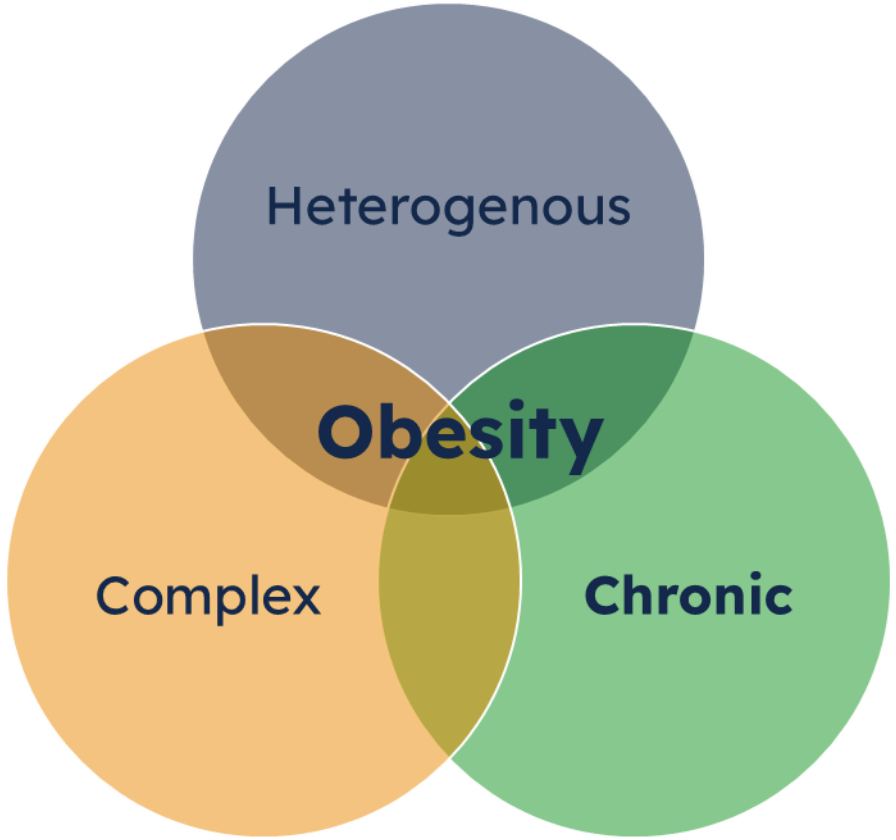
Obesity is a complex disease requiring combination therapy



- Obesogenic environment, genetics and biology make it difficult to achieve significant weight loss with lifestyle changes alone
- Offer entire spectrum of tools available when appropriate
  - Intensive lifestyle modifications
  - Medications
  - Metabolic bariatric surgery
- We may need combination therapy to treat T2D, the same is for obesity

Obesity is a chronic and progressive disease

- 90% of 3 year olds with obesity will be adolescents with overweight or obesity
- Nearly all 12 year olds with obesity will be adults with severe obesity
- NO cure is available
- Long-term, ongoing therapy is needed
  - Weight regain after discontinuation of medications for obesity



Fox, C. K. (2023). Managing Pediatric Obesity Using Advanced Therapies Practical Guide for Pediatric Health Care Providers (1st ed. 2023.). Springer International Publishing. https://doi.org/10.1007/978-3-031-37380-0

Key Learning Points - Obesity

- Lifestyle modification is an important part of obesity management but may be insufficient as monotherapy
- Several classes of obesity medications are approved for use in children
- Bariatric surgery is an option for adolescents with class 3 obesity or class 2 obesity + comorbidity
- Genetic testing can help determine the underlying cause of obesity
- Some genetic obesity disorders have available targeted pharmacotherapies

Key Learning Points – Type 2 DM

- Pharmacotherapy for children and adolescents with type 2 DM:
  - 1st line treatment is metformin when HbA1c <8.5%
  - GLP-1 RAs and SGLT2is are adjunctive medications to help achieve goal HbA1c of ≤6.5%
  - Insulin therapy is warranted when HbA1c ≥8.5% after optimization of other therapies

Thank you!