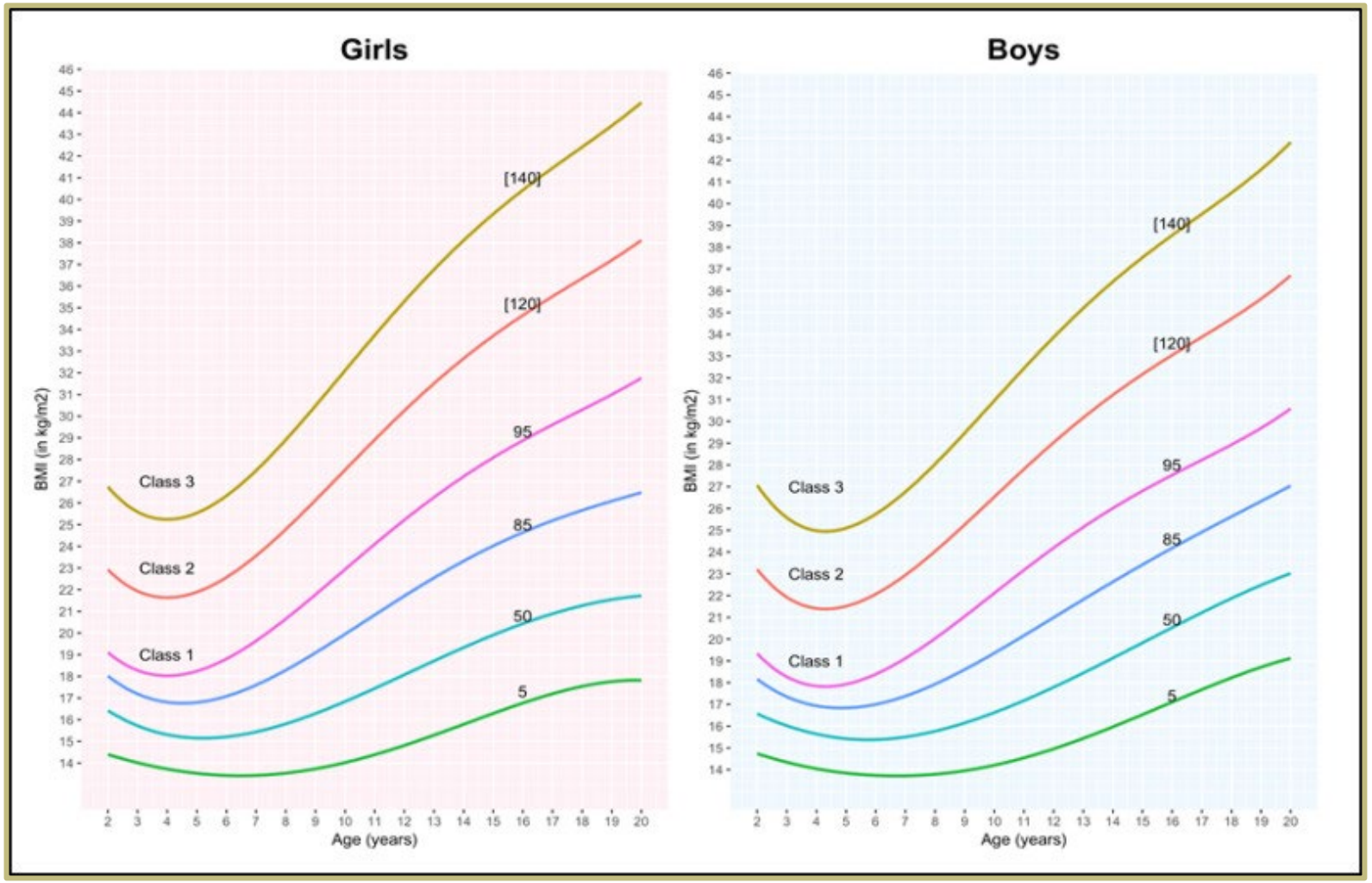
Treatment of Pediatric Obesity

Carrie Gordon, MD
Medical Director Healthy Eating/Active Living
MaineHealth CHI
Obesity Medicine Pediatrician, MaineHealth Weight Management

Disclosures

- I will be discussing off label use of medication
- None of the planners or speakers for this activity have relevant financial relationships to disclose.

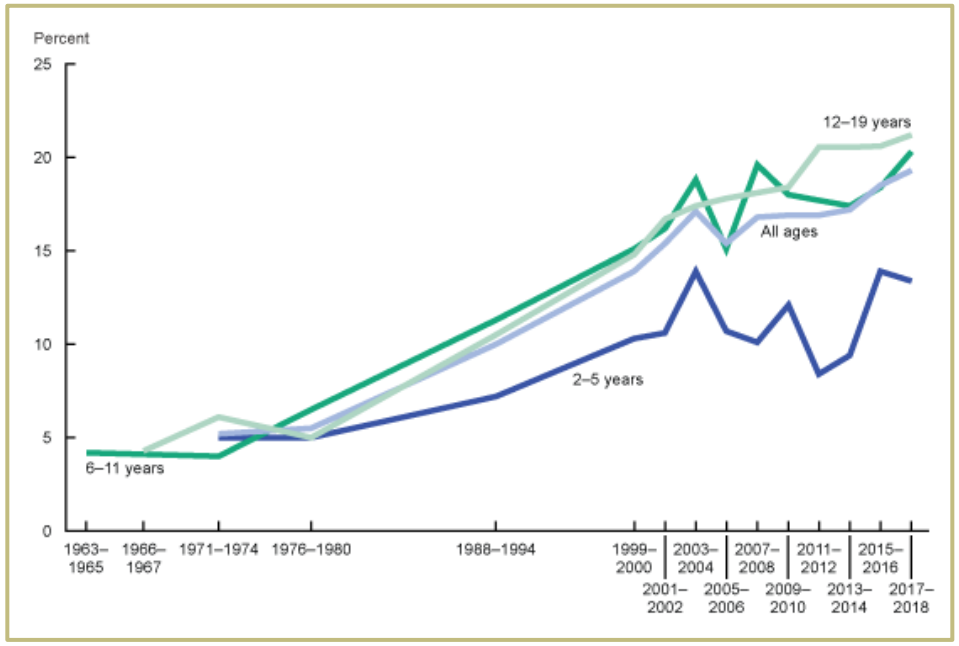
Definitions



Nih.gov

Obesity Prevalence

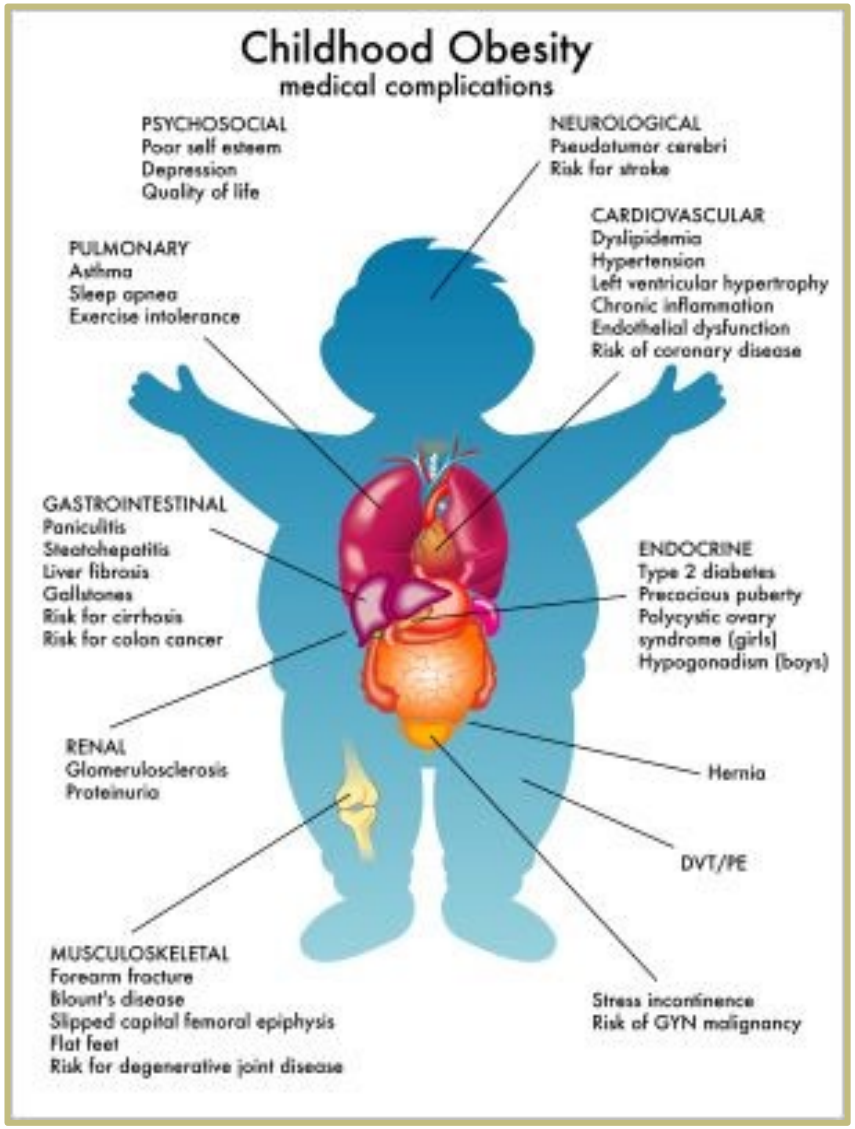
- Obesity prevalence increases as family income decreases:
  - 11.5% among U.S. children with family income more than 350% of the Federal Poverty Level (FPL).
  - 21.2% among children with family income 130% to 350% of FPL.
  - 25.8% among children with family income 130% or less of FPL



Causes

Internal Factors	Genetics
	Nutrition
	Metabolism
	Activity level
	Sleep
	Stress
	Hormones
External factors	Food policy
	Psychosocial influences
	Cultural norms
	Finances
	Education

Comorbidities



Freeart.com

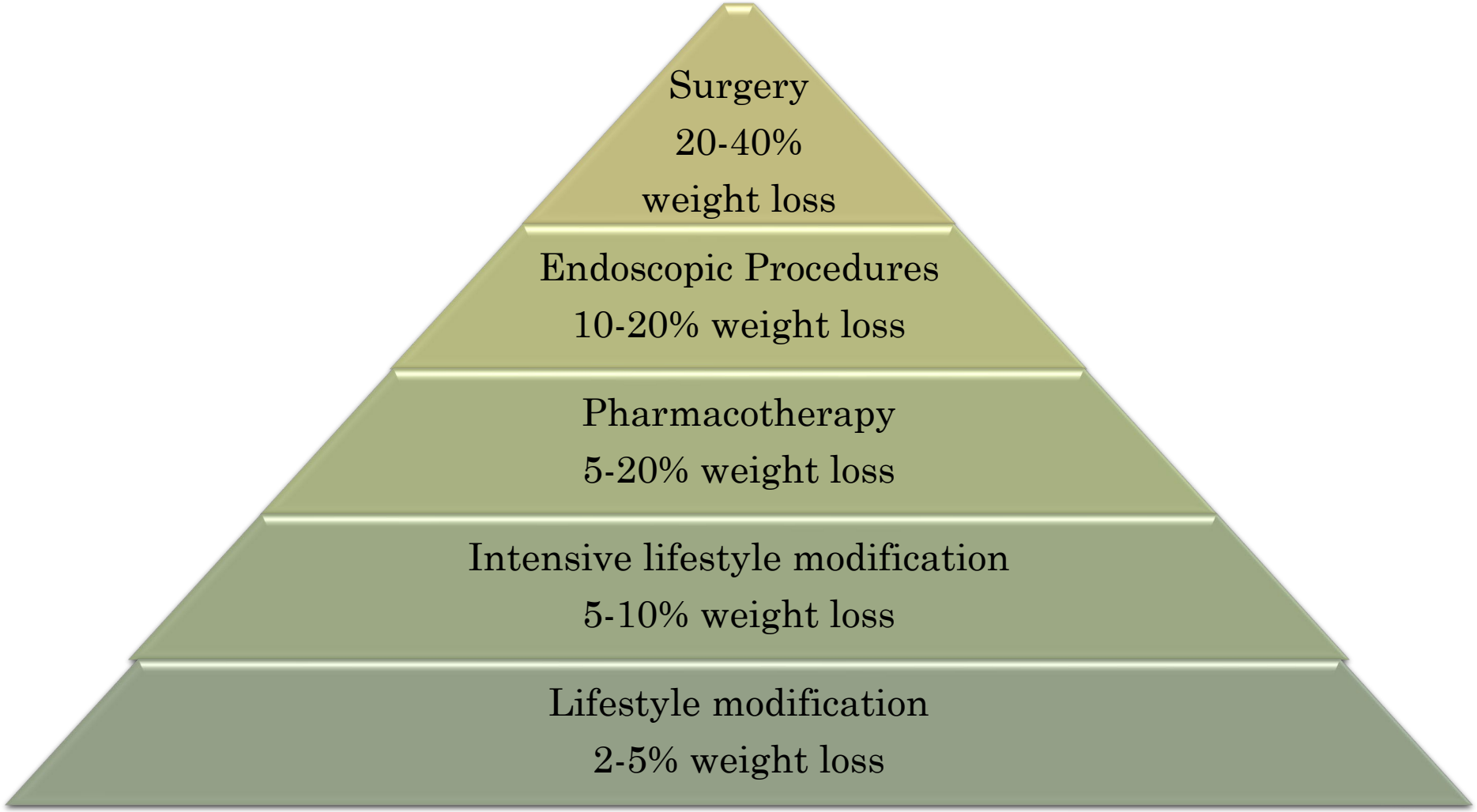
Evaluation considerations to guide obesity treatment

- Patient and family perspective of the child's health
  - impact of obesity on the child
  - their feelings about obesity treatment
- Review of growth over time
  - accelerating at unhealthy pace vs tracking along a stable percentile
- Thorough evaluation to assess for presence of comorbid illness or other diagnosis that could benefit from obesity treatment
- Understanding food relationships, dietary habits and impact of any current medications on appetite and weight
- Understanding patient goals
  - Ideally matching therapy to goals
  - Set evidence-based, realistic expectations of chosen treatment

What is "Meaningful Weight Loss"?

- 5% **total weight loss** is associated with improvements in comorbidities of obesity in adults, with greater weight loss associated with greater improvements
  - Benefits max out before "normalization" of weight
  - Can make it challenging to define sufficient weight loss with regard to health improvement given newer weight loss modalities
  - Patients may assume that to be healthy, BMI has to be "normal" on the chart
  - Interesting studies out of MBS data suggests that health benefits may level out at different amounts for different diseases
    - Condition that maximum benefit is largest for is cancer
- **BMI SDS reduction** of 0.2 has been considered clinically meaningful for pediatric patients (~5% **BMI reduction**)

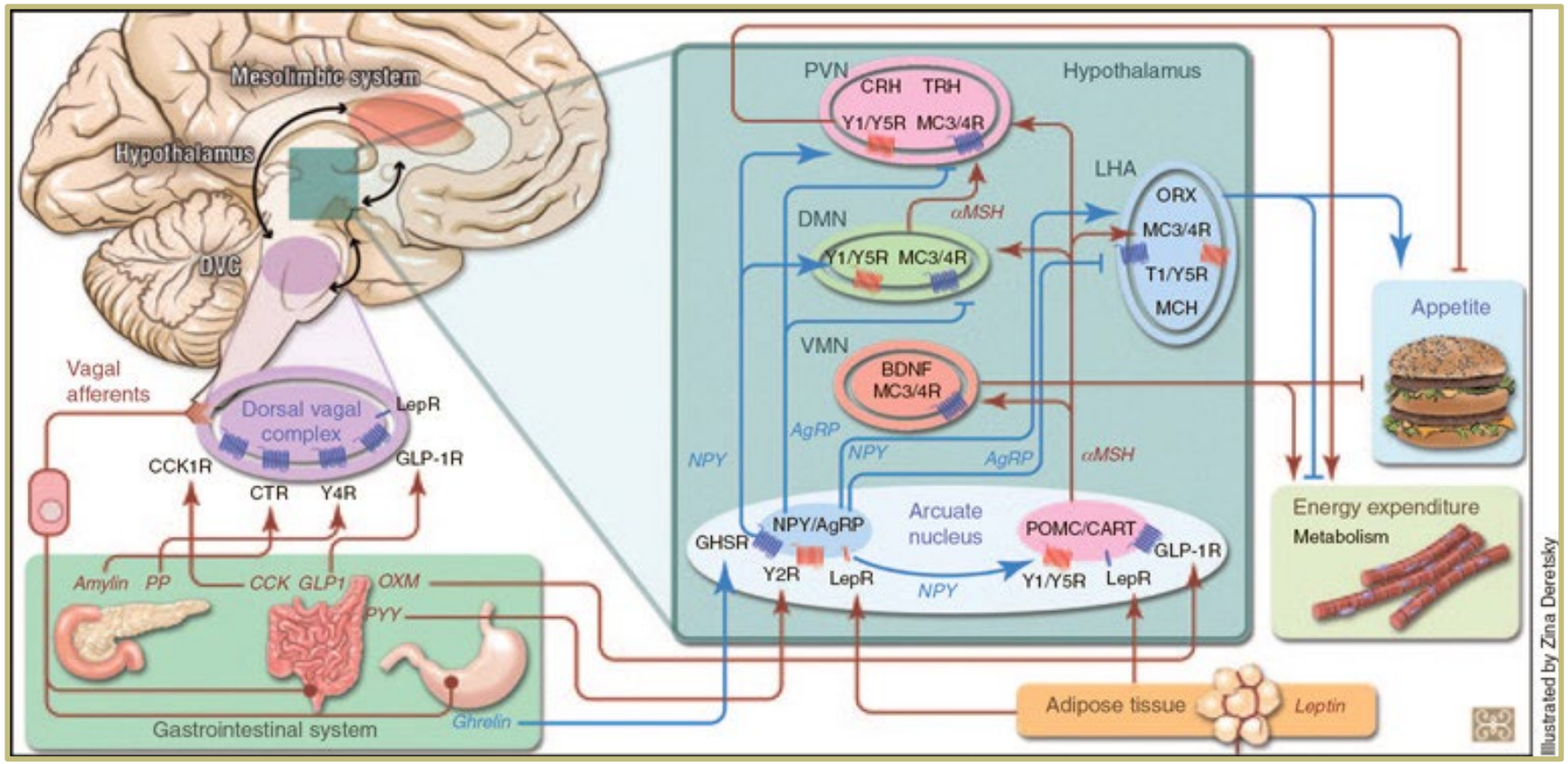
Treatment Options



Lifestyle Modification

- Has more of an impact on health as opposed to weight
- More intensive therapies provide greater health outcomes
- Also used as adjunct to medications and to MBS
- Offering IHBLT has been described by the AAP as the foundational approach that would ideally be offered to all children age 6 and older with overweight and obesity
- When this treatment is unavailable in your community, creating a network of supports for nutrition, activity, psychosocial support with provider follow up (including use of MI) is a recommended option

Appetite Regulation



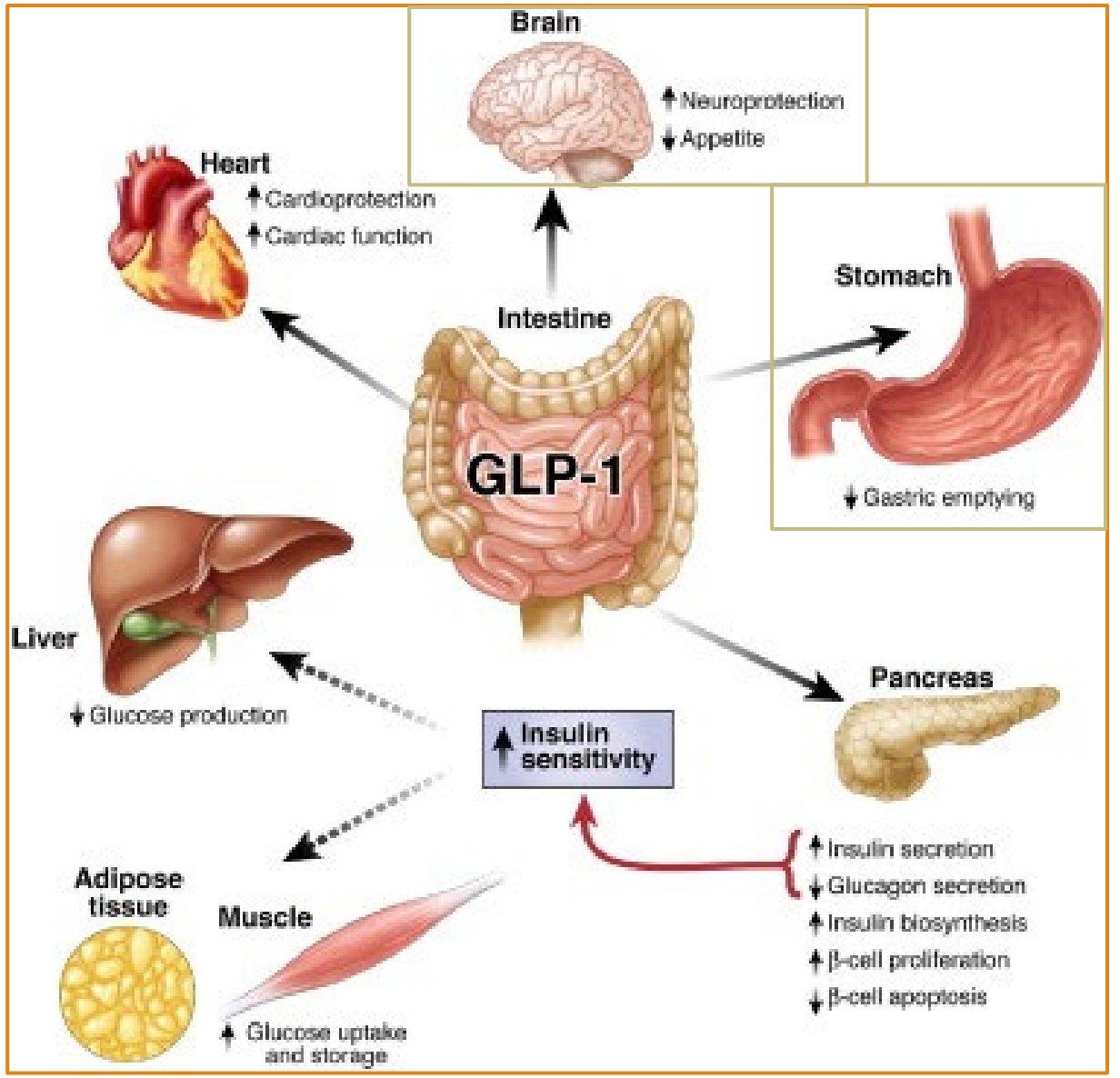
Kim GW, Clin Pharm and Therap 2013

What is an Anti Obesity Medication?

- Reduces weight or slows down weight gain
- Used in addition to (not in place of) a healthy diet and exercise

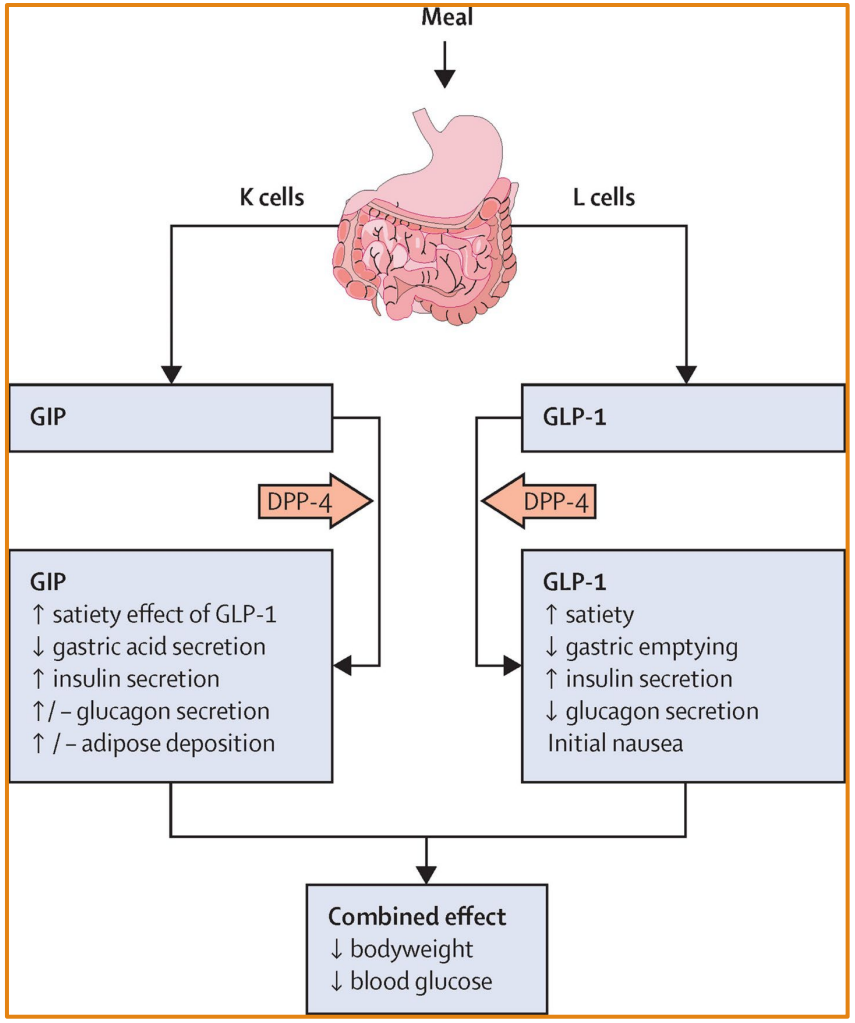
GLP1 Receptor Agonist

- **How it works**:
  - Increases MC4R stimulation to increase satiation
  - Decreases gastric emptying to increase satiety



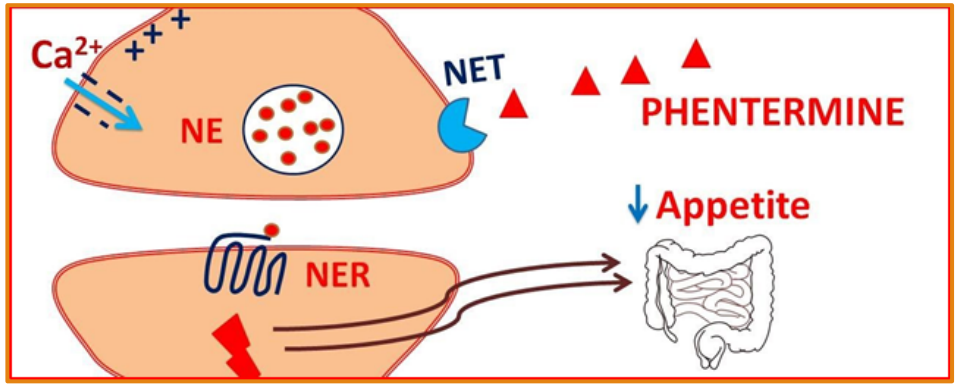
Medication	Brand Name(s)	Dosing Options and Frequency	Side effects/ Contraindications	Average Weight loss	Out of Pocket Cost	FDA Approval
Liraglutide	**Victoza**	0.6, 1.2, 1.8 mg SQ daily	Nausea, vomiting, abdominal pain/ history or family history of medullary thyroid carcinoma or MEN2; caution if history of pancreatitis	+/- 5-6%	$1300/mo	Type 2 diabetes adults and kids ≥ 10 yrs
Liraglutide	**Saxenda**	0.6, 1.2, 1.8, 2.4, 3 mg SQ daily		+/- 8-10%	$1300/mo	Obesity adults and kids ≥ 12 yrs (2020)
Semaglutide	**Ozempic**	0.25, 0.5, 1 mg SQ weekly		+/- 10-12%	$1300/mo	Type 2 diabetes adults
Semaglutide	**Wegovy**	0.25, 0.5, 1, 1.7, 2.4 mg SQ weekly		+/- 14-16%	$1300/mo	Obesity adults and kids ≥ 12 yrs (2022)
Dulaglutide	**Trulicity**	0.75, 1.5, 3, 4.5 mg SQ weekly		+/-4-5%	$880/mo	Type 2 diabetes adults
Exenatide	**Bydureon**	2 mg SQ weekly		<5%	$850/mo	Type 2 diabetes adults and kids ≥ 10 yrs (2021)
Exenatide	**Byetta**	0.5, 1 mg SQ twice daily		<5%	$250/mo	Type 2 diabetes adults

Tirzepatide



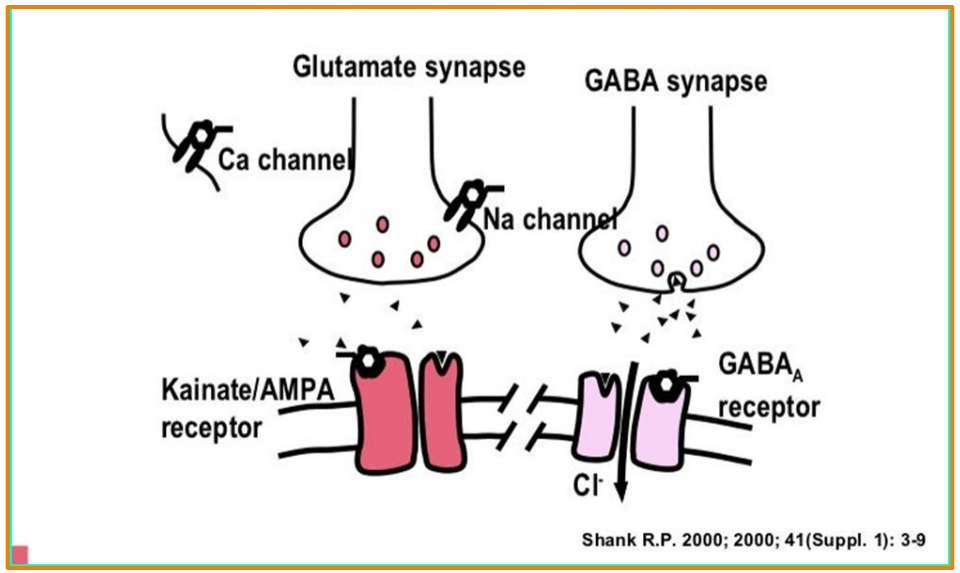
- FDA approved to treat obesity and/or Type 2 diabetes in adults
- **How it works:**
  - GLP1 and GIP receptor dual agonist
  - Increases satiation, satiety, decreases gastric emptying
- **Doses:** 5, 10, 15 mg SQ weekly
- **Side effects:** Nausea, vomiting
- **Average weight loss:** 21% (weight)
- **Out of Pocket Cost:** $975-1500/mo

Phentermine



- FDA-approved to treat obesity in adults and children ≥ 16 yrs (1959)
- **How it Works:**
  - Norepinephrine reuptake inhibitor
  - Increases norepinephrine, which decreases appetite through stimulation of POMC neurons
- **Doses:**
  - 8 mg tablet (Lomaira) PO once daily
  - 15-37.5 mg PO once daily
- **Side effects:** dry mouth, palpitations, increase in blood pressure
- **Out of pocket cost:** $10-50/mo
- **Average weight loss:**
  - 5-7% (weight)
  - 5-10% (BMI)

Topiramate



- Not FDA approved to treat obesity
- **How it works**
  - Increases GABA secretion and inhibits glutamate receptors
  - Modulates appetite control but exact mechanism is unclear
- **Doses:**
  - 25-200 mg po qd or divided bid
- **Side effects:** cognitive slowing, drowsiness, metallic taste, metabolic acidosis, nephrolithiasis, paresthesias
- **Out of Pocket Cost**: $30 per month
- **Average weight loss:**
  - 2-5% (weight)
  - 5-7% (BMI)

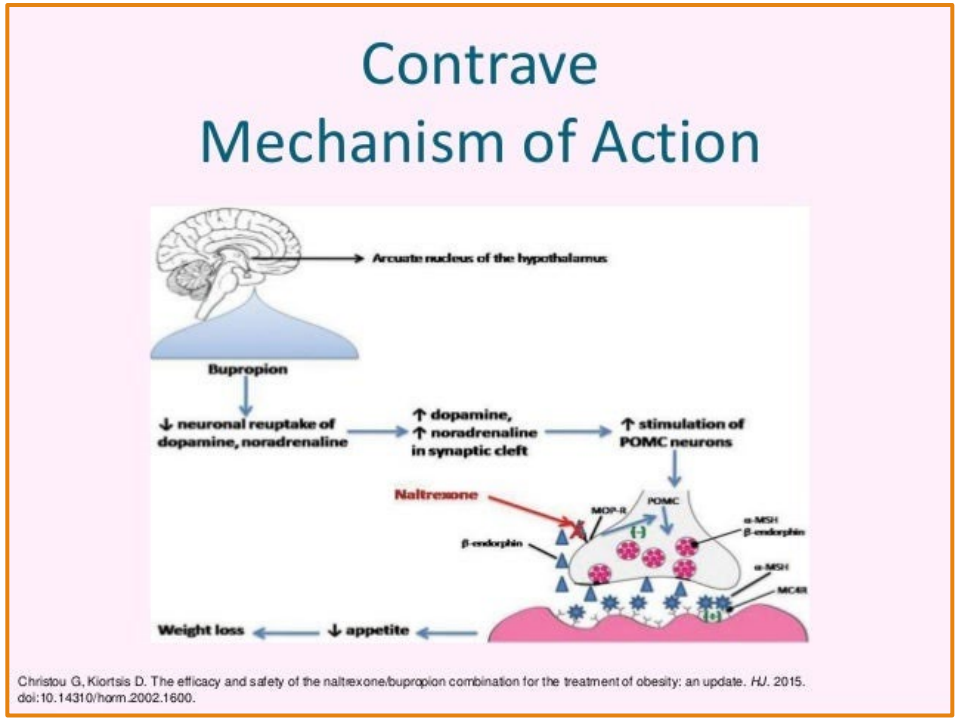
Slideshare.net

Qsymia

- FDA-approved for adults and children >12 yrs with obesity (2022)
- **How it Works:**
  - Combination of phentermine plus topiramate
- **Doses: (Phentermine/Topiramate) PO tablet once daily:**
  - 3.75/23 mg
  - 7.5/36 mg
  - 11.25/69 mg
  - 15/92 mg
- **Side effects:** dry mouth, palpitations, increase in blood pressure, cognitive dysfunction, taste changes, dizziness
- **Out of pocket cost:** $130-230/mo
- **Average weight loss:**
  - 9-12% (weight)
  - 8-10% (BMI)

Contrave

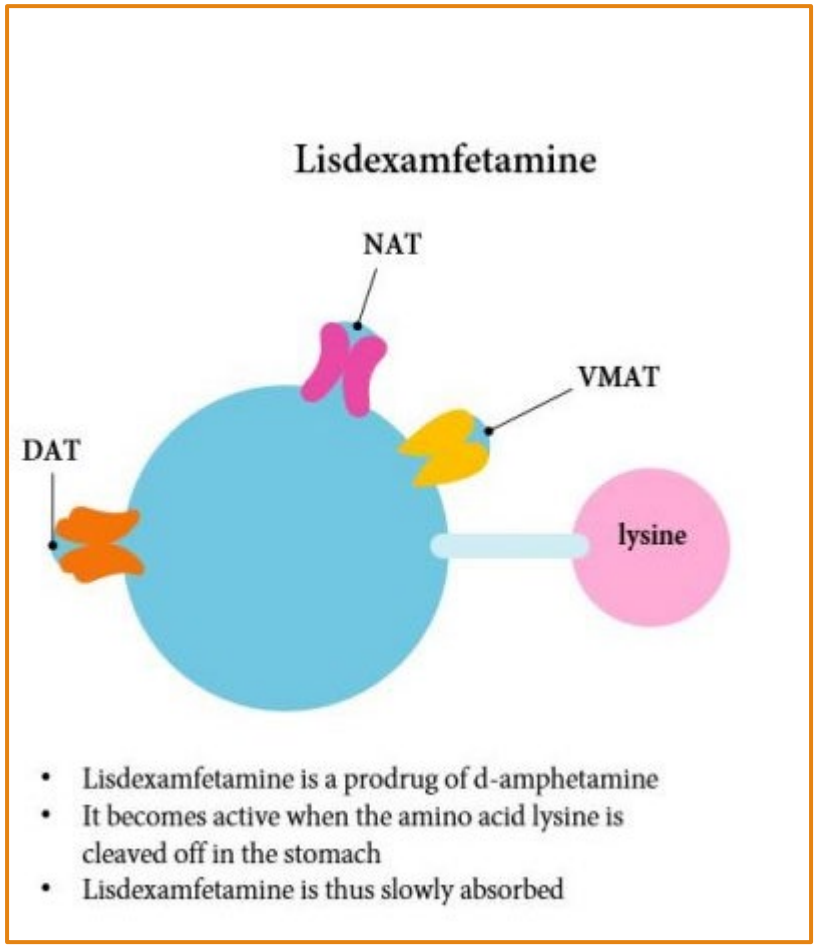
- FDA approved to treat obesity in adults
- **How it works:**
  - Naltrexone: opioid receptor antagonist
  - Bupropion: dopamine and norepinephrine reuptake inhibitor
  - Increases POMC stimulation and decreases POMC inhibition
- **Doses:**
  - 8/90 mg, 1-4 tabs po daily
- **Side effects:** dizziness, headache, constipation, nausea, vomiting
- **Out of pocket cost:** $200/mo
- **Average weight loss:**
  - 5-10% (weight)
  - no data (BMI)

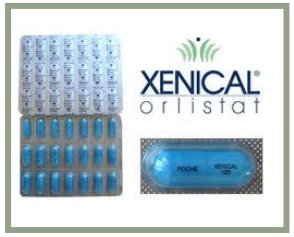


Slideshare.net

Vyvanse

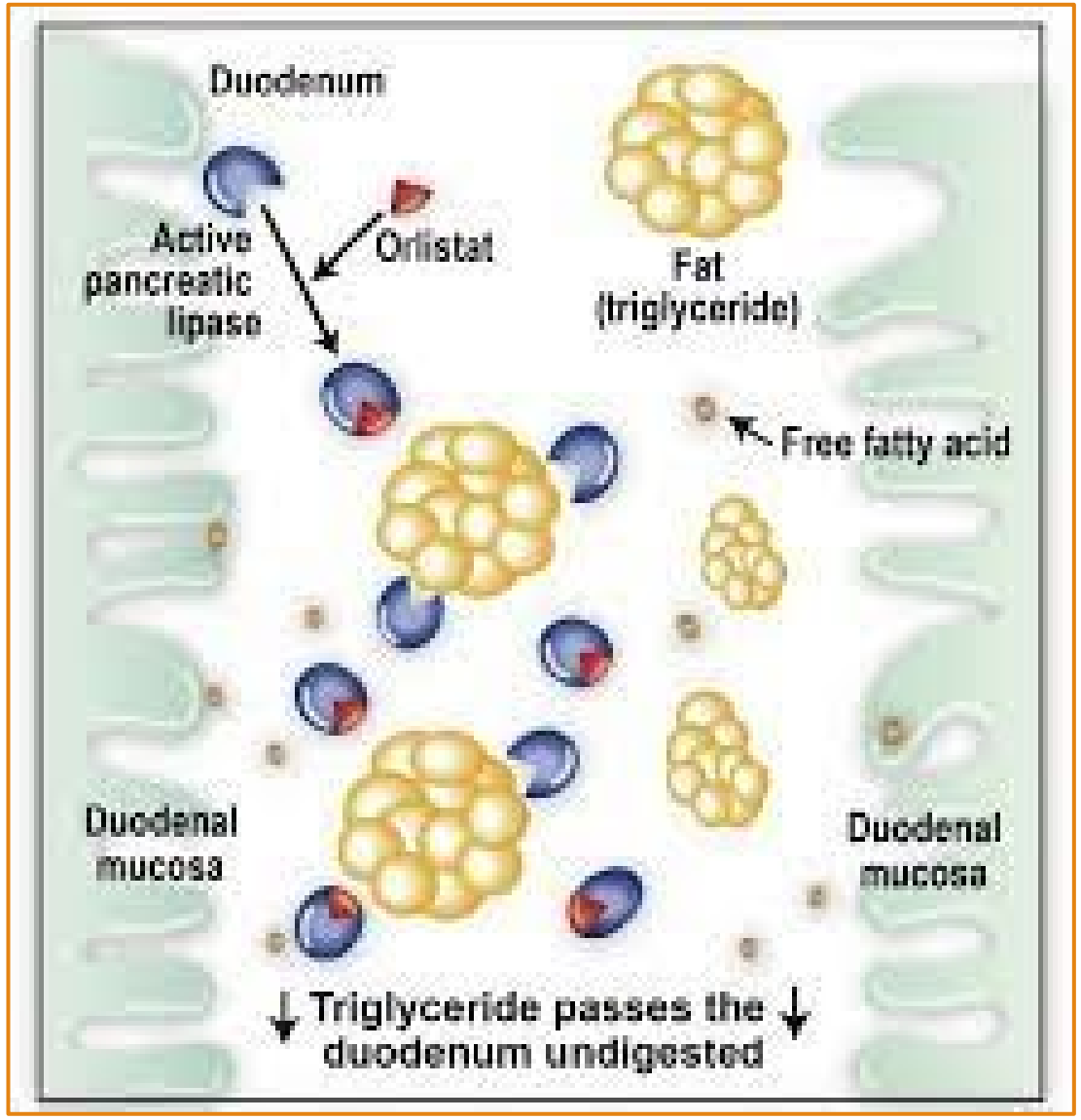
- FDA-approved to treat binge eating disorder in adults
- **How it works:**
  - Norepinephrine and dopamine reuptake inhibitor
  - unclear how it decreases binging but thought to reduce impulsivity with respect to food intake through increase in dopamine
- **Doses:**
  - 10-70 mg po once daily
- **Side effects:** dry mouth, increased blood pressure, palpitations
- **Out of Pocket Cost:** ~$400/month
- **Average weight loss:** not assessed





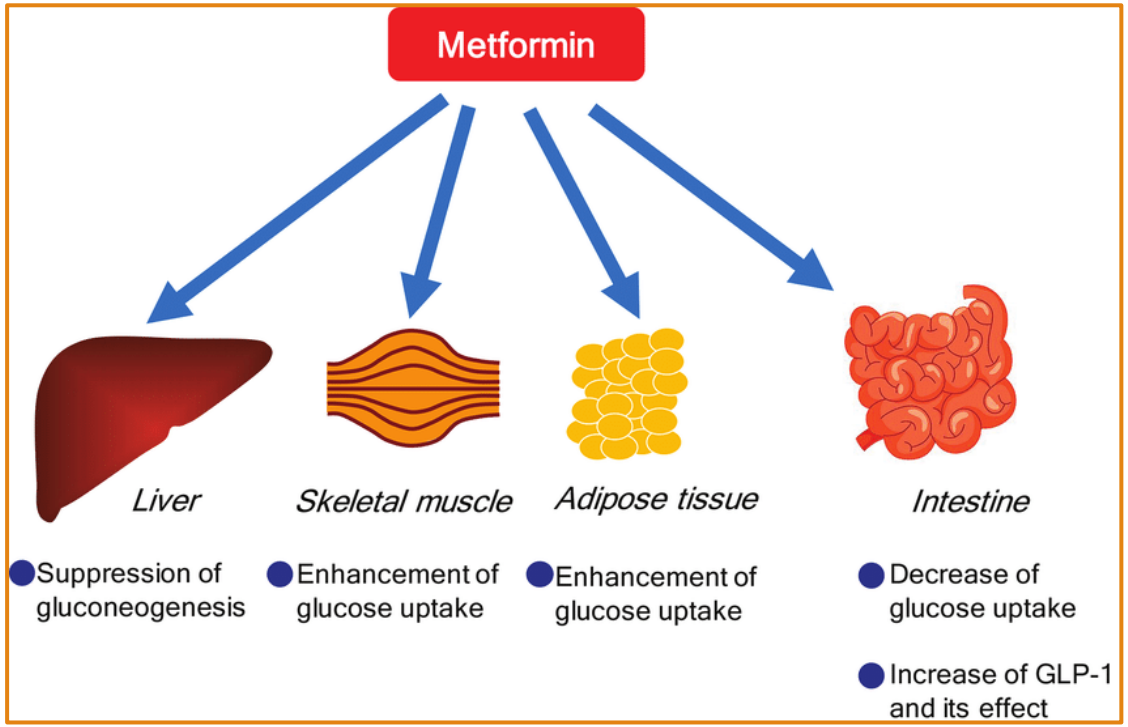
Orlistat

- FDA approved to treat obesity in adults and children ≥12 yr olds (2003)
- **How it Works:**
  - Gastrointestinal and pancreatic lipase inhibitor
  - Decreases intestinal fat absorption by up to 30%
- **Doses**:
  - 60 mg by mouth three times daily (OTC Alli)
  - 120 mg by mouth three times daily (Rx Xenical)
- **Side effects:** steatorrhea, anal leakage, stool frequency and incontinence, vitamins ADEK deficiency
- **Out of Pocket Cost:**
  - $56/mo Alli,
  - $500/mo Xenical
- **Average weight loss:**
  - 3-5% (weight)
  - 5-10% (BMI)



CJD APRIL 2016

Metformin

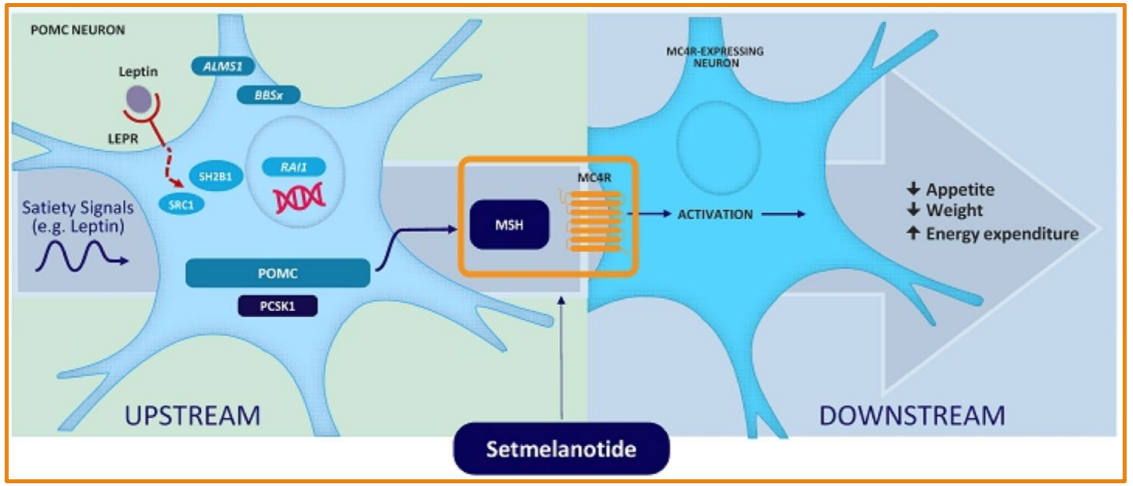


- FDA approved to treat type 2 diabetes in adults and children ≥10 yrs old
- **How it works:**
  - AMPK stimulator
  - GLP1 modulation as well as changes in gut bacteria
- **Doses:**
  - 500-2000 mg IR PO divided BID
  - 500-2250 mg XR PO daily
- **Side effects:** abdominal pain, diarrhea, lactic acidosis, B12 deficiency
- **Average weight loss:**
  - 3% (weight)

Medication for Special Circumstances

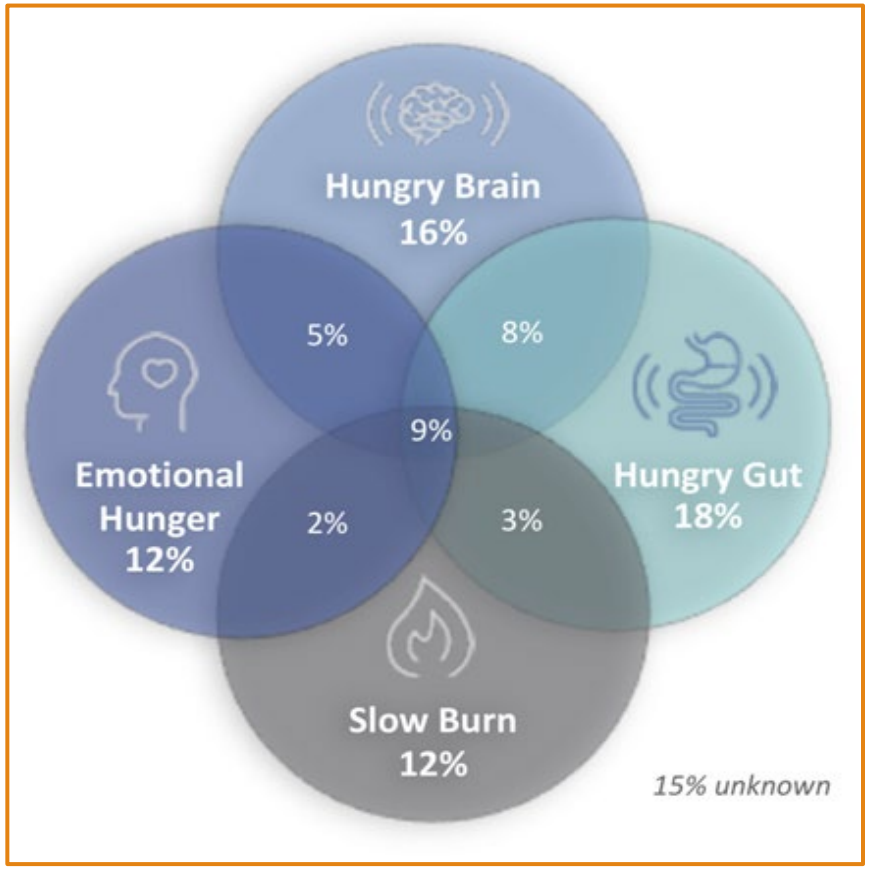
Setmelanotide

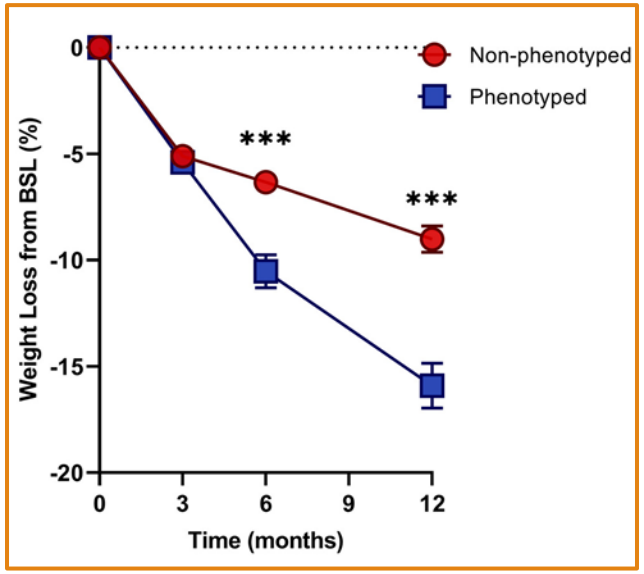
- FDA approved for adults and kids ≥6 yrs with BBS, POMC deficiency, PCSK1 deficiency and LEPR deficiency (2022)
- **How it works:**
  - MC4R agonist, activates satiety cues and increases energy expenditure
- **Doses:**
  - 0.5-3 mg SQ daily
- **Side effects:** GI upset, skin tanning
- **Out of Pocket Cost:** $4950-30,000/mo ($330/1mg!)
- **Average weight loss:** 10% (weight)



When and What Should You Start?

Obesity "Phenotyping"





Acosta et al Obesity 2021

Considerations when starting medications for obesity treatment

- If they have symptoms of hyperphagia, what time of day is this occurring?
- Do they have contraindications or cautions for any of the medication options?
- Would they swallow pills?
- Would they take an injection?
- What will their insurance cover?

- Set expectations with the family:
  - You might be recommending a therapy that is “off label”, is the family comfortable with this?
  - If weight loss is achieved, are they comfortable with long term use of a medication
  - Is the family able to afford mediation options as out of pocket expense?

Metabolic and Bariatric Surgery

- Most effective therapeutic intervention for larger amount of weight loss
- AAP endorsed for all patients with class II obesity and comorbidity or class III obesity at or above age 13 years
- Need to debunk patient misconceptions
  - Surgery is low risk (0.1% risk of death, 4% risk of major complication)
  - By 1-2 yeas post op, 90% of patients lose 50% of their **excess** weight and keep it off (Higher with some of the newer procedures)
  - Remission rates of diabetes, hypertension, OSA, dyslipidemia are 75% ad higher
  - MBS should not be considered “last resort” and it is OK to do this instead of medical management

Following patients during obesity treatment

Anticipate fluctuations over time and normalize this for the patient

Avoid celebration of weight loss, develop mindset of curiosity

Understanding of set point and plateau of individual therapies

Long-term follow up like other chronic disease models

Follow frequently enough to adjust or discontinue ineffective therapies

Anticipate need to coordinate with patients extended treatment team if other specialists are prescribing medications for your patients

Case examples

- Adolescent patient who has grown along the 75%ile until age 13 when he was started on Abilify for a psychotic episode and his BMI climbed rapidly since, now landing around the 130% of the 95%ile. Patient cannot safely discontinue antipsychotic regimen and has hyperphagia. Trying to limit food to a health amount is causing problems with his mood/temper and the family wonders what you can do to help. He is not on any other weight promoting medications. What might be your first step in medication management to combat his BMI changes.
- Adolescent patient who has a BMI of 58, with lifelong obesity. Patient would like to lose weight. She is on Lexapro for depression, has school avoidance. She wants to lose 120 lbs. How would you counsel this patient on how she might best meet her goals. Other health concerns include sleep apnea, hypertension. Her A1C and ALT are normal and she is using CPAP and is taking lisinopril.
- Adolescent patient with a BMI at the 150% of the 95%ile who just got diagnosed with type II diabetes. She also has an ALT of 120, irregular menses and high blood pressure. She isn't interested in discussing MBS, and wants to start medicine for obesity, she has modest weight loss goals (15% loss would satisfy her goals) and mostly is focused on getting the A1C and her ALT into the normal range. If you phenotype her, she falls into the "hungry gut" phenotype. What might you recommend?

Thank you!