Primary Care Treatment of Overweight or Obese Adult Patients

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Disclosures

- I have no financial disclosures
- I work at MUSC Department of Psychiatry in Clinical Trials and Innovation Sciences since Jan 2023. Various pharmaceutical companies and government trials are run through our center.
- The same location at MUSC used to be called MUSC Weight Management Center and had both a private practice clinic and ran weight management clinical trials.
- In January 2023, the MUSC Weight Management Center moved to *MUSC Health and Wellness Center in Mt Pleasant* offering the private practice clinic offering various intensive lifestyle programs with dietitians, exercise physiologists, and psychologist/social worker/psychology interns.
- I've been working with weight management clinical trials since 2014.

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Biases/Perspectives

- Native Californian Latina
- Vegetarian/Pescatarian for 44 years. Was in Biology and Ecology but never finished my Ph.D.
- In 2000, my program assistant job at MUSC promoting lifestyle change in faith-based communities was funded by a Duke Endowment grant for 3 years.
- The MUSC job inspired me to attend the MUSC CON BSN-MSN accelerated program.
- I've worked as an APRN/NP in post-cardiac intervention recovery research in Australia and in Charleston, at an endocrinology clinic, a cardiothoracic surgery step-down ward, home health care, and 12 years in clinical trials.
- I like fruits & veggies. I like sweets. I like research. I've lived for 5 years in Stockholm, Sweden, and 5 years intermittently in Australia.
- I'm a visual learner, like readable font and I use animations
- I've had issues with overweight from age 8 – 12, ages 30-36, and obesity since age 36.
- I successfully lost 30+ pounds twice. Once in my 40's with diet and exercise. And in my late 50's with (diet), exercise, low dose GLP-1 and meal-dosed phentermine. The pandemic destroyed my 4 day/week routine exercise. I stopped the meds due to cost. I regained over ~2 years

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Learning Objectives

1. Definitions of overweight and obesity.
2. Review the current state of obesity in the US and SC.
3. Discuss the Gut Brain Axis and neuroendocrine endocrine obesity pathways.
4. Review pharmacologic options for obesity management.
5. Discuss treatment of overweight and obesity in primary care.
6. Review case studies.
7. Medications in development

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Obesity/Overweight disease state

Obesity is a serious complex chronic neuro hormonal metabolic disease associated with altered neurocircuitry in the brain, where excess body fat (adiposity) impairs health, increases the risk of long-term medical complications and reduces the lifespan.
AACE: **a**diposity-**b**ased **c**hronic **d**isease ABCD

- Treatment requires long-term therapies.
- Weight loss and weight maintenance are very difficult for many people and lifestyle changes or medication alone often fail.
- Bias and stigma leads to under treatment and worse health outcomes.
- The primary function of most anti-obesity medication is to assist by impacting appetite regulation, allowing patients to better adhere to a calorie restricted diet.
- Consider Preclinical Obesity treatment to prevent diseases & complications

Obesity is NOT a moral failing

Nadolsky, K. et al (2025). *Endocr Pract*, *31*(11), 1351-1394.

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Obesity/Overweight BMI classifications

- Adolf Quetlet from Belgium in 1850, wanted to estimate the volume of an ordinary man.
- Metropolitan Life Insurance Company actuarial data from **1911 to 1935** was used to determine "ideal" weight based on longevity according to sex, height, and weight.
- Ancel Keys took Quetlet Quotient to develop health categories for white European males. Fogarty International Center Conference on Obesity in 1972 and NHANES created the current BMI tables.

	White Men & Women
Category	BMI
Underweight	**Below 18.5**
Normal weight	**18.5 - 24.9**
Overweight	**25.0 - 29.9**
Obesity Class I	**30.0 - 34.9**
Obesity Class II	**35.0 - 39.9**
Obesity Class III	**> 40.0**

Quick, inexpensive, noninvasive and has correlations to metabolic disease prevalence

Caleyachetty, R., et al. (2021). Lancet Diabetes Endocrinol 9(7): 419-426.
Tham, K. W., et al. (2023). Obes Rev 24(2): e13520

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Obesity/Overweight BMI classifications

- Researchers in various countries used their population data to identify and stage obesity
- BMI adjustments based on race/ethnicities

	White	Asian Pacific	Arab	Black
Category	BMI	BMI	BMI	BMI
Underweight	Below 18.5			
Normal weight	18.5 - 24.9	< 22.9	< 22.0	< 23.3
Overweight	25.0 - 29.9	23.0-24.9	22.1-26.5	23.4-28.0
Obesity Class I	30.0 - 34.9	25.0-29.9	26.6	28.1
Obesity Class II	35.0 - 39.9	≥ 30.0		
Obesity Class III	> 40.0			

Caleyachetty, R., et al. (2021). Lancet Diabetes Endocrinol 9(7): 419-426.
Tham, K. W., et al. (2023). Obes Rev 24(2): e13520

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Obesity/Overweight BMI classifications

NHANES data from **1999 to 2016** were used to estimate the distribution of BMI and 3 metabolic disease risk factors. Risk factors were used as the new obesity thresholds for each population subgroup.

Obesity Comorbidity	Women			Men		
	Black	Hispanic	White	Black	Hispanic	White
Dyslipidemia	29	27	25	27	26	27
Hypertension	31	28	27	28	29	28
Type 2 Diabetes	33	30	29	29	29	30
≥ 2 risk factors	31	30	28	28	29	29
Average	31	29	27	28	28	29

Stanford, F. C., et al. (2019). Mayo Clin Proc 94(2): 362-363.

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Percent Body Fat

- Women will have higher body fat percentages than men
- Racial differences exist: Black percentages lowest, Asian percentage highest*
  - DEXA scan, or hydrostatic weighing are most accurate, most expensive, least accessible
  - Skinfold measurements with calipers by trained professionals
  - Bioelectrical impedance, sends weak electrical current and measures time for current to get from point A to B. Mathematically calculates the amount of resistance from body fat.
    - Adjusted for fitness level (athlete/normal), gender, height, weight, age
    - AVOID measuring after: large amount of water/meal, alcohol, vigorous exercise, bath/sauna, first week of weight loss (shifts in hydration status)

Gender	Age	Low % BF BMI < 18.5			Normal % BF BMI 18.5-24.9			High % BF BMI 25.0-29.9			Very High%BF BMI ≥ 30.0		
		Black	White	Asian	Black	White	Asian	Black	White	Asian	Black	White	Asian
Female Number W = 225 B = 155 A = 633	20-39	< 20.0	< 21.0	< 25.0	20.0-31.9	21.0-32.9	25.0-34.9	32.0-37.9	33.0-38.9	35.0-39.9	≥ 38.0	≥ 39.0	≥ 40.0
	40-59	< 21.0	< 23.0	< 25.0	21.0-33.9	23.0-33.9	25.0-35.9	34.0-38.9	34.0-39.9	36.0-40.9	≥ 39.0	≥ 40.0	≥ 41.0
	60-79	< 23.0	< 24.0	< 26.0	23.0-34.9	24.0-35.9	26.0-35.9	35.0-40.9	36.0-41.9	36.0-40.9	≥ 41.0	≥ 42.0	≥ 41.0
Male Number W = 192 B = 99 A = 322	20-39	< 8.0	< 8.0	< 13.0	8.0-19.9	8.0-19.9	13.0-22.9	20.0-25.9	20.0-24.9	23.0-27.9	≥ 26.0*	≥ 25.0	≥ 28.0
	40-59	< 9.0	< 11.0	< 13.0	9.0-21.9	11.1-21.9	13.0-24.9	22.0-26.9	22.0-27.9	25.0-28.9	≥ 27.0	≥ 28.0	≥ 29.0
	60-79	< 11.0	< 13.0	< 14.0	11.0-22.9	13.1-24.9	14.0-23.9	23.0-28.9	25.0-29.9*	24.0-28.9	≥ 29.0	≥ 30.0	≥ 29.0

Adapted from
Gallagher D., et al. (2000). *Am J Clin Nutr*, 72(3), 694-701.
Omron HBF 306C user manual

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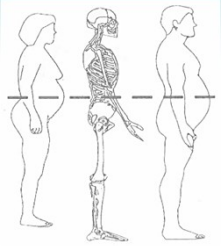
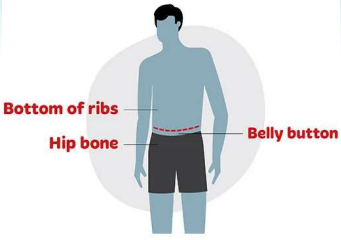
Measuring Waist Circumference





Top of iliac crest
Less variability between measurers
Women < 35 inches (88 cm)
Men < 40 inches (102 cm)
Columbia University Irving Medical Center

Half-way between lowest rib & iliac crest
High variability between measurers
Women < 37 inches (80 cm)
High Risk > 34.6 inches (88 cm)
Men < 31.5 inches (94 cm)
High Risk > 40.2 inches (102 cm)
American Heart Association

Accessed Feb 15, 2026
https://www.columbiadoctors.org/health-library/multimedia/waist-measurement/
https://www.heartfoundation.org.nz/wellbeing/body-size-and-heart-health/measure-your-waist

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WHO recommendations Waist Circumference and Waist-hip ratio associations with disease risk

- Waist circumference is defined as **midpoint between lowest palpable rib and top of iliac crest** at end of several consecutive regular breaths.
- **Hip is defined as largest circumference of buttocks**.
- Measure with a stretch-resistant tape wrapped snuggly on skin at a level parallel to the floor.
- Patient standing upright with arms relaxed and feet evenly spread and body weight evenly distributed.

Indicator	Cut-off points		Risk 100% would have 1-3+ risk factors
	Women	Men	
Waist Circumference	> 80.0 – 87.99 cm > 31.5 – 34.5 inches Asian > 80.0 cm" (31.5")	> 94 -101.99 cm > 37.0 – 40.16 inches Asian > 90 cm (35.4")	Increased
Waist Circumference	> 88.0 (34.6")	> 102 (40.17")	Substantially increased
Waist-hip ratio	> 0.85 cm	> 0.90 cm	Substantially increased

Adapted from
Waist circumference and waist-hip ratio. Report of a WHO Expert Consultation Dec 2008. Accessed Jan 30, 2026
https://www.who.int/publications/i/item/9789241501491

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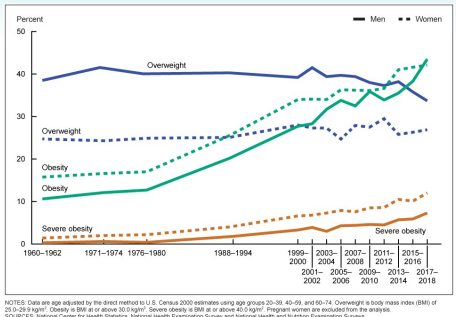
Prevalence of overweight, obesity and severe obesity among US adults aged 20+ From 1960-1962 through 2017-2018



NOTES: Data are age adjusted by the direct method to U.S. Census 2000 estimates using age groups 20–39, 40–59, and 60–74. Overweight is body mass index (BMI) of 25.0–29.9 kg/m². Obesity is BMI at or above 30.0 kg/m². Severe obesity is BMI at or above 40.0 kg/m². Pregnant women are excluded from the analysis.
SOURCES: National Center for Health Statistics, National Health Examination Survey and National Health and Nutrition Examination Surveys.

Overweight BMI 25.0 – 29.0
Obesity BMI ≥ 30.0
Severe Obesity ≥ 40.0
Pregnant women excluded
National Health Examination Survey
National Health and Nutrition Examination Surveys

CDC

Fryar CD, Carroll MD, Afful J. NCHS Health E-Stats. 2020

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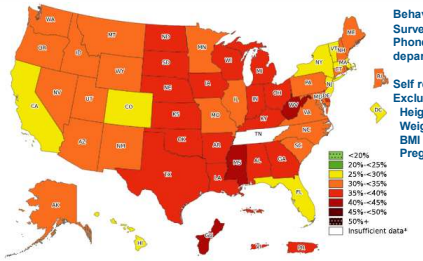
Prevalence of Adult Obesity Based on Self-Reported Weight and Height by State and Territory, BRFSS, 2024

In 2024, at least 1 in 4 adults in all US states and territories had obesity



Behavioral Risk Factor Surveillance System Phone Survey by state health departments assisted by CDC

Self reported height and weight Excludes:
Height < 3 feet or ≥ 8 feet
Weight < 50 lbs. or ≥ 650 lbs.
BMI < 12 kg/m^2 or ≥ 100 kg/m^2
Pregnant women

CDC

CDC – Adult Obesity Prevalence Maps 2024

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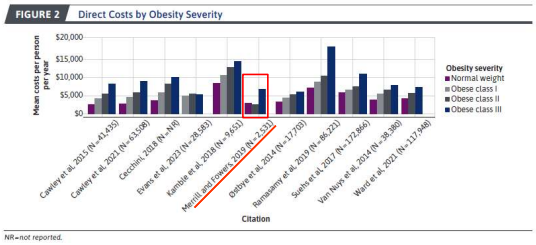
Literature review in 2023 showed the direct medical cost increase with increasing BMI category

FIGURE 2 Direct Costs by Obesity Severity



NR=not reported.

Bjornson et al (2025). J Manag Care Spec Pharm, 31(9): 851-861

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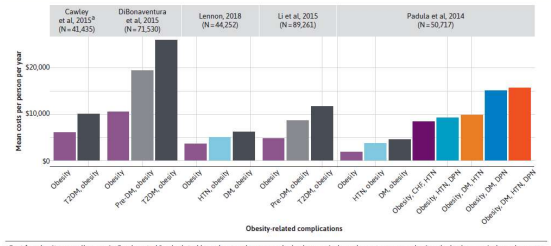
Literature review in 2023 showed the direct medical cost increase with obesity related comorbidities

FIGURE 3 Direct Costs Among People With Obesity by the Presence of Pre-DM, T2DM, and/or HTN



[a]Cost for obesity overall group in Cawley et al,[7] calculated based on crude average by body mass index subgroups, as sample sizes by body mass index subgroups were not reported in the original included article.
DM = diabetes mellitus; DPN = depression; HTN = hypertension; T2DM = type 2 diabetes mellitus.

Bjornson et al (2025). J Manag Care Spec Pharm, 31(9): 851-861

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Scale of Obesity in SC

In the past 5 years, South Carolina obesity rates have remained stable, data from 2022 to 2024

- **34.6% of SC adults are classified as Obese**
  - 33.7% of Hispanic adults
  - 31.8% of Non-Hispanic Native American adults
  - 45.2% of Non-Hispanic African American adults
  - 39% of public-school students are overweight or obese

$7B+

in reduced economic activity in SC due to obesity and overweight in 2022.

State of Obesity Report. SC Dept of Public Health

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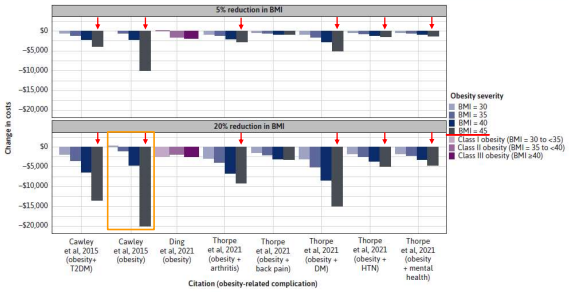
Literature review in 2023 showed direct medical cost decrease with weight loss

FIGURE 4 Change in Direct Costs With Weight Loss Over 1 Year



Sample sizes: Cawley et al[7] (N = 41,435); Ding et al[22] (N = 20,488); and Thorpe et al[4] (N = 20,971).
BMI = body mass index; DM = diabetes mellitus; HTN = hypertension; T2DM = type 2 diabetes mellitus.

Bjornson et al (2025). J Manag Care Spec Pharm, 31(9): 851-861

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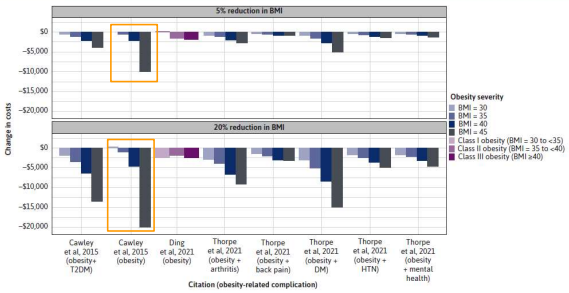
Literature review in 2023 showed direct medical cost decrease with weight loss

FIGURE 4 Change in Direct Costs With Weight Loss Over 1 Year



Sample sizes: Cawley et al[7] (N = 41,435); Ding et al[22] (N = 20,488); and Thorpe et al[4] (N = 20,971).
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Bjornson et al (2025). J Manag Care Spec Pharm, 31(9): 851-861

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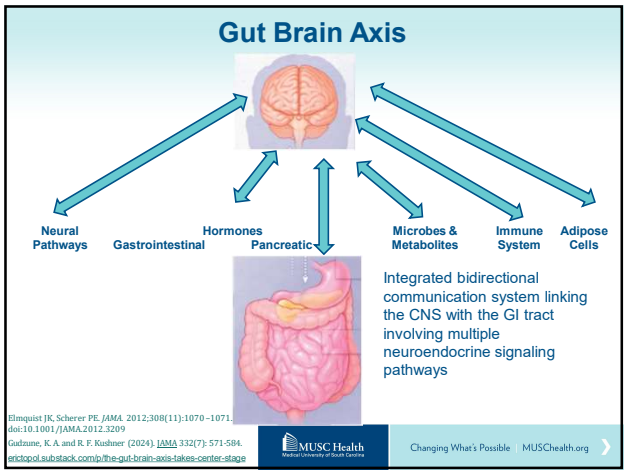
Gut Brain Axis
Neural Pathways
Hormones
Gastrointestinal
Pancreatic
Microbes & Metabolites
Immune System
Adipose Cells
Integrated bidirectional communication system linking the CNS with the GI tract involving multiple neuroendocrine signaling pathways
Elmquist JK, Scherer PE. JAMA. 2012;308(11):1070–1071. doi:10.1001/JAMA.2012.3209
Gudzune, K. A. and R. F. Kushner (2024). JAMA 332(7): 571-584.
erictopol.substack.com/p/the-gut-brain-axis-takes-center-stage
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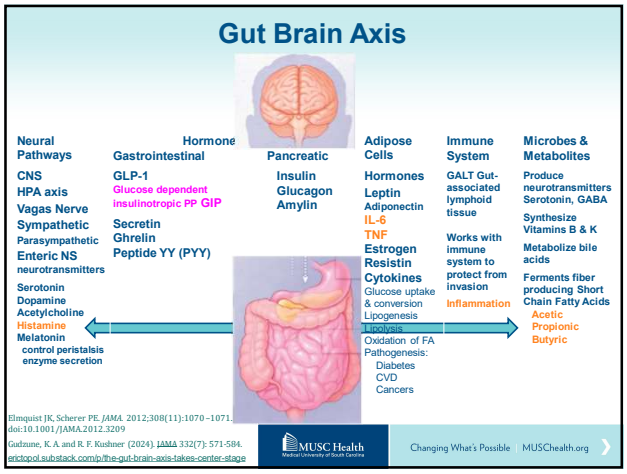
Gut Brain Axis
Neural Pathways
CNS
HPA axis
Vagas Nerve
Sympathetic
Parasympathetic
Enteric NS
neurotransmitters
Serotonin
Dopamine
Acetylcholine
Histamine
Melatonin
control peristalsis
enzyme secretion
Hormone
Gastrointestinal
GLP-1
Glucose dependent insulinotropic PP GIP
Secretin
Ghrelin
Peptide YY (PYY)
Pancreatic
Insulin
Glucagon
Amylin
Adipose Cells
Hormones
Leptin
Adiponectin
IL-6
TNF
Estrogen
Resistin
Cytokines
Glucose uptake & conversion
Lipogenesis
Lipolysis
Oxidation of FA
Pathogenesis:
Diabetes
CVD
Cancers
Immune System
GALT Gut-associated lymphoid tissue
Works with immune system to protect from invasion
Inflammation
Microbes & Metabolites
Produce neurotransmitters Serotonin, GABA
Synthesize Vitamins B & K
Metabolize bile acids
Ferments fiber producing Short Chain Fatty Acids
Acetic
Propionic
Butyric
Elmquist JK, Scherer PE. JAMA. 2012;308(11):1070–1071. doi:10.1001/JAMA.2012.3209
Gudzune, K. A. and R. F. Kushner (2024). JAMA 332(7): 571-584.
erictopol.substack.com/p/the-gut-brain-axis-takes-center-stage
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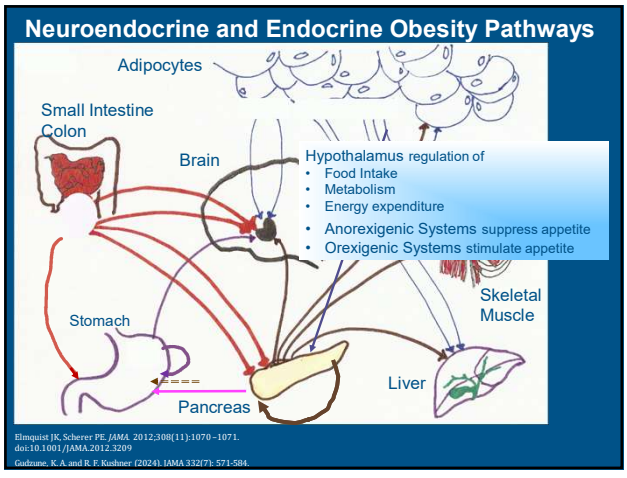
Neuroendocrine and Endocrine Obesity Pathways
Adipocytes
Small Intestine
Colon
Brain
Hypothalamus regulation of
• Food Intake
• Metabolism
• Energy expenditure
• Anorexigenic Systems suppress appetite
• Orexigenic Systems stimulate appetite
Skeletal Muscle
Stomach
Liver
Pancreas
Elmquist JK, Scherer PE. JAMA. 2012;308(11):1070–1071. doi:10.1001/JAMA.2012.3209
Gudzune, K. A. and R. F. Kushner (2024). JAMA 332(7): 571-584.

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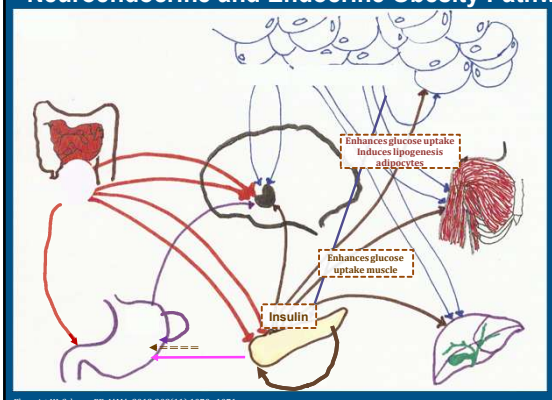
Neuroendocrine and Endocrine Obesity Pathways



Elmquist JK, Scherer PE. *JAMA*. 2012;308(11):1070–1071. doi:10.1001/JAMA.2012.3209
Gudzune, K. A. and R. F. Kushner (2024). JAMA 332(7): 571-584.

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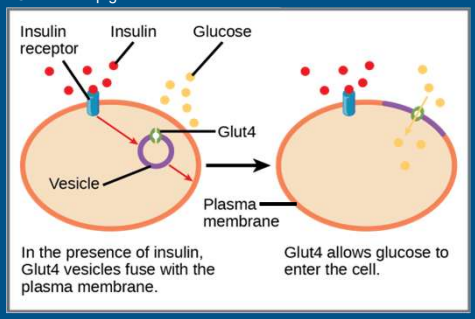
Insulin regulation controlling glucose uptake

- Extracellular insulin binds to receptors at plasma membrane.
- Vesicles with glucose transport protein (GLUT4) fuse with plasma membrane.
- Cells take up glucose.

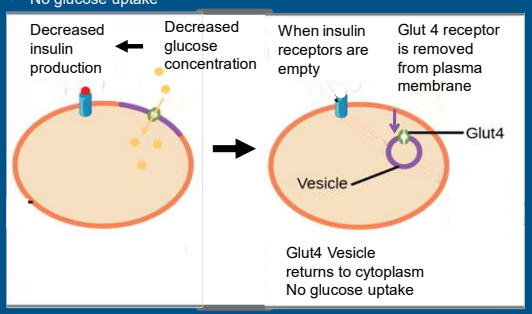


https://openstax.org/books/biology-2e/pages/7-7-regulation-of-cellular-respiration

23

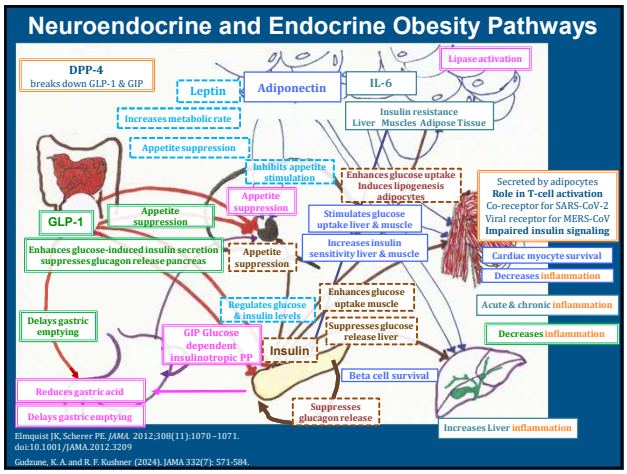
Insulin regulation controlling glucose uptake

- Decreased blood glucose concentrations results in decreased insulin levels.
- Decreased extracellular insulin unbinds with insulin receptors
- Glucose transport protein (GLUT4) pulled off plasma membrane as vesicles
- No glucose uptake



https://openstax.org/books/biology-2e/pages/7-7-regulation-of-cellular-respiration

24


Neuroendocrine and Endocrine Obesity Pathways
DPP-4
breaks down GLP-1 & GIP
Leptin
Adiponectin
IL-6
Lipase activation
Insulin resistance
Liver Muscles Adipose Tissue
Increases metabolic rate
Appetite suppression
Inhibits appetite stimulation
Enhances glucose uptake
Induces lipogenesis
adipocytes
Secreted by adipocytes
Role in T-cell activation
Co-receptor for SARS-CoV-2
Viral receptor for MERS-CoV
Impaired insulin signaling
Appetite suppression
GLP-1
Appetite suppression
Stimulates glucose uptake liver & muscle
Increases insulin sensitivity liver & muscle
Cardiac myocyte survival
Decreases inflammation
Enhances glucose-induced insulin secretion
suppresses glucagon release pancreas
Appetite suppression
Enhances glucose uptake muscle
Regulates glucose & insulin levels
Suppresses glucose release liver
Acute & chronic inflammation
Delays gastric emptying
GIP Glucose dependent insulinotropic PP
Insulin
Decreases inflammation
Beta cell survival
Reduces gastric acid
Delays gastric emptying
Suppresses glucagon release
Increases Liver inflammation
Elmquist JK, Scherer PE. JAMA. 2012;308(11):1070–1071.
doi:10.1001/JAMA.2012.3209
Gudzune, K. A. and R. F. Kushner (2024). JAMA 332(7): 571-584.

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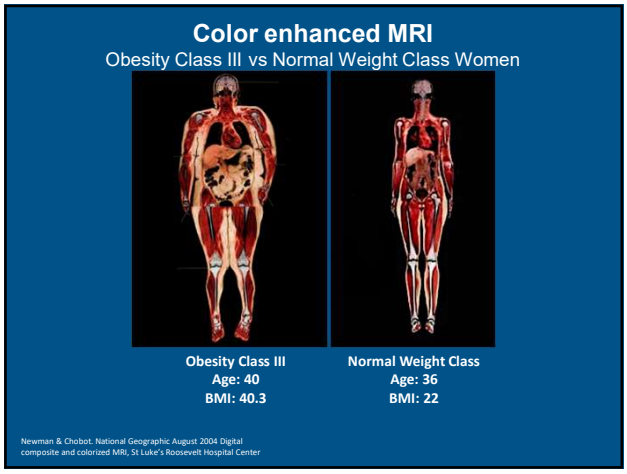
Color enhanced MRI
Obesity Class III vs Normal Weight Class Women
Obesity Class III
Age: 40
BMI: 40.3
Normal Weight Class
Age: 36
BMI: 22
Newman & Chobot. National Geographic August 2004 Digital composite and colorized MRI, St Luke's Roosevelt Hospital Center

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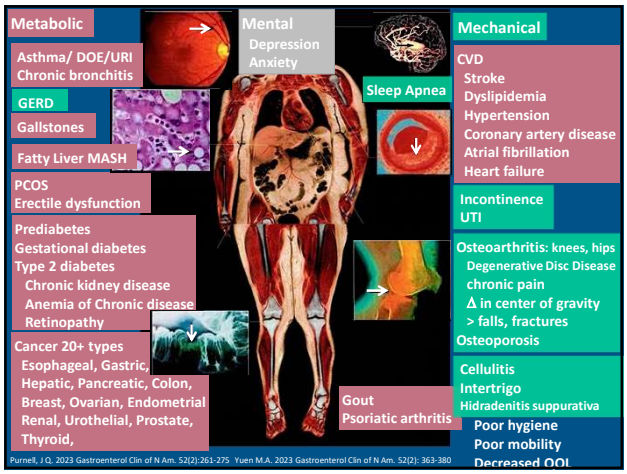
Metabolic
Asthma/ DOE/URI
Chronic bronchitis
GERD
Gallstones
Fatty Liver MASH
PCOS
Erectile dysfunction
Prediabetes
Gestational diabetes
Type 2 diabetes
Chronic kidney disease
Anemia of Chronic disease
Retinopathy
Cancer 20+ types
Esophageal, Gastric,
Hepatic, Pancreatic, Colon,
Breast, Ovarian, Endometrial
Renal, Urothelial, Prostate,
Thyroid,
Mental
Depression
Anxiety
Sleep Apnea
Gout
Psoriatic arthritis
Mechanical
CVD
Stroke
Dyslipidemia
Hypertension
Coronary artery disease
Atrial fibrillation
Heart failure
Incontinence
UTI
Osteoarthritis: knees, hips
Degenerative Disc Disease
chronic pain
Δ in center of gravity
> falls, fractures
Osteoporosis
Cellulitis
Intertrigo
Hidradenitis suppurativa
Poor hygiene
Poor mobility
Decreased QOL
Purnell, J Q. 2023 Gastroenterol Clin of N Am. 52(2):261-275 Yuen M.A. 2023 Gastroenterol Clin of N Am. 52(2): 363-380

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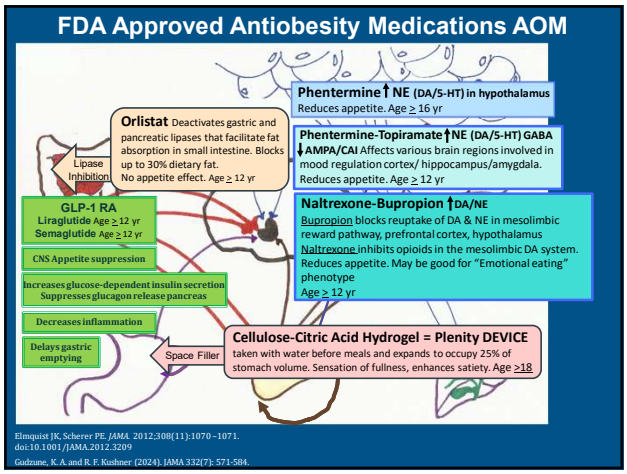
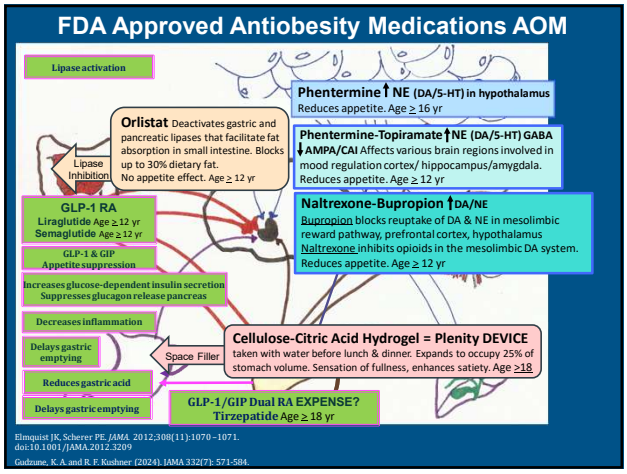

FDA Approved Antiobesity Medications AOM
Phentermine↑NE (DA/5-HT) in hypothalamus
Reduces appetite. Age ≥ 16 yr
Orlistat Deactivates gastric and pancreatic lipases that facilitate fat absorption in small intestine. Blocks up to 30% dietary fat.
No appetite effect. Age ≥ 12 yr
Lipase Inhibition
Phentermine-Topiramate↑NE (DA/5-HT) GABA ↓AMPA/CAI Affects various brain regions involved in mood regulation cortex/ hippocampus/amygdala.
Reduces appetite. Age ≥ 12 yr
GLP-1 RA
Liraglutide Age ≥ 12 yr
Semaglutide Age ≥ 12 yr
Naltrexone-Bupropion ↑DA/NE
Bupropion blocks reuptake of DA & NE in mesolimbic reward pathway, prefrontal cortex, hypothalamus
Naltrexone inhibits opioids in the mesolimbic DA system.
Reduces appetite. May be good for "Emotional eating" phenotype
Age ≥ 12 yr
CNS Appetite suppression
Increases glucose-dependent insulin secretion
Suppresses glucagon release pancreas
Decreases inflammation
Delays gastric emptying
Space Filler
Cellulose-Citric Acid Hydrogel = Plenity DEVICE
taken with water before meals and expands to occupy 25% of stomach volume. Sensation of fullness, enhances satiety. Age >18
Elmquist JK, Scherer PE. JAMA. 2012;308(11):1070–1071.
doi:10.1001/JAMA.2012.3209
Gudzune, K. A. and R. F. Kushner (2024). JAMA 332(7): 571-584.

28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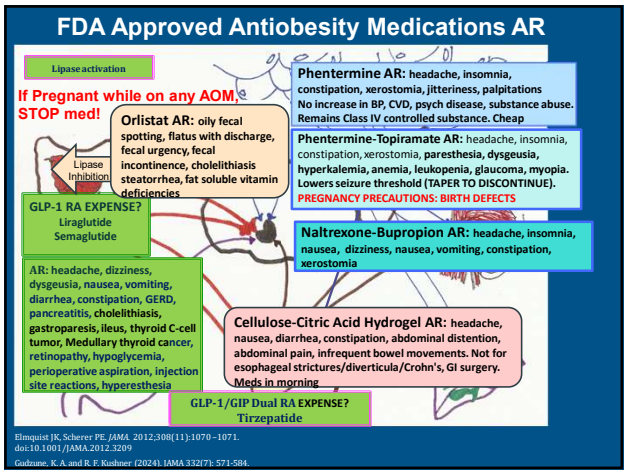
taken with water before lunch & dinner. Expands to occupy 25% of stomach volume. Sensation of fullness, enhances satiety. Age >18
Reduces gastric acid
Delays gastric emptying
GLP-1/GIP Dual RA EXPENSE?
Tirzepatide Age ≥ 18 yr
Elmquist JK, Scherer PE. JAMA. 2012;308(11):1070–1071.
doi:10.1001/JAMA.2012.3209
Gudzune, K. A. and R. F. Kushner (2024). JAMA 332(7): 571-584.

29


FDA Approved Antiobesity Medications AR
Lipase activation
If Pregnant while on any AOM, STOP med!
Phentermine AR: headache, insomnia, constipation, xerostomia, jitteriness, palpitations
No increase in BP, CVD, psych disease, substance abuse.
Remains Class IV controlled substance. Cheap
Orlistat AR: oily fecal spotting, flatus with discharge, fecal urgency, fecal incontinence, cholelithiasis steatorrhea, fat soluble vitamin deficiencies
Lipase Inhibition
Phentermine-Topiramate AR: headache, insomnia, constipation, xerostomia, paresthesia, dysgeusia, hyperkalemia, anemia, leukopenia, glaucoma, myopia.
Lowers seizure threshold (TAPER TO DISCONTINUE).
PREGNANCY PRECAUTIONS: BIRTH DEFECTS
GLP-1 RA EXPENSE?
Liraglutide
Semaglutide
Naltrexone-Bupropion AR: headache, insomnia, nausea, dizziness, nausea, vomiting, constipation, xerostomia
AR: headache, dizziness, dysgeusia, nausea, vomiting, diarrhea, constipation, GERD, pancreatitis, cholelithiasis, gastroparesis, ileus, thyroid C-cell tumor, Medullary thyroid cancer, retinopathy, hypoglycemia, perioperative aspiration, injection site reactions, hyperesthesia
Cellulose-Citric Acid Hydrogel AR: headache, nausea, diarrhea, constipation, abdominal distention, abdominal pain, infrequent bowel movements. Not for esophageal strictures/diverticula/Crohn's, GI surgery. Meds in morning
GLP-1/GIP Dual RA EXPENSE?
Tirzepatide
Elmquist JK, Scherer PE. JAMA. 2012;308(11):1070–1071.
doi:10.1001/JAMA.2012.3209
Gudzune, K. A. and R. F. Kushner (2024). JAMA 332(7): 571-584.

30

GLP1s do NOT increase risk of suicidality

Initial concern: "Disproportionality analysis" of 269 reported suicidal and self-injurious adverse drug reactions (WHO database)

- Liraglutide: No signal
- Semaglutide: Signal for suicidal ideation; no signal for self-injurious events

Regulatory reviews by European Medical Agency and a preliminary US FDA evaluation concluded the available evidence did **not** support a causal association between GLP-1 RAs and suicidal/self-injurious thoughts and actions. Both agencies continue routine monitoring

Guirguis A et al. European Neuropsychopharmacology 82 (2024) 82–91.
Tobaigy, M., Elkout, H. *Int J Clin Pharm* **46:** 488–495 (2024).
Schoretsanitis et al JAMA Network Open 2024; 7(8):e2423385.

31

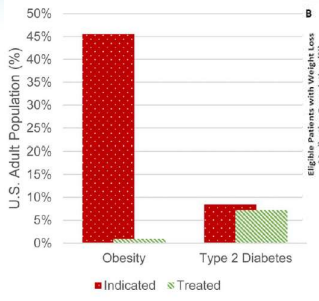
What About Weight Loss Supplements?

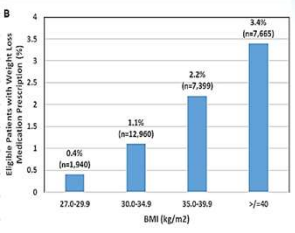
- Dietary supplements for weight loss are **regulated by the FDA as foods**
- **Efficacy is minimal based** on in-depth systematic reviews and meta-analyses
- While generally safe, weight loss supplements are associated with **adverse reactions** and can have **pharmacologically active ingredients** that **may pose a risk** to some people
- **More effective weight management options** include **lifestyle approaches**, **pharmacological AOM medications**, and **bariatric surgery**.
- **Human Chorionic Gonadotropin (hCG) does NOT** result in weight loss, reduce appetite, or redistribute fat. It is NOT FDA approved. Weight loss on the "hCG diet" **results solely from extreme calorie restriction** (500–800 calories/day), not the hormone.
- **Patients on an extreme caloric restriction, should be evaluated for gallstones, electrolyte imbalances, vitamin deficiencies, blood clots & irregular heartbeat!**

Heymsfield. (2023) *Gastroenterol Clin North Am, 52(2), 457-467*
https://www.mayoclinic.org/healthy-lifestyle/weight-loss/expert-answers/hcg-diet/faq-20058164

32

Real world: Few patients are prescribed anti-obesity medications 2009-2015





29,964 eligible patients
1.3% of total cohort filled 1+ AOM Rx
82.5% female
Median Age 44 yrs, Median BMI 37.2
Phentermine 76.5%

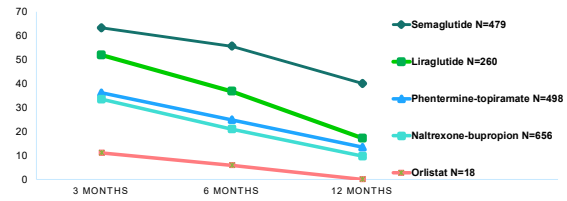
Saxon et al. Obesity, 2019

33

Real World: High Discontinuation Rates

A Retrospective Cohort Study of initial AOM filled between 2015 and 2022

PERCENTAGE OF PATIENTS WHO PERSISTED WITH AOM



Gasoyan et al. (2024) *Obesity (Silver Spring), 32*(3), 486-493.

34

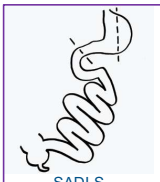
Bariatric Surgery Options

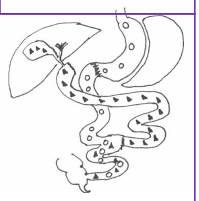
Restrictive

Restrictive and decreased absorption


Sleeve Gastrectomy


Roux-en-Y


SADI-S


BPD/DS

en.wikipedia.org/wiki/Sleeve_gastrectomy Gastric_Bypass_Surgery SADI_S-surgery

https://www.researchgate.net/figure/BPD-DS-bypass-anatomy-BPD-DS-biliopancreatic-diversion-duodenal-switch-Image-Credit_fig1_38405985

35

Bariatric Surgery Options

- **Sleeve Gastrectomy**
  - Potential for long-term vitamin deficiencies
  - Not as effective in reducing GERD
- **Roux-en-Y Gastric**
  - More complex than sleeve gastrectomy, **GERD treatment**
  - Long-term vitamin/mineral deficiencies B12, iron, calcium, and folate
- **Single anastomosis duodenal-ileal bypass with sleeve gastrectomy SADI-S Can be second surgery after Sleeve gastrectomy**
  - Potential to worsen or develop GERD
  - Diarrhea
  - Long-term vitamin/mineral deficiencies
- **Biliopancreatic diversion with duodenal switch BPD-DS**
  - Higher complication rate and risk for mortality, longer hospital stay
  - Long-term protein mineral and vitamin deficiencies iron, calcium, zinc, vitamins A, D, E, K

https://muschealth.org/medical-services/bariatric-surgery

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Bariatric Surgery "Failure"

- Losing less than 50% of excess weight, or BMI > 35 kg/m²
- Significant weight regain within 2 to 10 years
- 4.5% to 21.7% of patients may require revision surgery due to complications or inadequate weight loss

	Gastric Banding	Sleeve Gastrectomy	Roux-en-Y Gastric Bypass Most common	SADI-S	BPD-DS
Failure rate 5-year FU	31.5%	15%	15%	2.7%	1.5%
Failure rate 7-year FU	36.9%	35%	20-35% BMI > 50: 40-60%	6.0%	7.0%
Revision Rate Wt loss failure	20-60%	10-25%	4-6%	0-9.3%	0.5-2.8%
Complications	Band slippage Band erosion Obstruction Port infections	Pouch dilation Weight regain GERD Converted to Roux-en-Y	Pouch and anastomotic dilation V/M deficiencies	GERD diarrhea V/M deficiencies 7.7-11.7% revision surgery	Severe malnutrition 3.1-10% needing surgery

King, W.C. et al (2020). Surg Obes Relat Dis. 16(8); 113-1144.
Topart, PA & Becouarn G (2015).). Surg Obes Relat Dis. 11(4); 965-972.

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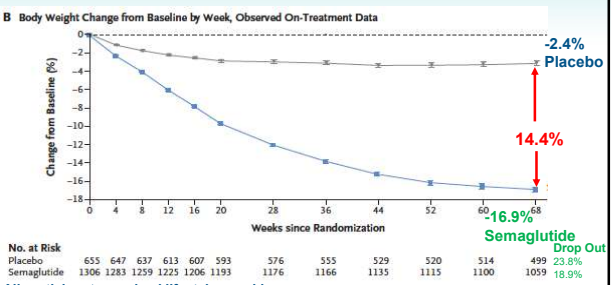
Semaglutide STEP 1 Trial
Non-diabetic overweight/obese adults



All participants received lifestyle coaching: Goal 500 kcal dietary deficit, 150 min weekly physical activity
GLP-1/GIP goal: decrease caloric intake. NOT create a very low-calorie diet, or weight loss from adverse events (severe diarrhea, severe nausea, severe fatigue)
Do NOT combine GLP-1/GIP medications with intermittent fasting

Wilding et al, *N Engl J Med* 2021

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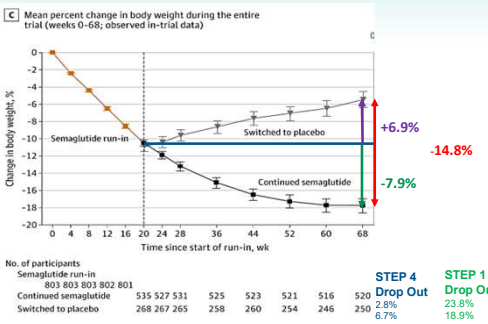
STEP 4: Effect of Continued Weekly Subcutaneous Semaglutide vs Placebo on Weight Loss Maintenance in Adults With Overweight or Obesity



Rubino, D. et al (2021). JAMA 325(14):1414-1425

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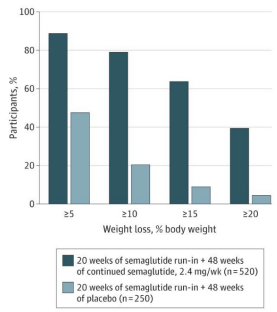
STEP 4: Effect of Continued Weekly Subcutaneous Semaglutide vs Placebo on Weight Loss Maintenance in Adults With Overweight or Obesity

D Proportion of participants achieving thresholds of weight loss during the entire trial (weeks 0-68; observed in-trial data)



% Wt loss	STEP 4 Sema vs Placebo	STEP 1 Sema vs Placebo
≥ 5	88.7 vs 47.9	92.4 vs 33.1
≥ 10	79.0 vs 20.4	74.8 vs 11.8
≥ 15	63.7 vs 9.2	54.8 vs 5.0
≥ 20	39.6 vs 4.8	38.2 vs 2.0

Why is there a stronger placebo effect in STEP 4?

STEP 4 Everyone started on semaglutide and escalated for 16 weeks prior to switch to placebo or maintenance on semaglutide

Rubino, D. et al (2021). JAMA 325(14):1414-1425

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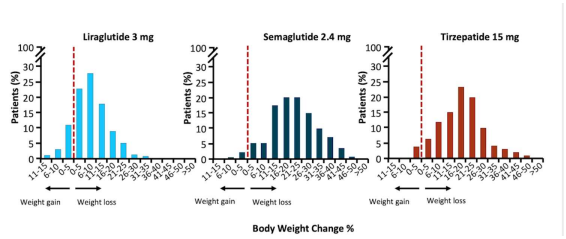
Medications will also have "failures"

There are always a subset of patients on medication that gain weight



Perdomo. et al (2023). Lancet (401):1116-1130

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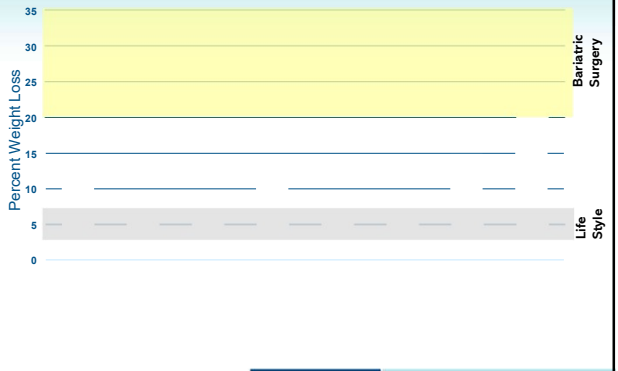
41

Effectiveness of Lifestyle, AOM & Bariatric Surgery for treating obesity

PubMed literature search Jan 1, 2025 to Feb 27, 2024, 88 studies



Gudzune, K. A. and R. F. Kushner (2024). JAMA 332

Greenway FL et al Obesity. 2019 Feb;27(2):205-216

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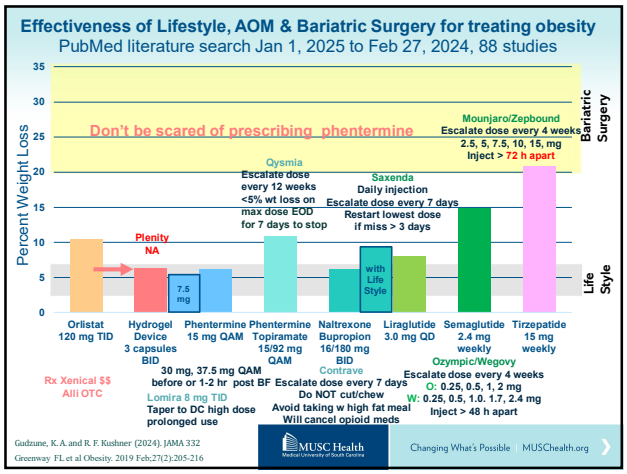
Effectiveness of Lifestyle, AOM & Bariatric Surgery for treating obesity
PubMed literature search Jan 1, 2025 to Feb 27, 2024, 88 studies
Percent Weight Loss
Don't be scared of prescribing phentermine
Bariatric Surgery
Life Style
Mounjaro/Zepbound
Escalate dose every 4 weeks
2.5, 5, 7.5, 10, 15, mg
Inject > 72 h apart
Qysmia
Escalate dose every 12 weeks
<5% wt loss on max dose EOD
for 7 days to stop
Saxenda
Daily injection
Escalate dose every 7 days
Restart lowest dose if miss > 3 days
Plenity
NA
7.5 mg
with Life Style
Orlistat 120 mg TID
Hydrogel Device 3 capsules BID
Phentermine 15 mg QAM
Phentermine Topiramate 15/92 mg QAM
Naltrexone Bupropion 16/180 mg BID
Liraglutide 3.0 mg QD
Semaglutide 2.4 mg weekly
Tirzepatide 15 mg weekly
Rx Xenical $$
Alli OTC
30 mg, 37.5 mg QAM
before or 1-2 hr post BF
Contrave
Escalate dose every 7 days
Do NOT cut/chew
Avoid taking w high fat meal
Will cancel opioid meds
Ozympic/Wegovy
Escalate dose every 4 weeks
O: 0.25, 0.5, 1, 2 mg
W: 0.25, 0.5, 1.0. 1.7, 2.4 mg
Inject > 48 h apart
Lomira 8 mg TID
Taper to DC high dose prolonged use
Gudzune, K. A. and R. F. Kushner (2024). JAMA 332
Greenway FL et al Obesity. 2019 Feb;27(2):205-216
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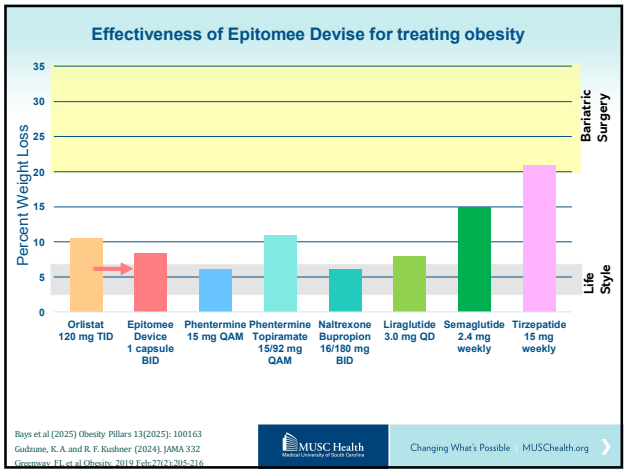
Effectiveness of Epitomee Devise for treating obesity
Percent Weight Loss
Bariatric Surgery
Life Style
Orlistat 120 mg TID
Epitomee Device 1 capsule BID
Phentermine 15 mg QAM
Phentermine Topiramate 15/92 mg QAM
Naltrexone Bupropion 16/180 mg BID
Liraglutide 3.0 mg QD
Semaglutide 2.4 mg weekly
Tirzepatide 15 mg weekly
Bays et al (2025) Obesity Pillars 13(2025): 100163
Gudzune, K. A. and R. F. Kushner (2024). JAMA 332
Greenway FL et al Obesity. 2019 Feb;27(2):205-216
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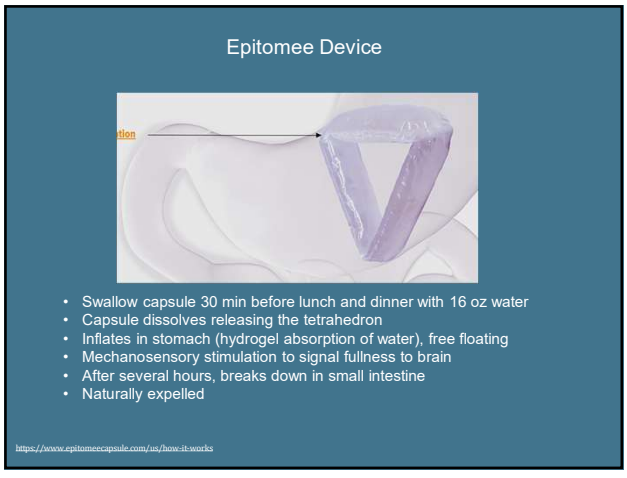
Epitomee Device
• Swallow capsule 30 min before lunch and dinner with 16 oz water
• Capsule dissolves releasing the tetrahedron
• Inflates in stomach (hydrogel absorption of water), free floating
• Mechanosensory stimulation to signal fullness to brain
• After several hours, breaks down in small intestine
• Naturally expelled
https://www.epitomeecapsule.com/us/how-it-works

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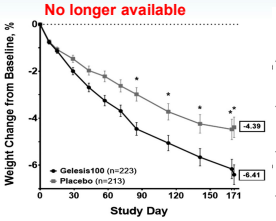
Hydrogel Studies Percentage Weight Loss Over Time

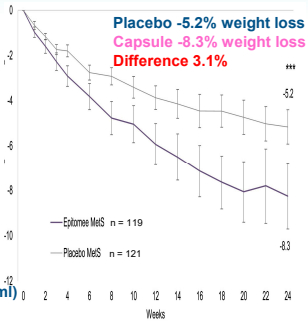
Plenity Capsule/ Gelesis100 GLOW Study

No longer available



Placebo -4.39% weight loss
Capsule -6.41% weight loss
Difference 2.02%

Epitomee Capsule RESET Study
Available soon



Placebo -5.2% weight loss
Capsule -8.3% weight loss
Difference 3.1%

Placebo effect: drinking 16 oz (500 ml) water 30 min prior to 2 meals daily

Greenway et al Obesity. 2019 Feb;27(2):205-216
Bays et al 2025 Obesity Pillars 13(2025): 100163

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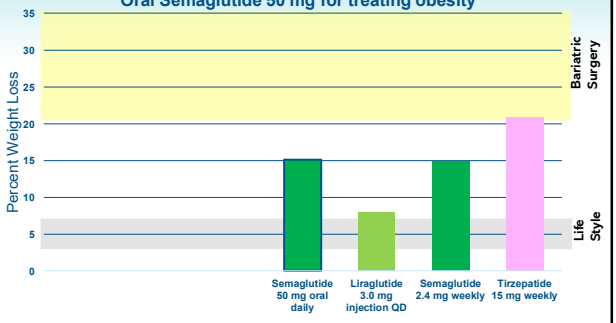
Effectiveness of FDA Approved Oral Semaglutide 50 mg for treating obesity



Knop et al (2003). Lancet 402(10403): 705-719

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Magnitude of Weight Reductions and Health Improvements

3%
- Hyperglycemia
- Triglycerides
- Diabetes prevention

5%
- HLD-Cholesterol
- GERD females
- Systolic & diastolic blood pressure
- Hepatic steatosis measured by MRS
- Measures of feeling and function
  - Symptoms of urinary stress incontinence
  - Measures of sexual function
  - Quality of life measures (IWQOL)

10%
- GERD males
- OSA Apnea-Hypopnea Index
- Osteoarthritis
- MASH Activity score on biopsy

15%
- Polycystic Ovarian Syndrome
- Remission of T2DM
- Reduction in CV events
- Reduction in CV Mortality

Lifestyle 3 -7%
Orlistat/Hydrogels 6-10%
Brain neurotransmitters 5 -10%
Neuroendocrine mimics 8 -21+%
Bariatric Surgery 20-35%+

Cefalu et al Diabetes Care 2015; 38(8):1567-1582
Lazo et al Diabetes Care 2010; 33-2156-2163
Lean et al Lancet 2018;391:541-551
Ryan Curr Obes Rep 2017:6(2):187-194

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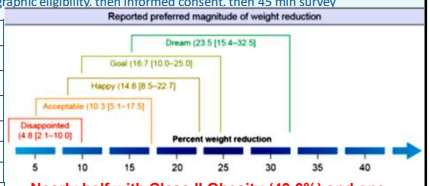
OBSERVE Study Participants with Overweight or Obesity: Shared decision-Making

Online survey Age ≥ 18 of people belonging to panel partners (N=1007, Median age 47.0)
Participants get points that can be redeemed for products/gift certificates/cash
Complete demographic eligibility, then informed consent, then 45 min survey

Women	67.3%
White	41.0%
Black/AA	28.9%
Hispanic	15.3%
Asian	6.5%
Median BMI	34.2 kg/m²
Overweight	13.9%
Class I Obesity	34.7%
Class II Obesity	21.4%
Class III Obesity	23.2%
AOM use	19.7%
Surgery*	10.0%
Some college+	76.5%
Most self- reported Obesity related complication	Anxiety 41.6%



- **Nearly half with Class II Obesity (49.6%) and one third Class III Obesity (32.1%) would be disappointed shifting down only 1 category**
- **Most Overweight participants (96.2%) and two thirds Class I Obesity (66.8%) would remain in same category at their disappointed weight loss.**
- **Dream loss 23.5%** Class III shift to Overweight (36.8%)
  Class III shift to Class I (26.9%)

Gudzune et al Endocrine Practice 2024:30: 917-926

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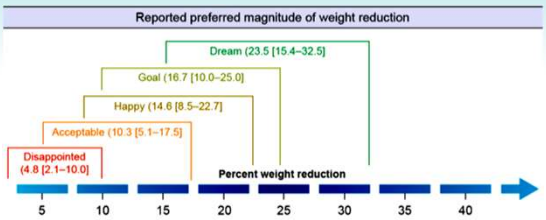
OBSERVE Study Participants with Overweight or Obesity: Shared decision-Making



Differences in Preferences

Women preferred greater weight loss than men

Higher BMI and weight self-stigma were associated with higher weight loss goals

Black/AA and Asian participants had lower preferred reductions

Hispanic participants preferred greater reductions than non-Hispanic White participants

Oldest participants had the lowest preferred weight reductions

Gudzune et al Endocrine Practice 2024:30: 917-926

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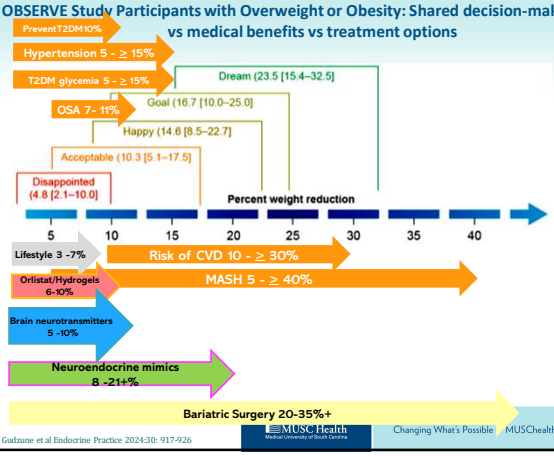
OBSERVE Study Participants with Overweight or Obesity: Shared decision-making vs medical benefits vs treatment options



Gudzune et al Endocrine Practice 2024:30: 917-926

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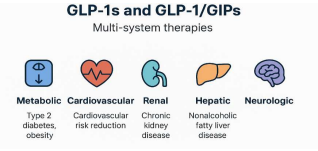
Other things treated with GLP1s or GLP1/GIPs

FDA Approved:

- Diabetes
- Obesity
- OSA (Sleep Apnea)
- MASH/ MASLD (Fatty Liver Stage F-2 F-3 fibrosis)
- Reduction on risk of Major Adverse Cardiac Events
- CKD (Kidney Disease) & Major Adverse Cardiac Event Reduction



More coming:

- CHF (Heart Failure)
- Addition disorders
- Pre-diabetes
- Inflammatory conditions
- Osteoarthritis
- CKD (Kidney Disease)
- PCOS
- Neuroprotection/Alzheimer's and Parkinson's?

Utilize obesity medication effects for other things

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Weight Loss is NOT Linear

Each person with have a unique journey

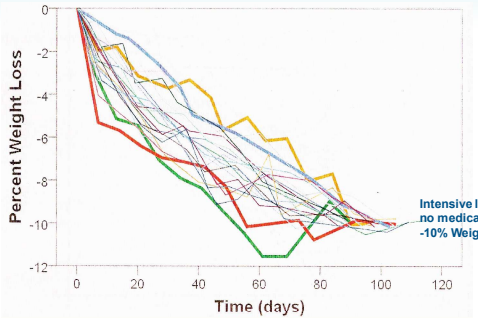

Image based on 690 patients completing MUSC Weight Management Center Intensive Lifestyle FOCUS Program (15 weeks) prior to 2018

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The Chronic Care Model of Weight Management

Obesity Society | American Heart Association | American College of Cardiology

Treatment Algorithm Guidelines 2013

1. Evaluate BMI & waist circumference for BMI 25.0 – 34.9kg/m^2 to ID risk:*
   - Treat if BMI ≥30 or ≥27 with a comorbidity
   - Treat if waist men > 40", women > 35"
2. Treat comorbidities regardless of "weight-loss efforts".
3. Assess weight and lifestyle histories.
4. Assess lifestyle choices and readiness to change in context of competing priorities. If ready, set realistic goals.
5. Lifestyle intervention goal of 5% - 10% weight loss at 6 months.
6. Refer to high intensity in-person program, ≥ 14 sessions in 6 months with diet & physical activity components. Energy deficit from caloric deficit ≥ 500 Kcal/day. Dietitian referral
7. Re-evaluate 6-8 weeks, if weight loss is not ≥ 5%, possibly add medication, re-evaluate, not ≥ 5% at 12 weeks, switch/add AOB medication.
8. Re-evaluate comorbidity medications, adjust HTN, DM, Cholesterol meds if needed
9. Weight loss pattern: max weight loss, plateau, then gradual regain
   Lifestyle 6 months, Meds 6 to 24 months**, Bariatric surgery longer to plateau
10. Consider bariatric surgery BMI ≥40 or ≥35 with comorbidity
11. Long-term follow up, self-weighing, reduced calorie diet, physical activity > 200+ min/wk

Jensen MD, et al. *Circulation*. 2014;129(25 Suppl 2): S102-S138

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CMS Will Reimburse Intensive Behavioral Therapy for Obesity

CMS.gov Centers for Medicare & Medicaid Services

- Screening for obesity in adults using measurement of BMI (obese defined as BMI ≥30 kg/m^2)
- Dietary (nutritional) assessment, refer to RD
- 1 face-to-face visit **every week for the first month**
- 1 face-to-face visit **every other week for months 2-6**
- 1 face-to-face visit **every month for months 7-12 if** 3 kg weight loss at month 6
- Total: 20 visits 1 year
- ICD-10 codes: (additional ICD-10 codes may apply)
  Z68.30, Z68.31, Z68.32, Z68.33, Z68.34, Z68.35, Z68.36, Z68.37, Z68.38, Z68.39, Z68.41, Z68.42, Z68.43, Z68.44, or Z68.45
- HCPS/CPT codes:
  - G0447 – Face to face behavioral counseling for obesity, 15 min
  - G0473 – Face to face behavioral counseling, **group (2-10), 30 min**

https://www.cms.gov/medicare-coverage-database/view/ncd.aspx?NCDId=353

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What to do evaluate/treat overweight/obesity

Assess & ASK: health risk & factors affecting behavior change (BC) goals
Advise: give clear, specific and personalized BC advice including benefits harms treatment options **Chronic diarrhea get amylase, lipase** **Hygiene issues** **Chronic Pain**
Agree: collaboratively select treatment goals and methods
Assist: using BC techniques, aid patient in achieving agreed goals, acquiring skills, confidence, social/environmental supports,
Arrange: follow-up contacts, assistance/support, referrals

Labs: CBC, CMP, A1c, Lipids, TSH Optional: FT4, T3, amylase, lipase, B12, Vitamin D, Folic acid **If elevated LDL-C: Lipoprotein A, Apolipoprotein B,S**

Height, Weight empty bladder, shoes off
Waist circumference, Hip circumference
Resting BP at least 5 min, 15 min best
PhQ-9: Score >10 Refer to Psych Moderate 10-14 Severe 15-19
Physical Exam:
- **Short-term memory words & simple math**
- **Tandem gait (balance)**
- **Romberg test (balance)**
- **Shoulder crepitus and ROM**
- **Posterior Lung auscultation on skin**
- **Spinal tenderness and flexibility**
- **Kidney tenderness**
- **Knee crepitus**
- **Anterior lung auscultation**
- **Heart valve auscultation & murmur**
- **Carotid artery auscultation**

PE:
- **Wrist Pulses**
- **Deep tendon reflexes**
- **Thyroid visual and palpitation**
- **Oral cavity assessment**
- **Neck circumference STOP/BANG**
- **Pronunciation & recall memory**

CLOTHES OFF*, SHOES & SOCKS OFF
- **Skin eval:** moles, acrochordons, **skin folds** etc.
- **Abdominal exam:** bowel sounds, light palpation, liver and spleen deep palpation, ballottement, diastasis recti, striae eval, skin eval
- **Inframammary folds**
- **ECG:** surgical razor hair removal, alcohol wipe
- **Feet:** pulses, toenails, skin condition, point & flex
- **Calves:** varicosities, peripheral edema

Lp(a) ≥75 nmol Risk CD & AS
Lp(a) ≥125 nmol CVD
ApoB,S Goal < 90
Above goal: 90-99
Borderline high: 100-119
High: 120-139
Very High ≥ 140
Mayo Clinic Laboratories

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New Slide: Potential Liver Injury Hy's Law

- **Elevated ALT/AST: Repeat CMP in 7-14 days, consider adding PT/INR**
  - **ALT > 3 x ULN or ALT > 3x baseline** if was abnormal.
  - **AST > 3 x ULN or AST > 3x baseline** if was abnormal.
  - **ALP > 2.5 x ULN or ALP > 2.5 x baseline** if was abnormal
- **Stop GLP-1/GIP**
  - **ALT or AST > 3 x UNL with** appearance of **fatigue, nausea, vomiting, anorexia, abdominal pain or tenderness, fever, rash and/or eosinophilia (> 5%)**
  - **ALT or AST > 8 x ULN** or ALT or AST **> 5x ULN for more than 2 weeks**
  - **ALT or AST > 3 x ULN** and **total bilirubin > 2x ULN** (35% direct bilirubin) or
  - **ALT or AST > 3 x UNL** and **INR > 1.5** (if INR measured), may indicate severe liver injury (potential Hy's law)
- **Stop GLP-1/GIP Repeat testing with PT/INR in 48 to 72 hours**
  - **ALT or AST > 8 x ULN** or ALT or AST **> 5x ULN for more than 2 weeks**
  - **ALT or AST > 3 x ULN** and **total bilirubin > 2x ULN** (35% direct bilirubin
  - **ALT or AST > 3 x UNL and INR > 1.5** (if INR measured), may indicate severe liver injury (potential Hy's law)
  - **Check follow up lab results, work-up for alternative**
- **Can resume GLP-1/GIP if alternative etiology is identified AND liver blood parameters have returned to pre-event levels if you AND patient are comfortable**

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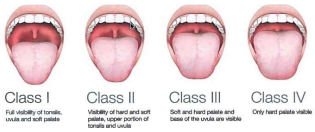
Risk of Obstructive Sleep Apnea (OSA) Adults

1. Determine Overweight/Obesity Weight Class
2. Oral Examination: risk for OSA increase more than 2-fold for every one-point increase in Mallampati Scale.
3. Assess neck girth: Large neck girth in patients who snore is highly predictive for OSA
   - **Circumference > 15.7 inches (40 cm)**



STOP/BANG score:
4 25% OSA
5 35%
6 45%
7/8 65%

S.T.O.P.
Snoring
Tiredness (daytime)
Observed stopped breathing
Blood Pressure elevated (HTN)

B.A.N.G
BMI > 35
Age > 50
Neck circumference > 40 cm (15.7")
Gender Male

Nagappa et al (2015) PLoS One 10(12) e0143697

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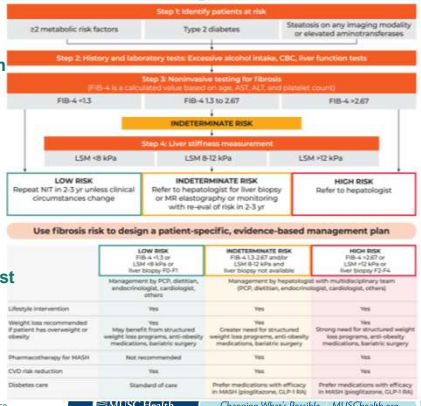
Assess for Fibrosis Risk Screening for MASH/MASLD

FIB-4 Cirrhosis Probability Calculation
Age in years
Platelets in x10^9/L
ALT in U/L
AST U/L
FIB-4 Risk
< 1.3 Low
1.3 -2.67 **Intermediate**
> 2.67 **High**
Levels 1.3+
- **Refer to hepatologist for liver biopsy**
- **Medication**
  -Pioglitazone
  -GLP-1RA



Kanwal (2021) Gastroenterology. 161(5)-1657-1669
Mobile app https://nash.gastro.org

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Interprofessional Team/Referrals

Bariatric Surgery
Most effective treatment for obesity & T2DM "remission"
BMI ≥ 40.0+ or ≥ 35 kg/m^2 & comorbidity

Cardiologist
Nuclear Stress Test
Calcium score CT
Transthoracic Echo
Heart failure clinic

Endocrinologist
Complex T2DM/T1DM Thyroid disorders/nodule, Cushing's syndrome

Exercise Physiologist
Cardiac/pulmonary rehab

Gastroenterologist/Hepatologist
Management of fatty liver, colonoscopy

Hematologist/Oncologist
Anemia, anemia of chronic disease

Obstetrician/gynecologist
Menorrhagia/Abnormal/worsening uterine bleeding: fibroids, endometriosis

Physical Therapist
Osteoarthritis, joint pain, order X-rays deconditioning, decreased mobility

Physical Therapist
Osteoarthritis, joint pain, order X-rays, deconditioning, decreased mobility

Psychotherapist/Social Worker
Trauma, sexual abuse, domestic violence

Pulmonologist/Sleep Specialist
Sleep study, COPD, PFT

Registered dietitian

Medical Weight Management
VA MOVE! https://www.move.va.gov

Screenings: mammogram, colonoscopy, prostate, osteopenia/osteoporosis

Vaccinations

Chiropractor
Medical massage therapy, you fill out letter of need for insurance coverage

Genetic Testing family history of CA
In Our DNA SC: mutations for **Breast & Ovarian Ca** (BRAC1, BRAC2), **Lynch Syndrome** (MLHA/2/6, PMS2, EPCAM)
Familial Hypercholesterolemia
https://www.musc.edu/community/in-our-dna-sc

SHINE Diabetes Prevention Program

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Interprofessional Team/Referrals

MUSC SHINE Diabetes Prevention
Supporting Health Improvement Nutrition and Exercise in Adults

Eligibility Criteria:

- **Age 18+**
- **BMI > 25 kg/m^2, > 23 if Asian**
- **No current or past diagnosis of diabetes or ESRD**
- **Prediabetes blood result**
  - **A1c:** 5.7 – 6.4%
  - **Fasting glucose:** 100-125 mg/dL Medicare coverage: **110**-125
  - **Glucose Tolerance Test:** 140-199 mg/dL

Program:

- **16 group sessions** during the first 6 **months**, **monthly meetings** thereafter, for **1 year**
- Sessions are offered on **Zoom and In-Person** (in Charleston, SC)
- Program cost is **covered by Medicare Part B and Advantage plans** (with co-pay)
- **Other insurance may be accepted**
- In **Epic** send **Ambulatory Referral** to Diabetes Prevention Program
- **MUSC eligible patients** receive notifications 3-4 x/yr regarding start times

https://muschealth.org/patients-visitors/population-health/diabetes-prevention-program

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NEW SLIDE: Physical Activity Evaluation for high risk patients in Charleston

General Wellness Program Roper Cardiac Rehab for non-cardiac/pulmonary patients

- Requires provider Rx for exercise: Epic or fax 843 792-1937
- Patients get **ONE baseline evaluation**: BP at rest, ECG while on treadmill, BP, pulse, O_2 sats after aerobic exercise ($75-110, Health Savings card)
  - Exercise physiologists can help customize a weight training routine
  - Evaluations are done Tuesdays and Fridays
  - Crash cart on premises
  - Small parking lot on Courtenay Drive.
- Patients can use gym facilities (monthly $50)

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NEW SLIDE: Other Issues/Resources

- **Shoes** with good support for exercise, properly fitted, replace every 6 months
  - **Fleet Feet** for proper fitting. Shoes will be more expensive than online. They will help people find the right type of shoe for the exercise type (walking, running, pickleball etc.) and foot support needed (Hoka, Addidas, Altra etc.). After shoe type and model can be ordered online. ($150 over 6 months (180 days) = $0.83/day)
- **Podiatry referral** for foot pain, plantar fasciitis, foot care
- **Dermatology referral** for skin issues, skin fold/mammary fold infections
- **Regular dental cleanings**: 2x/year and daily flossing
  - Obese patients have inflammation and research indicates poor oral hygiene increases the risk for respiratory diseases, CVD, and dementia
- **Use Heath Savings Card or CareCredit**
- **Use of Work Wellness programs:**
  - Blue365: Discounted* gym memberships, home-delivered meals can help with portion sizes, online weight loss programs
- **Increasing Physical Activity**
  - Walking at Hampton Park, Charleston Co Parks, Home Depot/Lowes/Mall
  - Silver sneakers program for Medicare patients
  - Senior citizens discounts: Charleston Co Parks $69 for Seniors 60+, $99
  - Add in 1-to-2-pound leg and/or hand weights as tolerated

Pathak et al (2021) *Respir Med*, *185*, 106475.
Tonelli et al (2023) *Nat Rev Cardiol*, *20*(6), 386-403
Liu et al *(2023) J Alzheimers Dis*, *91*(1), 129-150.

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Obesogenic Medications

Class	Medications	Mechanism of Weight Gain
Anticonvulsants/ Antimigraine Neuropathic pain	carbamazepine, gabapentin, pregabalin, valproic acid	Hypothalamic-mediated appetite stimulation and decreased energy expenditure
Antidepressants/ Antianxiety SSRI TCA	fluoxetine, paroxetine amitriptyline, nortriptyline, mirtazapine	Stimulation of serotonergic pathways resulting in appetite stimulation
Antihistamines	cetirizine diphenhydramine, fexofenadine, hydroxyzine, loratadine	Increased appetite Alters body regulation
Antipsychotics	olanzapine, quetiapine clozapine	Hypothalamus: increased orexigenic & decreased anorexigenic neuropeptide expression stimulating appetite
Beta-blockers	atenolol, carvedilol metoprolol, propranolol	Inhibited sympathetic tone, decreased lipolysis, reduced exercise tolerance, increased fatigue, reduced energy expenditure
Corticosteroids & Hormones	Oral contraceptive pills Medroxyprogesterone, prednisone	Alters energy intake & energy expenditure
Antidiabetic medications	Insulin: anabolic & adipogenic hormone sulfonylureas thiazolidinediones	Decreased energy expenditure Increased insulin secretion & water retention Insulin sensitizer causing water retention
Hypnotics	doxepin, mirtazapine	Increased appetite, increased sleeping
Opioids	All classes	Decreased metabolic rate and decreased exercise tolerance

Desalermos. Obesity (Silver Spring). 2019;27:716.
Cassidy. PLoS One. 2017;12:12:e0187982

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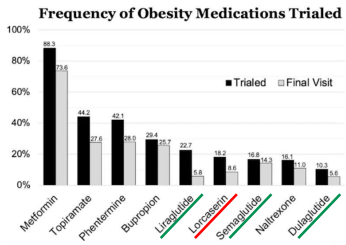
Significant Sustained Weight Loss with Non-GLP-1 Anti Obesity Medications*

Average % weight loss 10.4% with a mean follow up of 4.4 years



At Final Visit
- 65% taking > 2+ AOM
- Mean # AOM trialed 4.3
- 51% maximum weight loss regained
- 40.2% of patients maintained WL

Patients maintaining ≥ 10% WL
- **92% with unique AOM combinations**
- 13% metformin monotherapy
- 9% metformin, phentermine & topiramate

Predictors of > 10% weight loss
- More clinic visit
- Metformin
- Topiramate
- Bupropion

*Included both FDA approved and off label medications: metformin most successful
Lorcaserin removed from market due to increase cancer risks

Weintraub et al JCEM 2023; 108; e832-e841.

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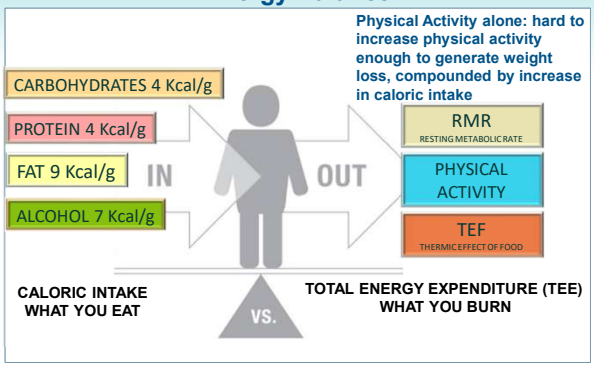
Energy Balance



Physical Activity alone: hard to increase physical activity enough to generate weight loss, compounded by increase in caloric intake

Thomas et al. (2016) Obes Rev 13(10):835-847

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Refer to a Registered Dietitian

RDs are licensed with a Master's degree, anyone can be a "nutritionist"
Can be associated with hospitals, Cardiac Rehab, clinics, or work independently
https://www.healthprofs.com/us/nutritionists-dietitians/south-carolina

- **Prescribe calorie deficit/day:**
  - **Weight loss goal 0.5-2 lbs./week** = Deficit of 500 to 750 Kcal/day
- **Track food intake** (monitor calories)
  - Apps: My Fitness Pal, Fitbit, Lose It! Weight Watchers
  - Track added sugar intake
  - Written food diaries: MUSC WMC
  - Follow AHA recommendations or decrease current intake
- **Emphasize high-quality foods & beverages**
  - Maximize vegetable intake
  - Minimize: added sugar |refined flour | trans fats
  - Focus on minimally processed foods prepared at home

There is NO Ideal diet

Set realistic goals, not Biggest Loser Fallacy of 10 lbs/week

Ge et al. (2020) *Bmj*, *369*, m696.

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Commercial Weight Loss Programs Can Be Beneficial

Gudzune, K.A. et al (**2015**) Ann Intern Med. (2015);162:501-512

Program CN counseling	Weight Loss	Intensity	Nutrition	Physical Activity	Behavior Strategy & Support
Weight Watchers **8 RCT: 6 control, 2 CN** **3 -24 months**	Control: 3.6-7.9% 6 mo 2.6% -3.2 12 mo CN: 0.8% 6 mo, 2.9% 12 mo	High	Low-calorie regular foods Point tracking	Tracking	Self-monitoring Group support Online forum, coach
Jenny Craig **3 RCT: 2 control, 1 CN** **6-24 months** CN: 4.7-5.8% 24 mo	Control: 7.5% 6 mo 6.4% 12 mo CN: 5.7-8.1% 6 mo 4.6-6.5% 12 mo	High	Low-calorie meal replacements	Encouraged	Self-monitoring Goal setting 1-on-1 counseling
Nutrisystem **3 RCT: 1 control, 2 CN** **3-6 months**	CN: 5.6% 6 mo	High	Low-calorie meal replacements	Exercise Plans	Self-monitoring 1-on-1 sessions Online forum
Atkins **8 RCT: 1 control, 7 CN** **3-24 months**	Control: 6.8% 6 mo CN: 0.1% - 2.9% 12 mo 1.0 – 1.9 24 mo	Self-directed	Low-carb foods Or meal replacements	Encouraged	Self-monitoring Online forum
SlimFast **8 RCT: 4 control, 4 CN** **3-51 months**	Control: 0.1-8.7% 6 mo 5.4% 27 mo CN: 0.3-8.7% 6 mo, 5.2% 51 mo	Self-directed	Low-calorie meal replacements	-	Self-weighing Online support Coaching texts
Very-Low-Calorie **9 RCT: 3 control, 5 CN** **4-6 months**	CN: MediF 5.6% 4 mo CN OptiF 4.9% 4 mo CN OptiF 9.2% 5 mo CN HMR 13.2 6 mo CN	**High** **HMR & OF: Medical supervision**	VLC meal replacements HMR/Medifast/Optifast	Encouraged	**MF:** Self-monitoring **HMR:** Goal setting **OF:** Problem solving **OF/MF:** 1-on-1, **HMR** group
Internet-based **3 RCT: 2 control, 1 CN** **3- months**	Biggest Loser Club 2.7% 3 mo eDiet No difference 12 mo Lose It! No difference 3 mo CN	Self-directed	Low-calorie meal plans Calorie tracking Low-calorie meal plans	Exercise Plans Tracking Tracking	All Online forum **eD** Online nutrition

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Commercial Weight Loss Programs Can Be Beneficial

Gudzune, K.A. et al (**2015**) Ann Intern Med. (2015);162:501-512

Program CN =counseling	Weight Loss	Intensity	Nutrition	Physical Activity	Behavior Strategy & Support
Weight Watchers **8 RCT: 6 control, 2 CN** **3 -24 months**	Control: 3.6-**7.9% 6 mo** 2.6 -3.2% 12 mo CN: 0.8% 6 mo, 2.9% 12 mo	High	Low-calorie regular foods Point tracking	Tracking	Self-monitoring Group support Online forum, coach
Jenny Craig **3 RCT: 2 control, 1 CN** 6-24 months CN: 4.7-5.8% 24 mo	Control: **7.5% 6 mo** **6.4% 12 mo** CN: **5.7-8.1% 6 mo** 4.6-**6.5% 12 mo**	High	Low-calorie meal replacements	Encouraged	Self-monitoring Goal setting 1-on-1 counseling
Nutrisystem **3 RCT: 1 control, 2 CN** **3-6 months**	CN: **5.6% 6 mo**	High	Low-calorie meal replacements	Exercise Plans	Self-monitoring 1-on-1 sessions Online forum
Atkins** **8 RCT: 1 control, 7 CN** **3-24 months**	**Control: 6.8% 6 mo** CN: 0.1% - 2.9% **12 mo**** 1.0 – 1.9 24 **mo****	Self-directed	Low-carb foods Or meal replacements	Encouraged	Self-monitoring Online forum
SlimFast **8 RCT: 4 control, 4 CN** **3-51 months**	Control: 0.1-8.7% 6 mo **5.4% 27 mo** CN: 0.3-**8.7% 6 mo, 5.2% 51 mo**	Self-directed	Low-calorie meal replacements	-	Self-weighing Online support Coaching texts
Very-Low-Calorie Meal Replacement **9 RCT: 3 control, 5 CN** **4-6 months**	CN: **MediF 5.6% 4 mo CN** OptiF 4.9% 4 mo CN **OptiF 9.2% 5 mo CN** **HMR 13.2 6 mo CN**	**High** **HMR & OF: Medical supervision**	VLC meal replacements HMR/Medifast/Optifast	Encouraged	**MF:** Self-monitoring **HMR:** Goal setting **OF:** Problem solving **OF/MF:** 1-on-1, **HMR** group
Internet-based **3 RCT: 2 control, 1 CN** **3- months**	Biggest Loser Club 2.7% 3 mo eDiet No difference 12 mo Lose It! No difference 3 mo CN	Self-directed	Low-calorie meal plans Calorie tracking Low-calorie meal plans	Exercise Plans Tracking Tracking	All Online forum **eD** Online nutrition

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Review Weight Loss Risks

Additional GLP-1/GIP concerns
***STOP injections**

- **Acute Pancreatitis***
- **Intestinal obstruction*** ileus, bowel obstruction
- **Hypersensitivity*** hives to anaphylaxis
- Hypotension (Add electrolytes, review meds)
- **Development of antibodies** to **GLP-1/GIP** making injections ineffective (10-15%)
- **Pregnancy* WOCBP on effective BC and multivitamin**
- **Alopecia** (Add multivitamin)
- **Aspiration with general anesthesia**
- **Diabetic retinopathy*** (T2 DM)
- **Hypoglycemia*** (T2DM)
- Pancreatic cancer*
- Medullary thyroid cancer* in rodents

With Any Significant Weight Loss

- **Risk of gallstones**
- **Increased liver enzymes temporary**
- **Fatigue** (Add B Complex Vitamins)
- **Increased risk of blood clots due to water** shifts (loss from vascular space)
  - Encourage use of **compression sock during travel or prolonged standing**
- **Review BE FAST signs of stroke**
- **Review signs & symptoms of heart attack in men vs women**

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Pen Injections

General Instructions
Store in refrigerator Protect from light (keep in box), do not leave pens in sunlight Protect from extreme temperatures, freezing or heating Protect from liquid spills: Wet box means pens are NOT sterile
Check expiration date before injecting
Pen solution should be clear, not cloudy, no crystals (pen is frozen)
Bubbles are OK
Goal: Inject the same day of the week, NOT on an empty stomach, NOT Bedtime
Sites: abdomen 2" or more from belly button, outer thigh, back of arm **NOT underarm** like demonstrated on TV commercials: RISK OF INFECTION
AVOID: stretch marks, scars, scratches, moles, rashes, bruises
Rotate sites week to week
If cap comes off easily, or you pull off cap and forget to inject, the needle is NOT sterile, Do NOT use
If pen appears damaged, cracked or see cracks in vial Do NOT USE
If power is lost, and food in fridge spoils, assume pens have come to room temp
DO NOT INJECT WHEN SICK: Diarrhea/Vomiting OR Sleeping and not eating

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Pen Injections

	Semaglutide 0.25, 0.5, 1.0, 1.7, 2.4 mg	Tirzepatide 5.0, 7.5, 10.0, 12.5, 15.0 mg
Solution	Clear, no color	Clear to slightly yellow
At Room Temp Can pack for travel unrefrigerated	Good for 14 days	Good for 21 days
If dose is skipped	• < 21 days from previous injection, stay at same dose • 21 - 27 days, decrease one dose • 28 - 35 days decrease two doses • > 35 days, restart at 0.25 mg	• < 21 days from previous injection, stay at same dose • > 21 days restart at 5 mg
Dosing Window if goal day missed	• **5-day window** • **> 48 hours between consecutive doses**	• **3-day window** • **> 96 hours between consecutive doses**
If dropped	Inspect for damage if no damage, OK to use	DO NOT USE

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Managing GPL-1/GIP Adverse Reactions

Nausea/Vomiting Heartburn/GERD Gas/Bloating

Do NOT skip breakfast, Can be snack

Nausea/Vomiting, inject **AFTER dinner but NOT at bedtime**

Stop after eating half of regular meal
Avoid seconds/refills, large portions
Choose appetizers/small plates/salads/sides
Increase fruits and vegetables
Split main entrees/large appetizers (ask for box at serving)
Avoid fatty meals (fried/heavy cream, lard, oil, butter)

Drink fluids, 64 oz all sources

4-5 snacks/day instead of 3 meals, don't eat if not hungry

Home remedies/OCT/Prescriptions

Nausea/Vomiting	Heartburn/GERD
Fresh ginger root, nickel size chew until zing, park in cheek, repeat until no zing, new piece	**Fast-Acting** Tums/Rolaids/calcium carbonate Pepcid Complete Pepto Bismol
Ginger lozenge/ ginger chew	**Long-Acting** omeprazole/famotidine
Pepto Bismol/Kaopectate	**Bloating/Gas**
Multiple vomiting episodes Call PCP for **Zofran Rx**	Gas-X/Mylanta Gas Minis/ simethicone
	Beno capsules before meals
	Remove constrictions/tight clothes

Constipation

Ideal BM: smooth log, easy to pass no strain. If log not that = constipation. Report to PCP frank blood, tarry stool, coffee ground stool

Drink fluids, 64 oz all sources
Increase fiber
Fruit, vegetables, whole grains
Fiber supplement powder

Exercise will help peristalsis
Remove abdominal constrictions/tight clothing

Try to eat at same time every day

Call PCP if no BM within 3-4 days of injection or symptomatic

Over the Counter Options

Fiber supplement powder, not capsules/chews
Metamucil/ Citrucel/ Benefiber (not BF if gluten sensitive)

MiraLAX/ polyethylene glycol/ non-stimulant laxative
OK to use long-term

Colace/ docusate stool softener

If fiber/laxative/stool softener not effective, no BM w/in 3-4 days REMAIN AT HOME, CLOSE TO TOILET
1. Milk of Magnesia: 30 ml in 4 oz prune juice, wait 4-8 hrs, repeat
2. Bottle of Magnesium Citrate: 4oz over ice, wait 4 hrs, repeat
If blockage/hardness at anus:
1. Glycerin suppositories to soften stool at opening
2. Fleet enema

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Managing GPL-1/GIP Adverse Reactions

Diarrhea Food Poisoning/Gastroenteritis/Noro

Stay hydrated: 64+ oz fluid including 8 – 10 oz electrolytes G Zero/Propel Zero/Pedialyte/hydration powders; Avoid Na > 300 mg. Broth counts as fluids. OK but Na often > 300 mg

If food poisoning/gastroenteritis/Noro HOLD INJECTION

Eat bland easy to digest diet: apple sauce, banana, cooked carrots, rice, pasta, bread, crackers, oatmeal, mashed potatoes, clear broth. As improve add in plain chicken/turkey, eggs, yogurt/kefir if not lactose intolerant. Normal diet when tolerated.

Reduce Milk products & derivatives

Reduce fat intake and avoid triggers
Avoid: fatty, greasy or fried foods, spicy foods, caffeine and alcohol

Over the Counter Options

If mild, add **Fiber supplement powder, not capsules/chews**
Metamucil/ Citrucel/ Benefiber (not BF if gluten sensitive

Pepto Bismol/Kaopectate

Liquid Imodium (loperamide): liquid allows lower dosing, start with 1 mg (7.5 mL) after each loose stool. Watch for rebound constipation

On GLP-1 with ongoing diarrhea, call PCP, HOLD INJECTION

Injection Site Reactions

Look/feel for the following symptoms at injection location every day for first 2 injections (14 days) then periodically while injecting

1. Pain/tenderness
2. Itchiness
3. Swelling at site
4. Redness
5. Infection
6. Hardening: skin at site feels different from surrounding skin

Note the date the symptom appeared, take photos, measure maximum length and width

Call PCP with details of injection site reaction (Bruising is to be expected and is not an injection site reaction).

Serious Reaction Call 911, SEEK IMMEDIATE ATTENTION

Hives
Shortness of breath
Swelling of tongue, lips or throat

Over the Counter Options

If you develop a minor issue (top list 1-4), take 30-60 min prior to weekly injection:

1. **Benadryl** (diphenhydramine) **25 mg (1 tablet).** This could make you sleepy. Swallow pill at home and DO NOT drive/use heavy machinery. Do NOT take with alcohol. This might mean you inject later in the day than you did previously. Do NOT take Benadryl more than 60 min before injection.
2. **Pepcid** (famotidine) **10 mg (1 tablet).** If you cannot take Pepcid 30 to 60 min prior to injection, you can take it earlier in the day.

Do NOT inject at Bedtime, Change body location of injection

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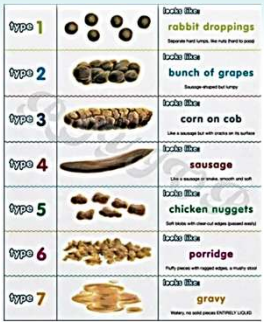
Bristol Stool Scale



Type 1 and 2
Constipation

Type 3 Normal
BUT if straining Constipation

Type 4 GOAL
Normal

Type 5
Might improve with fiber

Type 6 & 7
Diarrhea

https://www.walmart.com/search?q=bristol%20stool%20chart&typeahead=bristol%20sto

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Case Study 1

Cassie 25 yr old C female Calls office for GLP-1 prescription so she can lose 55 pounds prior to wedding in Sep 2027. **Office visit New patient** **Wt: 225 lb Ht: 67.5" BMI 34.7 kg/m² Waist at iliac: 36.0"** No reported chronic disease, no medications. Heterosexually active since age 18, uses no contraceptives and no histories of pregnancies, fiancé uses condoms ~50% time. Plans to start a family in future. Scared of needles, faints during blood draws. Basketball player in HS. Min weight: 150 lbs, Max Wt: 225 lbs. for 1 yr. Reports BM every other day "rabbit pellets". Paying out of pocket as insurance will not cover weight loss meds **Resting BP: 130/82** **PE:** Hirsutism on chin and abdomen, scattered acrochordons on truck. Abdominal adiposity, flesh-colored striae, diastasis recti 11 cm long x 8 cm wide. Otherwise, normal PHQ-9 Score 3	**Medications/Treatment** NEEDS BIRTH CONTROL **Add daily fiber supplement** **Add daily multivitamin** **Oral semaglutide** start at 3 mg for 30 days, 7 mg 30 days, 14 mg 30 days, 25 mg 30 days, 50 mg **Not able to eRx.** **She would need online Rx** **semaglutide injections** 0.25 mg for 4 wks, 0.5 mg for 4 wks, 1.0 mg for 4 wks, 1.7 mg for 4 wks, 2.4 mg maintenance **Phentermine 37.5 mg QD** **Referral to registered dietitian** **Increase physical activity 150 min/wk** **She picks phentermine**
Labs: A1c 6.6%, Fasting glucose 130 mg/dL CBC WML CMP WML, TSH WNL, Lipids: TC 205: LDL: 150, HDL: 55 VLDL: 20. Insurance will cover diabetes medications **What should you caution about metformin? If diarrhea, stop fiber**	**Add on semaglutide injections** 0.25 mg for 4 wks, 0.5 mg for 4 wks, 1.0 mg for 4 wks, 1.7 mg for 4 wks, 2.4 mg maintenance **Add on Metformin ER, 500 mg QPM,** increase 500 mg/day Q wk as tolerated
When should she be seen in clinic?	**Ideal: 2- 4 weeks**

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Case Study 2

Thom 60 yr old A male **Established patient** **Wt: 210 lb Ht: 65.0" BMI 34.7 kg/m² Waist at iliac: 36.0"** BP managed on lisinopril 10 mg QD. Dyslipidemia managed on atorvastatin 20 mg QD. Heterosexually active since with wife in menopause. Works at **Google**, but worried he will be downsized in favor of younger workers. Admits started drinking 2-3 beers per night last 3 months. Wife is complaining that he snores. Min weight: 140 lbs until age 45, Max Wt: 225 lbs. Lost 15 pounds with diet and exercise since last year. Reports BM daily, smooth no problems. He heard about hCG drops from his chiropractor and wonders if that would work for him. He started seeing chiropractor for back pain following a MVA 2 months ago. He is taking Tylenol 1000 mg BID for back pain. He has not been evaluated for the back pain. **Resting BP: 120/80** **PHQ-9 11** **PE:** Neck circumference 16.5". Class II Mallampati Scale, Abdominal adiposity, flesh-colored striae. Bilateral knee crepitus, lumbar spine pain.	**Medication Options** **Referral for SLEEP STUDY** **Referral for Depression/Anxiety** **Spinal X-rays** **Tirzepatide injections** 2.5 mg for 4 wks, 5 mg for 4 wks, 7.5 mg for 4 wks, 10 mg for 4 wks, 12.5 m, 15 mg maintenance **Why tirzepatide?** **May also help decrease EtOH** **What else do you advise?** **STOP Tylenol** **STOP/Decrease EtOH** **Referral to registered dietitian** **Increase physical activity 150 min/wk**
Labs: AST: 70 ALT: 92 Platelets: 450 x 10^9 Remaining CBC WNL TSH WNL, Lipids: WNL You call him he denies fatigue, nausea, vomiting, abdominal pain/tenderness/ fever/rash. **Continue tirzepatide** **What do you advise him with tirzepatide? Repeat CMP & PT/INR in 7 days**	**Fib-4 score 1.44 Refer to hepatologist** **Normal AST < 40, ALT < 33** **His AST 1.75 X ULN, ALT 2.79 x ULN**
When should he be seen in clinic?	**Ideal: 7-10 days for Focal PE and to review repeated labs**

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Case Study 3

Rosa 45 yr old H female **Established patient** **Wt: 150 lb Ht: 60.0" BMI 29.3 kg/m² Waist at iliac: 33.0"** BP managed on metoprolol ER 25 mg QD. She complains she started gaining weight gradually since starting metoprolol 9 months ago and started bruising more easily. She states her husband complains she is moodier but she attributes this to helping her first child plan her wedding. Min weight: 120 lbs. until age 35, Max Wt: 150 lbs. She wants to get down to 135 lbs. prior to daughter's wedding in 6 months. S/P bilateral tubal ligation. Heterosexually active with husband. No insurance. Had prior success with phentermine. **Resting BP: 123/83** **PHQ-9 Score 5** **PE:** Abdominal adiposity, purple-colored striae. No excess fat on legs. Small adipose pad base of neck/shoulder. Bilateral knee crepitus. Hirsutism on chin. What would advise about phentermine or other weight loss meds?	**Medication Options** **Referral to endocrinology for Cushings's evaluation** **Stop metoprolol** **Start lisinopril 5mg QD** **No weight loss medications, let endocrinologist handle** **Why stop metoprolol?** **Beta blockers can be associated with weight gain, she made a connection** **What else do you advise?** **Referral to registered dietitian** **Weight Watcher's** **Increase physical activity 150 min/wk**
Labs: WNL	
When should she be seen in clinic?	**4 weeks BP check?**

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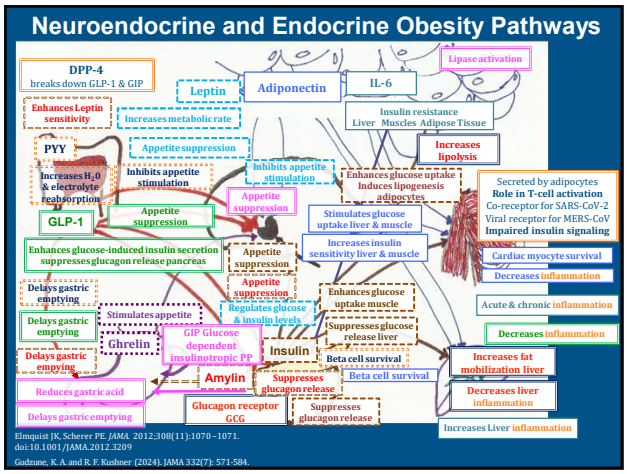
Neuroendocrine and Endocrine Obesity Pathways
DPP-4
breaks down GLP-1 & GIP
Leptin
Adiponectin
IL-6
Lipase activation
Enhances Leptin sensitivity
Increases metabolic rate
Insulin resistance
Liver Muscles Adipose Tissue
PYY
Appetite suppression
Increases lipolysis
Increases H2O & electrolyte reabsorption
Inhibits appetite stimulation
Inhibits appetite stimulation
Enhances glucose uptake
Induces lipogenesis adipocytes
Secreted by adipocytes
Role in T-cell activation
Co-receptor for SARS-CoV-2
Viral receptor for MERS-CoV
Impaired insulin signaling
Appetite suppression
GLP-1
Appetite suppression
Stimulates glucose uptake liver & muscle
Increases insulin sensitivity liver & muscle
Cardiac myocyte survival
Enhances glucose-induced insulin secretion
suppresses glucagon release pancreas
Appetite suppression
Decreases inflammation
Delays gastric emptying
Appetite suppression
Enhances glucose uptake muscle
Acute & chronic inflammation
Delays gastric emptying
Stimulates appetite
Regulates glucose & insulin levels
Suppresses glucose release liver
Decreases inflammation
Ghrelin
GIP Glucose dependent insulinotropic PP
Insulin
Beta cell survival
Increases fat mobilization liver
Delays gastric emptying
Amylin
Suppresses glucagon release
Beta cell survival
Reduces gastric acid
Glucagon receptor GCG
Suppresses glucagon release
Decreases liver inflammation
Delays gastric emptying
Increases Liver inflammation
Elmquist JK, Scherer PE. JAMA. 2012;308(11):1070–1071.
doi:10.1001/JAMA.2012.3209
Gudzune, K. A. and R. F. Kushner (2024). JAMA 332(7): 571-584.

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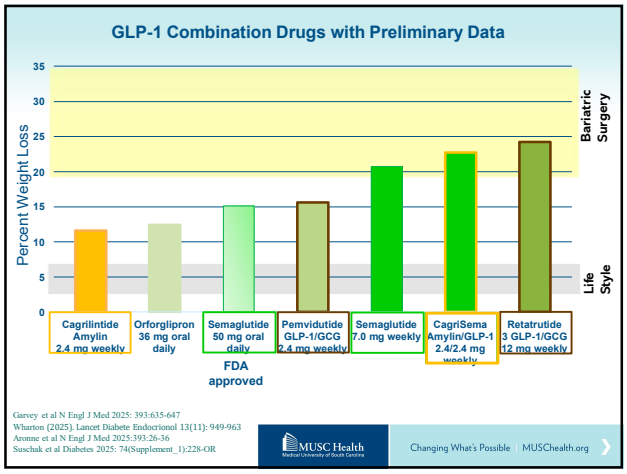
GLP-1 Combination Drugs with Preliminary Data
Percent Weight Loss
35
30
25
20
15
10
5
0
Bariatric Surgery
Life Style
Cagrilintide Amylin 2.4 mg weekly
Orforglipron 36 mg oral daily
Semaglutide 50 mg oral daily
Pemvidutide GLP-1/GCG 2.4 mg weekly
Semaglutide 7.0 mg weekly
CagriSema Amylin/GLP-1 2.4/2.4 mg weekly
Retatrutide 3 GLP-1/GCG 12 mg weekly
FDA approved
Garvey et al N Engl J Med 2025: 393:635-647
Wharton (2025). Lancet Diabete Endocrionol 13(11): 949-963
Aronne et al N Engl J Med 2025:393:26-36
Suschak et al Diabetes 2025: 74(Supplement_1):228-OR
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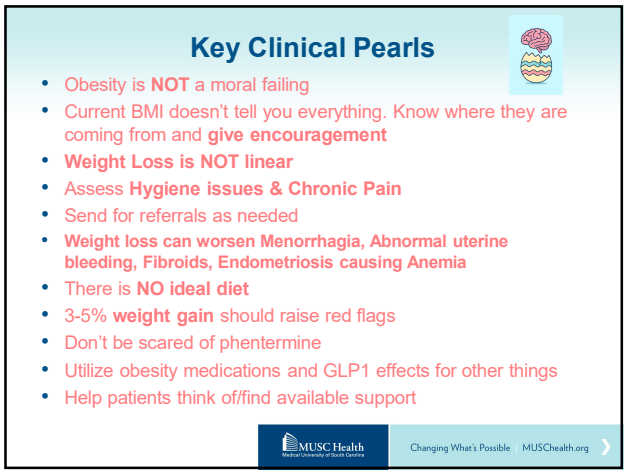
Key Clinical Pearls
Obesity is NOT a moral failing
Current BMI doesn't tell you everything. Know where they are coming from and give encouragement
Weight Loss is NOT linear
Assess Hygiene issues & Chronic Pain
Send for referrals as needed
Weight loss can worsen Menorrhagia, Abnormal uterine bleeding, Fibroids, Endometriosis causing Anemia
There is NO ideal diet
3-5% weight gain should raise red flags
Don't be scared of phentermine
Utilize obesity medications and GLP1 effects for other things
Help patients think of/find available support
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Summary

- **You will see these patients**
- **Will you be prescribing anti-obesity medications, GLP1s, GLP1/GIP?**
  - **No**, **maybe not right now**. Too many barriers.
    - Prior Authorizations
    - Developing Nutritional Resources
    - Developing Ambulatory Referrals to Specialists and Weight Management Clinics
    - In Person vs Telehealth vs MyChart patient contact/follow up
  - **Yes**
    - Patients need support with lifestyle/nutrition
    - Ambulatory Referral to Specialists & Weight Management Clinics
- **Treat obesity as a chronic, biologically driven disease**
- **Monitor weight closely when starting a medication and choose wisely**
- **Make it easier for patients to get care for obesity**

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Thanks!

Acknowledgements: Note I take responsibility for any mistakes in this presentation

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Clinical **Nutrition** Manager
MUHA SYS --Chief Operation Officer Administrator
Formerly Lead Dietitian for MUSC Weight Management Center
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Advancing Obesity Care: Leveraging Evidence-Based Medicine and Shared Decision-Making for Effective Weight Management CME/CE video series.

PESI Health Anti-Obesity (AOMs) for short and Long-Term Pharmacotherapy Treatment (Digital Seminar) by Pamela Moye, PharmD, BCPS.

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