Weitzman Institute
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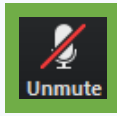
The France Foundation

Welcome to Weight MANAGEMENT in Community Health:

Bridging Systems & Care Coordination

We will begin at 1 PM ET/10 AM PT



Please keep your microphones on mute for now to avoid background noise.
You are muted if there is a red line across your microphone icon.

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Weight MANAGEMENT

in Community Health:

Bridging Systems & Care Coordination

ECHO Session #1:

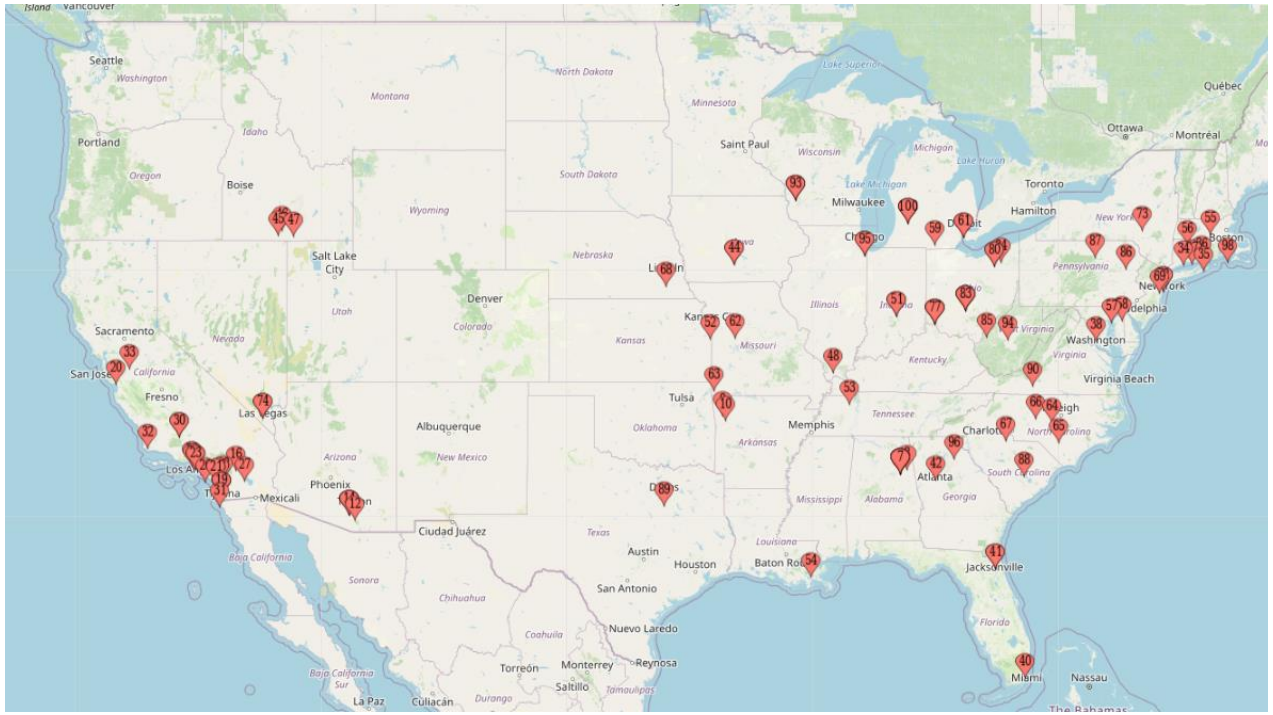
Biology of Obesity

Today's Agenda

- Welcome
- Overview of Technology and Reminders
- Faculty Introductions
- The Biology of Obesity
- Case Presentation

Health Centers Participating in Series

100 Participants from **65** Organizations
29 different states or US territories represented



- Access Family Care
- Ascension
- Bassett Healthcare Network
- Beacon Christian Community Health
- Buckeye Health Plan
- Cecil County Public Schools
- Center for Family Health
- Centerpoint Health
- Childrens' Aid
- Clinica Sierra Vista
- Community Health Center
- Community Health Centers
- Community Health Connections
- Community of Hope
- Concern Professional Services for Children, Youth, and Families
- Exodus Clinical Counseling Services
- Family Health Center, dba Sunset Park Health Council Inc.
- Family Health Centers San Diego
- Family Health Services
- Four Rivers Behavioral Health
- Hartford County Health Department
- Hartford Healthcare
- HCC Network
- Health Plan of San Joaquin
- HHM Health
- Hi-Desert Memorial Health Care District
- Higher Education
- Hilltown Community Health Center
- Hopewell Health Centers
- Indiana Health Centers
- KCMO
- Kintegra Health
- Lower Lights Christian Health Center
- LSUHSC School Based Health Center
- Marana Healthcare
- Medlink Georgia
- MHC Healthcare
- Minnie Hamilton Health System
- Mount Sinai Health System
- N/A
- Nebraska DHHS
- Neighborhood Healthcare
- New Horizons Healthcare
- Northeast Valley Health Corporation
- Nottawaseppi Huron Band of the Potawatomi Health
- PACE Place
- PCC Community Wellness Center
- Pediatric Associates of CT
- Piedmont Health Services
- Primary Health Care
- Quality of Life Health Services
- Roots Community Health
- Scenic Bluffs Community Health Center
- Shawnee Health
- St. Francis NWA, Inc., dba as Community Clinic
- Stedman-Wade Health Services, Inc.
- Tandem Health
- The Centers
- The Ohio State University Total Health and Wellness Clinic
- The Wright Center for Community Health
- Triad Adult & Pediatric Medicine
- UCI School of Nursing
- UF Health Pediatrics at Blanding

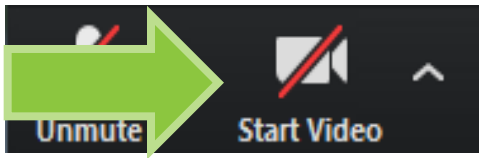
Technology: Your Zoom Window

Sound

- Muting/Unmuting
- Press *6 to unmute phone audio

Webcam

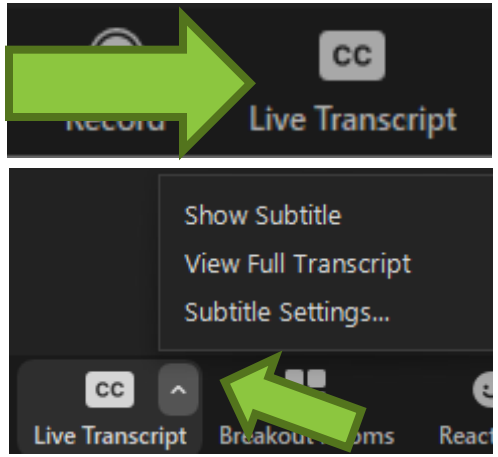
- Please share!



Chat

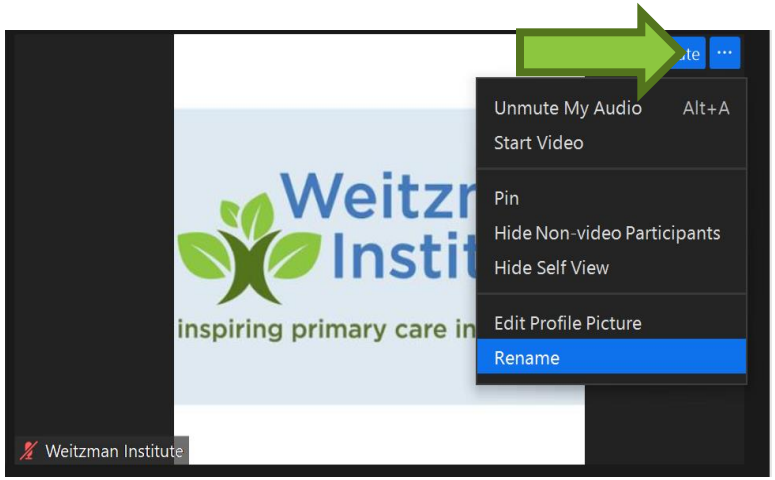
- Questions
- Sharing resources/ideas

Technology: Your Zoom Window



Closed Captioning & Live Transcript

- Click on the caret or icon
- Select ‘show subtitles’ for closed captioning on screen
- Select ‘view full transcript’ for live transcript pop-out window



Change Your Name

- Click on the three dots
- Click ‘Rename’
- Type in your name, health center, and pronouns

Important Program Logistics

Completing the Enrollment Pre-Series Form

- Survey link in the chat
- Link in email from Weitzman Evaluation Team
- Please complete before the next session

Submitting a Case

- **What:** Any patient or client case related to *obesity or weight management* that you find educational, challenging, or interesting!
- **When**: Schedule ahead of time with Emma, warshae@mwhs1.com
- **How:** Virtual Case Form sent to you via email
- Do NOT include patient identifying information

Continuing Education Credits

In support of improving patient care, Moses Weitzman Health System is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education (ACPE), and the American Nurses Credentialing Center (ANCC) to provide continuing education for the healthcare team.

This series is intended for primary care providers, behavioral health providers, dietitians, nurses, and other members of the care team.

Please complete the survey and claim your post-session certificate on the WeP after today's session.

You will be able to claim a comprehensive certificate on the WeP at the end of the ECHO series on April 10, 2025.

JOINT ACCREDITATION™
INTERPROFESSIONAL CONTINUING EDUCATION

Program Logistics Post-Session:

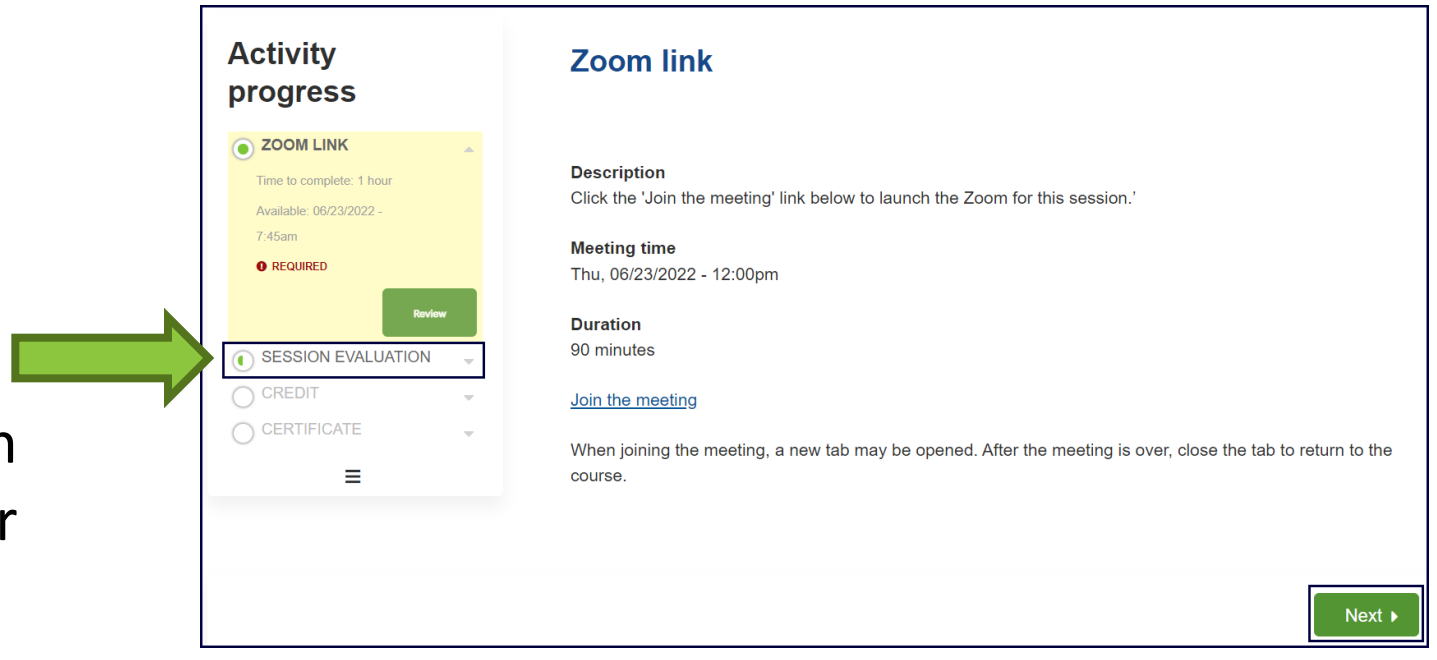
Completing the Session Evaluation & Claiming Your CME/CE Credit

After the live session has ended,

- Select the **Next button**

OR

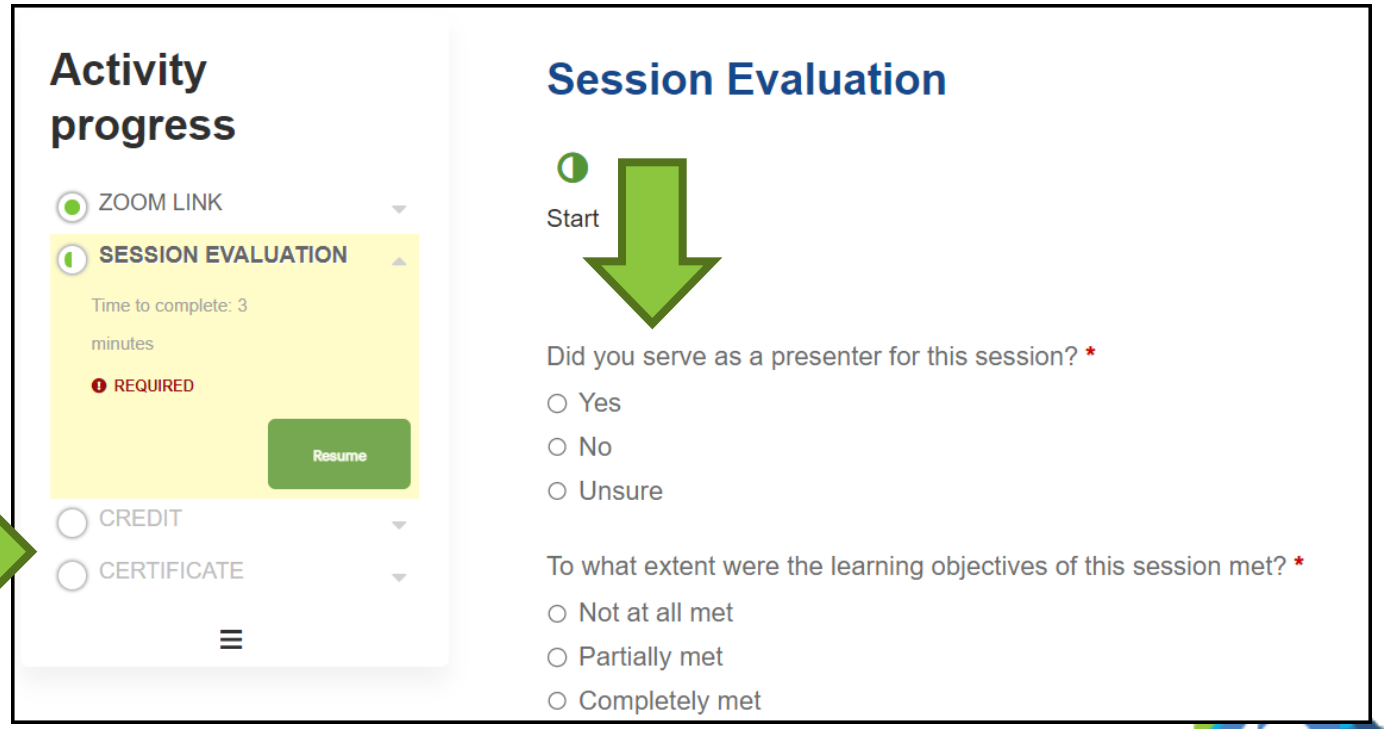
- Select **Session Evaluation** in the left-hand navigation bar



Program Logistics Post-Session:

Completing the Session Evaluation & Claiming Your CME/CE Credit

1. Complete the questions in the session evaluation.
2. Select the **Submit** button at the bottom of the evaluation.
3. View your credits awarded and download your certificate by selecting them in the left-hand navigation bar.



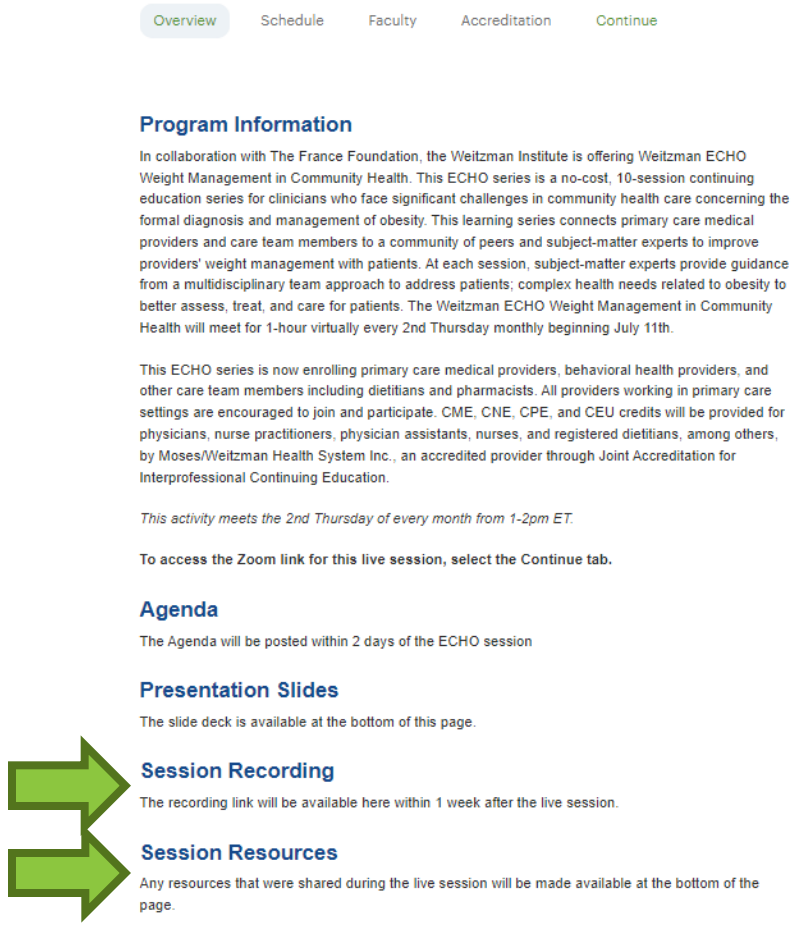
Program Logistics: Session Recordings & Materials

All session recordings and materials shared during the session will be available on the Weitzman Education Platform within one week of each session

1. Return to the **Overview tab** of the ECHO session, *Weitzman ECHO Weight Management in Community Health (July 11, 2024)*
2. Scroll down to the **Session Recording and Session Resources** headers

You will then be able to click on **Session Recording and Session Resources** listed below the headers to access the resources.

Instructions will be shared with you after this session.



Acknowledgements

- This activity is supported by an independent medical educational grant from Lilly

At the Weitzman Institute, we value a culture of equity, inclusiveness, diversity, and mutually respectful dialogue. We want to ensure that all feel welcome.

If there is anything said in our program that makes you feel uncomfortable, please let us know.

Disclosure

- With respect to the following presentation, there has been no relevant (direct or indirect) financial relationship between the party listed above (or spouse) and any for-profit company in the past 12 months which would be considered a conflict of interest
- The views expressed in this presentation are those of the presenter and may not reflect official policy of Moses/Weitzman Health System and its Weitzman Institute
- We are obligated to disclose any products which are off-label, unlabeled, experimental, and/or under investigation (not FDA approved) and any limitations on the information that I present, such as data that are preliminary or that represent ongoing research, interim analyses,
  and/or unsupported opinion

Weight Management Expert Faculty

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Tucson, AZ

Series Learning Objectives

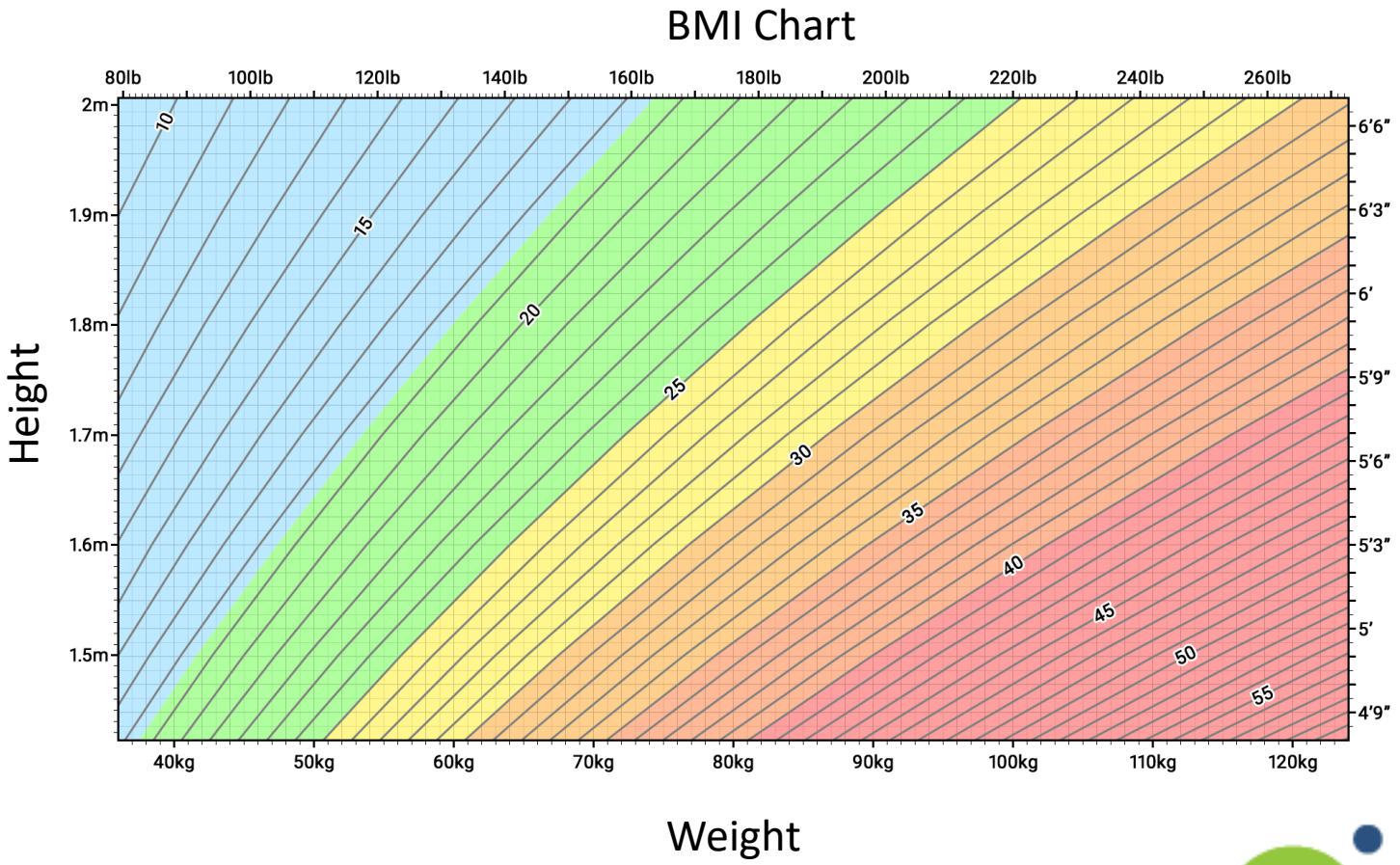
- Outline factors which impact obesity risk and outcomes
- Identify strategies to address barriers to initiating discussions of weight with patients with obesity in the community health setting
- Utilize evidence-based interventions to diagnose patients with obesity in the community health setting
- Identify effective multi- and inter-disciplinary are strategies to manage the care of patients with obesity in the community health setting

ECHO 1: Learning Objectives

- Outline the factors which impact obesity risk and outcomes
- Understand the role of genetics in obesity and the impact on molecular pathways
- Describe how environmental stimuli and lifestyle can lead to obesity

Overview of Obesity and Overweight

- Overweight and obesity are defined as abnormal or excessive fat accumulation that presents a risk to health
  - A body mass index (BMI) over 25 is considered overweight, and over 30 is obese
- Overweight and obesity raise the risk of cardiovascular disease, including coronary heart disease, type 2 diabetes, asthma, high cholesterol, osteoarthritis, high blood pressure, sleep apnea, and certain types of cancer



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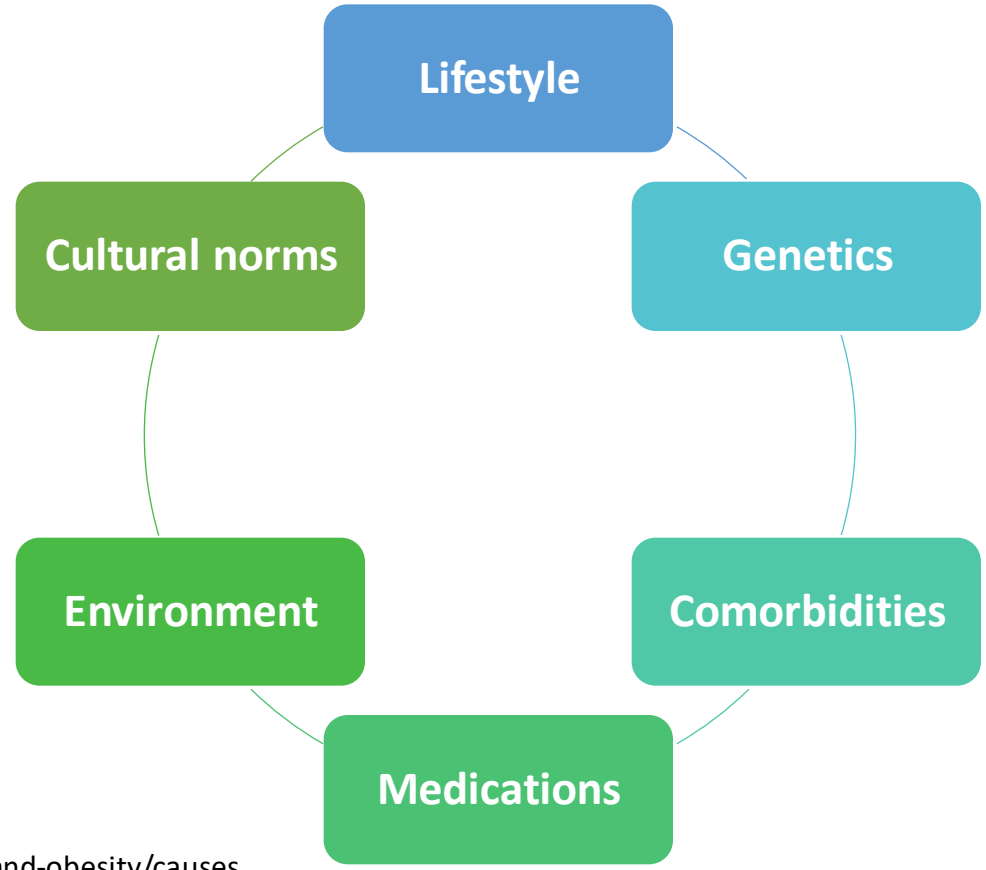
Causes of Obesity and Overweight

- Overweight/Obesity is a clinical outcome impacted by multiple modifiable and non-modifiable factors including:



https://www.nhlbi.nih.gov/health/overweight-and-obesity/causes

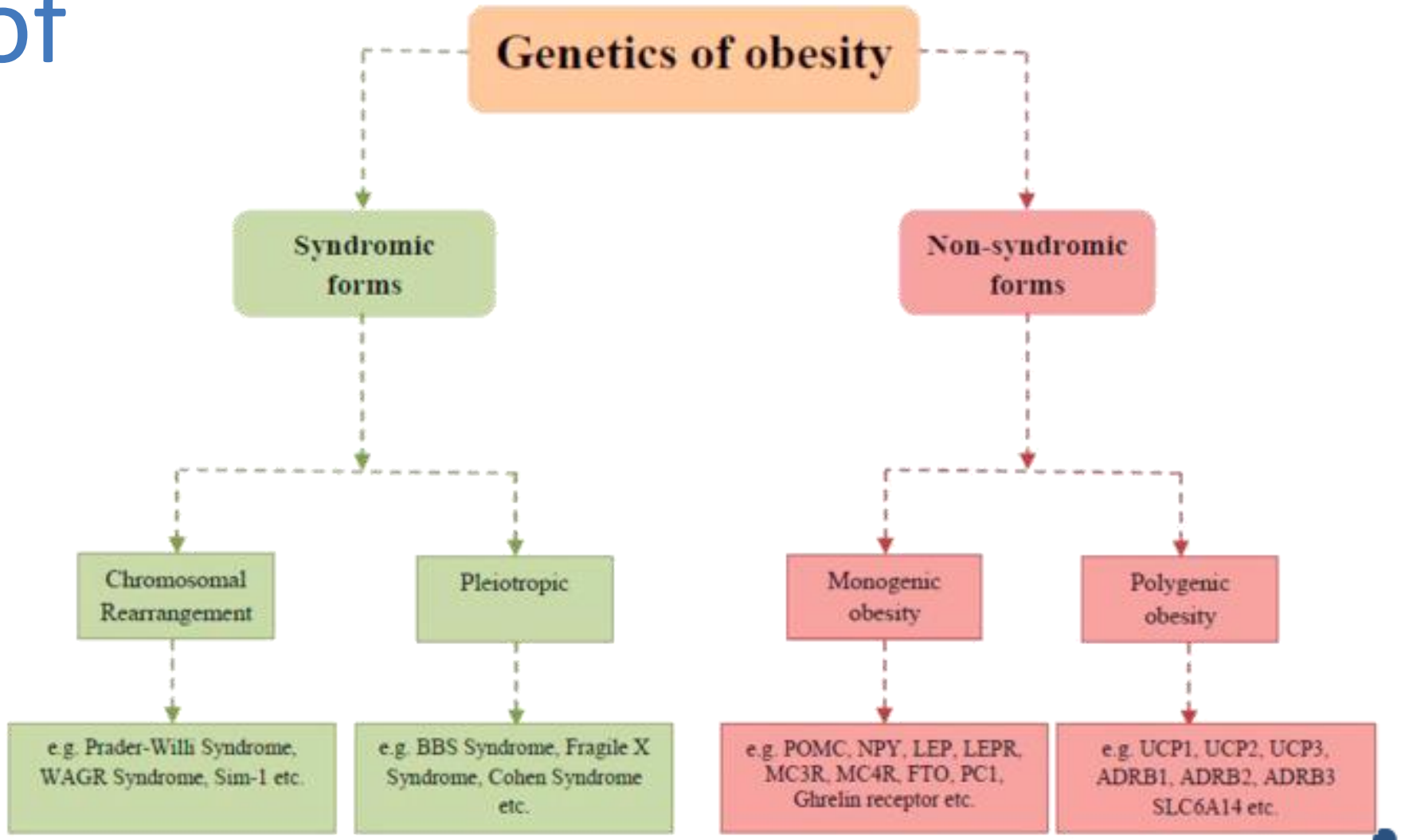
Modifiable Environmental and Lifestyle Factors Associated With Obesity/Overweight

Causative Agent	Examples	Select Involved Genes
Obesogenic chemicals	BPA, phthalates, pesticides	Examples include: *SREBP, IGF2R, PPARG*
Dietary factors	Excess food intake, energy imbalance, high-fat diet, poor nutrition	Examples include: *PPARG, MC4R, HDAC, POMC, NPY, LEPR*
Physical activity	Sedentary lifestyle, lack of exercise	Examples include: *PGC1a, KCNQ1, HHEX, IGF2BP2, JAZF1, TCF7L2*
Sleep deprivation	Insomnia, sleep disturbances	Examples include: *CLOCK, BMAL1, Cry1, Cry2, Per1*
Alcohol intake	Chronic alcohol intake, alcoholism	Examples include: *POMC, SCNA, BDNF, ALDH1L2, GABRP, GAD1, DBH*
Weight loss intervention	Hypocaloric diet, exercise regimens, bariatric surgery	*TNF, LEP, KCNA3, INSM1, SERPINE-1*
Epigenetic drugs	HDAC inhibitors, semaglutide, liraglutide	*HDAC, HDM, DNMT, PRMT*

Mahmoud AM. *Int J Mol Sci*. 2022;23(3):1341.

Genetics of Obesity

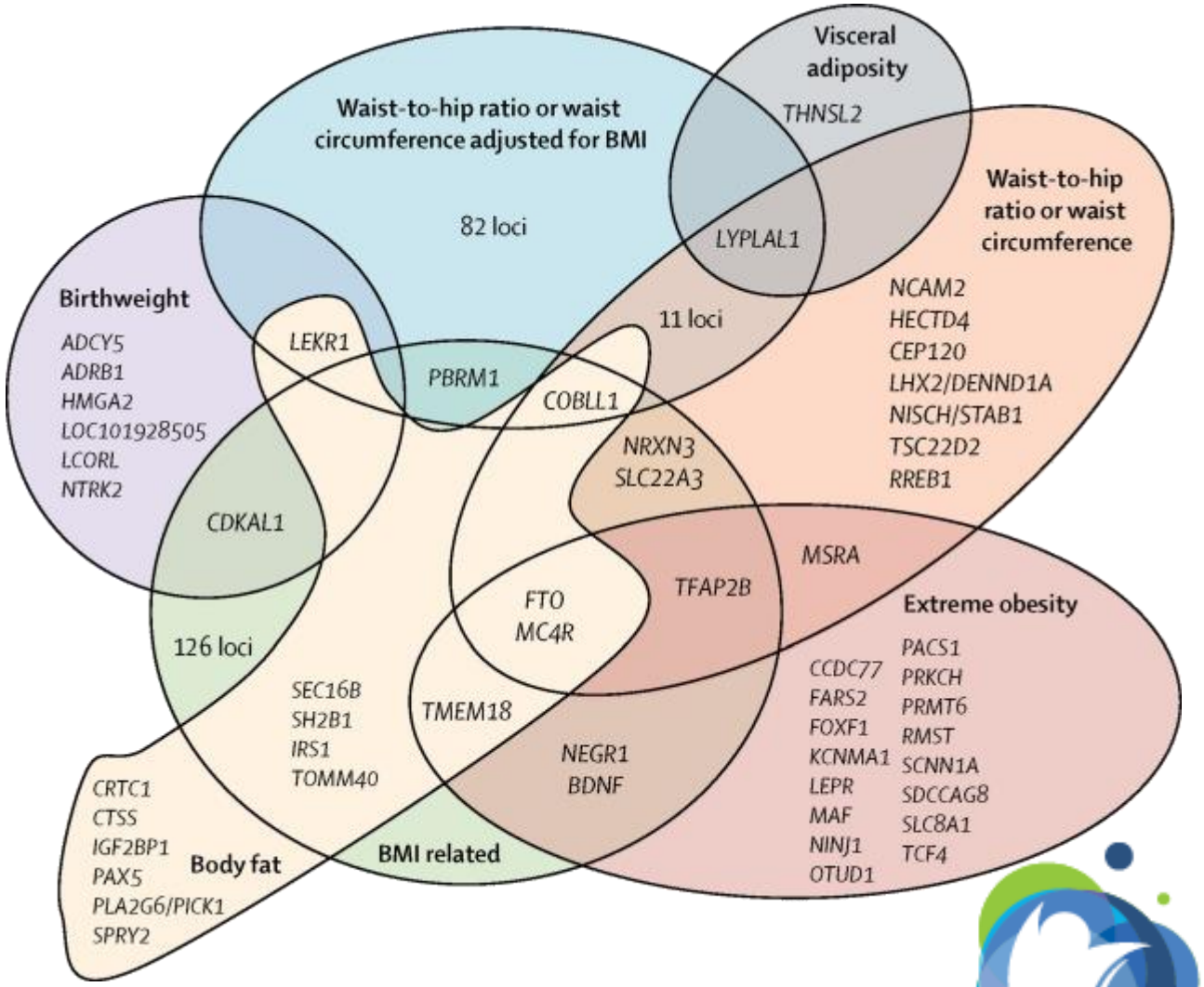
Individual genetics are non-modifiable risk factors that influence both the weight gain and weight loss experiences of patients



Qasim A, et al. *Obes Rev*. 2018;19(2):121-149; Singh RK, Kumar P, Mahalingam K. *C R Biol*. 2017;340(2):87-108; Tirthani E, Said MS, Rehman A. Genetics and Obesity. [Updated 2023 Jul 31]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK573068/

Genome-Wide Association Studies

- Genome-wide association studies (GWAS) identify genetic variations associated with disease risk or specific traits
- Genomes of many individuals are analyzed for variations that occur more frequently with a disease or trait
- Identified variations are used to investigate nearby genetic markers directly linked to the disease or trait
- GWAS has revealed over 200 loci associated with obesity and overweight

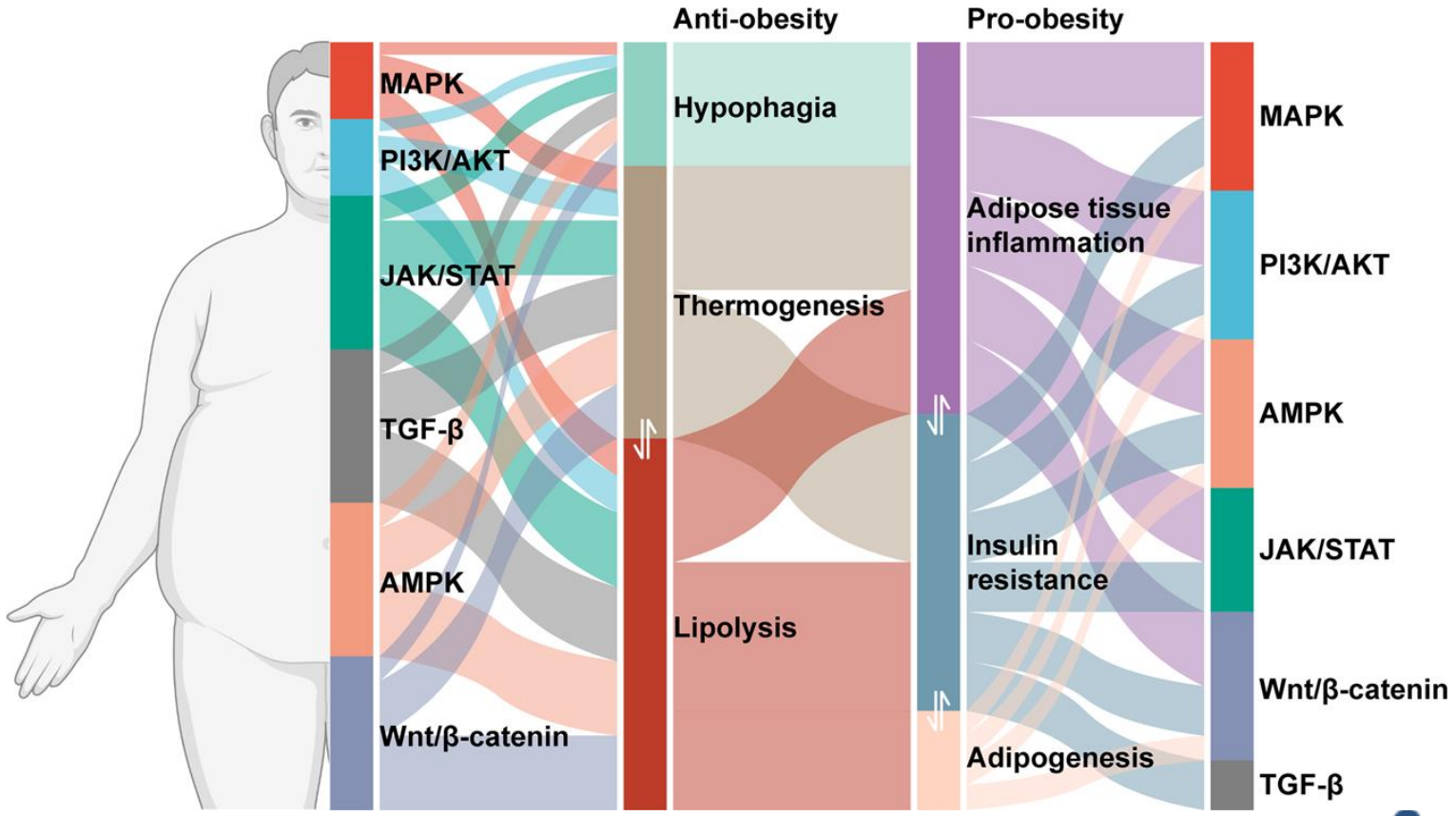


Goodarzi MO. *Lancet Diabetes Endocrinol*. 2018;6(3):223-236.

Molecular Pathways Impacted by Obesity

Obesity influences and is impacted by several different key biological pathways:

- **MAPK pathway:** Regulates appetite, adipogenesis, glucose homeostasis, and thermogenesis
- **PI3K/AKT pathway:** Regulates appetite, insulin signaling, cell growth and proliferation
- **JAK/STAT pathway:** Downstream mediator of various cytokines, hormones, and growth factors
- **TGF-β pathway:** Regulates appetite, lipid metabolism, and glucose homeostasis
- **AMPK pathway:** Regulates feeding, insulin sensitivity, BAT thermogenesis, and browning of WAT
- **Wnt/β -catenin pathway:** Negative regulator of adipogenesis and obesity



Wen X, et al. *Signal Transduct Target Ther*. 2022;7(1):369.

Monogenic Obesity

- Rare form of obesity that is inherited
- Monogenic obesity arises from a mutation in a single gene and not from environmental factors
- Often occurs with early-onset accompanied by abnormal feeding behaviors and endocrine disorders
- Can occur independently or as part of a syndrome
  - Syndromic obesity is often accompanied with neurodevelopmental delay and/or dysmorphic features

Huvenne H, et al. *Obes Facts*. 2016;9(3):158-173.

Overview of Select Genes Involved in Monogenic Obesity

Gene	Function	Inheritance	Severity and onset	Associated phenotypes
Leptin	Binds to leptin receptor in the hypothalamus, which activates pathways for inhibiting feeding and promote the release of energy	Recessive	Severe, from the first days of life	• Gonadotropic and thyrotropic insufficiency • Alteration in immune function
LEPR	Leptin receptor	Recessive	Severe, from the first days of life	• Gonadotropic, thyrotropic, and somatotropic insufficiency • Alteration in immune function
POMC	Protein is cleaved into smaller peptides that facilitate release of cortisol, and mediate energy homeostasis	Dominant	Severe, from the first months of life	• ACTH insufficiency • Mild hypothyroidism and ginger hair if the mutation leads to the absence of POMC production
PCSK1	Involved in the cleavage of insulin and glucagon biosynthesis	Dominant	Severe obesity occurring in childhood	• Adrenal, gonadotropic, somatotropic, and thyrotropic insufficiency • Postprandial hypoglycemic malaises • Severe malabsorptive neonatal diarrhea • Central diabetes insipidus

Huvenne H, et al. *Obes Facts*. 2016;9(3):158-173; Martinelli CE, et al. *J Clin Endocrinol Metab*. 2011;96(1):E181-E188; da Fonseca ACP, et al. *Diabetes Metab Syndr Obes*. 2021;14:11-22.

Overview of Select Genes Involved in Monogenic Obesity

Gene	Function	Inheritance	Severity and onset	Associated phenotypes
NTRK2	Membrane bound receptor that, upon binding, activates the MAPK pathway	Dominant	Severe obesity from the first months of life	• Developmental delay • Behavioral disturbance • Blunted response to pain
MC4R	Regulates energy homeostasis, food intake, and energy expenditure	Dominant	Severe obesity occurring in early childhood	• Hyperphagia • Increase in lean body mass and bone mineral density • Increased linear growth • Hyperinsulinemia
BDNF	Participates in neuronal survival and growth and mediates neuronal plasticity	Dominant	Severe obesity occurring in childhood	• Hyperphagia • Impaired cognitive function • Hyperactivity

Huvenne H, et al. *Obes Facts*. 2016;9(3):158-173; Martinelli CE, et al. *J Clin Endocrinol Metab*. 2011;96(1):E181-E188; da Fonseca ACP, et al. *Diabetes Metab Syndr Obes*. 2021;14:11-22.

Syndromic Obesity

- Obesity that occurs as part of a syndrome
- Often accompanied by intellectual disabilities
- Can result from
  - A monogenic cause
  - Chromosomal rearrangements
  - Errors in imprinting
- Thought to be caused by irregular development of the hypothalamus

Butler MG. *Prog Mol Biol Transl Sci*. 2016;140:1-45.

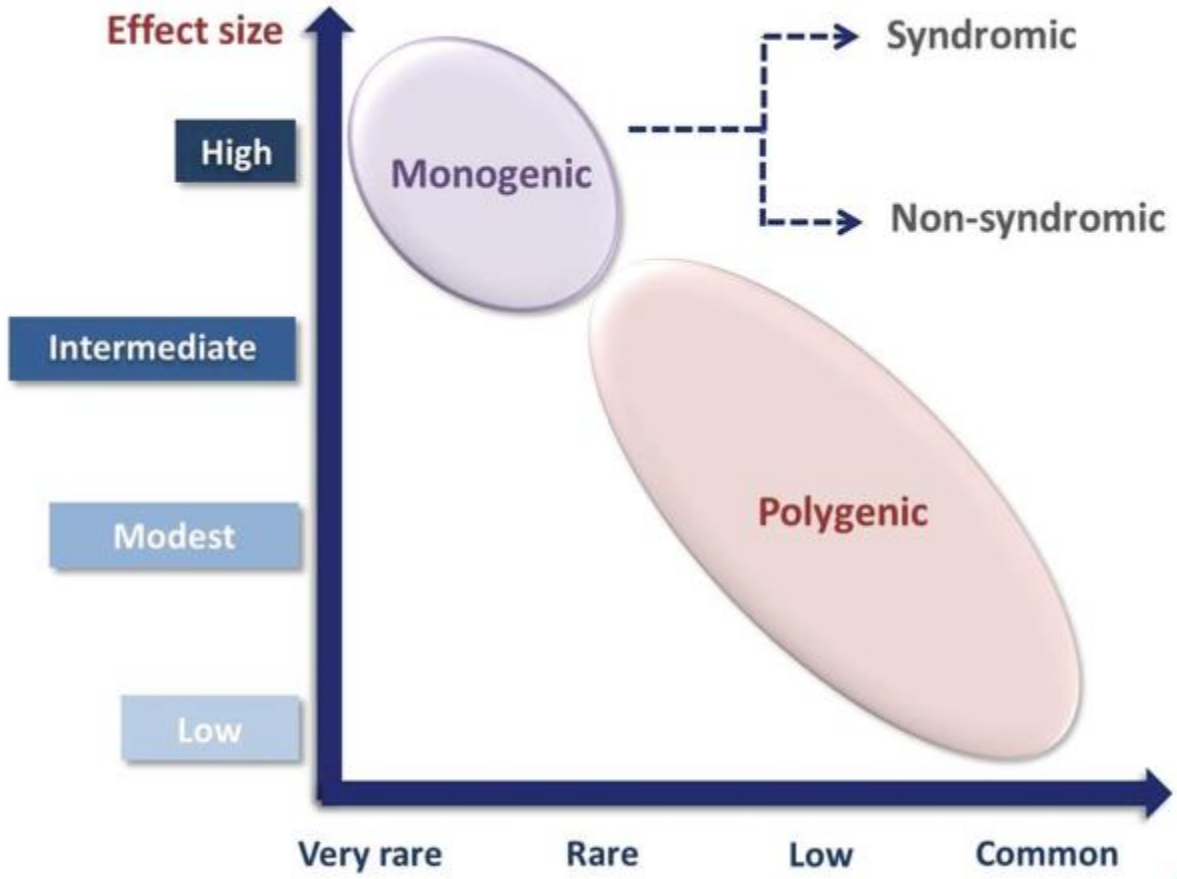
Types of Syndromic Obesity

Syndrome	Mutation type	Severity and onset	Associated Phenotype
Prader-Willi	Imprinting defect with loss of paternally expressed genes on 15q11–13	Severe obesity occurring in early childhood	Neonatal hypotonia, mental retardation, hyperphagia, facial dysmorphy, hypogonadotropic hypogonadism, short stature
Bardet-Biedl	Oligogenic	Severe obesity occurring in childhood	Mental retardation, retinal dystrophy or pigmentary retinopathy, dysmorphic extremities, hypogonadism, kidney anomalies
Cohen	Autosomal recessive	Obesity occurring in infancy and early childhood	Retinal dystrophy, prominent central incisors, dysmorphic extremities, microcephaly, cyclic neutropenia
Alström	Autosomal recessive	Obesity occurring in infancy to adulthood	Retinal dystrophy, neurosensory deafness, diabetes, dilated cardiomyopathy
X fragile	X-linked	Severe obesity occurring in childhood	Mental retardation, hyperkinetic behavior, macroorchidism, large ears, prominent jaw

Butler MG. *Prog Mol Biol Transl Sci*. 2016;140:1-45; Chung WK, et al. *Pediatr Blood Cancer*. 2012;58(1):122-128. Carvalho LML, et al. *Curr Obes Rep*; https://medlineplus.gov/genetics/condition/wagr-syndrome/;https://medlineplus.gov/genetics/condition/16p112-deletion-syndrome/

Polygenic Obesity

- Approximately 60% of inherited obesity is polygenic
- GWAS studies have identified more than 100 genetic loci that are implicated in body weight regulation
- Effect of a single polygene is typically small; however, the combined impact of multiple polygenes is significant for determining susceptibility to obesity
- Individual differences exist due to the unique combination of genetic predispositions and environmental influences across patients



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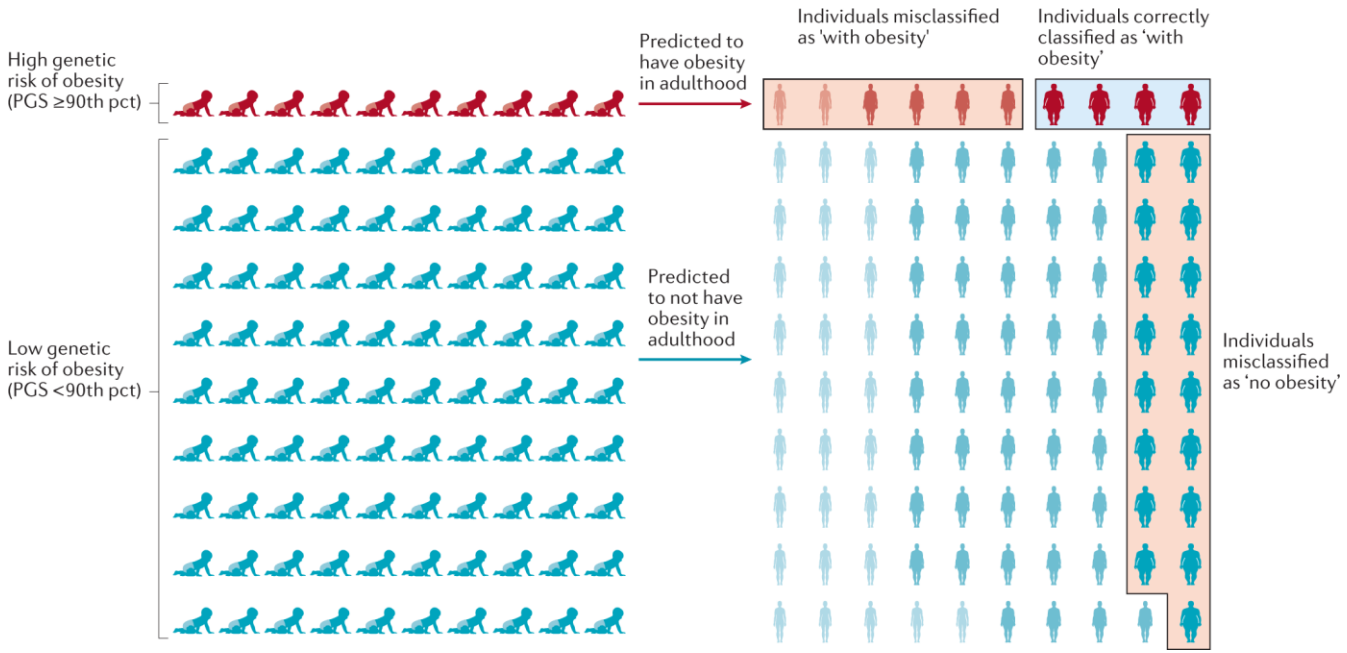
Select Genes Involved in Polygenic Obesity

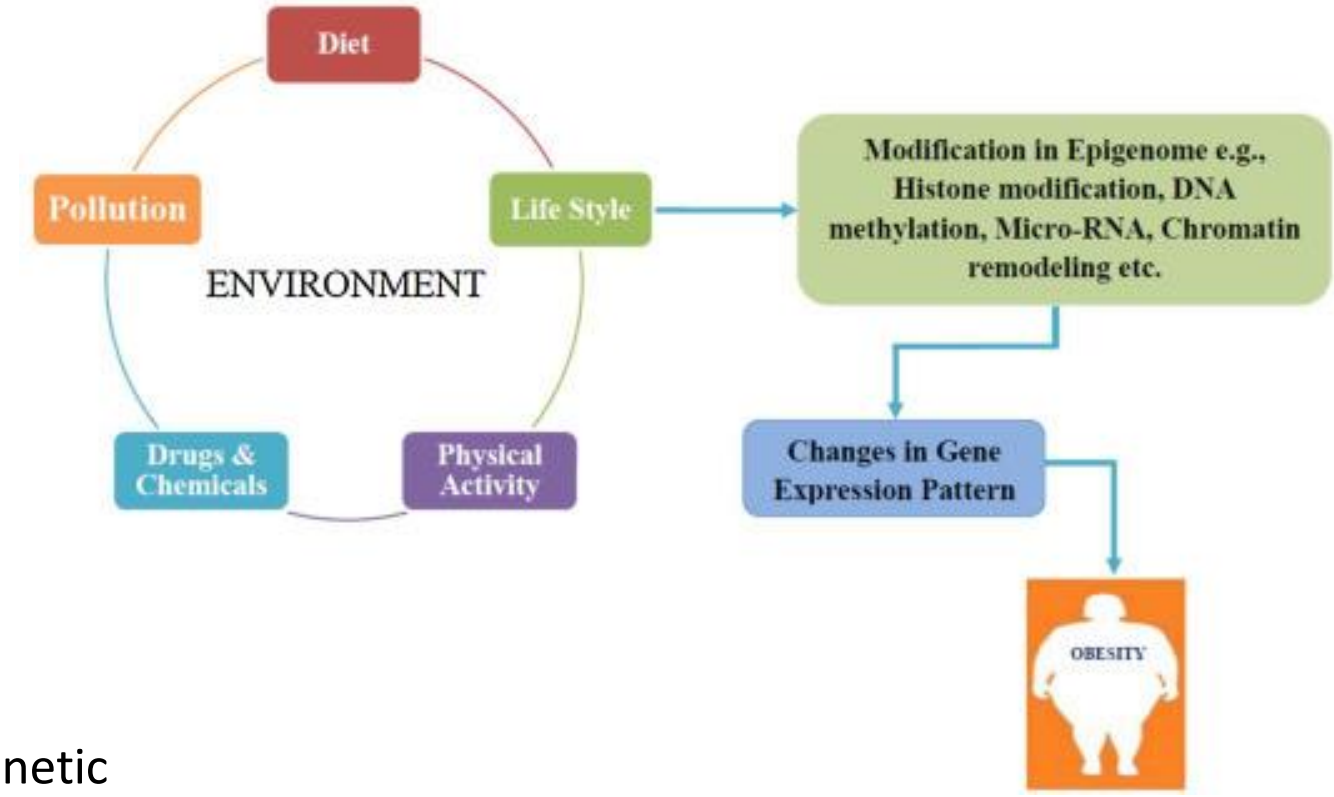


- Genes involved in monogenic obesity can be implicated in polygenic obesity
- GWAS studies have also identified as genes associated with polygenic obesity:
  - FTO – exact physiological mechanism of this gene is still not well understood
  - PPARG – regulates fatty acid storage and glucose metabolism
  - ADIPOQ – regulates oxidation of fatty acids, depends on PPARG for expression
- Polygenic score (PGS) predicts obesity based on individuals in the ≥ 90th percentile
  - PGS has a positive predictive value of 0.4 and a sensitivity of 0.19
  - Out of 10 classified 'obese,' only 4 developed obesity
  - Among 90 predicted 'non-obese,' 17 develop obesity
  - Only 4 out of 21 with obesity are correctly classified

Loos RJF, et al. *Nat Rev Genet*. 2022;23(2):120-133.

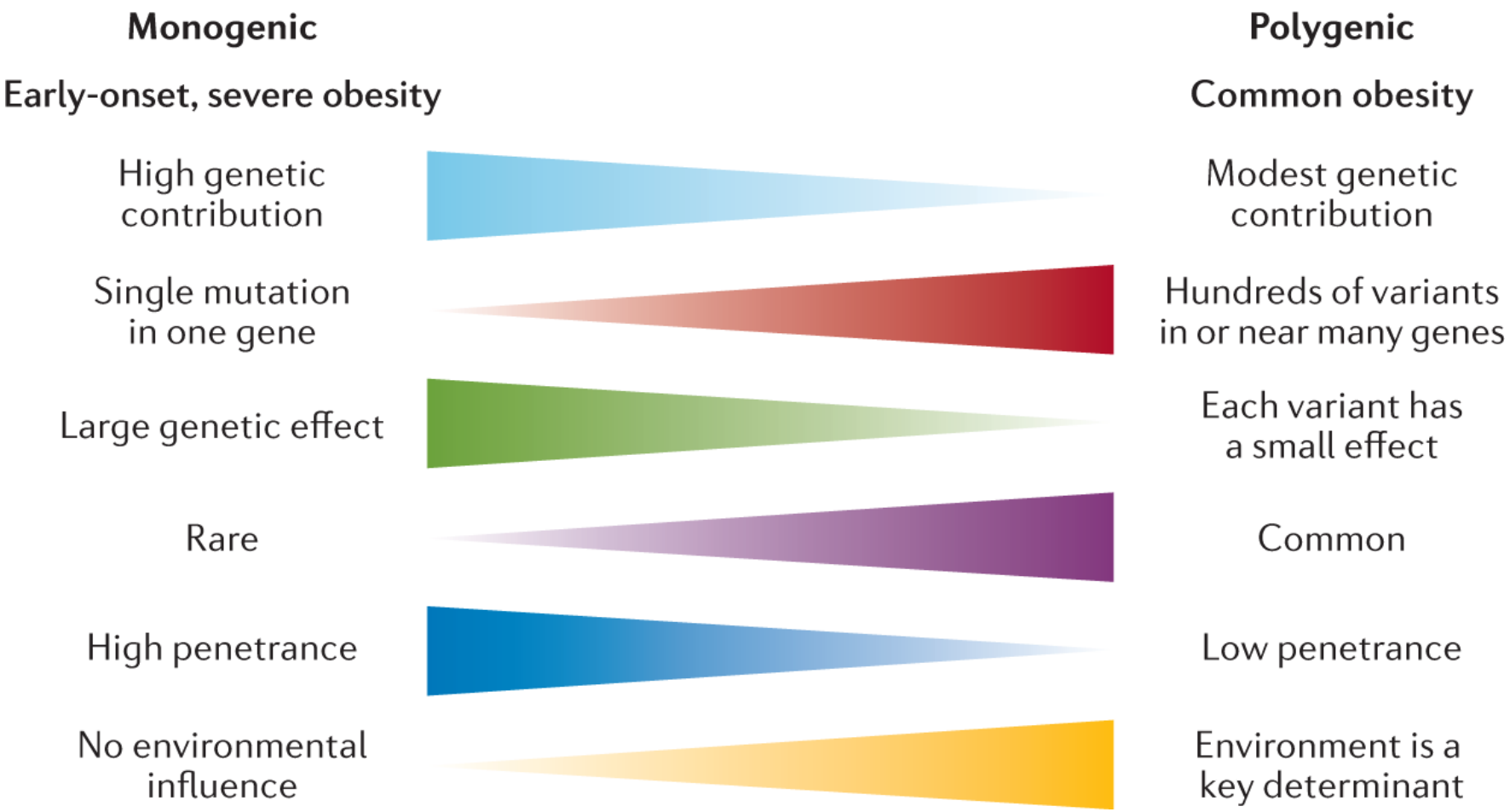
Epigenetic Obesity

- Epigenetics refers to changes in the level of expression of certain genes with or without changes to the DNA sequence, e.g., methylation, acetylation
- Epigenetic mechanisms are dynamic and adaptable
- Caused by stimuli from environmental factors and lifestyle
  - Removal of the stimuli reverts the epigenetic changes back to a standard profile



Mahmoud AM. *Int J Mol Sci*. 2022;23(3):1341.

Summary: Features of Obesity



Loos RJF, Yeo GSH. *Nat Rev Genet*. 2022;23(2):120-133.

Key Takeaways

- Obesity is a clinical outcome impacted by multiple modifiable and non-modifiable factors
- Different types of obesity are associated with specific genes
- Genetic variables can affect individual patients' weight gain as well as weight loss journey

Patient Information: Female, 19 Year Old

Main Question: How should obesity be assessed and managed in this case?

Medical Background:

Pertinent Medical History/Diagnoses:

- A 19-year-old female was referred to the endocrine clinic for evaluation and treatment of hyperphagia and weight gain.
- Patient provides a clinical history of increased weight while at college
- Her mother reported that the patient had breech positioning, feeding difficulties, a weak cry at birth, and delayed major motor milestones.
- Reports no behavioral health hx

Family Medical History:

- 1 older sibling with BMI of 30, mother and father are also overweight

Physical Examination:

- Height: 5 feet 7 inches
- Weight 211 lbs
- BMI: 33
- HR: 77
- BP: 132/7T
- RR: 16
- Pain 0/10
- HEENT: no thyromegaly, no LAD, PERRLA
- CVS: S1S2 normal, no murmurs, rubs or gallops
- Resp: normal breath sounds, no wheezes, crackles or rales
- Abd: soft, nontender, no hepato-splenomegaly, obese
- LE: no pedal edema, normal pedal pulses
- Neuro: no obvious gross deficits

Medications:

- None

Social/Cultural Factors:

Social Determinants of Health:

- She is accompanied by her mother and 20 year old sister who is also scheduled for evaluation of obesity as well.

Lifestyle History:

- Clinic history of increased weight while at college due to eating out and not packing her own meals many days.
- She notes that she is always hungry, and does not feel full after large meals.

Thank You

- ECHO Session 2 takes place on: Thursday, August 8 at 1:00 PM EST
- Please complete your session evaluation to claim your CME credit