



Beyond the Injection:

Lifestyle Medicine Strategies to Optimize GLP-1 Agonist Success in Obesity Care

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Learning Objectives

Describe

Describe efficacy, side effects and challenges with GLP-1 agonist use in obesity care

Identify

Identify key nutritional risks associated with GLP-1 agonist therapy

Understand

Understand evidence-based lifestyle interventions, appropriate patient counseling to improve patient outcomes and future directions

Lifestyle changes - Maximize Use of GLP-1 agonists



MAXIMIZE BENEFITS



MINIMIZE POTENTIAL
RISKS



INCREASE EFFICIENCY
OF TREATMENT

Introduction

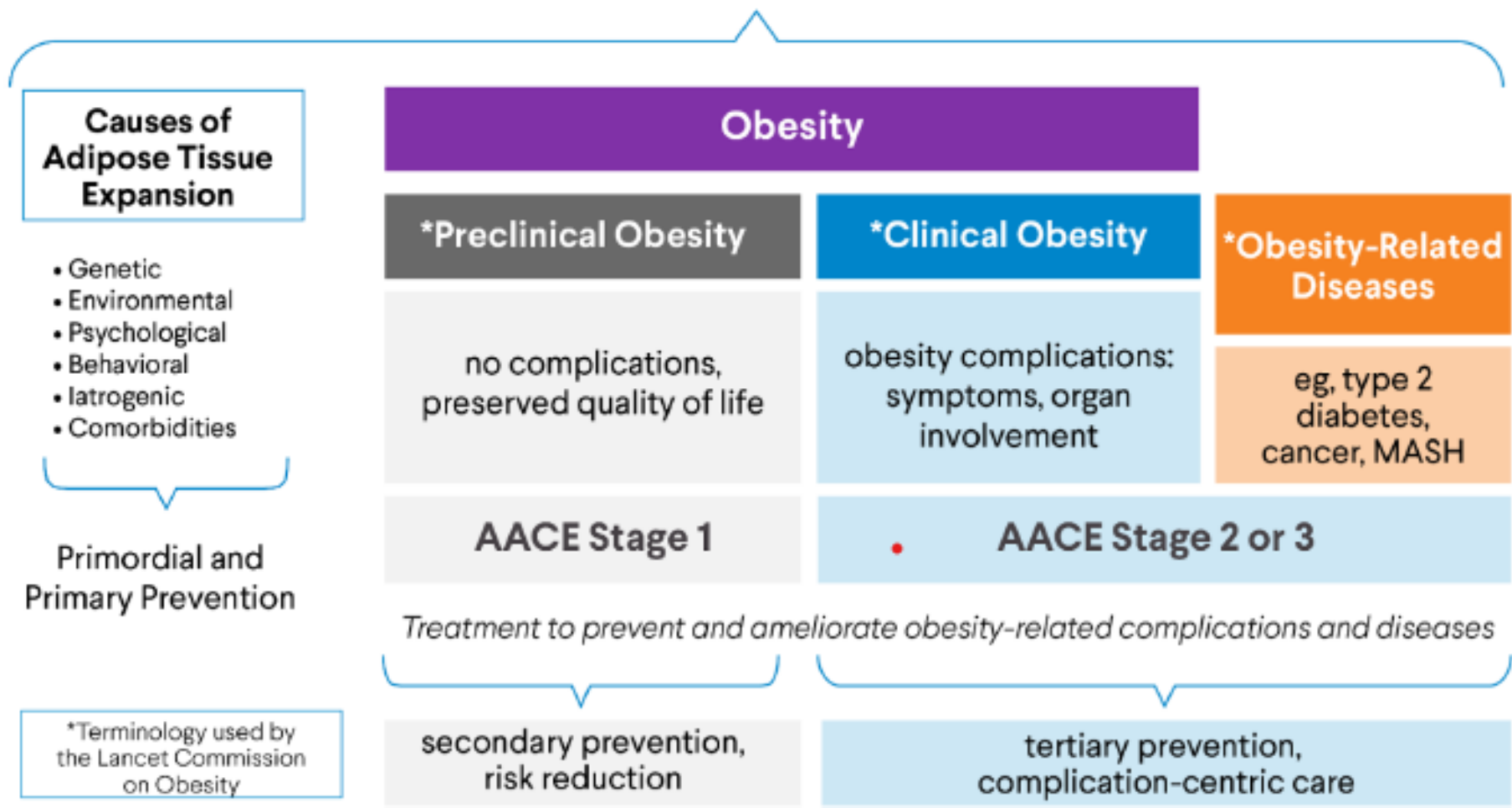
Defining Obesity: Not just about the scale

Chronic and often relapsing

- **World Health Organization** -
“Abnormal or excessive fat accumulation that presents a risk to health”
- **American Association of Clinical Endocrinologists /American College of Endocrinology** -
“Chronic disease characterized by pathological processes that result in increased adipose tissue mass and which can result in increased morbidity and mortality.”



Adiposity-Based Chronic Disease



ABCD = heterogeneous, progressive chronic disease, excess or dysfunctional adiposity that disrupts normal physiology and can drive the development of obesity related complications and diseases

ABCD Stage 1

No ORCD identified following intake evaluation

ABCD Stage 2 or 3

Obesity Complications*

- OA (knee, hip)
- OSA
- Obesity hypoventilation syndrome
- Lymphedema
- Stress urinary incontinence
- GERD
- Prediabetes and metabolic syndrome
- MASLD
- Obesity glomerulopathy, CKD
- HFpEF
- ASCVD
- Thromboembolism
- Idiopathic intracranial hypertension
- Disability limiting activities of daily living

Obesity-Related Diseases*

- T2D
- MASH
- HFrEF
- Atrial fibrillation
- Certain cancers
- Cholelithiasis, cholecystitis
- Asthma
- Depression, anxiety
- Internalized weight bias
- Stigmatization
- Disordered eating
- Cognitive decline, dementia
- Inflammatory skin diseases
- Intertrigo

*There can be overlap between complications and related diseases depending on the pathophysical role of obesity in individual patients. See Box A for definitions.

Healthy people 2030

- Goal: Reduce the proportion of adults with obesity
- Most Recent Data (2017-2020)
 - 41.8 %
- Target:
 - 36%
- Baseline % adults aged 20 years and over (2013-2016)
 - 38.6 %



Complexity of obesity

MERIGA, 2017

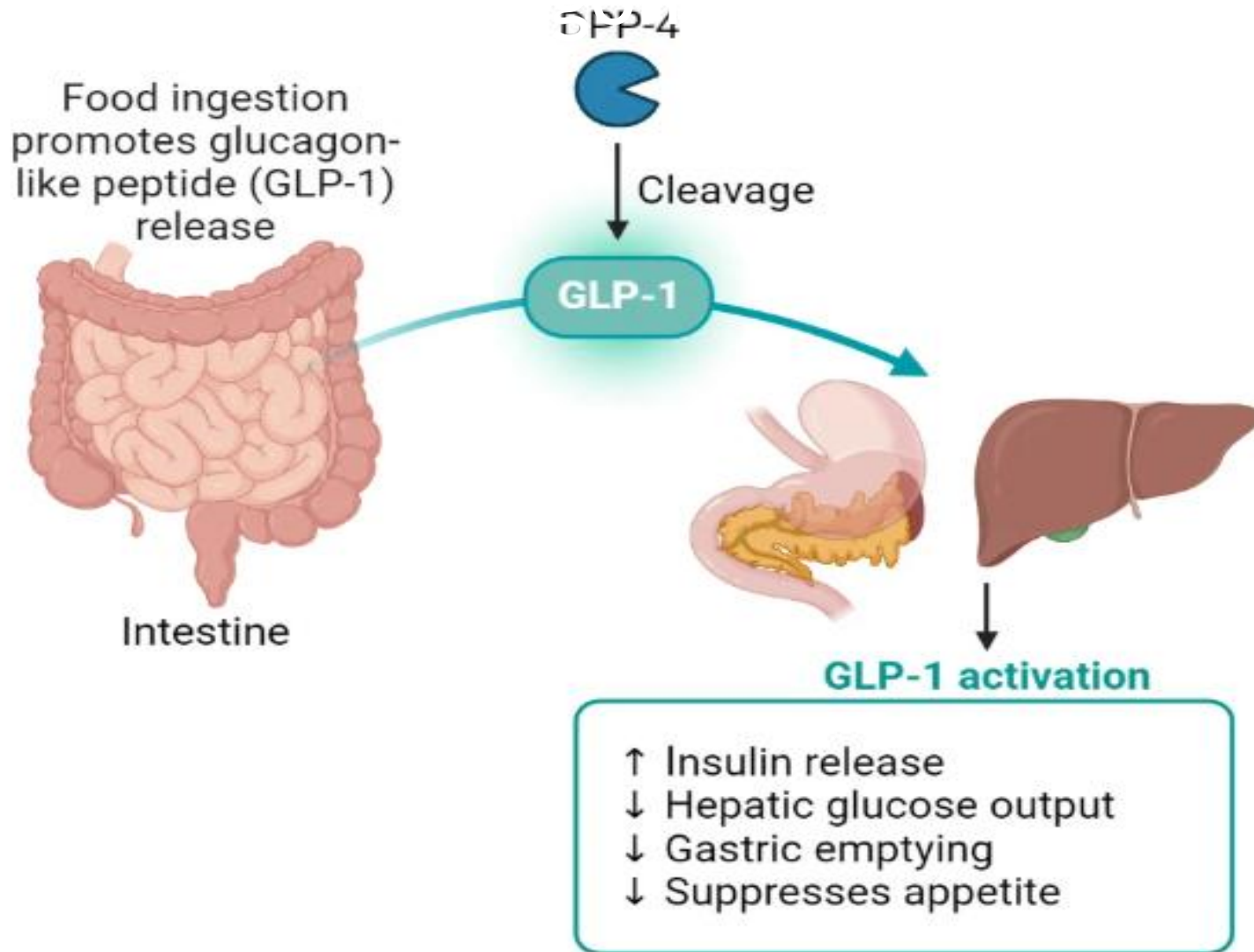


THE DRIVERS OF HEALTH ARE COMPLEX AND INTERCONNECTED

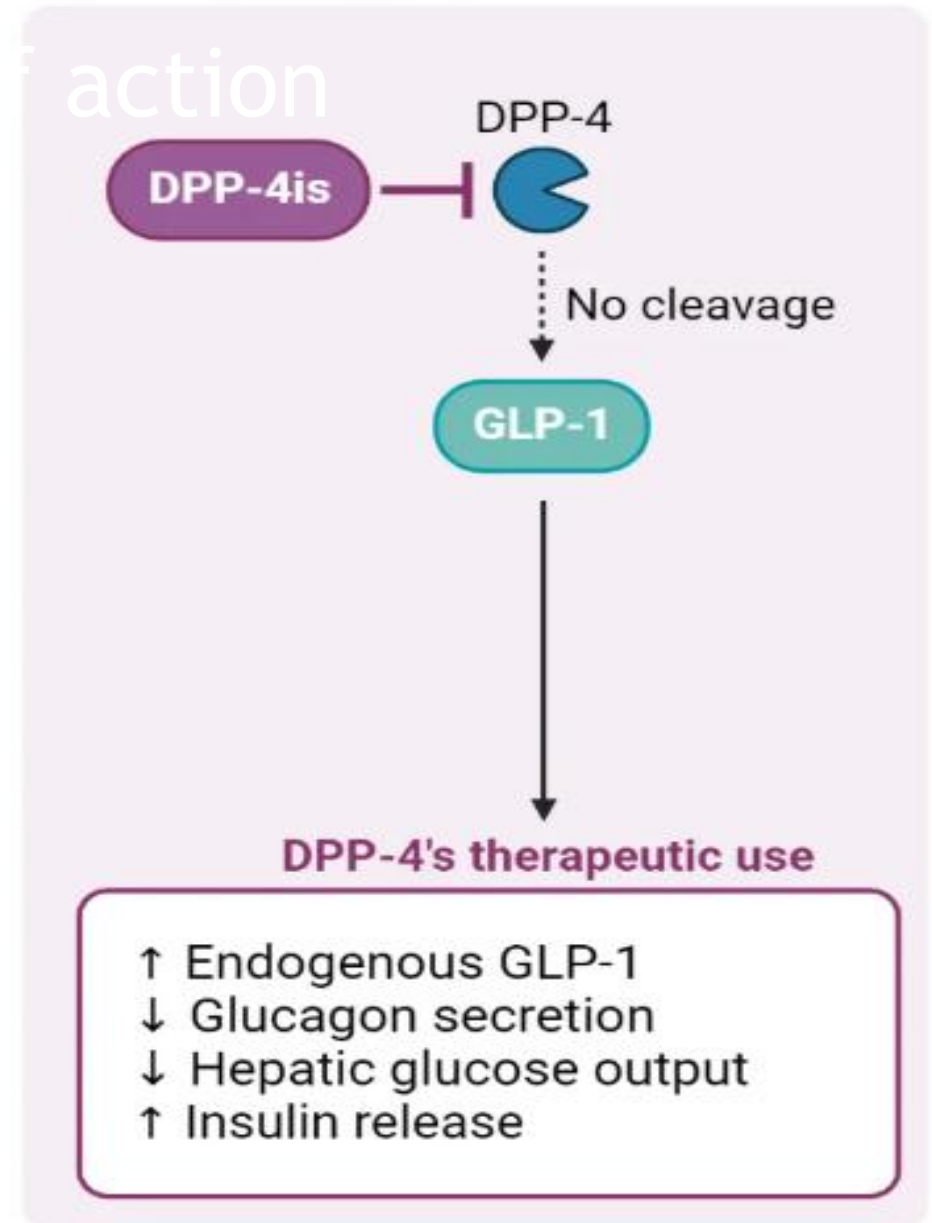


GLP-1 Agonists - Efficacy and Use

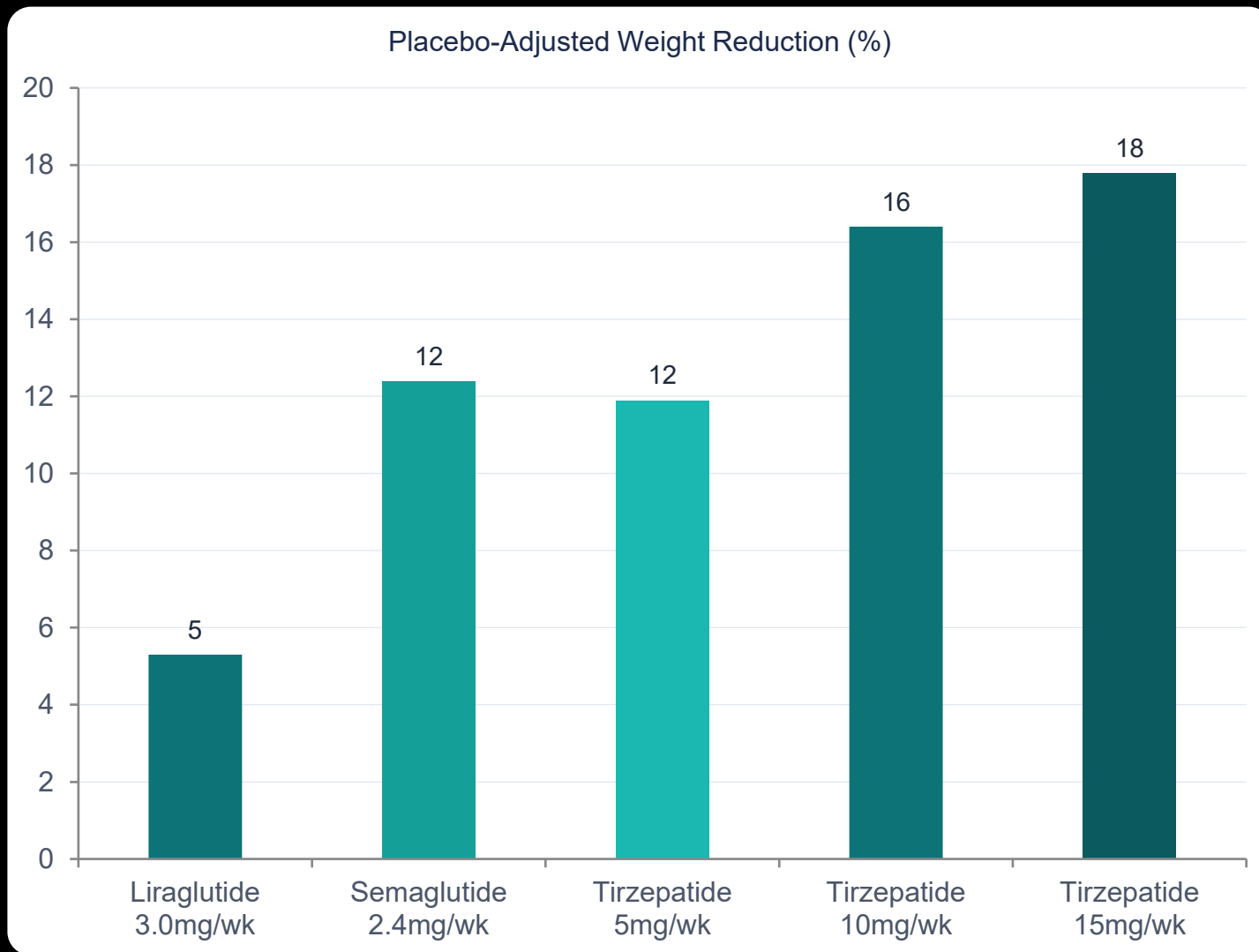
GLP-1 agonists



DPP-4 inhibitors



GLP-1 Efficacy: Landmark Trial Results



6%

US adults currently using
GLP-1s (2024)

50–67%

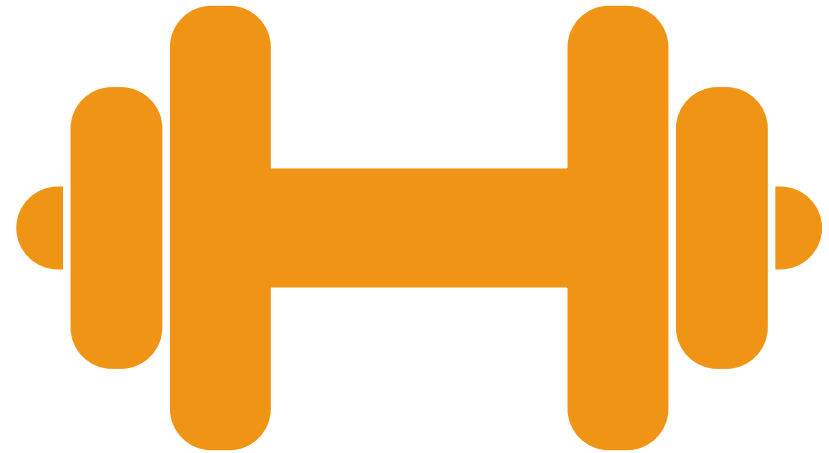
Discontinuation rate
at 1 year

≥30%

Possible weight loss
in best responders

GLP-1 Agonist | FDA indications

- Indication and Use:
 - **Wegovy** - Indicated in ***combination with*** a reduced calorie diet and increased physical activity
 - **Zepbound** - Indicated as an ***adjunct to*** a reduced-calorie diet and increased physical activity
 - **Saxenda** - indicated as an ***adjunct to*** a reduced-calorie diet and increased physical activity



Challenges

Side effects - Gastrointestinal
(N/V/D/C)

Nutritional deficiencies due to calorie
restriction

Potential muscle and bone loss

Low long-term adherence - weight
regain

High costs

What is the most frequent cited reason for discontinuing a GLP-1 agonist?

- A) Cost/Insurance related
- B) Medication Shortage
- C) Side effects
- D) Switch to a compounded medication
- E) Unsatisfactory weight loss

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Discontinuation reason	Overall (N = 288)	Early ^a (n = 138)	Late ^a (n = 150)	p ^b
Cost or insurance-related ^c	137 (47.6%)	56 (40.6%)	81 (54.0%)	0.02
Medication shortages	34 (11.8%)	15 (10.9%)	19 (12.7%)	0.6
Side effects	42 (14.6%)	29 (21.0%)	13 (8.7%)	0.003
Switch to a compounded medication	7 (2.4%)	4 (2.9%)	3 (2.0%)	0.7
Unsatisfactory weight loss	5 (1.7%)	2 (1.4%)	3 (2.0%)	> 0.9
Other	31 (10.8%)	19 (13.8%)	12 (8.0%)	0.1
Unspecified	32 (11.1%)	13 (9.4%)	19 (12.7%)	0.4

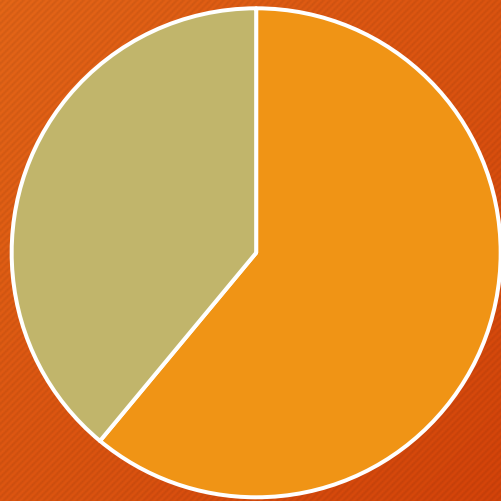
Nutritional Deficiencies

- Significant reductions in appetite and caloric intake
 - Reported calorie reductions = 16-39%
- Potential decrease in essential vitamins and minerals
 - <1200 kcal/day females
 - <1800 kcal/day males
- Nutrients: Vitamins A, D, E, K, B1, B12, C; Fe, Ca, Mg, Zn
- S/S: Fatigue, excessive hair loss, skin flakiness, muscle weakness



Muscle and Bone Density Changes

STEP 1 trial
Avg 13.6 kg weight loss

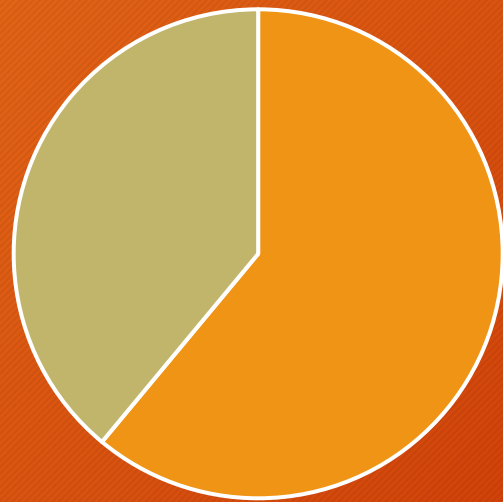


■ Fat mass ■ Lean Body mass

- Rapid weight reduction:
 - 62% Fat mass
 - 38% Lean body mass
 - Estimated about 20% muscle mass loss
- What affects lean mass reduction?
 - Degree of calorie restriction
 - Rapidity of weight reduction
 - Absence of strength training exercise
 - Low protein consumption

Muscle and Bone Density Changes

STEP 1 trial
Avg 13.6 kg weight loss



■ Fat mass ■ Lean Body mass

- Sarcopenia risk:
 - Low protein consumption
 - Lack of resistance training
 - Rapid and substantial weight reduction
 - >14% weight reduction
 - Over 3-4 months
- Slower/Moderate weight reduction may help preserve bone mass

Sarcopenia - Influential Factors

Initial body weight

Age

Gender

Physical activity
Ex. Lack of resistance training

Severity of calorie restriction

Lack of adequate protein intake

Rate of weight reduction

Evidence Based Priorities

Evidence Based Priorities



Patient centered goals for weight reduction



Nutrition baseline screening and counseling -
dietary habits, disordered eating patterns,
medical conditions



Comprehensive exam - muscle strength,
function, and body composition assessment



Social determinants of health screening



Lifestyle assessment/interventions - aerobic
activity, strength training, sleep, mental stress,
substance use, social connections

United States Preventative Services Task Force (USPSTF)

Multicomponent lifestyle and behavioral therapy for adults with:

- Obesity
- Cardiovascular disease risk factors
- Prediabetes/Diabetes

USPSTF evidence supports intervention components include:

- Nutrition - nutrient dense reduced calorie diet
- Physical activity - structured program
- Self-monitoring
- Identifying barriers
- Problem solving
- Peer support
- Relapse prevention

5 A's Framework Obesity Treatment

Assess

Advise

Agree

Assist

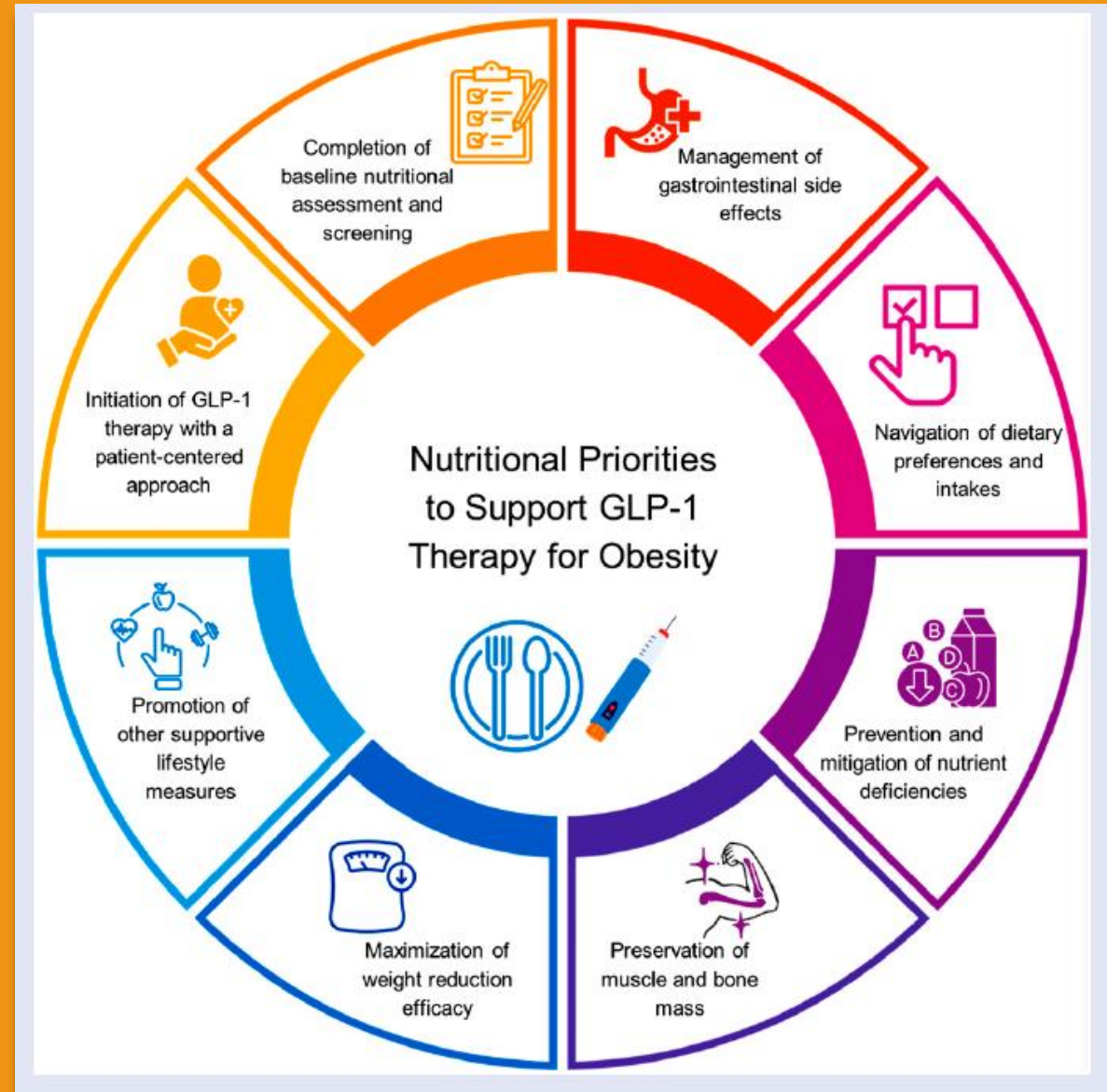
Arrange

5 A's Framework to Support GLP-1 Therapy

Step	Key component/Example
Assess	Comprehensive medical history and assessment, psychosocial factors - triggers for rapid weight gain, barriers to change, previous attempted weight interventions
Advise	Benefits and risks of GLP-1 therapy, Education about side effects and nutritional & physical activity recommendations, complimentary role of nutrition and lifestyle changes as foundation to wellness and health
Agree	Shared decision making and individualized plans, creating appropriate SMART goals
Assist	Address challenges and barriers, eligibility and enrollment support for assistance programs
Arrange	Referrals as needed - nutritionist, behavioral therapist, social worker, physical therapist

Patient Centered Approach

- Focus is on wellbeing and health
 - Not only weight reduction alone
- Highly individualized
- Foundation for long term healthy habits and behavior changes



Prevention Strategies - GLP-1 therapy Nausea

Gradual dose escalation

- Minimize frequency of GI symptoms (N/V)
- Lowest effective dose and escalate only as needed (Barrier: insurance and preferred dosing schedule)

Complementary therapy

- Ginger or peppermint tea, acupressure bands

Smaller more frequent meals

- Every 3-4 hours
- Avoid fatty or high fiber foods especially 1st few days of dose changes
- Stay hydrated (avoid alcohol)

Anti-nausea meds

- Prochlorperazine
- Ondansetron (worsen constipation)

Prevention Strategies - GLP-1 therapy Constipation

Hydration

- Adequate fluids throughout the day

Fiber

- Gradual increase soluble/insoluble fiber
- Fruits with higher water content - easier gastric emptying

Supplements

- Fiber supplements (food first strategies)
- Daily magnesium

Medications

- PEG 3350
 - Stool softeners +/- senna

Prevention of Nutrient Deficiencies

- Maintain adequate nutrients with lower calorie diets
- Diversity of nutrient dense, minimally processed foods
 - Eat the rainbow
- Consider adding dietary supplements
 - Vitamin D, Calcium, Vitamin B12 or MVI
- Small frequent meals
 - Setting an alarm for meal-time reminders
- Prioritize protein - Eat first during meals



Table 6.Key Dietary Recommendations to Support Effective GLP-1 Therapy.^a

Factors to Encourage	Factors to Minimize/Avoid
Food groups	
Fruits (e.g., berries, apples, citrus fruits, banana, grapes, avocado)	Refined carbohydrates (processed grains, flours, added sugars)
Vegetables (e.g., broccoli, leafy greens, tomatoes, carrots, peas, squashes)	Sugar-sweetened beverages
Whole grains (e.g., oats, quinoa, brown rice, and whole-grain breads, cereals, and pastas)	Red and processed meats
Dairy (e.g., yogurt, milk, cheese)	Most fast foods
Lean proteins (e.g., poultry, fish/seafood) and eggs	Sweets and savory snacks
Nuts and seeds (e.g., almonds, peanuts, chia seeds, sesame seeds, hemp seeds)	
Plant fats/oils (e.g., olive, canola, avocado oils)	
Ginger or peppermint tea	
Eating habits ^b	
Regular, small meals at consistent times	Emotional, mindless, or nighttime eating
Flexibility with food choices	Long periods without meals (i.e., becoming overly hungry)
Enjoy portion-controlled treats	Consumption of large meals
Ensure adequate fluids	
Minimal alcohol intake	

Preserve Muscle and Bone Mass: Protein Recommendations

- General adult population = 0.8g/kg/day
- Active weight reduction = 1.2 - 1.6g/kg/day
- Not fall below 0.4-0.5g/kg/day
- Prolonged intake > 2g/kg/day not advised
- Alternative = 80-120g/day or 16-24% of caloric intake based on 2000 calorie diet
 - Increase adherence and intake
- If needed - supplementing with high protein shakes, bars and other fortified foods to meet protein targets

Preserve Muscle and Bone Mass: Exercise program

- Important! Increasing protein intake alone is not protective enough
 - Physical activity min 150min/week weight reduction
 - 360min/week for weight maintenance
 - Structured resistance/strength training
 - Preserves lean muscle mass during weight reduction
- Excess protein above target and beyond needs for repair and growth (excess calories)
 - Converted to fat by the liver
 - Contributes to visceral adiposity

Intensive Lifestyle Intervention: SURMOUNT 3 Trial

Largest reduction seen in GLP-1 trials



First 12 weeks of intensive lifestyle intervention

Followed by tirzepatide
10mg/wk or
15mg/wk

25% body weight
reduction

Staged approach

Lifestyle Interventions

- Sleep Quality
 - Insulin resistance changes
 - Hunger dysregulation
 - Weight gain
- Stress
 - Chronic stress can contribute to weight gain
 - Elevated cortisol
 - Insulin sensitivity changes
 - Promotes energy storage
 - Disrupted food cravings



Lifestyle Interventions

- Avoiding risky substance use
 - Overlapping brain pathways - food reward and disordered eating
 - Address SUD: Tobacco, alcohol, opioid, or illicit substances
- Social Networks
 - Reducing stress
 - Increasing motivation
 - Encourage accountability
- **Six pillars of lifestyle medicine**
 - Need for strong interdisciplinary approach and collaborative care



Telehealth & Digital Platform Support

Video visits

Remote patient monitoring

Dietary guidance &
tracking

Education & behavioral
support

Equity & Accessibility

Future Research & Directions

Bioactive Research - Stimulate GLP-1 Release

Polyphenols

- Fruits & Vegetable

Catechins

- Green tea

Curcumin

- Turmeric

Capsaicin

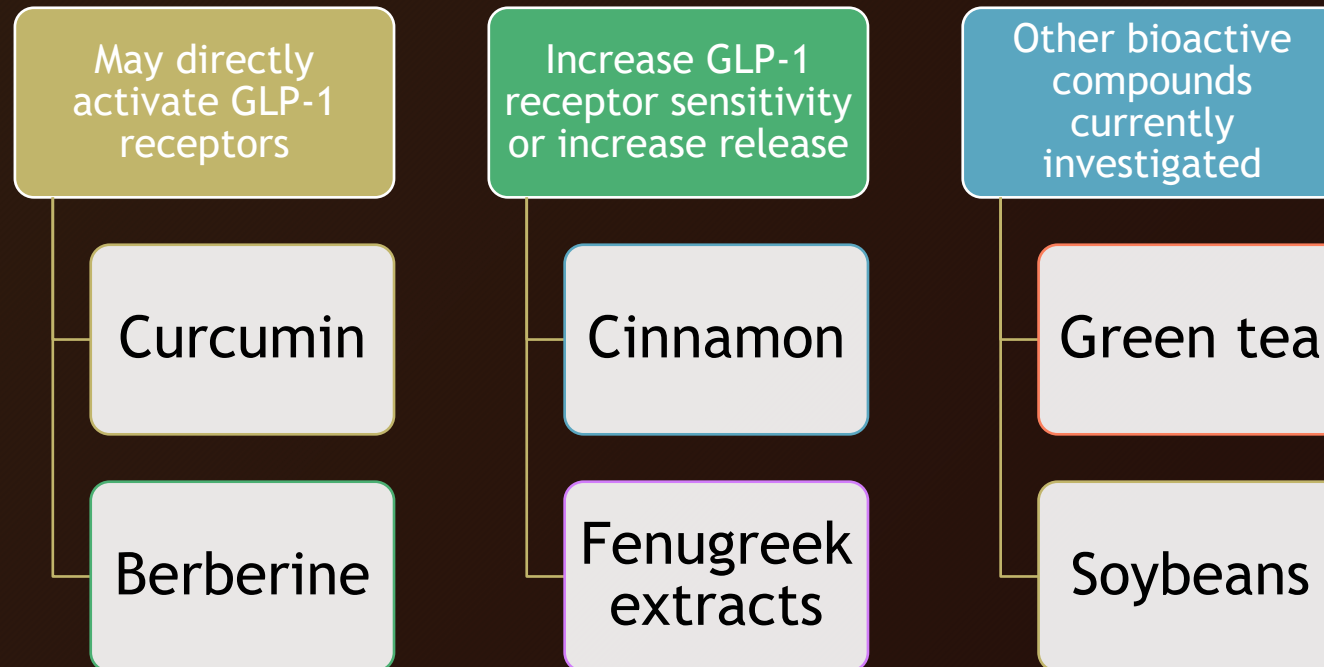
- Chili peppers

Omega-3 fatty acids

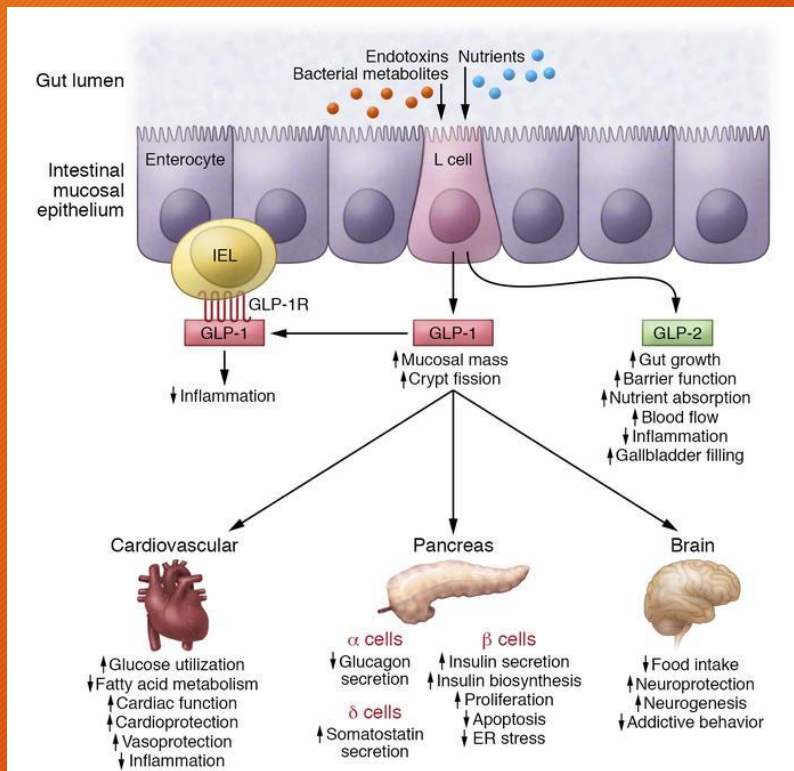
- Fish

Cinnamon & Ginger

Natural Products Research



Modulation of GLP-1 Release & Action



Drucker, 2017

- Physiologic GLP-1 secretion is complex and not yet completely understood:
 - Nutrient supplementation
 - Fiber
 - Resistant starch
 - Unsaturated fat
 - Whole foods
 - Dietary patterns
 - Mixed nutrient meals higher in protein and fiber
 - Microbiome
 - Effects of prebiotic and probiotics
- Protein-induced GLP-1 secretion poorly understood
 - Role in satiety

Nutrition Best Practices for Weight Maintenance: National Weight Control Registry



Eating at regular times daily



Eating regular breakfast



Increasing minimally processed foods

Foods higher in nutrients, fiber and protein



Avoiding sugary drinks



Minimizing highly processed foods and snacks



Permitting flexibility with food choices

Occasional portion controlled treats

Behavioral Best Practices for Weight Maintenance: National Weight Control Registry



Regular physical activity (>60min/day most days/week)



Self-monitoring body weight



Limiting screen time (<10h/week)



Social support



Advanced planning & problem-solving skills

Review Clinical Case & Questions

“Losing Weight, Losing Performance”

- An athletic trainer from an NCAA Division I women's tennis program reaches out for a consultation regarding a 20 year old female tennis player.
- One of the strongest competitors on the team on a full athletic scholarship.
- Progressive declines in her ability to maintain her competitive edge, recover between points, and sustain training intensity during practices.
- Coaches observed decreased performance, reduced endurance during long rallies, and slower recovery following conditioning sessions.



“Losing Weight, Losing Performance”

Medical History

- Polycystic Ovary Syndrome (PCOS)
- No history of diabetes, CVD or bariatric surgery
- No known eating disorder diagnosis

Current Measurements

- Age: 20 years
- Height: 6'3" (191 cm)
- Weight: 190 lbs (86 kg)
- BMI: 23.7 kg/m²

Current Medications

- Tirzepatide 10 mg subcutaneously once weekly

“Losing Weight, Losing Performance”

Last week she experienced severe nausea during practice and vomited on the court, requiring her to stop training early.

- She reports that some days she "forgets to eat" because she is not hungry.
- The athletic trainer estimates that her daily food intake is substantially lower than it was before starting tirzepatide.

When asked how she feels about treatment, the athlete states:

- "I don't really care about losing more weight. I mostly started because my parents and doctor thought it would help my PCOS. I just want to feel strong again and compete at the level I used to."
- She expresses concern that continued declines in performance may affect her playing time and future scholarship.

“Losing Weight, Losing Performance”

What are the clinical concerns regarding ongoing tirzepatide therapy in this athlete?

Which factors in this case place the athlete at increased risk for loss of lean body mass and athletic performance?

Question #1

- A 58-year-old woman has lost 7% of her body weight after 18 weeks of semaglutide treatment, current dose of 2.4mg/week. She reports eating substantially less food, decreased cravings, has not started an exercise program due to her busy schedule, and believes the medication alone is sufficient to meet her weight goals.

Which of the following would be the most appropriate counseling point to prioritize and discuss with this patient?

Question #1

- A. Lean mass losses are largely unavoidable and are unlikely to influence long-term metabolic health outcomes.
- B. Protein supplementation alone is generally sufficient to prevent clinically meaningful losses of muscle and bone during weight reduction.
- C. Progressive dose escalation should remain the primary strategy because additional weight loss offers greater long-term benefits.
- D. Physical exercise including resistance training combined with adequate protein intake is important for preserving lean mass during treatment.

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Question #2

- A pharmacist is preparing to counsel a patient starting tirzepatide for obesity management. Which recommendation is MOST likely to improve long-term adherence while reducing GI intolerance?

Question #2

- A. Encourage patients to skip meals during periods of nausea and resume normal eating once symptoms improve.
- B. Delay patient education until adverse effects are reported so counseling can be individualized to the patient's experience.
- C. Use gradual dose escalation, encourage smaller frequent meals, and counsel patients before treatment initiation.
- D. Increase the dose at every scheduled interval because treatment interruptions reduce overall efficacy.

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Question #3

- A health system is considering how to allocate resources for a new outpatient service for patients with obesity. Administrators argue that medication access should be prioritized over behavioral and lifestyle services because pharmacotherapy produces the largest weight reductions.
- Which of the following is both evidence and guideline-based best practice for obesity care and should be incorporated in this new clinical service?

Question #3

- A. Lifestyle interventions provide modest benefits and are primarily useful when pharmacotherapy is unavailable.
- B. Intensive multicomponent behavioral interventions remain foundational because medications are intended to complement, not replace, nutrition and lifestyle strategies.
- C. Lifestyle interventions should be reserved for patients who fail to achieve at least 10% weight reduction with pharmacotherapy alone.
- D. Behavioral interventions are primarily intended to address medication-related side effects rather than improve long-term outcomes.

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Question #4

- A patient asks why she regained much of her lost weight after discontinuing semaglutide despite meeting her weight goals during treatment.
- Which of the following is the best explanation?

Question #4

- A. Obesity is a chronic, relapsing disease, and substantial weight regain commonly occurs after GLP-1 agonist treatment is discontinued.
- B. Most patients regain weight because GLP-1 receptor agonists permanently reduce resting energy expenditure.
- C. Weight regain primarily reflects inadequate medication titration and is uncommon after successful treatment.
- D. Weight regain occurs mainly because patients develop tolerance to endogenous GLP-1 secretion.

Question #4

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Question #5

- A pharmacist is reviewing dietary recommendations for a patient receiving semaglutide 2.4mg/week. The patient consumes approximately 1,100 kcal/day and reports fatigue, hair loss, decreased appetite, generalized weakness, and decreased cravings, except for frozen yogurt.

What is most concerning about the patient's nutrition and symptoms while on semaglutide?

Question #5

- A. Excessive carbohydrate intake resulting in reactive hyperinsulinemia despite overall calorie restriction.
- B. Decreased calorie intake and appetite leading to increased risk of reduced intake of essential vitamins and minerals.
- C. Increased endogenous GLP-1 secretion resulting in impaired absorption of fat-soluble vitamins.
- D. Excessive dietary protein intake causes accelerated lean mass loss during weight reduction.

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