Metabolic complications of obesity

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Metabolic Complications of Obesity

Coronary Heart Disease

Insulin resistance (Diabetes)

Atherogenic Dyslipidemia

Nonalcoholic fatty liver disease
Prevalence of Metabolically-normal and Metabolically-abnormal Obesity in US Adults

**Men**
- Metabolically normal: 29%
- Metabolically abnormal: 71%

**Women**
- Metabolically normal: 35%
- Metabolically abnormal: 65%

Pathogenesis of Obesity-related Metabolic Dysfunction and NAFLD

- FFA
- VLDL
- TG
- HDL

Subcutaneous fat
Visceral fat

FFA → Adipokines

Glucose uptake

β-Oxid

DNL

Glucose production
Medical Screening & Body Composition Analyses

Metabolically Normal

Metabolically Abnormal

Baseline Testing
Euglycemic-hyperinsulinemic clamp, VLDL kinetics, Heavy water administration and sigmoidoscopy

Weekly Intervention Visits (8-12 weeks)
Review high calorie diet, blood tests, body weight, medical evaluation
Goal: Gain 5 – 7% body weight then maintain for 3 weeks

Post-Weight Gain Testing
Body composition, analyses, euglycemic-hyperinsulinemic clamp, VLDL kinetics, heavy water administration and sigmoidoscopy

Weight Loss Program (6 months)
Two-stage hyperinsulinemic-euglycemic clamp procedure

- **Insulin (mU/m²/min)**
  - **BASAL**
  - **STAGE 1**: 7
  - **STAGE 2**: 50

- **[13C16]palmitate infusion**
- **[2H2]glucose infusion**
- **20% glucose + [2H2]glucose**

- **Time (h)**
  - 0
  - 1
  - 2
  - 3
  - 4
  - 5
  - 6
  - 7
  - 8
  - 9
  - 10

- **Blood samples** at:
  - 0
  - 3
  - 6
  - 9

- **Biopsies** at:
  - 0
  - 6
Measurement of VLDL Kinetics

- $[^2\text{H}_5]\text{glycerol}$
- $[^2\text{H}_3]\text{leucine}$
- $[^2\text{H}_2]\text{palmitate}$
- $[^2\text{H}_3]\text{leucine}$

Blood samples at 0, 2, 4, 6, 8, 10, and 12 hours.

Weight Gain Intervention

• Estimated total daily energy expenditure + 1,000 additional calories

• Additional calories must come from:
  – McDonald’s
  – Burger King
  – Kentucky Fried Chicken
  – Pizza Hut
  – Taco Bell
Supervised Weight Loss after Weight Gain

- Eliminate 1,000 additional fast food calories
- Decrease daily calorie intake by 30% of estimated total daily energy expenditure
- Structured meal plan
- Increase physical activity
- Cognitive Behavioral Techniques include:
  - Self-monitoring
  - Goal-setting