ROOS Workshop Day 1 Brief Summary

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Workshop Day 1—A Brief Summary

- From primordial prevention to dual photon absorptiometry…and back!

- Session 1
  - Physical activity and the prevention and treatment of obesity
    - Moderator: Dr. Tim Church
      - Dr. Kelly Gabriel
      - Dr. John Jakicic
      - Dr. Robert Ross
- Session 2
  - The science of physical activity, obesity, and weight regulation
    - Moderator: Dr. Scott Busch
      - Dr. Steven Heymsfield
      - Dr. Bret Goodpaster
      - Dr. Mark Hopkins
      - Dr. Peter Katzmarzyk

Prevention and Treatment of Obesity

- The burden of obesity is high (illness, disability, years of life lost)
- The medical cost of obesity is high
- Physical inactivity is related to unhealthy weight gain across the life course
- Longitudinal observational studies with repeated measurement and assessments of PA and weight-related metrics are needed to address questions related to:
  - PA timing
  - PA dose
- Studies focused on in-utero, pregnancy, and very early childhood are currently lacking

- **Walking** stands out as a highly endorsed activity modality across the entire life course!

Where to focus? Weight loss vs. body composition

Is the goal of PA in obesity treatment weight loss or more general health improvement?

- Prevention of weight gain may be accomplished through PA
  - When of sufficient dose, intensity, duration,…
- Context needs to address PA alone, PA + diet, and its role in long-term weight loss maintenance
- Lean body mass does not equal muscle mass
- VLCD studies ➔ no differences in weight loss between groups, but increases in CRF and strength in exercise (aerobic vs strength) groups
- To date, no peer-reviewed published studies examining the effects of exercise on body composition (and specifically muscle quantity and quality) in patients undertaking a GLP-1RA at the onset of with loss treatment

Individual variability of response to PA in obesity management

A complex issue!

- What is the context?
- Does it exist? (it's complex…!)
- Guidelines provide guidance based on average responses of populations
- Individual responses may need to be personalized, but…
  - How will we know the variability is due to treatment?
  - If the variability is clinically meaningful?
  - If the variability is beyond the technical error?
- To answer these questions, experimental design will need to include:
  - Time-matched control group
  - Criterion/reference method
  - Supervised, standardized exercise
  - 24 hr. measured PA
  - Daily self-recording of energy intake
- Bottom line: no individual is average
  - Exercise must/should be part of obesity treatment
  - The certainty of exercise benefit for any given individual is not established (as of yet)

Body composition

- Five-Level Model of Body Compostion:
  - Atomic
  - Molecular
  - Cellular
  - Organ tissue
  - Whole body

- History of body composition measurement
  - 1921 through today
  - Anthropometry through smart phones and AI neural networks

- However, gaps remain:
  - Accurate detection of small changs in body composition
  - Need for improved/reproducible field methods
  - Lower cost advanced imaging technology
  - Approaches for measuring body (muscle) proteins
  - To address the need for integrated advanced dynamic energy balance-body composition models

Muscle Quantity vs. Quality

- Exercise improves insulin sensitivity, retains total skeletal muscle while losing fat mass
- **ONLY** exercise seems to improve:
  - mitochondrial function
  - Cardiorespiratory fitness (CRF)
  - Peak torque/strength

- **Weight loss** can improve many metabolic defects and reduce risk for type 2 diabetes and CVD
- Weight loss decreases muscle mass

- **Exercise** can correct both insulin resistance and impaired capacity for mitochondrial fatty acid oxidation
- Exercise can attenuate the loss of muscle with weight loss

- [and…due to people with obesity having high amounts of muscle mass to begin with, it's probably okay to lose some muscle during weight loss…]

PA and Regulation of Energy Balance

- Energy balance is a complex interaction between physiology and behavior

- Short-term period of PA may increase appetite
- But the energy gap reduces with more habitual PA

- Compensatory changes in individual components of energy balance are relatively modest on a daily basis
- Evidence suggest that appetite control may work better under conditions of high energy flux
- Fat-free mass is associated with hunger and daily energy intake, but its effect on energy intake is mediated statistically by resting metabolic rate and total daily energy expenditure
- Fat-free mass loss may act as an orexigenic (i.e., appetite increasing) signal and provide an active drive to increase food intake

Beyond the Scale

- Risk reductions are observed for exercise and PA behaviors even among those with obesity or other chronic conditions such as cancer, metabolic syndrome

- PA is associated with lower risk of mortality (regardless of body weight, BMI)
- Cardiorespiratory fitness protects against increased risk of mortality associated with obesity and metabolic syndrome

- **Even in the absence of weight loss, individuals with obesity still accrue health benefits because of engaging in PA behavior**