Resistance Training Modulation of Fat Metabolism in Postmenopausal Women with Obesity

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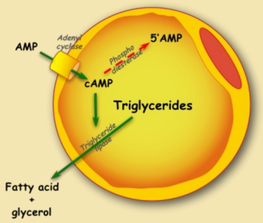
Introduction

- Prediabetes, a comorbidity of obesity, affects more than one-half of women over 60 years of age, and is a precursor of many disease
- It is believed that obese individuals have a reduced response to both lipolytic and antilipolytic stimuli.
- The flexibility to adapt both basal lipolysis as well as the response to lipolytic and antilipolytic stimuli has been presented as a determinant of future weight gain, impaired glucose control, and eventually type 2 diabetes



- Lipolysis is the process of breaking down lipids. It entails hydrolysis as it breaks down a triglyceride into a fatty acid and a glycerol.

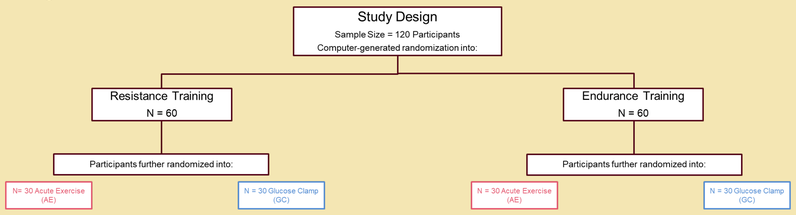
- It is known that endurance exercises improving cardiovascular endurance can help reduce the risk for these diseases, however, other exercise types have not been investigated.
- The increased plasma concentration of epinephrine, which activates betareceptors in adipocytes, is regarded to be the main component stimulating adipose tissue lipolysis during exercise.

Abstract

- Participants will undergo 12 weeks of either resistance or endurance training and both their regional lipolytic activity and whole-body fat metabolism will be assessed before and after the exercise training.
- Our study hopes to yield results that will have implications on improving health guidelines to prevent diabetes and other metabolism related disorders in postmenopausal women.
- Our hypothesis is that both resistance and endurance training will have positive impacts on fat metabolism by increasing lipolytic flexibility.

Methods

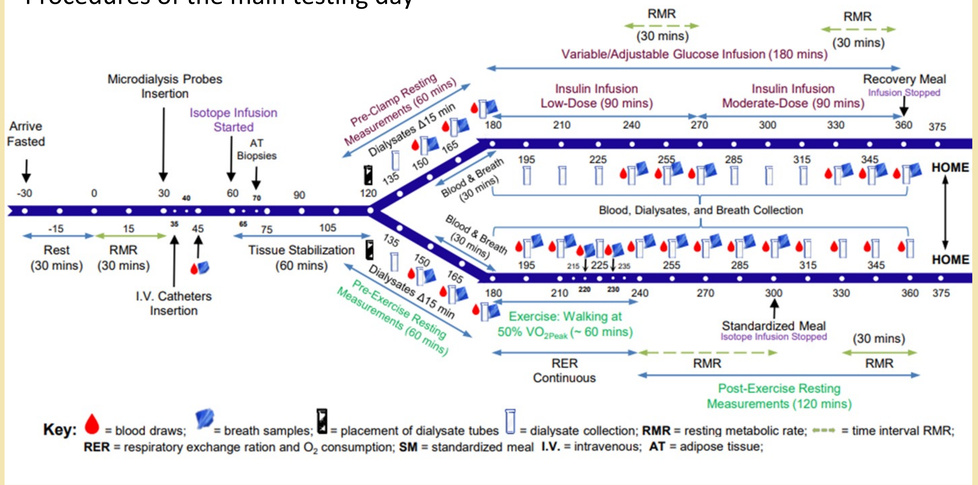
- 120 participants were chosen to reinforce statistical significance within the differences in lipolytic activity and other variables.
- For testing, each group was further subdivided into either acute exercise or glucose clamp testing each of which is combined with microdialysis procedures in the subcutaneous adipose tissue.



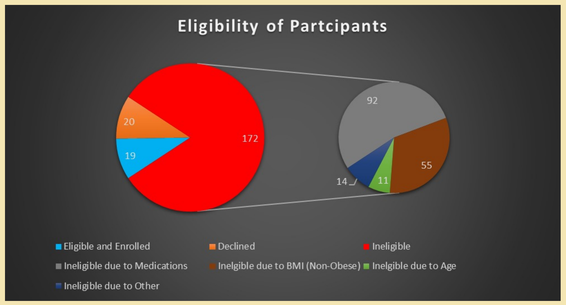
- For the main testing procedure, each participant underwent microdialysis, a technique where an ethanol-water mixture is perfused into probes inserted into fat deposits in the glutes and abdominals.
- The probes collected dialysate (fluid) samples, which give data on the participant's regional lipolytic activity.

Methods Continued

Procedures of the main testing day



Results



- Inclusion Criteria: Age: 50-70, postmenopausal at least 2 years, BMI: 30-39.9 kg/m², prediabetes, sedentary, stable body weight
- Exclusion Criteria: Blood pressure above 140/90 mmHg, type 1 or 2 diabetes, use of tobacco, medications affecting lipid metabolism, and eating disorders

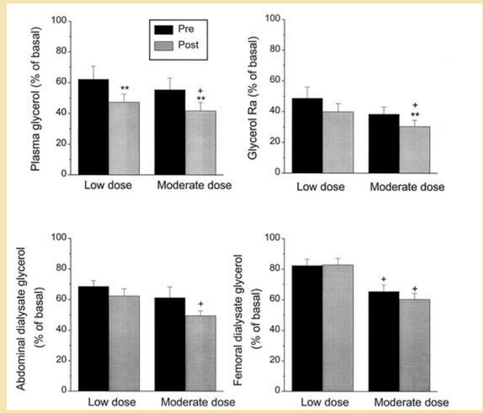
Characteristics of study participants

	Endurance (N = 8)		Resistance (N = 11)	
	Insulin Clamp (N = 5)	Acute Ex. (N = 3)	Insulin Clamp (N = 5)	Acute Ex. (N = 6)
Age (yrs.)	58.80 ± 2.10	56.67 ± 4.10	60.20 ± 2.22	59.67 ± 2.70
Height (cm)	160.0 ± 4.02	164.7 ± 1.53	166.6 ± 3.27	166.6 ± 2.33
Weight (kg)	87.22 ± 4.37	92.97 ± 2.33	97.14 ± 4.28	97.88 ± 3.59
BMI (kg/m²)	34.14 ± 1.45	34.26 ± 0.47	35.11 ± 1.93	35.40 ± 1.70
FBG (mg/dL)	111.5 ± 2.53	97.33 ± 4.91	106.0 ± 3.21	94.00 ± 4.27
HbA1c (%)	5.650 ± 0.10	5.700 ± 0.06	5.920 ± 0.28	5.860 ± 0.08
2-hr OGTT (mg/dL)	150.3 ± 11.76	139.0 ± 2.52	139.8 ± 19.54	145.0 ± 13.90
WHR	0.8650 ± 0.02	0.8733 ± 0.02	0.7920 ± 0.04	0.8620 ± 0.04

- Data are shown as means ± SEM
- BMI= Body Mass Index
- FGB= Fasting Blood Glucose
- HbA1c= Amount of blood sugar (glucose) attached to hemoglobin (oxygen carrier)
- OGTT= Glucose tolerance test, measures response to glucose
- WHR= Waist-to-hip ratio

Conclusions

- As our project is still in the experimental data collection stage, final results have not been determined
- However, preliminary data demonstrates that acute resistance exercise increases lipolysis in non-obese women.
- Additionally, it is known that endurance training increases lipolytic flexibility as per results of existing research.
- These studies inform our hypothesis that both endurance and resistance training will increase lipolytic flexibility.



- Plasma glycerol, glycerol Ra, and dialysate glycerol from microdialysis probes placed in abdominal and femoral sc adipose tissue before (▪) and after (weeks of endurance training during a low dose (10 mU/m2·min) and moderate dose (20 mU/m2·min) insulin infusion.

References

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