Why the focus on body Composition?

- Obesity rates are increasing by 1% per year
- 19% of all children are overweight or obese
- Obese individuals health care cost are 6X over the national average
- More than 68% of the U.S. population is overweight or obese
- Physical activity is decreasing among all age population groups
- Caloric intake predictions have not changed in the past twenty years

What is body composition anyway?

Male 170 #			**Female 140 #**	
Muscle 43%	**73#**		**Muscle 36%**	**50#**
Essential fat 3%	**5#**		**Essential fat 12%**	**17#**
Storage fat 14%	**24#**		**Storage fat 15%**	**21#**
Bone 15%	**26#**		**Bone 12%**	**17#**
Other tissue 25%	**43#**		**Other tissue 25%**	**35#**

Body composition

- Lean body mass LBM or FFM: includes fluids, lean muscle, connective tissue, organs, bones
- Fat EFM: essential fat include lipids incorporated in cells of nerves, brains, heart, lungs, liver, and glands 3%men 12% women (ACSM 2014)
- Nonessential fat NEFM: storage fat or adipose tissue located just underneath the skin and around major organs (10 to 15% for both genders)
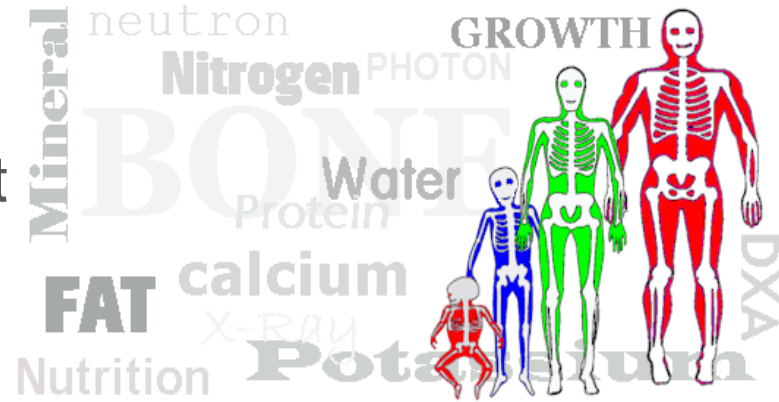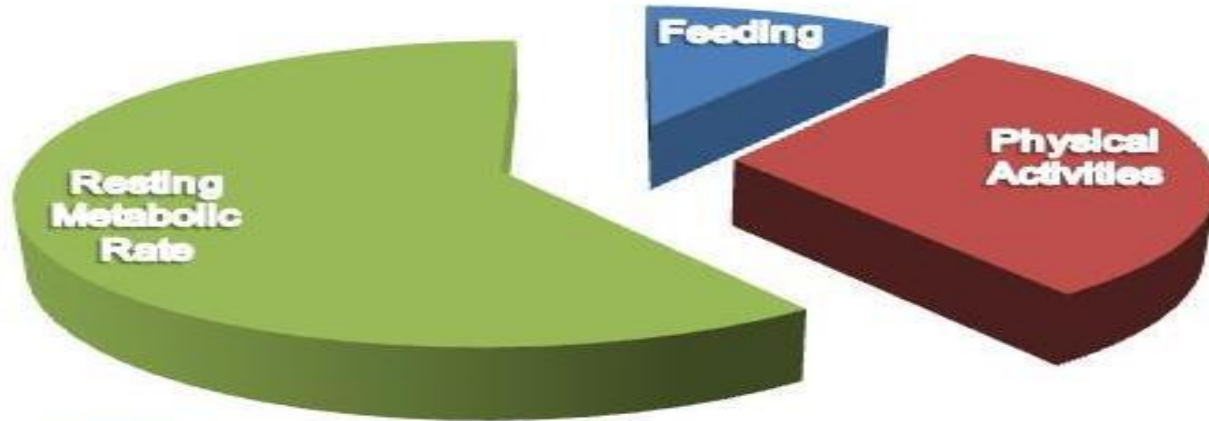
What factors have an effect on body composition?

- **Activity Level?**
- **Type of activity?**
- **Fuel Mix during exercise?**
- **Resting Metabolic Rate?**
- **Gender** √
- **Caloric Intake** √
- **Genetics** √
- **Health** √
- **Age** √

Resting Metabolic Rate 60-75% of our caloric expenditure

BREAKDOWN ON HOW YOUR BODY USED ENERGY IN A DAY

Feeding

Physical Activities

Resting Metabolic Rate

FEEDING - 10%
PHYSICAL ACTIVITIES - 15-30%
RESTING METABOLIC RATE - 60-75%
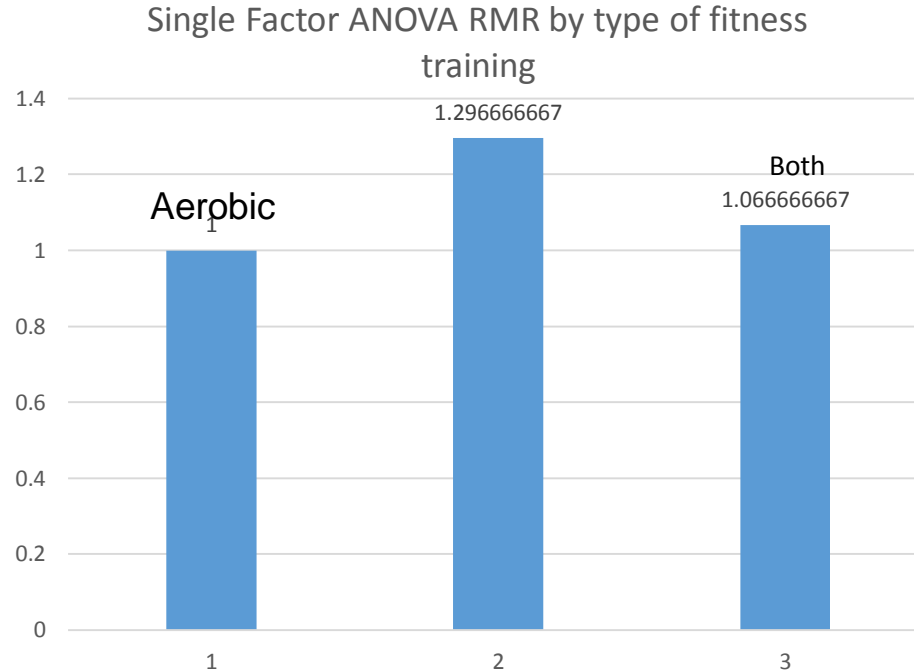
Ways to increase or decrease your REE

- Exercise (Number one factor to ↑ REE)
- Eat small meals and snacks throughout the day
- Short burst of activity
- Temperature
- Stress
- Fever
- Illness
- Muscle

Be a potato
Eat big meals high in fat and skip meals
Starvation or very low restricted caloric diet
Moderate temperature
Lower your percentage of lean body mass
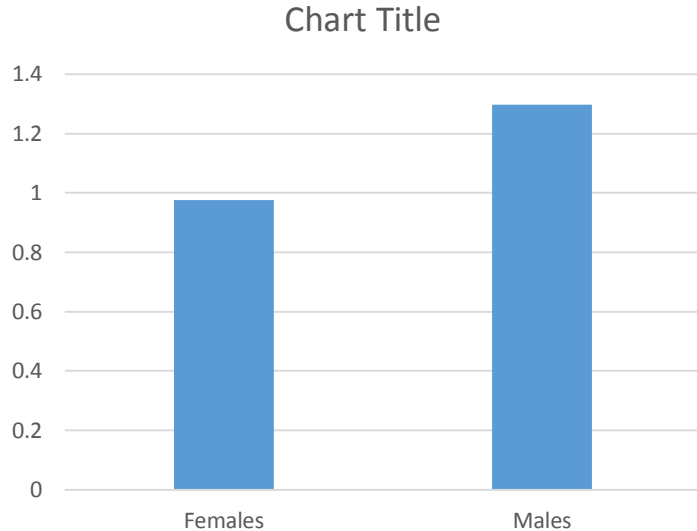
What we do know about training from research.

- **Research study investigating diffrences between aerobically trained swimmers and anaerobically trained wrestlers resulted in significant differences in VO2 max and anaerobic capacity but not a significant difference in resting metabolic rates.**

Schmidt, W., Hyner, G. C., Lyle, R. M., Corrigan, D., Bottoms, G., & Melby, C. L. (1994). The Effects of Aerobic and Anaerobic Exercise Conditioning on Resting Metabolic Rate and the Thermic Effect of a Meal, International Journal of Sport Nutrition, 4(4), 335-346. Retrieved Sep 25, 2019, from https://journals.humankinetics.com/view/journals/ijsnem/4/4/article-p335.xml

ANOVA Between groups based on training and the effect on RMR p=.301

Single Factor ANOVA RMR by type of fitness training

Gender plays a bigger role in RMR p=.0260

Chart Title

No matter what the type of training gender was a more significant factor on RMR than any other factor including body composition, fitness level, fuel mix during activity, and type of training.

Difference in fuel mix at rest by type of training

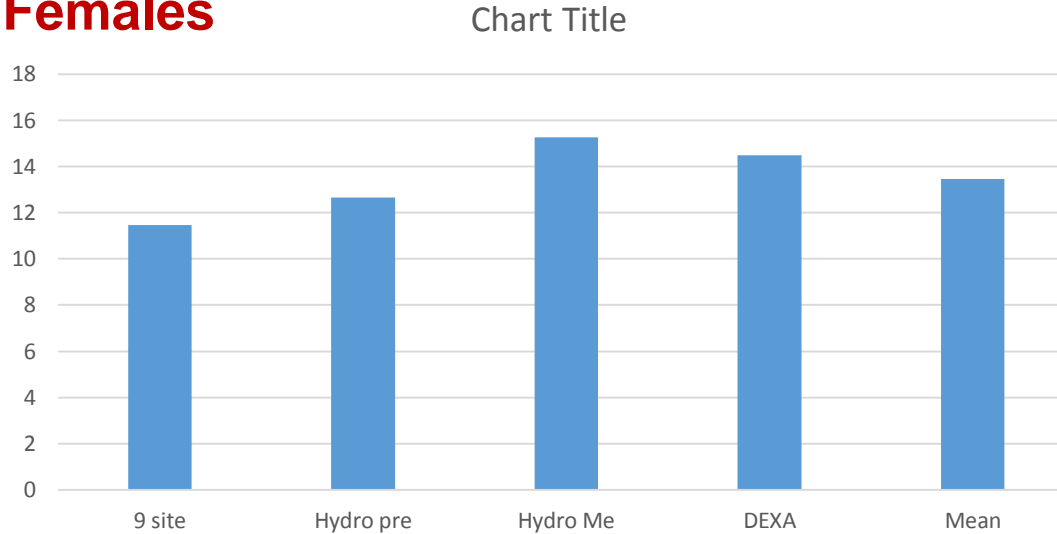**Aerobically Trained fuel mix average**
70% fat and 30% Carbohydrates

Anaerobically trained fuel mix average
50.25 Fat and 49.75 Carbohydrate
Aerobically trained individuals burned
more calories from fat at rest than
anaerobically trained individuals.
Did this have any influence on Body
Composition?

Body Composition Results by gender

- **Females**

Chart Title

T-test between predicted and measure residual volume hydrostatic weighing p=.248
Mean of predicted=21.17
Mean for measured=23.1225

The population group were all fit individuals who had less residual volume than the average population group
Single factor ANOVA p=.5904

Body Composition for the males

Percent body fat males
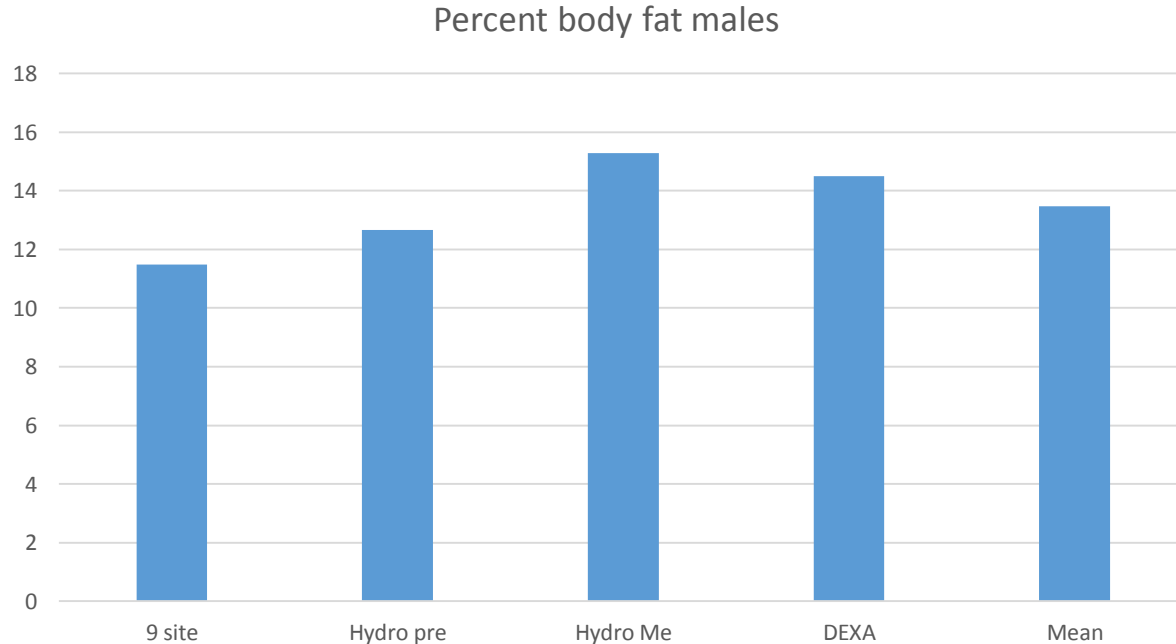
Both population groups
very healthy.
Single Factor
ANOVA
p=.6425

Brain Break: what have we learned so far?

- **So far gender is the most significant variable in differences in RMR**
- **The study includes healthy individuals**
- **Fuel mix at rest does not have a big effect on RMR.**
- **Type of activity that one participates in training is not a big factor in differences in RMR**
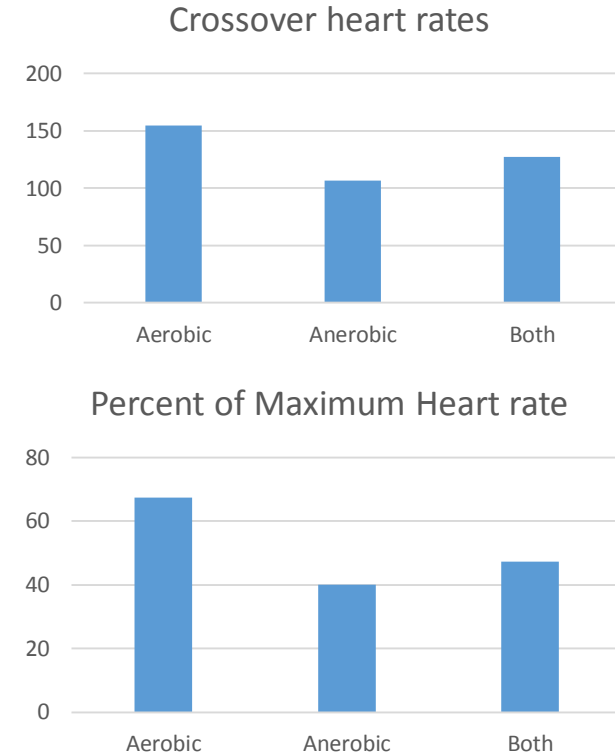
What about Fuel used during activity?

- **Who do we expect to cross over to using more carbohydrates at an earlier state in a graded exercise test aerobically trained or anaerobically trained individuals? P=.69134**

Time to reach crossover point
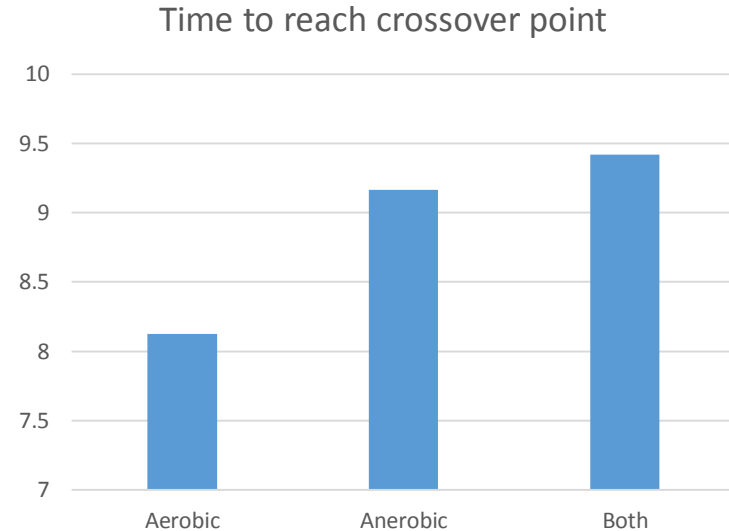
What we are finding is differences in hear rates.

- **Not only what their heart rates are at the cross over point but also what percentage of their predicted maximum heart rate they are working at when they cross over.**
- **Heart rate Cross over average ANVOA p=.02766**
- **Percentage of maximum Heart rate at cross over point.**

Crossover heart rates

Percent of Maximum Heart rate

Thank You. Questions?