ES.010: Week 4
Nutrition

Topics:

1. Multisport expo – March 29th, 2014 at Z center
2. Workouts update
3. Nutrition
   - fueling you body
   - picking the best training food, calories
   - How to determine how much you need to eat each day
4. Literature review

Multisport Expo

http://www.tri-mania.com/Boston.htm

- Saturday March 29th at the Z center

(this is the last weekend of Spring break)

- Free registration at the above site

Really big expo – you can see all the really cool stuff that triathletes with money can by (runs from 10 am to 4 pm)

Costs money to go to most of the clinics, but the registration, seminars and expo are free.

Schedule for the next few weeks:

- Next week's class: March 5th
  - Swimming seminar with Coach Bill Paine from MIT masters swimming
  - Please be on deck at the diving well side of the Z center pool by 3:15 pm in your swim suit
  - don't shower –we will be doing dry land stuff first
  - Bring goggles

Schedule for the next few weeks:

March 12th – Steve will talk to us about the physics of bicycling

Running Clinic – March 19th

-meet at the Indoor track for our running clinic no later than 3:10 pm

-Mike Blanchard from Newton Running Shoe company will come and give us a running clinic

-wear your running shoes and running gear

Update on the workouts

- Spinning workout – Thursday Feb. 27th in the Z center pool
- Swim workout in prep for the masters class with coach Bill.

Readings for this week

- Nutritional mistakes a pro made
- Fats and carbohydrates for exercise (Burke and Hawley, 2006)
- Protein requirements for athletes (Tipton and Witard, 2007)

Optional reading:

- Vegetarian diets for athletes (Venderley and Campbell, 2007)
- Nutritional and functional characteristics of whey proteins (de Wit, 1998)
- Fluid and Electrolyte balance in ultra-EnduranceSport (Rehrer, 2001)

Why do we eat?

To provide the energy to our body to carry out chemical reactions

– carbohydrates in enable us to convert the stored chemical energy into ATP

– We then use the ATP for anabolic reactions (for instance synthesizing proteins from amino acids)

Energy Requirements

A calorie is the amount of heat necessary to raise the temperature of 1 gram of water 1 ^{0}C.

We use a kilocalorie (kcal) as a unit of measure (1 kcal = 1000 calories) and nutritionists refer to is as the Calorie (Cal)

Scientists have to be different, 1 joule = 0.239 calories

Metabolic rate

Is a measure of the overall energy needs that must be met by the animals ingestion and digestion of food

The way to determine your basal metabolic rate is to use the Harris-Benedict formula

Harris-Benedict formula

The Harris Benedict equation is a calorie formula using the factors of height, weight, age, and sex to determine basal metabolic rate (BMR). This makes it more accurate than determining calorie needs based on total bodyweight alone. The only variable it does not take into consideration is lean body mass.

Therefore, this equation will be very accurate in all but the extremely muscular (will underestimate caloric needs) and the extremely overfat (will overestimate caloric needs).

Harris-Benedict formula

Men: BMR = 66 + (13.7 X wt in kg) + (5 X ht in cm) - (6.8 X age in years)

Women: BMR = 655 + (9.6 X wt in kg) + (1.8 X ht in cm) - (4.7 X age in years)

- Note: 1 inch = 2.54 cm.
- 1 kilogram = 2.2 lbs.

Reference: http://www.bmi-calculator.net/bmr-calculator/bmr-formula.php

Harris-Benedict formula

Women: BMR = 655 + (9.6 X wt in kg) + (1.8 X ht in cm) - (4.7 X age in years)

Example:

- You are female
- You are 30 yrs old
- You are 5' 6 " tall (167.6 cm)
- You weigh 120 lbs. (54.5 kilos)
- Your BMR = 655 + 523 + 302 - 141 = 1339 calories/day

Harris-Benedict formula

Let us calculate our BMR:

Men: BMR = 66 + (13.7 X wt in kg) + (5 X ht in cm) - (6.8 X age in years)

Women: BMR = 655 + (9.6 X wt in kg) + (1.8 X ht in cm) - (4.7 X age in years)

Note: 1 inch = 2.54 cm.

1 kilogram = 2.2 lbs.

BMR modifiers

Now that you know your BMR, you can calculate total daily energy expenditure (TDEE) by multiplying your BMR by your activity multiplier from the chart below:

Activity Multiplier

- Sedentary = BMR X 1.2 (little or no exercise, desk job)
- Lightly active = BMR X 1.375 (light exercise/sports 1-3 days/wk)
- Moderately active = BMR X 1.55 (moderate exercise/sports 3-5 days/wk)
- Very active = BMR X 1.725 (hard exercise/sports 6-7 days/wk)
- Extremely active = BMR X 1.9 (hard daily exercise/sports &
- physical job or 2X day training, i.e marathon, contest etc.)

What does this value mean?

Energy in (food) = energy out - weight stays the same

Energy in < energy out - lose weight

Energy in > energy out - gain weight

You need to make sure you are eating the correct number of calories to fit into the category you want to

Food energy and how we use it

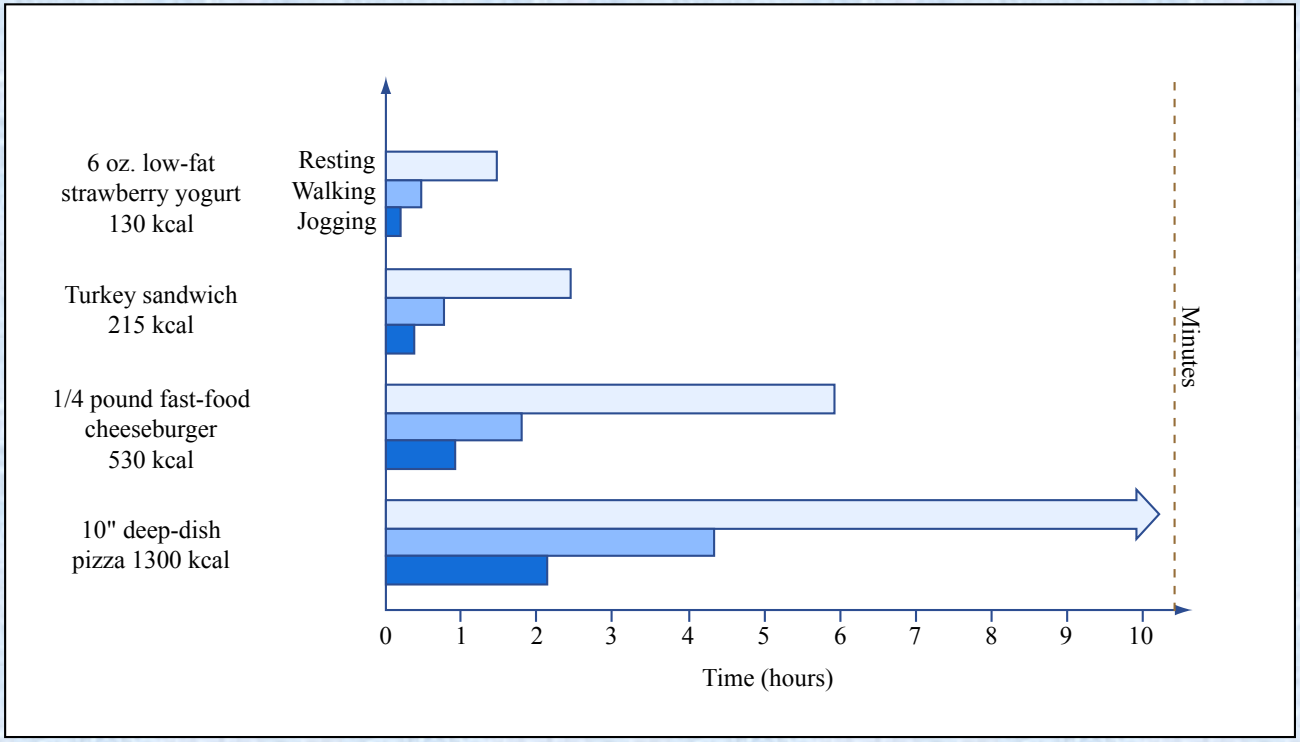


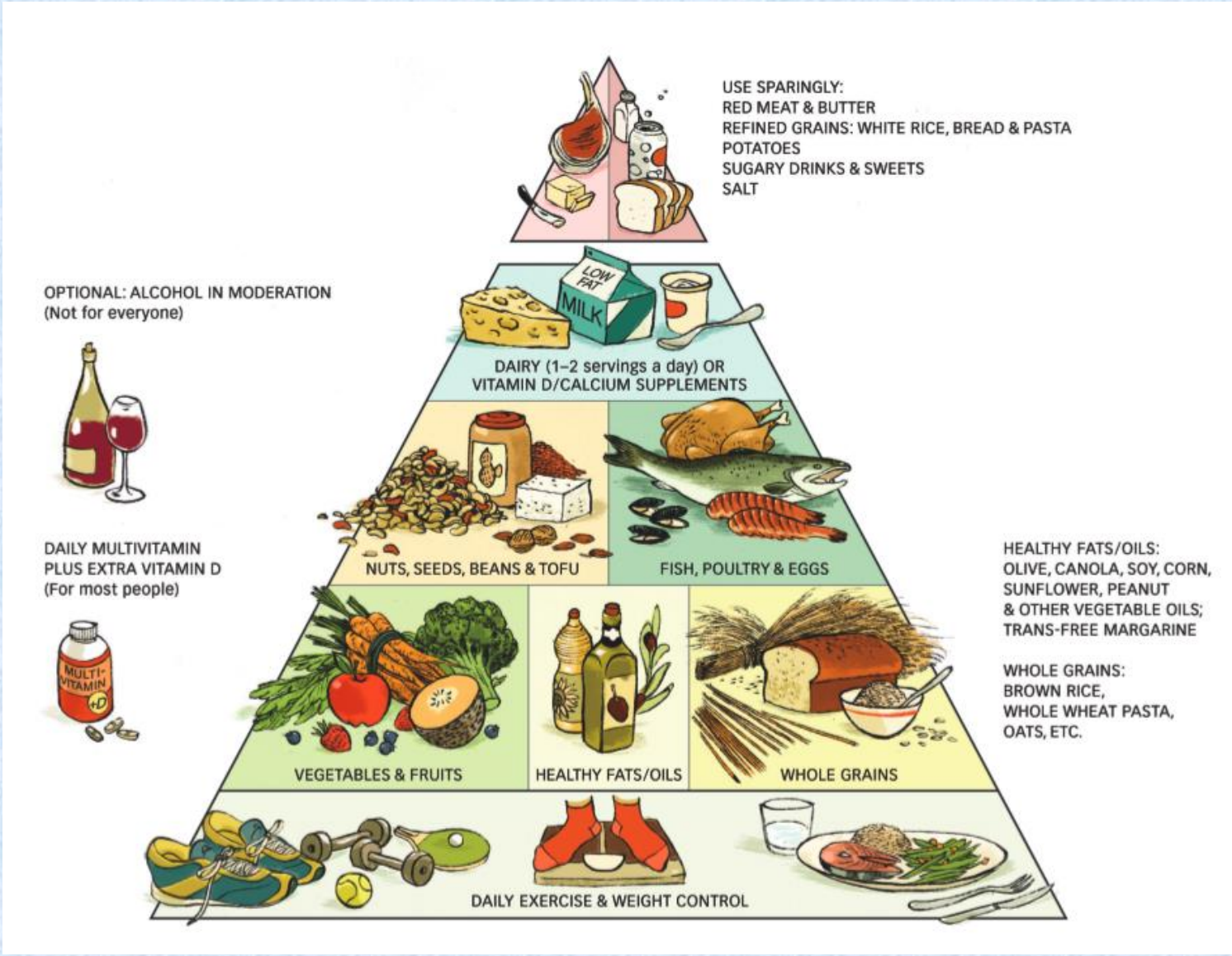
Image by MIT OpenCourseWare.

From The Biology of Life, 7th edition by Sadava et al

A balanced diet

- Carbohydrates - 45 - 65 %
- Fats -20-35 %
- Proteins -10 - 35 %

Food pyramid: 1992



Anatomy of MyPyramid

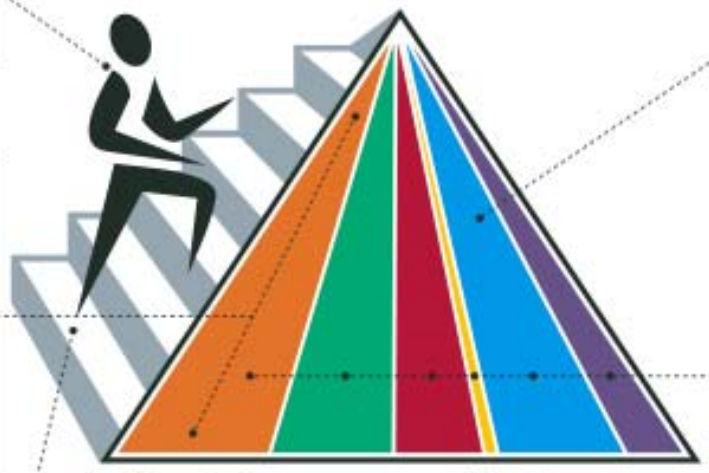
One size doesn't fit all

USDA's new MyPyramid symbolizes a personalized approach to healthy eating and physical activity. The symbol has been designed to be simple. It has been developed to remind consumers to make healthy food choices and to be active every day. The different parts of the symbol are described below.

Activity
Activity is represented by the steps and the person climbing them, as a reminder of the importance of daily physical activity.

Moderation
Moderation is represented by the narrowing of each food group from bottom to top. The wider base stands for foods with little or no solid fats or added sugars. These should be selected more often. The narrower top area stands for foods containing more added sugars and solid fats. The more active you are, the more of these foods can fit into your diet.

Personalization
Personalization is shown by the person on the steps, the slogan, and the URL. Find the kinds and amounts of food to eat each day at MyPyramid.gov.



MyPyramid.gov
STEPS TO A HEALTHIER YOU

Proportionality
Proportionality is shown by the different widths of the food group bands. The widths suggest how much food a person should choose from each group. The widths are just a general guide, not exact proportions. Check the Web site for how much is right for you.

Variety
Variety is symbolized by the 6 color bands representing the 5 food groups of the Pyramid and oils. This illustrates that foods from all groups are needed each day for good health.

Gradual Improvement
Gradual improvement is encouraged by the slogan. It suggests that individuals can benefit from taking small steps to improve their diet and lifestyle each day.

USDA U.S. Department of Agriculture
Center for Nutrition Policy and Promotion
April 2005 CNPP-16

GRAINS | VEGETABLES | FRUITS | OILS | MILK | MEAT & BEANS

New food pyramid: http://www.choosemyplate.gov/

Now in 2011:

- Introduced along with updating of USDA food patterns for the *2010 Dietary Guidelines for Americans*
- Different shape to help grab consumers' attention with a new visual cue
- Icon that serves as a reminder for healthy eating, not intended to provide specific messages
- Visual is linked to food and is a familiar mealtime symbol in consumers'

minds, as identified through testing

- "My" continues the personalization approach from MyPyramid

http://www.choosemyplate.gov/

Now for your own personal data analysis

- Look at your sample calorie counts
- Answer the following questions:

1. How many calories did you consume?
2. Did you eat breakfast?
3. When did you eat in relation to your workout on that day?
4. Do you take a multivitamin?
5. Do you use supplements? Which ones?

Supplements

The dark side of supplements:

- http://triathlon.competitor.com/2010/01/nutrition/super-supplement-me-an-editors-attempt-at-living-off-of-only-powders-and-pills-for-seven-days_6602

Calorie exchange

- Fats yield 9.5 kcal/gram
- Carbohydrates 4.2 kcal/gram
- Proteins 4.1 kcal/gram

What was your percentage of fats? Proteins? Carbohydrates?

A balanced diet

- Carbohydrates - 45 - 65 %
- Fats -20-35 %
- Proteins -10 - 35 %

What were your numbers?

Do you feel that your diet is balanced?

Energy storage in the body

Carbohydrates are stored in liver and muscle cells as glycogen but the total glycogen store represents only about a days' basal energy requirements (1,500 - 2,000 Cal)

Energy storage in the body

Fats is the most important form of stored energy in the bodies of animals

Fat has more energy per gram than glycogen and since it is stored with little associated water, it is more compact

Energy storage in the body

Proteins are not used as energy storage compounds, although body protein can be metabolized as an energy source of last resort

What happens if you are undernourished

The body makes up the shortfall by metabolizing some of the molecules of its own body

The consumption of self beings with the energy storage compounds of glycogen and fat

Protein loss is minimized for as long as possible, but eventually a starving animal begins to break down its own proteins for fuel

Metabolizing self

Blood proteins are among the first to be used, resulting in loss of fluid to the intercellular spaces (edema)

Additional consequences of protein deficiency are breakdown of the immune system and degeneration of the liver

Muscles waste away and eventually even brain protein is list, leading to mental retardation

If starvation continues, the breakdown of body proteins eventually leads to death.

Overnourished

Excess nutrients are stored as increased body mass

First, glycogen reserves are built up

Then additional dietary carbohydrates, fats and proteins are converted to body fat.

Notes from the Web:

- Nutrition information from triathlete magazine: http://triathlon.competitor.com/category/nutrition

Under-fueling:

http://running.competitor.com/2011/02/training/intentional-under-fueling_22097

Essential amino acids

These are the amino acids that can not be synthesized by the body

In humans there are 8 amino acids – isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan and valine.

All available in milk, eggs, meat and soybean products (but most foods do not contain all eight)

Complete proteins

- These are protein sources that contain the essential amino acids
- Difficult for vegetarians to source the complete proteins
- Resource: http://greatist.com/health/complete-vegetarian-proteins

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