Proper Nutrition and Exercise for the Non-Competitive Athlete

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Introduction:

- Who are the Non-Competitive Athletes?
- The Importance of Physical Activity
- The Importance of Proper Nutrition
- Substrate Utilization and Energy Metabolism during Exercise
- Controversies & New Direction of Thinking
- Current Researches
Non-competitive vs. Competitive Athletes

- Not working towards a competition
- Does not follow the competitive regimen
- Sedentary, moderately active/active, highly active
- Not a mandatory training schedule
- Recommended to stay within a limit for training
- Follow a workout regimen for a competition/sports team
- NCAA athletes, school-sponsored teams, other professional teams
- Able to take on more intense workouts
- Nutrition periodization: preparation, competition, transition
- General, specific, pre-competition, competition, transition

Setting the Stage: Physical Activity

Benefits

- Sedentary lifestyles have promoted poor practices
- It is in the best interest of our community to increase physical activity in order to improve overall health conditions (Healthy People 2010)

General Practice

- According to Canada’s Physical Activity Guide to Healthy Active Living, it is important to take part in aerobic exercise at least 3-5 times per week, and strength exercise at least 2-3 times per week
Setting the Stage: Physical Activity

**Deficiencies**
- Circulatory, lung, cardiovascular, bone, and joint problems
- Obesity, immune system protection

**Excessive Practices**
- Overload
  - Stress on bodily functions, working beyond normal levels
- Overtraining
  - Fatigue, higher probability of injury, decrease in immune function, declination in performance, and slow rate in recovery from an intense workout
  - Decrease in peak performance

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Setting the Stage:
Nutrition and the Non-competitive vs. Competitive Athlete

*By following a balanced diet and incorporating physical activity into daily life, athletes can reach maximum performance. If nutrition is not up to recommended levels, the athlete can fall short of their full potential (Jensen, n.a.).*
Nutrition and the Non-competitive vs. Competitive Athlete

Dietary needs should work hand in hand with workout regimen

Calories, Proteins, Carbohydrates Alteration

High-intensity, high-endurance athletes

*Competitive and highly-active non-competitive athletes*

**Carbohydrates:**

- Carbohydrates loading
- Increase carbohydrates

**Protein:**

- 1.2 grams- 1.4 grams/kg for endurance
- 1.2 grams- 1.7 grams/kg for strength

RDA requirements: nothing should fluctuate unless intensity or duration increases

For the most part, recommendations for the average person are what the athlete needs

According to the RDA, at least 55%-60% of calories should come from carbohydrates

**Deficiencies:**

- Glycogen depletion, fatigue, impaired workout, ATP production for energy coming from other dietary sources, decrease in maximum potential with high-intensity, short duration workouts that rely readily on glycolytic pathways for ATP production

**Excessive:** Fat in adipose tissue

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Setting the Stage: Nutrition and the Non-competitive vs. Competitive Athlete

Protein should be 0.8 grams/kg of weight
- **Deficiencies:**
  - Tissue maintenance after intense activity and cannot help carbohydrates produce more glycogen.
- **Excessive:**
  - Dehydration from fluid losses from urine
  - Heart disease, obesity, and cancer

Dietary fats should stay within 20%-35% of daily calories
- ~ 30% fats, <10% saturated fats,
- Monounsaturated, polyunsaturated fatty acids

**Deficiencies:**
- Insufficient delivery of fat-soluble vitamins, low body insulation
- Hormonal imbalance, inability to spare glycogen stores during low-moderate intensity activities

**Excessive:**
- Heart disease, obesity, hinder glycogen oxidation for ATP production for high-intensity workouts, and exercises that need spurts of intense energy
Setting the Stage: Nutrient Metabolism Overview

Fats and proteins are metabolized aerobically

Carbohydrates are the only macronutrients that can be metabolized both aerobically and anaerobically

Glucose main source for ATP production
- Glycolysis ➔ Citric Acid Cycle ➔ Electron Transport Chain

Fats and Proteins come in as fatty acids and amino acids for ATP when sufficient amounts of glucose are not available
- Citric Acid Cycle ➔ Electron Transport Chain

Setting the Stage: Nutrient Metabolism Overview

Metabolic processes do not different between competitive and recreational athletes
- Carbohydrates readily produce ATP
- If sufficient amounts of glucose are not available, having good, recommended daily amounts of other macronutrients can help aid in metabolic processes in order to produce energy and allow the body perform physical activity.
Setting the Stage: Hydration

Most important nutrient is water

Functions:
- Homeostasis
- Fluid loss $\implies$ dehydration
- Decrease in optimal performance

Fluid needs (Insel, 2006)
- Relatively active in cool weather drink 3-6 liters of fluid/day; if it is warm outside, 5-10 liters of fluid/day
- Sedentary individuals in cool weather should intake 2-3 liters of fluid/day, and 3-5 liters of fluid/day in warm weather

As athletes, we are all different. There can never be a set amount for our bodies. These are all tips to take into consideration, and it is important to be aware of changes in your body and hydrate yourself when you feel it is needed.
The Controversy

- Many athletes, whether competitive or non-competitive, have several misconceptions about what constitutes a proper diet
- Lack of proper nutrition can lead to fatigue, weight gain, lack of focus, or low energy levels
- People seek out the latest nutrition fad or supplement to placate their troubles
  - An estimated $33 billion is spent each year
  - Rare if any of these fads or supplements have been proven safe or even effective

Controversy cont’d

- Assumption that non-competitive athletes do not train at the level or intensity of competitive athletes
- Do not require special nutritional attention
- However, research shows that non-competitive athletes train at various intensities
  - very high or low
  - for a variety of reasons
- General nutritional guidelines are a beneficial
- A one-size-fits-all approach may not be appropriate for such a diverse category of physically active people
The New Direction of Thinking

- Nutritional needs- specific to exercise intensity
- Non-competitive athletes train with wide variability of intensities
- Important to develop individualized meal plans
  - Level of intensity should be determined
  - Current diet should be assessed
  - Specific goals should be set
- May not improve performance
- Issue is of achieving optimal health

What Current Research Indicates

- Nutritional Status of Athletes and Sedentary Individuals
- Physical Activity and Risk of Disordered Eating
- Body Fat Profile
- Dietary Fat and Exercise
- Use of Dietary Supplements
Athletes’ dietary intake was closer to French RDA’s than those of young sedentary counterparts.


Purpose

The purpose of the experiment is to study the nutritional status of young French adults, particularly to compare the nutritional status of trained young male and female athletes to those of young sedentary control subjects, and to national RDA’s.
Methods

Subjects:
- 85 subjects
  - 26 were endurance-trained runner
  - 12 were sprinters
  - 25 were handball players
  - 22 were sedentary control subjects
• Athletes - trained between 3-5 times per week for at least 8 years
• Control group - did not engage in any regular exercise during their daily routine
• All are non-smokers, had no previous pregnancies, no eating disorder and did not take any supplements or drugs

Methods

Experimental Design:
• 4-day food record (Monday through Thursday)
• Nutrient intake records were processed using the software Nutrilog.
• TEE (Black) = basal metabolic rate x physical activity
• Athlete’s energy expenditure - based on the type of sport, exercise duration, exercise intensity and on the percentage inactivity during the session
• Compare with the RDA for the French population
• Statistical Analysis - Two-Way Analysis of Variance wherein the independent values are sex (men or women) and sport practiced.
Result

• Both sex and type of sport had significant effects on energy intake, energy expenditure, minerals and vitamins B1, B2, B6 and B12, whereas only sex had significant effects on vitamin B3, B5 and only type of sport had significant effects on energy balance, water, carbohydrates and fat.

• The energy intake of the control subjects was statistically significantly lower than the recommended one for their age group.

• Carbohydrate was below recommended values whereas fat was above the French RDA’s for control subjects.

Result

• Protein was below the recommended values for men but it was above for women.

• Insufficient consumption of vitamins and minerals. Vitamin C for both athletes and control subjects were above the recommended levels whereas magnesium, vitamin D and E were below the French RDAs.

• All groups of males showed an excess of vitamin B12, whereas all the female groups showed an insufficient consumption of iron and magnesium.
Conclusion

The main findings of this study were that the athletes’ nutritional qualitative and quantitative status were closer to French RDA’s than those of control subjects.

Majority of the athletes who participated in the study have a good nutritional status except for magnesium, vitamin D & E and iron. It appeared that control subjects consumed less carbohydrates, water and mineral but consumed more fat than recommended values for their age group.

Practicing a sport may allow athletes to balance their energy intake and expenditure and could be a good way to have a quantitative and qualitative nutritional status closer to recommended values.

Evaluation

(+)  
• Made use of good selection of previous studies with results that won’t bias the result of the current study  
• Subjects are compliant and particularly motivated by the study  
• Opens doors for another research study to further the nutritional data regarding the athlete’s nutrition  
• Gave solution on how to improve the nutritional intake of the non-athletes

(-)  
• Result of the study has both consistency and contrast with other studies  
• Days chosen when to record the food intake and physical activity are only on weekdays  
• Accuracy of the filling up of the food diary  
• Results cannot be generalized for other population due to cultural differences in food practices and food availability

### Purpose

- This experiment examines the relationships between physical activity, psychological eating disorder risk and body composition among college athletes and their non-athlete counterparts.
- Tests physiological effects that can be associated with physical activity
- Effects physical activity could have on anthropometric measurement between the two groups.
Methods

• The athlete in this experiment is defined as those who participate in NCAA or university sport programs (Malinauskas, 2007)

• Group A included the NCAA athletes and other participants active in university sponsored sports programs.

• Group B included the non-athletic participants.

• 115 undergraduate female students were tested.

Methods

• Two tests took place with a 21-day period in between.

• The physical activity for the first meeting was tested, and the second was a review of the physical activity plus anthropometric measurements (skinfold measurements/circumference measurements).

• These were records for two weekdays, and one weekend day.

• Rest, very light, light, moderate and heavy activities.

• Questionnaires that would help show their attitudes towards physical activity; measured psychological disordered eating risk, drive for thinness and body dissatisfaction (Malinauskas, 2007).
Result

• They found that to some extent some of their results might need to be questioned because some of these non-athletes were once physically active.

• Experimenters found many females with body dissatisfaction and drive for thinness; moderate physically active non-athletes vs. athletes.

• High physically active participants from the athletic group were about the same with anthropometric measurements and body dissatisfaction (Malinauskas, 2007).

• Athletes saw physical activity as a very important part of their daily lives than the non-athletes.

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Result

• Correlation between low physical activity and high body fat. (Non-Athletes)

• Non-athletic participants were also more dissatisfied with their bodies.

• 10%-31% of those studied had a predictive psychological eating risk, and drive for thinness (Malinauskas, 2007).

• Highly active participants were more focused on performance than thinness.
Discussion & Conclusion

- Eating disorder risks occur frequently among females but for different reasons.
- There is a correlation between physical activity and body-fat.
- Important it is to not make the assumption that non-athletes are not as active as athletes.

Evaluation

Female study
Interesting study
Needs to take into account that some of these non-athletes were once athletes
  - Hard to generalize for this reason.
  - Some non-athletes can be just as physically active as athletes
References from 1975-2005
  - Female athletes
  - Eating disorders
  - Athletes and non-athletes
Pertains to our class subject
  - Goes in depth with athlete versus non athlete mindsets
  - Eating disorder risks
  - Reasons for being physically active
Lipidemic profile of athletes and non-athletes with similar body fat


**Purpose**

To compare the lipidemic profile of young lean athletes and non-athletes matched for age, and percent body fat.

Experimenters want to find out if lean endurance athletes have different lipidemic profiles from sedentary individuals. Note that it is known that exercise
Methods

- Similar age and percent body fat.
- 14 endurance athletes and 14 sedentary athletes 18-26 years.
- Two blood samples were taken from all those who participated.
- One given at the beginning of the study and one at the end of the study, which was after a 7-day period where they were physically active and given food.
- The athletes worked out five days a week, and one hour per day.
- The non-athletes were considered the control group and did not partake in physical activity.

Results

- Athletes were found to have significantly higher energy expenditures and energy intakes.
- There were no differences found in the macronutrient components and intakes of their non-athletic counterparts.
- No significant differences were found from serum levels of triacylglycerol, LDL, or HDL levels in blood plasma.
Discussion & Conclusion

This experiment suggests that athletes and non-athletes with similar body fat do not differ in regards to their lipidemic profiles.

Evaluation

“A healthy amount of exercise on blood lipids, even when they are normal at a young age, may help prevent the accumulation of causes that will lead to cardiovascular disease at an older age” (Petridou, 2005).

- Few studies have been done on exercise effects on lipidemic profile
- Everything in the study was matched
- Male study
- Young + lean athletes
  Did not account for those of older age or different amounts of body fat.
Evaluation

- Relevance
  - We are comparing athletes to non-athletes
  - Exercise, healthy hearts, all pertaining to us.

- References from the late 70s through 2002.
  - Low Density Lipoproteins
  - Plasma levels of fats
  - Aerobic training
  - Athletes + sedentary individuals
  - Adolescent females

Effect of ingestion of medium-chain triacylglycerols on moderate-intensity and high-intensity exercise in recreational athletes

Purpose

- **Background**: During exercise fat oxidation generates a great deal of required energy. Medium-chain triacylglycerols (MCT) are shown to metabolize more readily to fatty acids than long-chain triacylglycerols (LCT)

- **Purpose**: To investigate the effects of the ingestion of food containing a small amount of MCT on fat and carbohydrate utilization in recreational athletes
  - Rate of perceived exertion (RPE) during moderate-intensity and high-intensity exercise was also examined

Methods

- Double-blind, crossover study
- One man and seven women, ages 21-28
- Given a test meal for 14 days
- 414 kilocalories, 67.6 grams of carbohydrate, 4.8 grams of protein, and 14.4 grams of fat
- Either 6 g of MCT or 6 g of LCT
- Participants performed a cycle ergometer exercise
  - moderate-intensity of 60% peak VO2 max for 40 mins.
  - high-intensity of 80%VO2 max until exhaustion
- **Measurements**: blood lactate levels, VO2, CO2, and RPE at rest and during exercise
Results

• With the MCT trial:
  – At a high-intensity workload time to exhaustion was longer
  – Blood lactate and RPE levels were significantly lower
• Fat oxidation was higher, while carbohydrate oxidation was lower
• **Results suggest:** ingestion of food containing MCT may suppress the increase of blood lactate during moderate exercise and decrease the RPE during high-intensity exercise in recreational athletes
• MCT may be more effective than LCT at suppressing carbohydrate utilization for energy by increasing the utilization of fatty acids

Prevalent use of dietary supplements among people who exercise at a commercial gym

Purpose

- **Background**: A wide variety of dietary supplements are available in the United States, and its usage is rampant.
- **Purpose**: To examine the use of dietary supplements by people who workout at a commercial gym and determine the sources of supplement information.
- The study took place at a commercial gym in a community of Long Island, New York.

Methods

- Convenience sample of 222 people
  - age 18 and older
  - exercised at least four times per week for about one hour per session for at least one year
- Data collected over a period of two days by one researcher
- Survey included questions about demographics, frequency of supplement use, reasons for usage, primary reason for exercising, and sources of supplement information
Results

• 84.7% of the participants reported taking at least one supplement
  – of those, 94.5% used supplements all year
  – 5.5% used them only during certain seasons.
• 4 supplements were reported as being taken regularly (more than five times/week):
  – multivitamins and minerals, 45%
  – protein bars or shakes, 42.3%;
  – vitamin C, 34.7%;
  – vitamin E, 23.4%

Results

• Reasons for supplement use:
• 49.1% to build muscle
• 38.4% to prevent illness
• 36.1% to increase energy
• 24.4% to improve sport performance
• 22.4% to gain strength
• 20.5% to help in recuperation
Results

- Sources of supplement information:
  - 65.8% from magazines
  - 63.1% from family and friends
  - 55.7% from a vitamin store employee 54.5% learned from books
  - 45.5% relied on media
  - 38.7% asked personal trainers
  - **28.4% consulted a registered dietitian or certified nutritionist**