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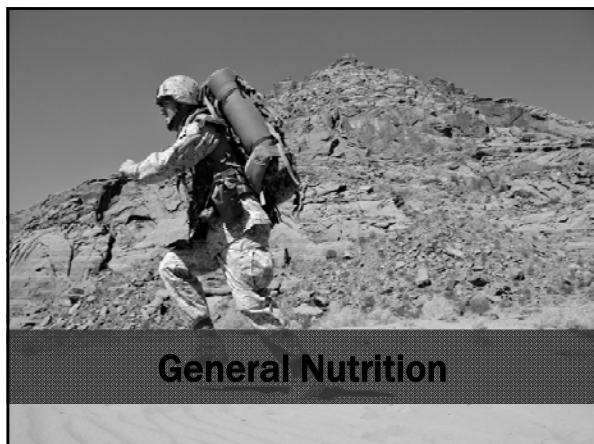
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Content Weighting

| Nutrition Topic Areas | Total | RE | AP | AN |
|---|-----------|----------|----------|----------|
| Nutritional Factors Affecting Health and Performance | 3 | 3 | 0 | 0 |
| Strategies for Optimizing Body Composition and Maximizing Physical Performance and Recovery | 4 | 0 | 4 | 0 |
| Eating Disorders and Altered Eating Habits | 2 | 2 | 0 | 0 |
| Performance-Enhancing Substances and Methods | 4 | 4 | 0 | 0 |
| Total | 13 | 9 | 4 | 0 |





General Nutrition

Topics

- Basic components of nutrition
- USDA's dietary guidelines and general recommendations



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Macronutrients

Needed in large amounts and contain energy

- Protein
 - Primary role: Tissue repair and growth
 - 4 calories per gram
- Carbohydrates
 - Primary role: Energy source
 - 4 calories per gram
- Lipids (fats)
 - Primary roles: Energy reserve, protection of organs, thermal insulation, carrier of fat-soluble vitamins
 - 9 calories per gram





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Protein

- Structure
 - 20 amino acids
 - 9 "essential" amino acids
 - 11 "nonessential" amino acids

- Protein quality
 - Complete protein
 - High biological value
 - Essential amino acids
 - Animal origin
 - Incomplete protein
 - Low biological value
 - Plant proteins
 - Complementary proteins
 - Variety of plants to obtain essential amino acids









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Protein Recommendations

- General intake
 - Protein: 10-15% overall; 0.8 grams/kg bodyweight
- For the tactical athlete
 - Resistance training: 1.6-1.7 g/kg bodyweight
 - Endurance training: 1.2-1.4 g/kg bodyweight







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Carbohydrates

- Simple sugars
 - Monosaccharides
 - Glucose
 - Fructose
 - Galactose
 - Disaccharides
- Complex carbohydrates
 - Polysaccharides
 - Starch, fiber
 - Glycogen





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Carbohydrate Recommendations

- Complex carbohydrates
 - Glycemic index
 - Rating indicative of the effects of carbohydrates on blood glucose levels
 - Most relevant for diabetics
 - Inconsistent effects on performance
 - Fiber: 25 g (females) 38 g (males)
 - Low intake linked to disorders
 - Heart disease, diabetes, constipation
 - Fruits, vegetables, nuts, seeds, whole-grains
 - Glycemic load takes the serving size into account



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Carbohydrate Recommendations

- General intake
 - 45-65% of total caloric intake
 - Depends on the individual
 - 50-100 g to prevent ketosis
- For the tactical athlete
 - High volume/aerobic endurance focus
 - 10 g/kg day
 - Anaerobic focus
 - 5-6 g/kg day



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Lipids (Fats)

- Lipids: Three groups
 - Simple
 - Example: Triglycerides = "Fat"
 - Compound
 - Example: LDL and HDL
 - Derived
 - Example: Steroids, cortisol, vitamin D



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Lipids

- Structure of fat
 - Triglyceride/fat
 - Glycerol + 3 fatty acids
 - Saturated fats
 - Typically animal sources and tropical oils
 - Linked to increased disease risk
 - Unsaturated fats (“heart healthy”)
 - Typically plant sources; olive and canola oils, almonds



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Fat Recommendations

- Fat
 - Sedentary: 20-35%
 - Tactical athletes: 20-40%
 - Diets with <15% fat may decrease testosterone
- Heart disease
 - Saturated fat <10%
 - Lower cholesterol intake
 - LDL: “bad” cholesterol collects in blood vessel walls
 - HDL: “good” cholesterol protects against heart disease; increases with exercise



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Micronutrients

Needed in small amounts but do not provide energy

- Vitamins
 - Perform specific metabolic functions and tissue synthesis
 - Cannot be synthesized in the body (except for vitamin D)
 - Water-soluble vs. fat-soluble



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Micronutrients

- Minerals
 - Calcium, phosphorus, magnesium, iron, sodium, potassium, and chloride
 - Provide structure, maintain functions, and regulate metabolism
 - Common deficiencies:
 - Iron: Located in hemoglobin or myoglobin and transports oxygen
 - Calcium: Affects bone density, nerve transmission, muscle contraction



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Water and Electrolytes

- Water
 - Affects performance through thermoregulation
 - 2-6% of bodyweight can be lost during exercise
 - Dehydration decreases performance
- Electrolytes
 - Sodium chloride, potassium
 - Adaptation occurs with training
 - Replacement may be necessary



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Dehydration

- Indicators
 - Weight, urine, thirst
- Sweat-related loss of bodyweight
 - 1% ↑ body temperature
 - 3-5% ↑ cardiovascular strain
 - 7% collapse
- Fluid replacement and activity
 - Before: 16 oz two hours prior
 - During: 6-8 oz every 15 min during
 - After: 20-24 oz for every pound lost



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- Recommended daily allowance (RDA)
 - Grains: 6-8 oz per day, half from whole grains
 - Protein: 5-8 oz
 - Fruits: 1.5-2 cups
 - Vegetables: 2.5-3 cups
 - Dairy: 3 cups



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Caloric Expenditure

Topics

- Energy requirements
- Metabolic equivalent of tasks



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Energy Requirements

- Calorie balance
- Metabolic rate factors
 - Resting metabolic rate (RMR): 60-75%
 - Physical activity: 2nd largest component
 - Thermic effect of food: 7-10%
- Estimating energy requirements
 - Food diary/recall
 - Formulas
 - Indirect calorimetry



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Metabolic Equivalent of Tasks

- Metabolic equivalent of tasks (METs) is used to express energy expenditure and to prescribe exercise
 - 1 MET = $3.5 \text{ ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1} \text{ O}_2$
 - Examples:
 - Walking 4 mph = 5.0 METs
 - Circuit training = 8.0 METs
 - Running 8 mph = 13.5 METs



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Heart Disease and Dietary Choices

Topics

- Hyperlipidemia
- Heart healthy diet
- Obesity



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Heart Disease and Dietary Choices

- Hyperlipidemia
 - High levels of cholesterol or other lipids and unfavorable ratios of lipoproteins (LDL/HDL) in the blood
 - Associated with ↑ risk of heart disease
 - Optimal levels:
 - Total serum cholesterol <200 mg/dL
 - HDL >40 mg/dL
 - LDL <130 mg/dL
 - Triglycerides <150 mg/dL



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Heart Disease and Dietary Choices

- Heart healthy diet
 - Decrease overall fat intake
 - Saturated fats <7% of total calories
 - Cholesterol <200 mg/day
 - Trans fats: Hydrogenated oils
 - Increase fiber
 - Whole-grains
 - Fresh fruits and vegetables



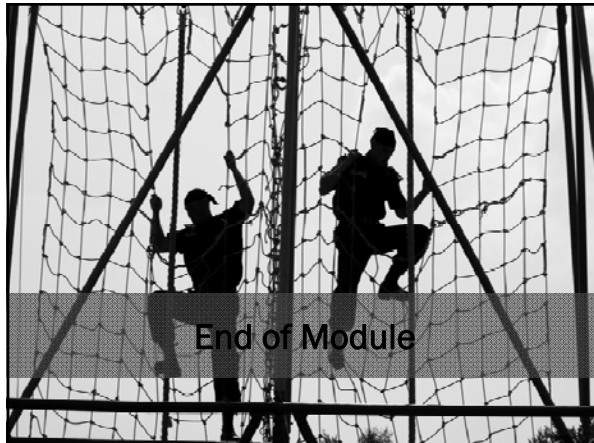
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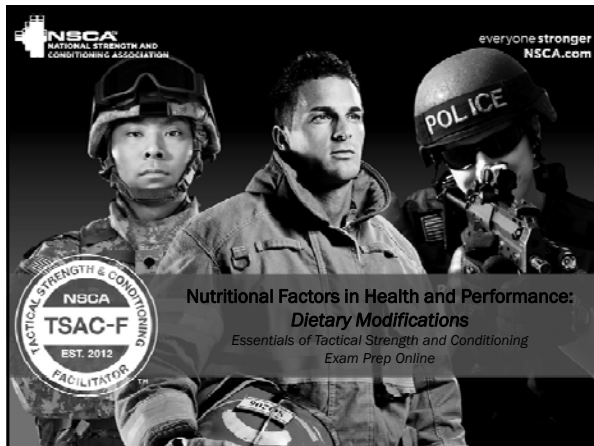
Obesity and Heart Disease

- Obesity
 - BMI ≥ 30.0
 - Fat distribution
 - Waist circumference values that increase risk
 - Males: >40 in.
 - Females: >35 in.



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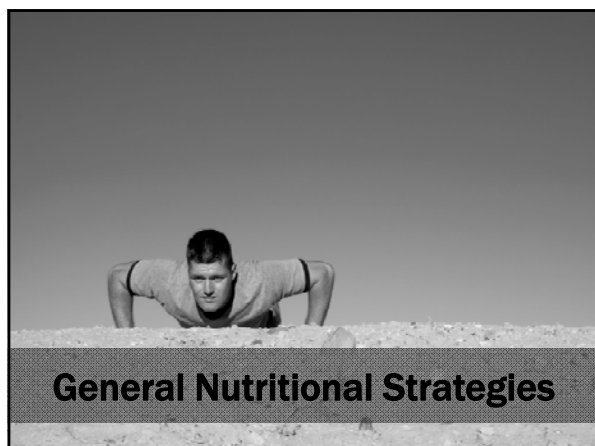
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General Nutritional Strategies



Topics

- Nutritional strategies
 - Weight loss
 - Weight gain/hypertrophy
 - Nutrient timing

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Nutritional Strategies

- Nutrient consumption
- Nutrient timing
- Additional factors
 - Genetic predisposition
 - Somatotype
 - Compliance

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Weight Loss

- Achieve negative calorie balance
 - 1 lb fat equals ~3,500 calories
 - ↓ caloric intake by 500-1,000 calories/day
 - 1-2 lb/week or ~1% of bodyweight/week
- Preservation of lean body mass
 - Increase protein intake 1.2-2.0 g/kg bodyweight
 - Maintain resistance training



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Weight Gain/Hypertrophy

- Achieve positive calorie balance
 - 1 lb of muscle ~2,500 calories
 - ↑ caloric intake by 350-700 calories/day
 - 5-6 meals per day
 - 1-2 lb per week
- Exercise
 - Progressive resistance training



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Nutrient Timing

- Pre-workout
 - Aerobic endurance
 - Individual and activity dependent
 - 3-4 hours prior
 - Up to 30 min prior
 - Resistance training
 - Combination of carbohydrates and proteins



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Nutrient Timing

- During
 - Aerobic endurance
 - Exercise duration >60 min: 30-60 g carbohydrates/hr
 - 1-2 cups of 6-8% carbohydrate solution every 10-20 min
 - Carbohydrate/protein combination beneficial
 - Resistance training
 - No recommendations currently



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Nutrient Timing

- Post-workout
 - Aerobic endurance and resistance training
 - Carbohydrate-to-protein ratio of 4:1
 - High glycemic index carbohydrates
 - Within 30 min to 2 hours



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Carbohydrate Loading

- Enhanced muscle glycogen levels
 - Used for long-distance/duration events (>1 hour)
- Method
 - 3 days of high-carb diet prior
 - 600 g or 8-10 g/kg bodyweight
 - Exercise tapering 1 week prior
 - Complete rest 1 day prior
- Water retention, gastrointestinal issues



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Topics



- Performance-enhancing substances
- Dietary supplements



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Performance-Enhancing Substances

- Categories
 - Hormones and similar drugs
 - Substances that change the body's structure or function
 - Dietary supplements
 - Vitamins
 - Minerals
 - Herbs
 - Amino acids
 - Dietary substances for supplementation



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Dietary Supplements

- Essential amino acids
 - ↑ anabolic response
- Muscle buffers
 - β-Alanine, sodium bicarbonate, sodium citrate
- L-Carnitine
 - May enhance recovery
- Creatine
 - May ↑ strength and improve training
- Stimulants
 - Caffeine can prolong endurance and increase power production



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Deployment or Extended Field Duty

Topics

- Recommendations for prolonged caloric deficit
- Planning and intervention strategies



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Deployment or Extended Field Duty

- Prolonged caloric deficit
 - Results in decrements in performance
 - Marksmanship
 - Decision-making/reaction time
 - Reduction in body mass
 - ↓ power, strength, and aerobic fitness
 - Alteration in endocrine status
 - ↓ anabolic hormones, testosterone, and insulin-like growth factor-I
 - ↑ catabolic hormones, cortisol



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Planning and Intervention Strategies

- Tips to maintain energy balance and hydration
 - Eat a high-carbohydrate diet
 - Avoid fatty foods
 - Avoid high-protein intake (increases water loss)
 - Eat small, frequent meals
 - Hydrate regularly
- Encourage consumption during periods of lower energy expenditure
- Teach identification of safe food/water sources



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