### Scientific Knowledge Base: Nutrients

<table>
<thead>
<tr>
<th>Carbohydrates</th>
<th>Proteins</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starches and sugars</td>
<td>Amino acids</td>
</tr>
<tr>
<td>Fats</td>
<td>Water</td>
</tr>
<tr>
<td>Saturated, monounsaturated, and polyunsaturated</td>
<td>Cells depend on a fluid environment</td>
</tr>
<tr>
<td>Vitamins</td>
<td>Minerals</td>
</tr>
<tr>
<td>Essential to metabolism</td>
<td>Catalysts for biochemical reactions</td>
</tr>
<tr>
<td>Water or fat soluble</td>
<td></td>
</tr>
</tbody>
</table>

### Essential Nutrients

**Water 60-70% body weight**
- Cell function depends on fluid environment
- Found in:
  - liquids
  - Fruits & vegetables
- Carbohydrates (CHO) – 1 gm=4kcal
  - A main source of energy for the brain and muscles during exercise
  - Classified according to their sugar units
  - Breads, rice, cereals, fruits, vegetables, pasta
**Essential nutrients**

*continued*

**Proteins** – Produce 4 kcal/g

Essential for growth,

Maintenance & repair of body tissue

Amino acids:

essential and nonessential

Complete and complementary proteins

Nitrogen balance

Meat, poultry, fish, dry beans, eggs, nuts,

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**Minerals**

Inorganic elements essential to the body as catalysts in biochemical reactions.

Found in all body fluids and tissues as organic compounds, inorganic compounds and free ions.

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**Essential Nutrients**

*continued*

**Minerals** continued

Iron (Fe) - liver, lean meats, whole grains, green leafy vegetables

Calcium (Ca) - milk, leafy veggies, fish

Sodium (Na+) - salt, soda

Potassium (K+) - cereals, peas, fruit, nuts, fish

Chloride (Cl-) - diets rich in salt

Macrominerals (needed in amounts of 100mg/day)

(Calcium, sodium, potassium, chloride, magnesium)

Microminerals (needed in amounts less than 100mg/day)

(iron, zinc, manganese, iodine, fluoridem, copper, cobalt)
Essential nutrients continued

Lipids (Fats) produce 9 kcal/g
composed of triglycerides and fatty acids.
Saturated-animal fat (solid at room temp)
Unsaturated-vegetable (liquid at room temp)
Linoleic-only essential fatty acid found in humans

Essential Nutrients continued

Vitamins – organic substances that are essential to normal metabolism.
B, C (water soluble) – whole grains, nuts, egg yokes, fruits and veg.
A,D,E,K (fat soluble)- fish, liver, butter, milk, eggs, alfalfa

Anatomy and Physiology of the Digestive System

<table>
<thead>
<tr>
<th>Digestion</th>
<th>Absorption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Begins in the mouth and ends in the small and large intestine</td>
<td>Intestine is the primary site for absorption</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Metabolism and Storage of Nutrients</th>
<th>Elimination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anabolic and catabolic reactions</td>
<td>Chyme is moved through peristalsis into the large intestines and turned into feces</td>
</tr>
</tbody>
</table>
Dietary Guidelines

- Dietary reference intakes (DRIs)
  - Evidence based criteria for acceptable range of amounts of vitamins and nutrients for each gender and age-group.

- Food Guidelines USDA
  - Dietary Guidelines of 2010

- Daily values
  - FDA created for food labels. Needed protein, vitamins, minerals, fats, cholesterol, carbohydrates, fiber, sodium, and potassium

http://www.choosemyplate.com

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**Nutritional Self-Assessment** in syllabus
Plan ahead - you will be listing your actual food intake for 48 hours, analyzing and making recommendations
Calculate your BMI
Record your actual intake

**Analysis**
For each of the six food groups did your meals include: an adequate amount?
- not enough (deficient)
- too much (excessive)

**Recommendation**
Identify specific changes needed to attain a balanced diet.

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**Factors that influence Nutrition across the lifespan**

**Infants** - marked by rapid growth & high protein, vitamin, mineral and energy requirements

**Toddlers & preschoolers** - growth rate slows
Needs fewer kilocalories but increased amount of protein in relation to body weight.

**School age 6-12yrs** - grow at slower, steadier rate with gradual decline in energy requirements.

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Quietly, efficiently, and without warning, the tobacco companies switch to Plan B.
Age-Influencing Factors

- **Adolescents**: energy needs increase, rapid bone growth (need Calcium), girls need iron to replace menstrual losses, boys need iron for muscle development.

- **Young and Middle adults**: growth period ends. Needs for energy maintenance and repair. Obesity can become prob due to decreased physical exercise.

- **Older adults**: energy requirements gradually decrease

Influencing Factors continued

- **Gender**: men usually need more calories and protein because of their larger muscle mass.

- **Health status**: increase in metabolic demands for wound healing

- **Climate**: Heat and cold affect our appetites and metabolism

- **Activity**: increases the need for calories.
Influencing Factors continued

**Cultural aspects** - preferences
Based on patterns, religion,

**Dietary habits** - formed while young,
best time to make changes

**Personal preferences** - what are your
favorite foods?

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**Influencing Factors**

**Psychosocial factors** - example
depression and feelings of powerlessness
can result in loss or increase of appetite.

**Economic factors** - poverty
may increase the difficulty of
obtaining food. Diets usually
consist of increased starch and
low protein.

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**Influencing Factors**

**Pregnancy** - quality nutrition is imp.
Increased need for calcium, protein,
folic acid

**Lactation** - Increased nutritional
needs
Alternative Food Patterns

• Based on religion, cultural background, ethics, health beliefs, preference
• Vegetarian diet
  – Ovolactovegetarian
  – Lactovegetarian
  – Vegans
  – Fruitarian

Nutritional Assessment

History and interview
Number of meals per day?
recent weight change?
change in appetite?
difficulty obtaining food
food allergies
Food preferences
Beliefs
Alcohol use

Physical exam
general - height & weight-Anthropometry
inspection - skin, hair, mouth, eyes, nails

At Risk for Alterations

NPO—potential fluid volume deficit

Immobilized —Ca leaves the bones when there is no weight bearing activity

Postoperative—increased need for albumin to repair tissues

Cancer — increased metabolic demand on body
### At Risk continued

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
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<tbody>
<tr>
<td>Obesity</td>
<td>impaired healing</td>
</tr>
<tr>
<td>Draining wounds</td>
<td>loss of protein</td>
</tr>
<tr>
<td>Infection</td>
<td>increased metabolic demand</td>
</tr>
<tr>
<td>Lactose intolerant</td>
<td>genetic disorder may result in diarrhea &amp; cramping</td>
</tr>
<tr>
<td>Eating disorders</td>
<td></td>
</tr>
<tr>
<td>a) anorexia</td>
<td>poor appetite</td>
</tr>
<tr>
<td>b) anorexia nervosa</td>
<td>refusal of food</td>
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### Common Nutritional Alterations

<table>
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<th>Condition</th>
<th>Description</th>
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<tr>
<td>Protein calorie malnutrition</td>
<td>high calorie/low nutrient value foods often seen in poverty</td>
</tr>
<tr>
<td>Anorexia resulting in Starvation</td>
<td>(Cachexia) general malnutrition. Associated with severe diseases</td>
</tr>
<tr>
<td>Obesity</td>
<td>adverse effects on tissue oxygenation</td>
</tr>
<tr>
<td>Malabsorption</td>
<td>interference with absorption of nutrients</td>
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</table>

### Diagnostic Testing

*No Single Test is diagnostic for manutrition.*

Common Lab tests used to study nutritional status include:

- Measures of plasma protein
- Total iron-binding capacity
- Hemoglobin
- Serum Albumin
- Total protein
Diagnostic Testing continued
Factors that frequently alter tests results:

- Fluid balance
- Liver function
- Kidney function
- Presence of disease

Nursing Diagnosis

Assessment – may determine actual or potential nutritional probs.
Nutrition, altered:
- a) less than body requirements
- b) more than body requirements
Self-care deficit, feeding
Impaired swallowing
Knowledge deficit (nutrition)

Nutritional Interventions

Nutritional Counseling
- Coordinate Plan of Care
- Individualize menu plans

Nutritional Monitoring
- Monthly weight gain/loss
- Physical Assessment

Nutritional Management
- Alternate rest with activity
- Encourage fluid/fiber
Nursing Intervention

Hospital Diets

Clear liquids – Tea, black coffee, clear broth, gelatin sugar OK, no milk products

Full liquids - Smooth textured dairy products, custards, refined cooked cereals...

Pureed - includes liquids plus scrambled eggs, mashed potatoes, custard.

Mechanical Soft - Foods that are easily chewed

Hospital Diets continued

Soft/Low residue - low fiber easily digested

High Fiber - fresh uncooked fruits, steamed veg. oatmeal, dried fruits

Low Sodium - 4g (no additional salt), 2g, 1g, or 500mg

Low Cholesterol - 300mg/day

Hospital Diets

Cardiac - follows AHA guidelines- low fat, low sodium, potassium rich.

Diabetic - follows ADA guidelines, balanced carbohydrates, proteins and fats.

Chemo - management focuses on maximizing intake of nutrients and fluids.

Vegetarian - knowledge r/t complementary use of complete and incomplete proteins is necessary.
**Enteral Access Tubes**

**Enteral Feeding:** nutrients given directly into the GI tract

**Purpose:** When oral feeding are not possible, but pt can digest and absorb nutrients-tube inserted to maintain nutrition

**Insertion:** tubes can be inserted through the nose, surgically or endoscopically.

**Placement:** NG placement is verified by aspiration, checking ph levels and auscultation. Placement of small EN tubes must be verified by x-ray

**Removal:** requires a physicians order. HOB up to prevent aspiration.

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**Feeding Tubes-continued**

**Types**

- NG-naso-gastric
- EN-Enteral tubes are smaller than NG and require Xray verification for placement
- G-Gastrostomy- surgically inserted into stomach
- J-Jejunostomy-surgically inserted into the jejunum

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**Enteral Feedings**

- HOB up 30-35 degrees during and for 30 min after always verify placement
- use pumps
- bacterial contamination: change feeding bag q24 hours
- fill with 4 hours of formula
- dehydration: dilute with H₂O, monitor I&Os
- diarrhea: continuous delivery, lower rate, dilute or change to isotonic solution
Parenteral Nutrition

Specialized nutritional support-Nutrients are provided intravenously.

• (PPN) Peripheral Parenteral Nutrition - provides supplemental calories and essential amino and fatty acids, through a peripheral access. Saline lock - IV Pump used. Glucose monitoring, daily wts, I&Os

• (TPN) Total Parenteral Nutrition - given through a central line and carefully monitored. High concentration of nutrients/glucose IV pump is always used. Glucose monitoring, daily wts, I&Os.