

# Chapter 13: Child and Preadolescent : conditions and interventions

# Nutritional Requirements of Children with Special Health Care Needs

# Factors to consider

Small muscle size “Hypotonia”	Low caloric intake
high protein losses, such as skin breakdown	High protein
frequent fluid losses from vomiting or diarrhea	High fluid volume
chronic-constipation	High fiber
Long term use of medications	increase or decrease vitamin or mineral requirements

# Energy

- Under ideal conditions, the caloric needs are estimated using standard calculations that cannot take into account the specific conditions involved!!!
- Thorough:
  - nutritional assessment
  - activity level

# Energy

- Conditions that slow growth or decrease muscle size generally result in **lower caloric needs**
- Caloric needs in a child with **Prader-Willi syndrome** may be **only 66%** of the caloric needs of a child of the same age and gender without the syndrome

# Protein Needs

- Healing burns and cystic fibrosis are examples of disorders with **high protein needs**—at 150% of the DRI
- Conditions such as PKU and other protein-based inborn errors of metabolism require greatly **reduced amounts of natural protein in the diet**
- Children with diabetes mellitus do not have modified protein needs

# Other nutrients

- As in all children, if the diet provides sufficient foods to meet the needs for protein, fats, and carbohydrates
  - → it is likely the vitamin and mineral needs are also met

# Meeting DRI with chronic conditions

Children with chronic conditions may **have more difficulty meeting the DRI for vitamins and minerals**

- **Eating or feeding problems** may restrict intake of **foods requiring chewing**, such as meats, so that certain minerals may be low in the diet.
- Prescribed **medications and their side effects** can increase turnover for specific nutrients, raising the recommended amount needed.
- **Food refusals** are common with recurrent illness, so total intake may be more variable day to day than in other children of the same age.
- Treatment of the condition necessitates **specific dietary restrictions**, so that vitamins and minerals usually provided in restricted foods have to be supplemented.



# Growth Assessment

- If the child's condition is known to change the rate of weight or height gain—**either slowing or accelerating it**—the following signs need attention regardless of what growth chart is used:
  - A plateau in weight
  - A pattern of gain and then weight loss
  - Not regaining weight lost during an illness
  - A pattern of unexplained and unintentional weight gain

# Growth Assessment

- Factors that affect growth assessment and interpretation in childhood
  - the age of onset of the condition
  - secondary conditions*
  - activity

# Age of the onset

- **Early onset** is more likely than later onset to affect growth in conditions such as *seizures*.
- If the seizures started in **middle childhood**, the **standard growth chart** may be appropriate because the child's growth pattern is already established.
- Onset of seizures in the **neonatal period** may reflect more severe **brain damage**, which markedly slows growth rate.
- Then the **child's own growth record over time** would be the best indicator of future growth

# Special Growth Charts

- Table 13.1
- The number of children reported in such growth charts is **smaller and less representative**
- low-percentile **heights** are usual for a child with Down syndrome if growth is plotted on the CDC chart rather than the special growth chart for Down syndrome.

**TABLE 13.1** ▶ Examples of specialty growth charts<sup>2,19</sup>

**CONDITIONS WITH SPECIAL GROWTH CHARTS**

**COMMENT**

Achondroplasia

Form of dwarfism

Down syndrome

Short stature, variable weight

Trisomy 13

Trisomy 18

Fragile X syndrome

Short stature, primary in males

Prader-Willi syndrome

Short stature, overweight

Rubinstein-Tabyi syndrome

Short stature

Sickle-cell disease

Short stature

Turner syndrome

Short stature

Spastic quadriplegia

Short stature, low weight

Marfan syndrome

Tall stature

# Special Growth Chart

- A thorough assessment that includes **body composition** is necessary.
- For example, a thin-appearing child needs to have **body fat stores** measured before diet recommendations are made.
- If **body fat stores** are fine, adding calories is more likely to contribute to overweight

# Body composition and growth

- Children with small muscle size will have **lower weights** than those with regular-sized muscles.
- Conditions with altered muscle size may be described using terms such as **hypotonia** or **hypertonia**.
  - Examples include cerebral palsy, Down syndrome, and spina bifida

# Body composition and growth

- **By standard interpretation**, every child with Down syndrome or spina bifida could be overweight
- For now, no established BMI tables cover specific conditions or the appropriate time for adiposity rebound.



# Nutrition Recommendations

- Children with special health care needs benefit from the **same nutritional recommendations** other children do, particularly in general areas such as :

Dietary fiber

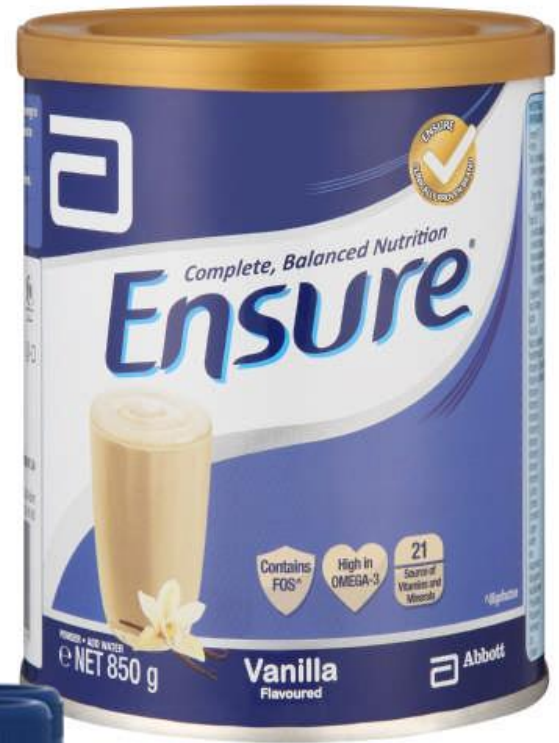
- Appropriate use of soft drinks

# Nutrition Recommendations

- Nutritional supports common for children are **enteral supplements**
  - when oral feeding of regular foods is insufficient in **quality** or **amount** to maintain health and to assure growth

**Table 13.2** Examples of nutritional supplements and formula for children<sup>26</sup>

Formula	Comments
Pediatric versions of complete nutritional supplements, such as Pediasure	Generally recommended for children under 10 years of age; can be used for gastrostomy or oral nutrition support
Adult complete nutritional supplements, such as Ensure	Generally 1 calorie per milliliter is recommended for children
Enrichment of beverages, such as Carnation Instant Breakfast added to milk	Requires that milk is tolerated
Predigested formula with amino acids and medium-chain fatty acids, such as Peptamen Junior	For conditions in which intestinal absorption may be impaired
Special formulas for inborn errors of metabolism (PKU), such as Phenex-2	Usually a powder that is mixed as a beverage, but other forms such as bars and capsules are available
High-calorie booster for cystic fibrosis, such as Scandishake	Generally 2.5 calories per milliliter to concentrate calories in small volume



## PEPTAMEN® JUNIOR



Peptamen® Junior is a PBS listed whey protein peptide based formulation for the dietary management of children with gastrointestinal impairment.

Suitable for children aged 1-10 years and for oral or tube feed use

### FEATURES

Energy Density 1.0 kcal/mL 4.2 kJ/mL

#### Energy Distribution

Protein - 12% Whey protein peptides

Carbohydrate - 54% Maltodextrin, sucrose, potato starch

Fat - 34% Medium chain triglycerides (MCT 51% of fat), vegetable oils (rapeseed, sunflower) and soy lecithin E322

Nonprotein Calorie: Nitrogen Ratio . . . . . 190:1

Calorie: Nitrogen Ratio . . . . . 215:1

n-6:n-3 Ratio . . . . . 7.5:1

Osmolality . . . . . 370 mOsm/kg water

Water Content . . . . . 850mL/1000mL (220g powder + 850mL water)

# Eating and Feeding Problems in Children with Special Health Care Needs

- About 70% of children with developmental delays have feeding difficulties, independent of whether neuromuscular problems have been identified
  - having difficulty accepting foods
  - chewing them safely
  - ingesting sufficient foods and beverages to meet their nutritional requirements

# Examples of feeding problems

- **Self-feeding skills** are lower than the child's chronological age, **requiring assistance and supervision** to ensure adequate intake
- Meals take so long or so much food is lost in the process of eating that the actual food intake is too low
- The condition requires adjustment in the timing of meals and snacks at home and at school.

# CYSTIC FIBROSIS

Will be covered in presentation



# Diabetes Mellitus

- **Type 1 diabetes** is related to immune function and results in virtually no insulin production.
- Children with type 1 diabetes have both **high and low blood sugars** during diabetes management, not just high blood sugars, as in type 2 diabetes

# Diabetes Mellitus

- Treatment for diabetes is regulation of the **timing** and **composition** of meals and **exercise**, along with **insulin injections** or medications
- Type 1 diabetes requires families and children to master a **carbohydrate counting system**
- This is not the same as the diabetes exchange system, it focused only on the **carbohydrate** content of foods

# Diabetes Mellitus

- Common colds, or foods a child refuses to eat, can cause wide variation in blood sugar, contributing to irritability, sleepiness, or difficulty with schoolwork

# Seizures

- Seizures are uncontrolled electrical disturbances in the brain.
- Epilepsy and seizures are the same disorder
- Currently, no known nutrients bring on seizures

# Seizures

- Feeding or eating during the **postictal state** is not recommended, because the child may choke.
- Some children have long enough postictal states to miss meals.
- In this case, adding other eating times is needed to make up for the lost calories and nutrients

# Controlled seizures

- When Seizures controlled with medications, **growth** usually continues at the rate typical for that child.
- Dietary consequences of controlled seizures are primarily related to **drug–nutrient side effects**, such as change in hunger or sleepiness

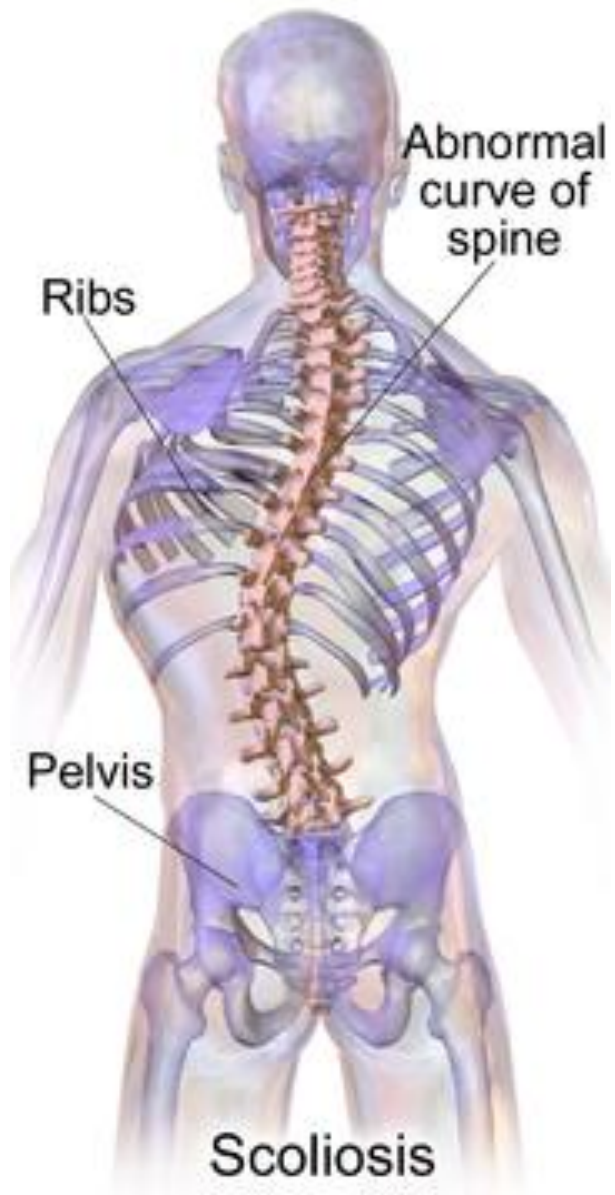
# Uncontrolled seizures

- May cause further brain damage over time
- seizures decrease when brain metabolism is switched from the usual fuel, glucose, to ***ketones*** from fat metabolism
  - Ketogenic diet **(will be covered as presentation)**

# Cerebral Palsy

- *Cerebral palsy* is a general term covers a broad range of conditions resulting from brain damage
- Secondary effects may include
  - Contractures
  - Scoliosis
  - Gastro-esophageal reflux
  - Constipation





Contracture of fingers of right hand (clawed hand)

# Cerebral palsy - Constipation

- **Muscle coordination problems** most easily seen in movements of the arms and legs may occur in muscles all over the body,
  - including the **abdominal muscles** that assist in bowel evacuation

# Spastic Quadriplegia

- The form of cerebral palsy that presents the most nutrition problems is spastic quadriplegia, involving all limbs.
- Most children with spastic quadriplegia **appear thin**, but this appearance may be a result of **brain damage** or **muscle size**
  - **Chart 13.2 page 348**

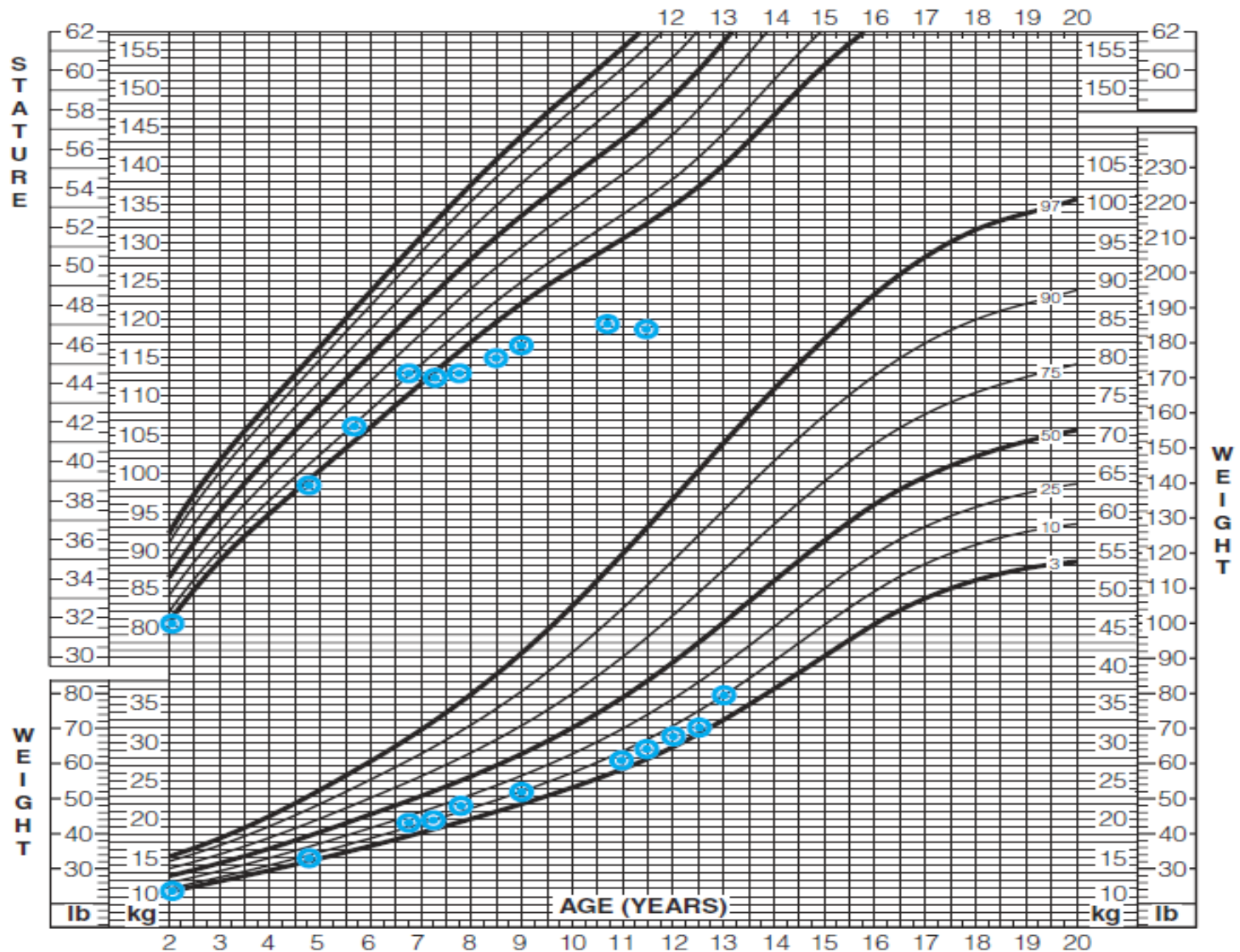
**Illustration 13.2** Growth chart for gastrostomy feeding for a boy with spastic quadriplegia and scoliosis.

2 to 20 years: Boys

Stature-for-age and Weight-for-age percentiles

NAME \_\_\_\_\_

RECORD # \_\_\_\_\_



Revised and corrected November 21, 2000.

SOURCE: Developed by the National Center for Health Statistics, and updated by the National Center for Chronic Disease Prevention and Health Promotion (2000).

<http://www.cdc.gov/growthcharts>

S. Muhanna 2019



# Nutritional consequences of spastic quadriplegia

- Slow weight gain and other growth concerns
- Difficulty with feeding and eating
- changes in body composition
- Problem nutrients are likely to be those :
  - Related to bone density, calcium, and vitamin D
  - Nutrients needed in higher amounts as a result of medication side effect
- Caloric needs are difficult to determine!!

# Nutrition intervention for CP

- Stimulating oral feeding
- Promoting healthy eating at school
- Adjusting menus and timing of meals and snacks at home or school for meeting nutrient needs from foods that minimize fatigue during meals
- Assessing and adjusting the child's diet over time
- Using adapted self-feeding utensils or other types of feeding equipment



# Phenylketonuria (PKU) and Inborn Errors of Metabolism

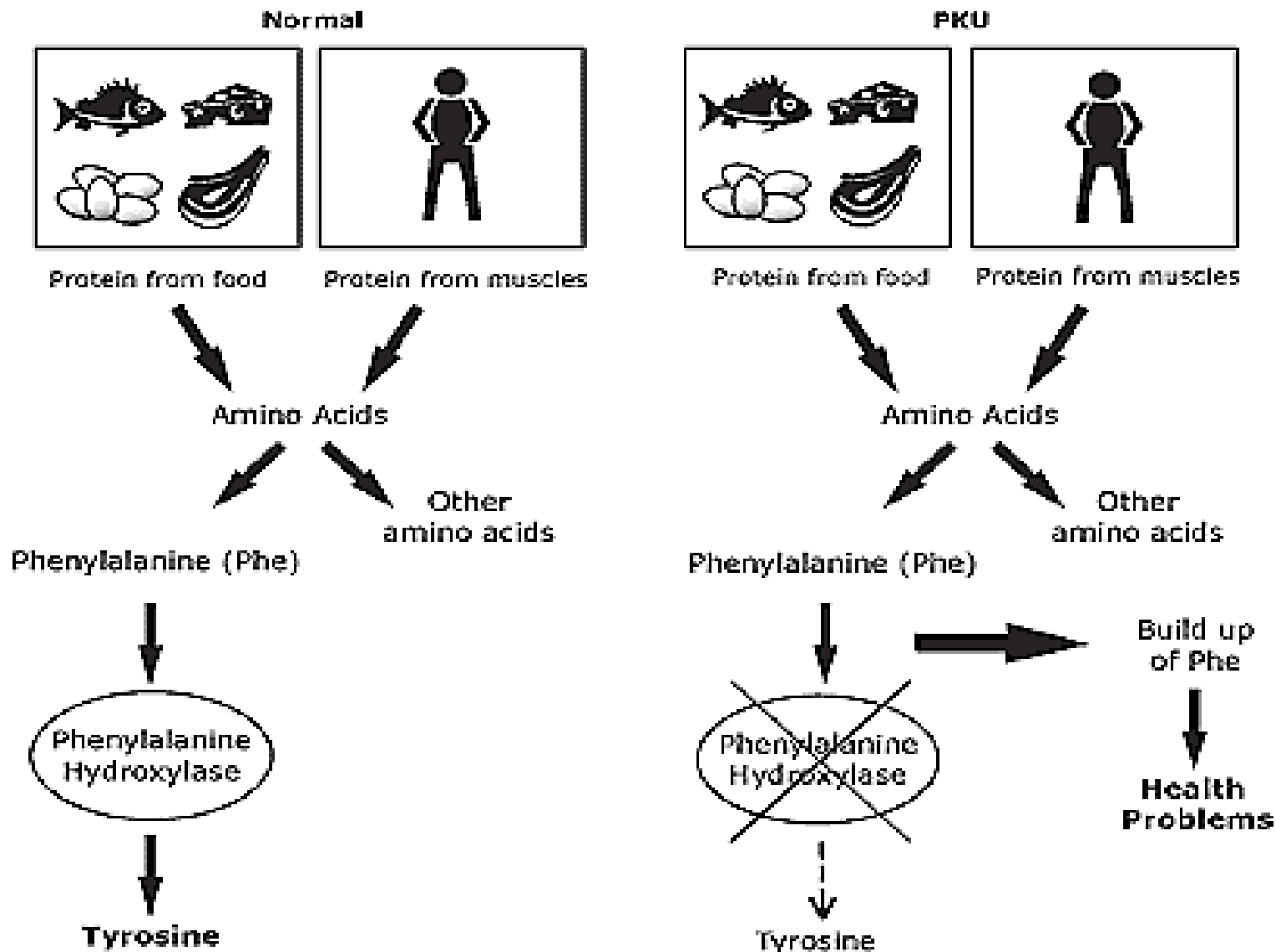
- These disorders require interventions **to manage breakdown products from dietary protein, fats, and carbohydrates being metabolized incompletely or inadequately**
  - glycogen-storage diseases (inborn errors of carbohydrate metabolism)
  - medium-chain fatty acid disorders (inborn errors of fat metabolism)



# PKU

- The enzyme that uses phenylalanine as a substrate is either not working at all or only partially active in the liver of a person with PKU
- The main treatment is **lifelong dietary management**, in which more than 80% of protein intake from foods and beverages is replaced by a mixture of amino acids from which phenylalanine has been removed

# PHENYLKETONURIA (PKU)



# PKU

- Dietary management limits toxic breakdown products of accumulated phenylalanine, which the body has difficulty clearing

# PKU

- If foods with protein are consumed in too-high amounts, PKU slowly becomes **a degenerative disease** affecting the brain at whatever age the treatment is stopped.
- When their diets are managed correctly, children with PKU appear to be eating meals providing less food than the meals of other children.
- The diet is adequate in all vitamins, minerals, protein, fats, and calories, but more nutrients are **in liquid rather than solid forms.**

# PKU diet

- Foods to be **avoided completely** are protein-rich foods such as meats, eggs, regular dairy products, peanuts, and soybeans in all forms.
- **Allowed natural sources of protein** are limited amounts of regular crackers, potato chips, rice, and potatoes.
- Many fruits and vegetables are encouraged, if offered without added sources of protein.
- Some foods that are high in fats and/or sugars and generally low in natural protein, such as fried vegetables or candy canes, are safe for children with PKU

high phenylalanine foods	low phenylalanine foods
<p data-bbox="401 362 465 408">fish</p> <p data-bbox="819 334 915 379">meat</p> <p data-bbox="227 591 330 636">beans</p> <p data-bbox="421 691 517 736">dairy</p> <p data-bbox="214 805 374 851">diet soda</p> <p data-bbox="220 876 413 962">ASPARTAME</p> <p data-bbox="517 905 625 951">wheat</p> <p data-bbox="703 876 794 922">eggs</p> <p data-bbox="846 719 993 836">nuts &amp; legumes</p> <p data-bbox="413 1119 780 1190">high-protein foods</p>	<p data-bbox="1089 662 1379 708">most vegetables</p> <p data-bbox="1534 634 1702 679">most fruit</p> <p data-bbox="1058 933 1174 979">sugars</p> <p data-bbox="1244 791 1348 976">Special Formula</p> <p data-bbox="1514 848 1649 1090">special breads cookies crackers</p> <p data-bbox="1213 1119 1561 1190">low-protein foods</p>

# Attention Deficit Hyperactivity Disorder

- The incidence of ADHD is estimated at 5% to 8% of school-age children and adolescents
- Children suspected of having ADHD may have a chaotic meal and snack pattern and the inability to stay seated for a meal.