

Increased Phenylalanine Phenylketonuria (PKU)

Differential Diagnosis: Phenylketonuria (Classical PKU); non-PKU mild hyperphenylalaninemia; pterin defects; transient hyperphenylalaninemia.

Condition Description: In PKU the phenylalanine from ingested protein cannot be metabolized to tyrosine because of deficient liver phenylalanine hydroxylase (PAH). This causes elevated phenylalanine. Pterin defects result from deficiency of tetrahydrobiopterin (BH4), the cofactor for PAH and other hydroxylases. This produces not only increased phenylalanine but also neurotransmitter deficiencies.

You Should Take the Following IMMEDIATE Actions

- Contact family immediately to inform them of the newborn screening result.
- Do not change infant's diet on the basis of this filter test. Confirmatory testing needed.
- Consult with pediatric metabolic specialist. (See attached list.)
- Evaluate the newborn and refer as appropriate.
- Initiate confirmatory/diagnostic tests in consultation with metabolic specialist.
- Initial testing: plasma amino acids.
- Repeat newborn screen if second screen has not been done.
- Provide the family with basic information about PKU and dietary management.
- Report findings to newborn screening program.

Diagnostic Evaluation: Plasma amino acid analysis which shows increased phenylalanine without increased tyrosine (increased phenylalanine:tyrosine ratio). Urine pterin analysis and red blood cell DHPR assay will identify pterin defects. Consider PAH mutation testing.

Clinical Considerations: Asymptomatic in the neonate. If untreated, PKU will cause irreversible mental retardation, hyperactivity, autistic-like features, and seizures. Treatment will usually prevent these symptoms. Pterin defects cause early severe neurologic disease (developmental delay/seizures) and require specific therapy.

Additional Information: Genetics Home Reference

PKU

<http://ghr.nlm.nih.gov/condition=phenylketonuria>

Tetrahydrobiopterin Deficiency

<http://ghr.nlm.nih.gov/condition=tetrahydrobiopterindeficiency>

New England Metabolic Consortium

http://www.childrenshospital.org/newenglandconsortium/NBS/pku_protocol.htm

Gene Tests/Gene Clinics

<http://www.genetests.org/servlet/access?db=geneclinics&site=gt&id=8888891&key=HWrct-uSq-Lup&gry=&fcn=y&fw=t6xL&filename=/profiles/pku/index.html>

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<http://www.newbornscreening.info/Parents/aminoacid disorders/PKU.html> <http://www.newbornscreening.info/Pro/aminoacid disorders/PKU.html>

Phenylketonuria (PKU)

What is PKU?

PKU is a type of amino acid disorder. People with PKU have problems breaking down an amino acid called phenylalanine from the protein in food they eat.

What Causes PKU?

Enzymes help start chemical reactions in the body. PKU happens when an enzyme called “phenylalanine hydroxylase” (PAH) is either missing or not working right. This enzyme breaks down the amino acid phenylalanine (Phe). When a child with PKU eats food containing Phe, it builds up in the blood and causes problems. Phe is found in almost every food, except pure fat and sugar. PKU is an inherited disorder where both parents carry a gene for PKU.

What Symptoms or Problems Occur with PKU?

[Symptoms are something out of the ordinary that a parent notices.]

Babies with PKU seem perfectly normal at birth. The first symptoms are usually seen around 6 months of age. Untreated infants may be late in learning to sit, crawl, and stand. They may pay less attention to things around them. A child with PKU who doesn't get treatment will become mentally retarded.

Some of the things caused by untreated PKU include:

- mental retardation
- behavior problems (such as hitting, biting)
- hyperactivity (over-active)
- restlessness or irritable mood
- seizures
- eczema (itchy areas of skin that become flaky or hard)
- a “musty” or “mousy” body odor
- light hair and skin

What is the Treatment for PKU?

The following treatments are often used for children with PKU:

1. Medical formula with low Phe – Even though they need less Phe, children with PKU still need a certain amount of protein. A special low-Phe medical formula gives babies and children with PKU the nutrients and protein they need. It helps keep their Phe at a safe level.

2. Low-Phe food plan – The right diet is made up of foods that are very low in Phe. This means your child must not have cow's milk, regular formula, meat, fish, eggs, or cheese. Regular flour, dried beans, nuts, and peanut butter also have Phe. They must be highly limited or not eaten at all. This diet is needed for life.

Things to Remember

Children with PKU who start treatment soon after birth usually have normal growth and intelligence. Even when treated, some children have problems with schoolwork and may need extra help.

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