NEBRASKA
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DEPT. OF HEALTH AND HUMAN SERVICES

Galactosemia Information

Galactosemia is an autosomal recessive inherited metabolic disorder. Abnormal galactose metabolism can be caused by the deficiency of any of the three enzymes of the galactose catabolic pathway: galactose-1-phosphate uridyl transferase, galactokinase, or UDP-galactose4-epimerase. Clinically, deficiency of galactose-1-phosphate uridyl transferase has become synonymous with classical galactosemia.

Galactose is a component of lactose, the principle carbohydrate of mammalian milks and most non-soy commercial infant formulas. Lactose is hydrolyzed to glucose and galactose in the intestine. The body cannot break down the galactose without the proper enzymes. The galactose builds up in the body and causes cellular damage and even death. The incidence of galactosemia is estimated at 1:60,000 to 1:80,000 live births.

Clinical Features:

TEST RESULTS	LIKELY CAUSES	ACTIONS TO TAKE WHEN POSITIVE RESULT FOUND
Gal and Gal-1-P > 15 Uridyltransferase< 40	**Severe galactosemia** **Improperly collected sample (heat damage or transit delay)** **Mild galactosemia variant**	**Potential Neonatal Emergency** **Laboratory immediately notifies via phone and fax (followed in writing) submitter, newborn's physician and NNSP.** **Newborn's physician should advise**

The severe form of this disease is due to almost total deficiency of galactose-1-phosphate uridyl transferase enzyme activity in all cells of the body. The early clinical features of severe galactosemia include liver dysfunction manifest as jaundice and hypoglycemia; neurological findings of irritability and seizures; and gastrointestinal findings of poor feeding, failure to thrive, vomiting, and diarrhea. Death may result from gram-negative sepsis within one to two weeks of birth. If the infant is untreated and survives the neonatal period, cataracts, cirrhosis, Fanconi syndrome, and mental retardation are usual developments.

There are several genetic variants characterized by a less severe reduction in enzyme activity (e.g. Duarte Variant). Most of these cases are asymptomatic and are detected because of a persisting abnormality in the enzyme test. However, some of these cases may benefit from dietary therapy. For this reason, many infants require further testing and evaluation by a pediatric metabolic specialist.

Laboratory Test:

Every newborn is screened using a total galactose assay which measures both galactose and galactose-1-phosphate uridyl transferase activity. Dried blood spots are incubated with galactose-1-phosphate, uridine diphosphoglucose, and NADP. In the presence of galactose-1phosphate uridyl transferase, a sequence of enzyme reactions proceeds with generation of NADPH which is detected by fluorescence.

	False positive	interruption of breast or formula feedings and place the newborn on a powder-based soy formula at least until confirmatory results are known. Assess the condition of the newborn and order confirmatory tests.

Confirmation and Treatment:

Consultation with a pediatric metabolic specialist should be made for confirmation and diagnosis (see Galactosemia ACT sheet). Upon notification of a positive screening result the physician should direct the family to stop breast-feeding and stop the feeding of lactose or galactose containing formulas. The family should use a powder-based soy formula. (The gum in premixed soy formulas can contain galactose). The physician should collect or cause to be collected 2 ml. of whole blood, EDTA (lavender top) and order a confirmatory test for galactosemia, specifically a quantitative galactose 1-phosphate uridyl transferase. The galactosemia syndromes are treated by a rigid dietary exclusion of all galactose. Exclusion of milk and milk products alone does not constitute a galactose-restricted diet, as galactose is found in other foods as well. A galactose-free diet requires close supervision and monitoring. In Nebraska, this diet is monitored by the metabolic program for newborns and children at the Hobart E. Wiltse
Research Institute for Metabolic Diseases metabolic clinic and for adults at the University of Nebraska Medical Center metabolic clinic.

Screening Practice Considerations:

The screening test should be abnormal in all severe (classical) galactosemic infants - even if the specimen is collected before lactose is ingested - unless the infant has been transfused.
ALWAYS OBTAIN A NEWBORN SCREENING SPECIMEN PRIOR TO A TRANSFUSION.
Galactosemia can kill quickly. It should be considered in any infant with non-glucose reducing substances in the urine. If galactosemia is suspected, immediate consultation with a pediatric metabolic physician is advised.

NOTE: Galactose reacts with "Clinitest" and with most blood "glucose" methods, such as Somogyi-Nelson, etc., which measure total blood sugars (but not with glucose oxidase methods, i.e. Clinistix). Galactosemia produces a positive Clinitest and a negative Clinistix result.

Prompt confirmatory testing is required even if there is evidence to suggest that one of the situations associated with false positive screens is present. These situations can include early specimen collection, prematurity, heat-damaged specimen, hyperalimentation, or antibiotic therapy. The presence of any of these does not exclude the possibility of disease.
If screening test results are positive for galactosemia, the physician shall take the child off milk and then collect or cause to be collected a new specimen for confirmatory tests.