Congenital Disorders of Glycosylation: Carbohydrate Deficient Transferrin Analysis, Plasma

**Condition Description**

Congenital disorders of glycosylation (CDG) are a group of genetic disorders caused by the alteration in synthesis and structure of protein and lipid glycosylation. In the past decade, over 50 genetic diseases have been identified that alter glycan synthesis, structure and ultimately the function of nearly all organ systems.

CDG type I (CDG-I) disorders result from impaired synthesis of the incomplete lipid linked oligosaccharide (LLO) and/or its attachment to the growing polypeptide chain. PMM2-CDG (CDG-Ia) is the most common form reported, due to phosphomannomutase deficiency, an enzyme that converts mannose-6-phosphate to mannose-1-phosphate. CDG-Ib (phosphomannose isomerase, MPI deficiency) is one of the treatable forms of CDG, by giving mannose orally.

CDG type II (CDG-II) includes defects in processing of N-linked and/or O-linked glycans. More than half of the CDG type II disorder will not be detect by transferrin alone. The combination of transferrin and N-glycan profile is highly recommended if a CDG type II disorder is suspected.

Phenotypes of this disorder are extremely variable. Manifestations range from severe developmental delay and hypotonia with multiple organ system involvement beginning in infancy, to hypoglycemia and protein-losing enteropathy with normal development. However most subtypes have been described in only a few individuals, and thus understanding of the phenotypes of most CDG subtypes is limited.

**Educational Materials:**
- CDG Handout for Parents
- CDG Handout for Clinicians

**References:**


**Indications**

Manifestations of CDG range from severe developmental delay and hypotonia with multiple organ system involvement to hypoglycemia and protein-losing enteropathy with normal development. The diagnosis should be considered in all patients with failure to thrive, mental retardation, cerebellar hypoplasia, liver dysfunction, or stroke-like episodes.

**Methodology**

Affinity Chromatography / Mass Spectrometry (MS)

**Detection**

Ratio of mono-oligosaccharide / di-oligosaccharide transferrin and the a-oligosaccharide / di-oligosaccharide transferrin ratio. Note the majority of CDG type II may not be detected by this test alone. The combination of transferrin and N-glycan profiles is highly recommended to improve the detection of CDG.

**Reference Range**

The test reports qualitative results based on semi-quantitative measurement using a threshold (cut-off value) to discriminate between a positive and negative clinical interpretation.

**Specimen Requirements**

**Additional Specimen Collection/Handling Instructions Required for this Test**

Only one specimen type is required for this test: Frozen serum or frozen plasma.

Please provide clinical information.

Submit only 1 of the following specimen types

**Type: Plasma**

Specimen Requirements:

In sodium heparin (green top) tube:
Draw 3-5 ml blood
Centrifuge immediately to separate plasma and freeze.

Specimen Collection and Shipping: Ship frozen sample on dry ice with overnight delivery.

**Type: Serum**

Specimen Requirements:

In serum (red top) tube:
Draw 3-5 ml blood
Centrifuge immediately to separate serum and freeze.

Specimen Collection and Shipping: Ship frozen sample on dry ice with overnight delivery.

**Special Instructions**

Click [here](#) for the clinical presentation form.

**Related Tests**

- N-glycan Structural Analysis for CDG (BNGLY)
- N-glycan and Carbohydrate Deficient Transferrin Panel for CDG (BCDGP)
- Congenital Disorders of Glycosylation: O-glycan Profile and Quantification (BOGLY)
- Oligosaccharide and Glycan Screening (OS)
- Sequencing analysis of individual CDG genes is available.
- Sequencing analysis of different panels for CDG genes are also available.
- Custom diagnostic mutation analysis (KM) is available to family members if mutations are identified by targeted mutation testing or sequencing analysis.
- Prenatal testing is available to adult couples who are confirmed carriers of mutations. Please contact the laboratory genetic counselor to discuss appropriate testing prior to collecting a prenatal sample.