LAB #: Sample Report
PATIENT: Sample Patient
ID:
SEX: Female
AGE: 56

CLIENT #: 12345
DOCTOR: Sample Doctor
Doctor's Data, Inc.
3755 Illinois Ave.
St. Charles, IL 60174 U.S.A.

Hepatic Detox Profile; Urine

TOXIC EXPOSURE MARKERS

	RESULT per creatinine	REFERENCE INTERVAL	PERCENTILE 2.5th 16th 50th 84th 97.5th
D-Glucaric Acid (Phase I)	**300** nM/mg	40 - 400	
Mercapturic Acids (Phase II)	**39** µM/mM	40 - 95	

URINE CREATININE

	RESULT mg/dL	REFERENCE INTERVAL	-2SD -1SD MEAN +1SD +2SD
Creatinine	**47**	35 - 225	

INFORMATION

The human body attempts to eliminate xenobiotics (foreign organic chemicals) through a concerted effort of enzymatic "functionalization" (phase I) and conjugation (phase II). Functionalization involves chemical modification of the xenobiotic by the cytochrome P-450 or the "mixed function oxidase" enzyme systems. Once functionalized, the altered xenobiotic can then be conjugated and excreted. Urinary D-glucaric acid, a hepatic byproduct of enzymatic response to chemical toxins (phase I), is a reliable indicator of exposure to xenobiotics. Mercapturic acids are direct, excretory end products of the functionalized xenobiotics that have been conjugated with glutathione prior to excretion. Together, the urinary levels of these metabolites provide valuable information about exposure to xenobiotics, liver disease, and quantitative assessment of the status of hepatic phase II detoxification.

D-GLUCARIC ACID MARGINALLY ELEVATED: The level of D-glucaric acid, a marker of exposure to hepatotoxic substances, is marginally elevated for age and gender in this patient's urine sample. This suggests possible mild exposure to xenobiotics with normal detoxification (check mercapturic acids level/phase II activity). Elevated urinary excretion of D-glucaric acid is an indication of induction of cytochrome P-450 enzymes (phase I) in the liver that may be the result of exposure to any of over 200 different xenobiotics (e.g. pesticides, herbicides, fungicides, petrochemicals, drugs, alcohol, toluene, xylene, formaldehyde, styrenes, ibuprofen etc.). Occupational and environmental exposure to toxic compounds causes induction of the glucuronic acid enzyme pathway and production of D-glucaric acid, thus D-glucaric acid excretion is considered an indirect by-product of detoxification reactions. Elevated levels of urinary D-glucaric acid have also been correlated with viral hepatitis and jaundice, and have also been found in patients receiving antirheumatic drugs independent of disease activity. With marginally elevated levels of D-glucaric acid, there may be an increased need for antioxidant protection because toxins that are processed through phase I generate free radicals that require quenching or neutralization. It is important to consider that phase I detoxification tends to become less active with aging.

MERCAPTURIC ACIDS LOW: The level of mercapturic acids in this patient's urine specimen is abnormally low for age and gender, and indicative of sluggish phase II detoxification in the presence of chemical exposure (check for elevated urinary D-glucaric acid). Mercapturic acids are final excretory products of detoxification (phase II) and include a variety of functionalized xenobiotics that have been conjugated with cysteine or glutathione. Urinary levels of mercapturic acids should be increased with exposure to xenobiotics and enhanced phase I detoxification. When the rate of formation of functionalized xenobiotics (phase I) exceeds the capacity for conjugation by phase II, more potent toxins can accumulate and possibly result in nephrotoxicity. Evaluation of renal function, by means of creatinine clearance, may be warranted. Detoxification can be supported with supplemental vitamins C, E, and lipoic acid, selenium, Mg, K, rGSH and sulfur containing amino acids. Urine amino acids analysis can be utilized to assess the status of precursors of endogenous glutathione production and identify disorders in methionine metabolism.

SPECIMEN DATA

Comments:

Date Collected: **02/05/2019**
Date Received: **02/11/2019**
Date Completed: **02/15/2019**

Methodology:
D-Glucaric: HPLC
Mercapturic: Enzymatic

v2