

# HEPATIC DETOX PROFILE



LAB#: U000000-0000-0  
 PATIENT: Sample Patient  
 SEX: Female  
 AGE: 67

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

## PHASE I EXPOSURE MARKER

ANALYTE	RESULT nmole/mg creat	REFERENCE RANGE	PERCENTILE				
			2.5 <sup>th</sup>	16 <sup>th</sup>	50 <sup>th</sup>	84 <sup>th</sup>	97.5 <sup>th</sup>
D-Glucaric Acid	33	10 - 200					

## PHASE II DETOXIFICATION MARKER

ANALYTE	RESULT µmole/mmmole creat	REFERENCE RANGE	PERCENTILE				
			2.5 <sup>th</sup>	16 <sup>th</sup>	50 <sup>th</sup>	84 <sup>th</sup>	97.5 <sup>th</sup>
Mercapturic Acids	46	40 - 95					

## DISCUSSION

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 NORMAL:** The level of D-glucaric acid in this patient's urine sample is within the normal range for age and gender, and indicates that the patient's liver is not likely under abnormal stress due to exposure to xenobiotics. The urinary level of D-glucaric acid provides a reliable, indirect marker for the degree of induction of cytochrome P-450 enzymes (phase I) in the liver. Exposure to any of over 200 different xenobiotics (e.g. pesticides, herbicides, fungicides, petrochemicals, drugs, alcohol, toluene, xylene, formaldehyde, styrenes, ibuprofen, etc.) is the most common factor associated with elevated urinary levels of D-glucaric acid. However, it should be noted that some xenobiotics may not illicit elevated levels of D-glucaric acid (e.g. rotenone, aniline, benzene, nitrobenzene).

**MERCAPTURIC ACIDS MARGINALLY LOW:** The level of mercapturic acids in this patient's urine specimen is marginally low for age and gender, and may be indicative of sluggish phase II detoxification if there is significant exposure to xenobiotics (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. 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: 7/26/2007                      Methodology: **Enzymatic**  
 Date Received: 7/27/2007  
 Date Completed: 8/3/2007

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