*** US BioTek** US BioTek. 16020 Linden Av N, Shoreline WA 98133

Lab ID
Patient ID P000060
Ext ID 26134-0705

Test Patient
Sex: Female • 56yrs • 01-Jan-70

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14-May-26

ENVIRONMEN TAL TOXINS PANEL
Specimen type – Urine, Spot

Collected
04-Jun-26 01:42pm

CYSTEINE DERIVATIVES

TEST	RESULT	H/L	REFERENCE	UNITS
N-Acetyl (3,4-Dihydroxybutyl) cysteine (NADB)	172.88		(<250.00)	ug/gCR
N-Acetyl (carbomoylethyl) cysteine	20.05		(<190.00)	ug/gCR
N-Acetyl phenyl cysteine (SPMA)	0.55		(<5.00)	ug/gCR
N-Acetyl (propyl) cysteine (NAPR)	1.00		(<25.00)	ug/gCR

ENVIRONMEN TAL PHENOLS

TEST	RESULT	H/L	REFERENCE	UNITS
4-Nonylphenol	**<DL**		(<3.00)	ug/gCR
Bisphenol A (BPA)	0.78		(<4.00)	ug/gCR
Bisphenol S (BPS)	0.10		(<0.80)	ug/gCR
Triclosan (TCS)	5.24		(<50.00)	ug/gCR

HERBICIDES (Synthetic Auxins)

TEST	RESULT	H/L	REFERENCE	UNITS
2,4-Dichlorophenoxyacetic acid (2,4-D)	**<DL**		(<1.00)	ug/gCR

HERBICIDES (Photosynthetic Inhibitors)

TEST	RESULT	H/L	REFERENCE	UNITS
Atrazine	0.08		(<0.50)	ug/gCR
Atrazine mercapturate	**<DL**		(<0.50)	ug/gCR

HERBICIDES (EPSP Inhibitors)

TEST	RESULT	H/L	REFERENCE	UNITS
Aminomethylphosphonic Acid (AMPA)	0.23		(<2.00)	ug/gCR
Glyphosate	0.2		(<1.0)	ppb

METHYLTERT-BUTYL ETHER (MTBE) EXPOSURE

TEST	RESULT	H/L	REFERENCE	UNITS
2-Hydroxylsobutyric Acid	1.26		(<6.90)	mmol/molCR

MITOCHONDRIAL MARKERS

TEST	RESULT	H/L	REFERENCE	UNITS
Tiglylglycine	1.28		(<10.00)	ug/gCR

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PARABENS

TEST	RESULT	H/L	REFERENCE	UNITS
Benzylparaben	0.09		(<2.00)	ug/gCR
Butylparaben	**<DL**		(<1.00)	ug/gCR
Ethylparaben	0.46		(<7.00)	ug/gCR
Methylparaben	118.17		(<120.00)	ug/gCR
4-Hydroxybenzoic Acid (4-HBA)	0.11		(<0.57)	mmol/molCR
Propylparaben	2.57		(<35.00)	ug/gCR

PESTICIDES

TEST	RESULT	H/L	REFERENCE	UNITS
3-Phenoxybenzoic Acid (3PBA)	0.07		(<3.00)	ug/gCR
Diethyl Phosphate (DEP)	0.24		(<9.00)	ug/gCR
Diethyldithiophosphate (DEDTP)	0.01		(<0.20)	ug/gCR
Diphenyl phosphate (DPP)	0.60		(<2.50)	ug/gCR
Diethylthiophosphate (DETP)	**<DL**		(<1.00)	ug/gCR

PFA's

TEST	RESULT	H/L	REFERENCE	UNITS
Perfluorobutanoic acid (PFBA)	**<DL**		(<1.20)	ug/gCR
Perfluorooctanoic Acid (PFOA)	0.01		(<0.10)	ug/gCR
Perfluorooctane Sulphonic Acid (PFOS)	**<DL**		(<0.60)	ug/gCR

PHTHALATES

TEST	RESULT	H/L	REFERENCE	UNITS
Butyl Benzyl phthalate (BBP)	0.16		(<1.00)	ug/gCR
Mono-Benzyl phthalate (mBzP)	**<DL**		(<3.00)	ug/gCR
Mono-n-Butyl phthalate (mBP)	21.76		(<55.00)	ug/gCR
Mono (3-carboxypropyl) phthalate (mCPP)	**<DL**		(<31.00)	ug/gCR
Mono-ethyl phthalate (MEtP)	9.19		(<100.00)	ug/gCR
Mono-2-ethylhexyl phthalate (MEHP)	7.18		(<11.00)	ug/gCR
Mono-(2-ethy-5-hydroxyhexyl) phthalate (MEHHP)	2.00		(<12.00)	ug/gCR
Mono-(2-ethy-5-oxohexyl) phthalate (MEOHP)	3.44		(<27.00)	ug/gCR
Mono-n-odyl phthalate (mOP)	**<DL**		(<2.00)	ug/gCR
Phthalic Acid	10.98		(<170.00)	ug/gCR
Quinolinic Acid	1.46		(<9.10)	mmol/molCR

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VOLATILE ORGANIC COMPOUNDS

TEST	RESULT	H/L	REFERENCE	UNITS
2-hydroxyethyl-mercapturic acid (HEMA)	**<DL**		(<5.00)	ug/gCR
Mandelic Acid	1312.8	H	(<340.0)	ug/gCR
Phenylglyoxylic Acid	622.4	H	(<300.0)	ug/gCR
Mandelic Acid + Phenylglyoxylic Acid	1935.2	H	(<610.0)	ug/gCR

BENZENES EXPOSURE

TEST	RESULT	H/L	REFERENCE	UNITS
t,t-Muconic Acid	0.04		(<0.12)	mmol/molCR
3,4-Dimethylhippuric Acid	0.01	H	(<0.01)	mmol/molCR

TOLUENES EXPOSURE

TEST	RESULT	H/L	REFERENCE	UNITS
Benzoic Acid	6.89		(<9.30)	mmol/molCR
Hippuric Acid	499.7		(<603.0)	mmol/molCR

XYLENES EXPOSURE

TEST	RESULT	H/L	REFERENCE	UNITS
2-Methylhippuric Acid	0.50	H	(<0.04)	mmol/molCR
3-Methylhippuric Acid	0.50	H	(<0.11)	mmol/molCR

TEST	RESULT	H/L	REFERENCE	UNITS
Creatinine, Urine	18.20		(3.45-22.90)	mmol/L

Environmental Toxins Comment

ENVIRONMENTAL POLLUTANTS PROFILE:

The reported markers in the Environmental Pollutants Profile commonly originate from industrial/manufacturing products or their associated byproducts. Exposures are often occupationally-related and typically through either inhalation or topical exposure.

Metabolism of these products occurs via the liver detoxification pathways leading to excretion into the urine. Chronic exposures may also lead to build up of these products in fatty tissue deposits.

MANDELIC ACID – ELEVATED (URINE):

Elevated urinary mandelic acid suggests increased exposure to styrene or ethylbenzene, as mandelic acid is a primary urinary metabolite of these aromatic hydrocarbons.

Clinically, elevated mandelic acid may be associated with headaches, dizziness, fatigue, mucosal irritation, or neurocognitive symptoms, depending on the level and duration of exposure.

From an organic acid pattern perspective, elevated mandelic acid is often observed alongside phenylglyoxylic acid and other aromatic solvent metabolites, reflecting increased aromatic hydrocarbon metabolism and detoxification demand.

From a functional medicine perspective, this finding should be interpreted in the context of occupational or environmental exposure (e.g. plastics manufacturing, resins, fuels, solvents), indoor air quality, and overall hepatic detoxification capacity, with emphasis on identifying

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and reducing exposure sources.

Treatment: Removal of sources of exposure.

PHENYLGLYOXYLIC ACID (PGO) ELEVATED (URINE):

Elevated urinary phenylglyoxylic acid (PGO) similarly suggests increased exposure to styrene or ethylbenzene, reflecting downstream oxidation of aromatic hydrocarbons.

Clinically, elevated phenylglyoxylic acid may be associated with fatigue, headaches, dizziness, or cognitive symptoms, although findings may be non-specific at lower exposure levels.

From an organic acid pattern perspective, elevation commonly occurs alongside mandelic acid, supporting a shared exposure source and increased aromatic solvent burden.

From a functional medicine perspective, elevated phenylglyoxylic acid should be interpreted in conjunction with mandelic acid levels, exposure history, and environmental risk factors, with primary focus on exposure mitigation rather than treatment of the metabolite itself.

Treatment considerations: Improve indoor air quality, avoid plastic and solvent fumes, and consider air purifiers with activated carbon. Support detox pathways using Phase I/II cofactors (B vitamins, glutathione, NAC). Antioxidants and mitochondrial support (CoQ10, PQQ) may help mitigate oxidative damage. Evaluate occupational risk if relevant.

MANDELATE + PHENYLGLYOXYLATE ELEVATED (URINE):

Concurrent elevation of urinary mandelate and phenylglyoxylate suggests increased exposure to styrene and/or ethylbenzene, as these metabolites represent complementary and well-established biomarkers of aromatic hydrocarbon metabolism. Mandelate reflects primary metabolic conversion, while phenylglyoxylate represents downstream oxidative metabolism.

Clinically, elevation of both metabolites strengthens the likelihood of a true exposure signal and may be associated with non-specific symptoms such as fatigue, headaches, dizziness, mucosal irritation, or neurocognitive complaints, depending on exposure magnitude and duration.

From an organic acid pattern perspective, the combined elevation of mandelate and phenylglyoxylate supports increased aromatic solvent burden and hepatic detoxification demand, particularly through oxidative and conjugative pathways.

From a functional medicine perspective, this pattern should be interpreted in the context of occupational, environmental, or household exposure sources (e.g. fuels, solvents, plastics, resins, indoor air quality), with emphasis on exposure identification and reduction, alongside support of endogenous detoxification capacity rather than treatment of the metabolites themselves.

2-METHYLHIPPURIC ACID ELEVATED (URINE):

2-Methylhippuric acid is a urinary metabolite associated with xylene exposure (commonly from solvents, paints, fuels, and some occupational settings). Elevation indicates increased recent exposure and clearance.

Clinically, elevations may be associated with headaches, dizziness, fatigue, and mucosal irritation (non-specific). Interpretation should consider recent exposure timing, hydration status, and overall detoxification capacity.

From a functional medicine perspective, management focuses on reducing solvent/fume exposure, improving ventilation/PPE where relevant, and supporting antioxidant and detoxification capacity.

Treatment: Treatment options include limiting exposure to xylenes and can also include sauna use, niacin, glycine, or glutathione/N-acetyl cysteine supplementation to accelerate elimination.

3-METHYLHIPPURIC ACID ELEVATED (URINE):

Elevated urinary 3-methylhippuric acid suggests increased exposure to xylene, as this metabolite represents glycine conjugation of xylene-derived methylbenzoic acids. Urinary methylhippuric acids are well-established biomarkers of xylene exposure.

Clinically, elevated 3-methylhippuric acid may be associated with headaches, dizziness, fatigue, mucosal irritation, or central nervous system symptoms, depending on exposure magnitude and duration.

From an organic acid pattern perspective, elevated 3-methylhippuric acid may be observed alongside increased hippuric acid or other aromatic conjugates, reflecting increased aromatic solvent burden and glycine-dependent detoxification demand.

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From a functional medicine perspective, this finding should be interpreted in the context of occupational, environmental, or household solvent exposure (e.g. paints, fuels, adhesives), alongside assessment of hepatic conjugation capacity and glycine availability, with emphasis on exposure identification and reduction.

Treatment: Treatment options include limiting exposure to xylenes and supportive supplements such as glycine and N-acetyl cysteine can support natural detoxification.

3,4-DIMETHYLHIPPURATE ELEVATED:

Whilst metabolised by the liver, the substance is lipophilic and may accumulate in fat/fatty tissues

Effects:

Central Nervous System	Neurotoxic, Carcinogenic, anxiety, nervousness, cognitive and motor impairment, Low frustration tolerance, lack of initiative, apathy, depression, irritability (painter's syndrome) Cyanosis, apnea, bursts of perspiration, cardiac arrest.
Irritations	mucous membranes, dermatitis, dizziness, "drunkenness", fatigue, headache,
Gut symptoms	Diarrhea, abdominal pains, nausea, blurred vision.
Lowers blood parameters	Decreased erythrocyte, leukocyte and platelet counts.
Renal symptoms	Glomerulonephritis, renal dysfunction.

Methodology

Liquid Chromatography-Mass Spectrometry (LC-MS/MS/MS), Automated Chemistry/Immunochemistry

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