

# Metabolites Tested by GPL-TOX

<p><b>2-Methylhippuric Acid (2MHA)</b>  <b>3-Methylhippuric Acid (3MHA)</b>  <b>4-Methylhippuric Acid (4MHA)</b></p>	<p>These are metabolites of xylenes, solvents found in paints, lacquers, cleaning agents, pesticides, and gasoline. Exposure to xylenes generates methylhippuric acid isomers. Avoid/reduce exposure to these substances.</p>
<p><b>N-Acetyl Phenyl Cysteine (NAP)</b></p>	<p>NAP is a metabolite of benzene. Benzene is a solvent that is widespread in the environment. It is found in cigarette smoke and gasoline, and is a byproduct of all types of combustion, including motor vehicle exhaust. Treatment consists of removing sources of exposure.</p>
<p><b>Phenylglyoxylic Acid (PGO)</b></p>	<p>Exposure to environmental or workplace styrene may increase phenylglyoxylic and mandelic acid. Reduce exposure by eliminating the use of plastic and styrofoam containers for cooking, reheating, eating or drinking. Elimination of styrene can be accelerated by supplementing with glutathione and N-acetyl cysteine (NAC).</p>
<p><b>2-Hydroxyisobutyric Acid (2HIB)</b></p>	<p>2-Hydroxyisobutyric acid is formed endogenously as a product of branched-chain amino acid degradation and ketogenesis. This compound is also the major metabolite of gasoline octane enhancers such as MTBE and ETBE. Elevated levels indicate environmental exposure. Use of purified water is useful if local water is contaminated.</p>
<p><b>Monoethyl Phthalate (MEP)</b></p>	<p>MEP from diethyl phthalate is the most abundant phthalate metabolite found in urine. Diethyl phthalate is used in plastic products. Elevated values indicate exposure from various possible sources. Elimination of phthalates may be accelerated by sauna treatment.</p>
<p><b>Dimethylphosphate (DMP)</b>  <b>Diethylphosphate (DEP)</b></p>	<p>DMP and DEP are major metabolites of 147 organophosphate pesticides. Reduce exposure by eating organic foods and avoiding use of pesticides in your home or garden. Living near agricultural areas or golf courses and areas regularly sprayed with pesticides will increase exposure. Elimination of organophosphates can be accelerated by sauna treatment.</p>
<p><b>3-Phenoxybenzoic Acid (3PBA)</b></p>	<p>3-Phenoxybenzoic acid is a metabolite of six different pyrethroid insecticides. Elimination can be accelerated by sauna treatment.</p>
<p><b>2,4-Dichlorophenoxyacetic Acid (2,4-D)</b></p>	<p>2,4-D was an ingredient in Agent Orange, and is most commonly used in agriculture of genetically modified foods, and as a weed killer for lawns. Reduce exposure by eating organic foods and avoiding use of pesticides in your home or garden.</p>
<p><b>Tiglylglycine (TG)</b></p>	<p>TG is a marker for mitochondrial dysfunction. Mutations of mitochondria DNA may result from exposure to toxic chemicals, infections, inflammation, and nutritional deficiencies.</p>

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<p><b>N-acetyl-S-(2-carbamoylethyl)-cysteine (NAE)</b></p>	<p>NAE is a metabolite of acrylamide, which is detoxified through a two-step process. First acrylamide is metabolized by the cytochrome P450s. Second it is conjugated to glutathione in order to make it more water soluble. Acrylamide is used in many industrial processes such as plastics, food packaging, cosmetics, nail polish, dyes, and treatment of drinking water. High levels of acrylamide can elevate a patient's risk of cancer and cause neurological damage. Supplementation with glutathione can assist in the elimination of this compound.</p>
<p><b>Diphenyl Phosphate</b></p>	<p>This is a metabolite of the organophosphate flame retardant triphenyl phosphate (TPHP), which is used in plastics, electronic equipment, nail polish, and resins. TPHP can cause endocrine disruption. Studies have also linked TPHP to reproductive and developmental problems.</p>
<p><b>Perchlorate</b></p>	<p>Perchlorate is used in the production of rocket fuel, missiles, fireworks, flares, explosives, fertilizers, and bleach. Studies show that perchlorate is often found to contaminate water supplies and food sources. It can disrupt the thyroid's ability to produce hormones. The EPA has also labeled perchlorate a likely human carcinogen. Patients that are high in perchlorate can use a reverse osmosis water treatment system to remove perchlorate.</p>
<p><b>N-Acetyl (3,4-Dihydroxybutyl) Cysteine (NABD)</b></p>	<p>NADB is a metabolite of 1,3 butadiene, which is evident of exposure to synthetic rubber such as tires. 1,3 butadiene is a known carcinogen and has been linked to increased risk of cardiovascular disease. Individuals that come into contact with rubber, such as car tires, could absorb 1,3 butadiene through the skin.</p>
<p><b>N-Acetyl (2-Hydroxypropyl) Cysteine (NAHP)</b></p>	<p>NAHP is a metabolite of propylene oxide which is used in the production of plastics and as a fumigant. It is also used in the preparation of lubricants, surfactants, and oil demulsifiers and as a food additive, an herbicide, a microbicide, an insecticide, a fungicide, and a miticide. Propylene oxide is a probable human carcinogen.</p>
<p><b>N-Acetyl (Propyl) Cysteine (NAPR)</b></p>	<p>NAPR is a metabolite of 1-bromopropane. Chronic exposure can lead to decreased cognitive function and impairment of the central nervous system. Acute exposure can lead to headaches.</p>
<p><b>2-Hydroxyethyl Mercapturic Acid (HEMA)</b></p>	<p>HEMA is a metabolite of ethylene oxide, which is used in the production of agrochemicals, detergents, pharmaceuticals, and personal care products. Chronic exposure to ethylene oxide has been determined to be mutagenic to humans. HEMA is also a metabolite of vinyl chloride and halopropane, which are used in many commercial chemical processes such as foam glueing, dry cleaning, and in the production of solvents. Supplementation with glutathione should assist in the detoxification process of these chemicals.</p>
<p><b>N-Acetyl (2-Cyanoethyl) Cysteine (NACE)</b></p>	<p>NACE is a metabolite of acrylonitrile, which is used in the production of acrylic fibers, resins, and rubber. Acrylonitrile is metabolized by the cytochrome P450s and then conjugated to glutathione. Supplementation with glutathione should assist in the detoxification of acrylonitrile.</p>