sample type: **BUCCAL**

GENOVATIONS®

DetoxiGenomic® Profile

DetoxiGenomic® Profile evaluates single nucleotide polymorphisms (SNPs) associated with increased risk of impaired detoxification capacity especially when exposed to environmental toxins. It also identifies individuals potentially susceptible to adverse drug reactions.

Phase I: Cytochrome P-450

- CYP1A1
- CYP2A6
- CYP2C9
- CYP3A4
- CYP1B1
- CYP2D6
- CYP1C19

Phase I is the first line of defense in the detoxification of all environmental toxins, including pesticides, herbicides, pollutants, and solvents, pharmaceuticals and nutraceuticals, as well as many of the body's own waste products (including steroid hormones).

Phase II: Conjugation of Toxins and Elimination

Methylation (catechol-O-methyltransferase)

- COMT

Polymorphisms may lead to impaired metabolism of the catecholamine neurotransmitters (dopamine, epinephrine, and norepinephrine) and may predispose individuals to anxiety, ADHD, alcoholism, and rapid cycling in bipolar individuals.

Acetylation (N-acetyl transferase)

- NAT1
- NAT2

NAT detoxifies many environmental toxins, including tobacco smoke and exhaust fumes. Polymorphisms may result in slow or rapid acetylation, both associated with increased risk of lung, colon, bladder, or head & neck cancer.

Glutathione Conjugation (glutathione s-transferase)

- GSTM1
- GSTT1
- GSTP1

GST detoxifies many water-soluble environmental toxins, including solvents, herbicides, fungicides, and heavy metals (eg, mercury, cadmium, and lead). Defects in GST activity can contribute to fatigue syndromes and many cancers.

Oxidative Protection (superoxide dismutase)

- SOD1
- SOD2

Mutations affecting these antioxidant enzymes can lead to increased free radical activity and cell damage, and may increase the risk of developing neurodegenerative disorders.

- ***Specimen Requirements:***
  - **Buccal**–Two cotton swabs
- ***Before Patient Takes this Test:***
  - See instructions inside test kit for more details

GENOVA DIAGNOSTICS®

DetoxiGenomic™ Profile

Physician's Copy

GENOVA DIAGNOSTICS

63 Zillicoa Street
Asheville, NC 28801

Patient: **JANE DOE**
DOB:
Sex: F
MRN:

Order Number:
Completed:
Received:
Collected:

Security Code:

PHASE I Detoxification: The First Line of Defense

In Phase I detoxification, enzymes, known collectively as the cytochrome P-450 system, use oxygen to modify toxic compounds, drugs, or steroid hormones. Many toxins must undergo Phase II detoxification after a reactive site has been formed. Because there are many different toxic compounds the body might encounter, there are many variants of Phase I enzymes.

(CYP1A1) detoxifies polycyclic aromatic hydrocarbons (PAHs) produced from the combustion of organic materials (exhaust fumes, charbroiled meats, etc.)

(CYP1B1) is involved in the 4-hydroxylation of estrogen.

(CYP2A6) detoxifies nitrosamines and nicotine

(CYP2C9) detoxifies coumadin® and sulfonylureas.

(CYP2C19) detoxifies proton-pump inhibitors (e.g., prilosec®) and many anticonvulsants (e.g., valium®).

(CYP2D6) detoxifies ~20% of all prescription drugs including tricyclics, MAOIs, SSRIs, opiates, anti-arrhythmics, beta-blockers, Cimetidine, etc.

(CYP3A4) detoxifies over 50% of all prescription medications and most steroid hormones

Cytochrome P-450		
Result	Gene	internet information
✓	**CYP1A1** *	www.genovations.com/gdgen01
●	**CYP1B1** *	www.genovations.com/gdgen02
✓	**CYP2A6**	www.genovations.com/gdgen10
●	**CYP2C9** *	www.genovations.com/gdgen05
✓	**CYP2C19** *	www.genovations.com/gdgen06
✓	**CYP2D6**	www.genovations.com/gdgen03
●	**CYP3A4** *	www.genovations.com/gdgen07

Use of H2 blockers (e.g. Cimetidine) should be avoided as these bind to the heme-containing reactive site of all CYPs inhibiting binding to toxins.

Your Results: Polymorphisms (SNPs) in the genes coding for a particular enzyme can increase or, more commonly, decrease the activity of that enzyme. Both increased and decreased activity may be harmful. Increased phase I clearance without increased clearance in Phase II can lead to the formation of toxic intermediates that may be more toxic than the original toxin. Decreased Phase I clearance will cause toxic accumulation in the body. Adverse reactions to drugs are often due to a decreased capacity for clearing them from the system.

General Therapies to Improve Detoxification:

Foods that generally improve Phase I detoxification and as well improve the efficiency of Phase II conjugation are generally recommended for individuals with CYP SNPs. These include most vegetables and fruits, but especially cruciferous vegetables (broccoli, Brussels sprouts, cauliflower, watercress, and cabbage), garlic, onions, soy, grapes, berries, green and black tea, and many herbs and spices like rosemary, basil, turmeric, cumin, poppy seeds, and black pepper. Indeed, improving Phase I and Phase II detoxification helps explain why vegetables and fruits protect against many cancers.

Key

✓	Optimal genomic potential - no polymorphism detected
●	Polymorphism detected in this enzyme, increasing your susceptibility to toxins, if exposed
*	Multiple SNP locations were evaluated for these genes
NR	See commentary if applicable.

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Related Phenotype Assessments

Follow-up:
To regularly monitor therapeutic interventions that modify genetic expression

- ***Oxidative Stress Analysis*** *(blood or urine)*
- ***Elemental Analysis*** *(hair, urine, or packed erythrocytes)*

For test kits, clinical support, or more information contact:
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Oregon City, OR 97045
(503) 631-4184