



Nothing But Pure

PureGenomics[®]



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ANTIOXIDANT & CELLULAR DEFENSE PROTOCOL*

*These statements have not been evaluated by the Food & Drug Administration. These products are not intended to diagnose, treat, cure or prevent any disease.



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is a family practice, trained functional medicine practitioner. He specializes in determining connections between seemingly disparate clinical observations, approaching the body as an integrated whole. Dr. Morris applies genetic testing as a tool to objectively guide personalized approaches.



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About PureGenomics®

Within every patient’s genome are opportunities to optimize health and wellness. Genetic testing can empower practitioners with information that can enhance patient management and clinical outcomes. But the translation of genetic testing to effective clinical decisions can be challenging. PureGenomics® is a platform combining educational tools, protocols and core products with our dynamic, practitioner-exclusive website application designed to help identify common genetic variations known as Single Nucleotide Polymorphisms (SNPs) that are clinically relevant and nutritionally actionable. Developed in collaboration with Nathan Morris, M.D., and Kelly Heim, Ph.D., PureGenomics® makes it easy to **TEST, TRANSLATE** and **TARGET** SNPs with the right nutritional support, empowering practitioners with precision and confidence in the pursuit of optimal health for every patient.*

Learn more at www.PureGenomics.com.

The Antioxidant & Cellular Defense Protocol* is Designed to:

- ✓ Optimize antioxidant status*
- ✓ Support detoxification*
- ✓ Support healthy estrogen metabolism*

Overview

Toxins are not only derived from our environment, but are generated continuously during normal metabolic processes. Examples include reactive oxygen species (ROS) and reactive byproducts of detoxification and hormone metabolism. The body maintains homeostasis by producing specialized enzymes that dispose of ROS and other toxic substances at the cellular level. Common genetic variations can have profound influences on how well these enzymes work.¹⁻⁴

Superoxide Dismutase 2 (SOD2; MnSOD) Val16Ala

SOD2, also known as MnSOD, detoxifies superoxide radicals, which are continuously created as byproducts of mitochondrial energy production. SOD2 converts superoxide to a more stable derivative, hydrogen peroxide (**Figure 1**). The Val16Ala SNP, which affects more than 60% of Americans of European ancestry, alters the cellular location, stability and antioxidant function of this enzyme.⁵

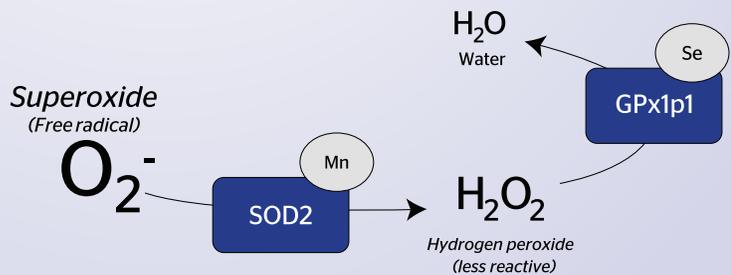


Figure 1: The SOD2 gene encodes a vital manganese-dependent, mitochondrial antioxidant enzyme that neutralizes superoxide anions by converting them to a weaker compound, hydrogen peroxide. Glutathione peroxidase (GPx1p1) eliminates hydrogen peroxide by converting it to water.

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In multiple studies, higher fruit and vegetable and/or antioxidant intake nullified the effect of the SNP on breast and prostate health.^{26,9} Specific antioxidants that act in the mitochondrial matrix and membrane include vitamin C and astaxanthin, which help to moderate superoxide and hydrogen peroxide levels.^{10,16} Diindolylmethane (DIM), sulforaphane and resveratrol provide more general support for antioxidant defenses by promoting Nrf2 activity (Figure 2).^{17,21*}

Glutathione Peroxidase 1P1 (GPx1P1) Pro198Leu

Hydrogen peroxide is a precursor to other types of ROS that can perpetuate oxidative stress if not removed quickly by glutathione peroxidase 1 (GPx). The Pro198Leu SNP in the P1 isoform (GPx1P1) is associated with reduced enzyme activity and higher oxidative stress. To function optimally, this enzyme requires selenium, its major cofactor, as well as vitamin C and glutathione.^{23,24} Phytochemicals such as DIM, sulforaphane and resveratrol support the expression of multiple peroxidases.^{21,25-26*}

Glutathione Sulfotransferase P1 (GSTP1) Ile105Val

Glutathione sulfotransferases (GSTs) are phase II detoxification enzymes that detoxify a wide range of endogenous and environmental toxins. By attaching glutathione, the P1 isoform renders these substances less active and easily excreted (Figure 3). GSTP1 is abundantly expressed in lung tissue, where it helps to protect cells from inhalational toxins.²⁷ In breast cells, GSTP1 aids in detoxifying reactive forms of estrogen.²⁸ The GSTP1 Ile105Val SNP is an extensively researched, highly prevalent SNP that is associated with reduced detoxifying capacity.^{29,30}

Studies show that cruciferous vegetables help to maintain prostate and breast health in individuals carrying this SNP.³¹ Bioactives from these foods, such as sulforaphane and DIM, support the expression of GSTP1 and other members of the GST family.^{27,31-32} Specialized support should include optimization of glutathione levels, as this enzyme depends on its systemic availability.*

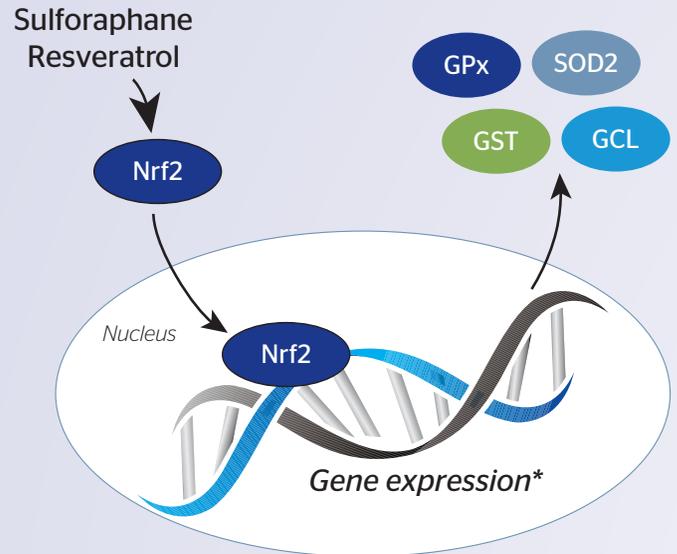
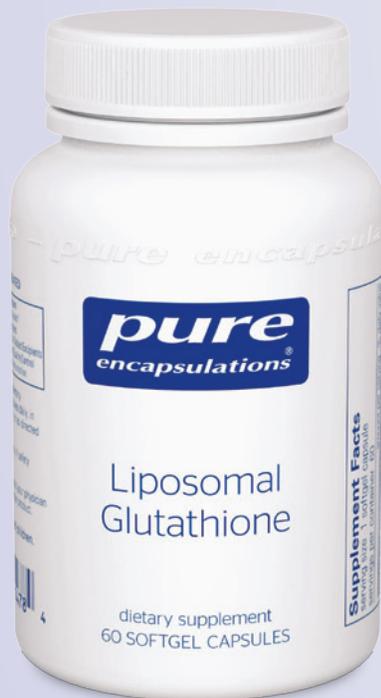


Figure 2: The Nrf2 pathway operates in cells throughout the body to protect tissues from oxidative stress, toxins and reactive substances. Nrf2 responds to phytochemicals such as sulforaphane and resveratrol to enlist a robust array of antioxidant and detoxifying enzymes, including SOD2, glutathione peroxidase, glutathione sulfotransferases and enzymes involved in glutathione production.^{19,22}

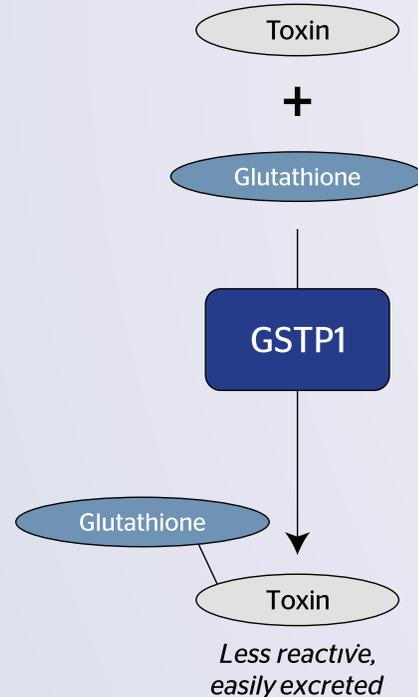


Figure 3: Glutathione S-transferase P1 (GSTP1) is a phase II detoxification enzyme. It attaches glutathione to toxins, reducing their activity and facilitating their elimination.

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How to Test for SNPs and Find Personalized Supplement Support:*

1. If you already have a **PureGenomics®** account and have previously uploaded **23andMe®** data, simply login to view your personal and/or patient reports. All reports have been automatically updated to include SOD2, GPx1P1 and GSTP1 genotypes.
2. Visit **www.23andMe.com** to order your own personal kit or ask your patients to visit **www.23andMe.com** to order their kits. Recipients of the kit will need to follow the step-by-step instructions to obtain full-service genotyping and secure, downloadable results.
3. To obtain personalized reports on SNPs and personalized supplement recommendations, visit **www.PureGenomics.com** and click *Practitioner Sign Up* to get started.

SNP-Based Protocols:††

Gene	SNP	What it means	Recommendations	Pure Encapsulations® Products*
SOD2	Val16Ala (rs4880)	Alters the location of the SOD2 enzyme, which compromises antioxidant defenses	Astaxanthin Vitamin C DIM Sulforaphane	Nrf2 Detox Astaxanthin Ascorbic Acid or Buffered Ascorbic Acid (powder or capsules) DIM Detox
GPx1P1	Pro198Leu (rs1050450)	Reduced capacity to detoxify hydrogen peroxide, a reactive oxygen species	Selenium Glutathione Alpha Lipoic Acid N-Acetyl-L-Cysteine DIM Sulforaphane Vitamin C	Nrf2 Detox Selenomethionine Liposomal Glutathione Ascorbic Acid or Buffered Ascorbic Acid (powder or capsules) DIM Detox
GSTP1	Ile105Val (rs1695)	Reduced ability to conjugate certain toxins with glutathione	Glutathione Alpha Lipoic Acid N-Acetyl-L-Cysteine DIM Sulforaphane	Nrf2 Detox Liposomal Glutathione Alpha Lipoic Acid 400 mg N-Acetyl-L-Cysteine (NAC) DIM Detox

Where multiple supplements are suggested, please note that the patient may not require all of them. The selection can be fine-tuned by assessing nutrient levels (*refer to suggested monitoring below*) or by other testing you would normally include in the patient evaluation.

Suggested Monitoring:

SNP	Method(s) to evaluate progress with supplementation*
SOD2 Val16Ala (rs4880)	NutrEval® FMV (Genova Diagnostics) includes analysis of antioxidant status as part of a comprehensive evaluation. The Oxidative Stress Analysis 2.0 (Genova Diagnostics) provides a more in-depth assessment of antioxidant defenses. Urinary F ₂ -isoprostanes are also useful in assessing and monitoring systemic antioxidant status.
GPx1P1 Pro198Leu (rs1050450)	NutrEval® FMV (Genova Diagnostics) includes analysis of antioxidant status as part of a comprehensive evaluation. The Oxidative Stress Analysis 2.0 (Genova Diagnostics) provides a more in-depth assessment of antioxidant defenses. Urinary F ₂ -isoprostanes are also useful in assessing and monitoring systemic antioxidant status.
GSTP1 Ile105Val (rs1695)	Estrogen metabolite ratios (2-OHE1:16α-OHE1) reflect the amount of protective estrogen (2-hydroxyestrone) relative to the stronger estrogen, 16α-hydroxyestrone. Cruciferous vegetables and their metabolites, such as DIM, support a healthy ratio.*

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††These are general recommendations. Please follow the recommendations of your healthcare professional.

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