CLINICAL SERVICES

Therapeutic considerations

BioCeuticals

Detoxification Profile Report

How to read this report

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SNP	A single nucleotide polymorphism is a DNA sequence variation occurring when a single nucleotide adenine (A), thymine (T), cytosine (C) or guanine (G) in the genome differs between paired chromosomes in an individual.
rs number	The rs number is an accession number used by researchers and databases to refer to a specific SNP. It stands for reference SNP cluster ID.
Gene Variation	A variation within a gene such as a SNP
No effect	This result is likely to be associated with normal protein function.
Pay attention	This result may have some effect on protein function. Altered protein function may effect health outcomes.
Pay close attention	This result is likely to have an effect on the protein function. Altered protein function may effect health outcomes.
- -	This is considered the 'wild type' allele. No variant has been inherited.
- +	Heterozygous allele, being inherited from one parent.
+ +	Homozygous allele, being inherited from both parents.

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Research

The gene and SNP results indicated in this report utilise a rating scale to provide an indication of the quality of the research. The evidence is based on Oxford Centre for Evidence Based Medicine (Level of Evidence March 2009) and has been modified by BioCeuticals to apply to genetic tests.

Evidence Rating System

Level	Causation and treatment
5 stars ★★★★★	Systematic review of multiple randomised controller trials (meta-analysis) Systematic review of meta-analyses Single randomised controlled trial with narrow confidence intervals
4 stars ★★★★	Meta-analysis of cohort studies Prospective cohort study with 80% follow-up Single RCT (not supported by at least 5 studies) Good quality ecological research Genome-wide association studies
3 stars ★★★	Multiple-case control studies Meta-analysis of case control Follow up cohort study < 80% Cross-sectional studies (n>1000 subjects; subjects can be additive from multiple studies if direction is the same) Case control (n>100 subjects; more than 1 study in same direction) Multiple studies on human enzyme function/activity
2 stars ★★	Single-case control study (or in multiple studies conflicting in at least three) Cross-sectional study (n<1000 subjects) Case series Single study on human enzyme function/activity
1 star ★	Single-case report Expert opinion Biochemistry First principle Animal/bacteria analogy

Detoxification Profile Report

Nutrient Considerations

Betaine

1
0

Betaine is an important cofactor for the Methylation cycle. Betaine-rich foods include spinach and beetroot. Betaine can also be made from choline.

MTHFR [PMID: 27342765]

Bioflavonoids - Quercetin/Rutin

1
1

Quercetin is effective in reducing inflammation, oxidative stress, histamine release and blood pressure by modulating the activity of associated enzymes. Food sources containing quercetin include berries, cherries, apples, aswell as cruciferous and green leafy vegetables. Rutin has anti-inflammatory properties by inhibiting histamine production. Dietary intake of rutin can be increased by consuming buckweheat, black olives and raspberries.

NAT2 [PMID: 19215233, 12487326]

PON1 [PMID: 19141295, 25328927]

Resveratrol

0
1

Resveratrol is an antioxidant and may assist with detoxification of organophosphates and oestrogens.

PON1 [PMID: 24478552, 15458977]

Selenium

0
1

Selenium supports GPX1 activity and may help to balance oxidative stress and heavy metal detoxification. Selenium is also required for thyroid function. Selenium is found in brazil nuts, meat, poultry and fish. Consider a selenomethionine supplement if required.

PON1 [PMID: 23678416]

Vitamin B2

1
0

Vitamin B2 (riboflavin) acts as a precursor for the coenzymes flavin adenine dinucleotide (FAD) and flavin mononuclotide (FMN). FAD and FMN are cofactors for many enzymes, including MTHFR, NOS3 and DAO, support methylation and energy metabolism and are involved in vitamin B6 and B3 metabolism. Vitamin B2 is found in dark green leafy vegetables, whole grains, milk and milk products. Consider supplementation if required.

MTHFR [PMID: 27170501, 15831132]

Legend

- No Effect
- Pay Attention
- Pay Close Attention
- - - Wild type
- - + Heterozygous
- + + Homozygous

Detoxification Profile Report

Nutrient Considerations

Vitamin C

0
2

Vitamin C, or ascorbic acid, is required for the synthesis of collagen, carnitine and catecholamines. Increased intake of vitamin C is associated with improved antioxidant status and increased antioxidant enzyme activity, and has been shown to reduce clotting factors. Vitamin C-rich foods include kiwi fruit, capsicum, and oranges. Consider liposomal form of vitamin C where absorption in the GIT may be compromised.

SOD2 [PMID: 18008141, 9973207]
PON1 [PMID: 19285602, 22548179, 12171796]

Vitamin E

0
1

Vitamin E is positively associated with antioxidant status and antioxidant enzyme activity. In addition, vitamin E may be beneficial where cholesterol is of concern. Dietary sources of vitamin E include almonds, beef, and corn.

PON1 [PMID: 23678416, 22548179, 12171796]

Legend

- No Effect
- Pay Attention
- Pay Close Attention
- - Wild type
- - + Heterozygous
- + + Homozygous

Detoxification Profile Report

Legend

- No Effect
- Pay Attention
- Pay Close Attention
- - Wild type
- - + Heterozygous
- + + Homozygous

Dietary and Lifestyle Considerations

3 2 Consider a diet rich in cruciferous vegetables

A diet rich in cruciferous vegetables can support both phase 1 and phase 2 enzyme activities and thereby increase the detoxification of xenobiotics.

Cruciferous vegetables are rich in sulfurophane, which has anti-inflammatory and antioxidant properties.

NAT2 [PMID: 20956097, 19549811]
NAT2 [PMID: 20956097, 19549811]
CYP1B1 [PMID: 26167297, 20833222, 25234182]

CYP19A1 [PMID: 25234182]
CYP2A6 [PMID: 17266520]

0 4 Consider following a Mediterranean diet

A Mediterranean diet, rich in olive oil, fish, nuts, fruits and vegetables, can reduce oxidative stress and increase antioxidant enzyme activity.

A Mediterranean diet has been shown to reduce susceptibility to cardiovascular disease.

GSTP1 [PMID: 24722539, 26572891]
GSTP1 [PMID: 24722539, 26572891]
SOD2 [PMID: 23963800, 22057896]
PON1 [PMID: 26024295, 16276071, 22236145, 30592255, 11740946]

2 4 Consider green and white tea

Green and white tea exhibit detoxification and antioxidant properties by increasing phase 2 and antioxidant enzyme activities. Both teas are effective at inducing these enzymes, however white tea is more effective than green tea when exposed to oxidative stress.

MTHFR [PMID: 18669903, 24972245]
CYP1B1 [PMID: 22960141]

GSTP1 [PMID: 26872811, 22833520, 19856314]
GSTP1 [PMID: 26872811, 22833520, 19856314]
SOD2 [PMID: 21893570, 8458506, 4968709]
PON1 [PMID: 25328927, 21893570, 28212288]

0 Consider intake of epicatechins

2

Cocoa is a rich source of epicatechins. Consuming 25-40gr of cocoa (unsweetened and at least 75%) has antioxidant properties and may increase blood flow, lower LDL cholesterol, benefit insulin sensitivity and result in a mild reduction in blood pressure.

Other sources of epicatechins include apples, black grapes, brewed green tea and cherries.

GPX1 [PMID: 19602430, 19195869, 25559866]
SOD2 [PMID: 23870648, 24314870]

3

0

Consider reducing caffeine intake

Caffeine consumption may inhibit CYP450 activity and reduce VDR expression.

High caffeine intake can affect bone mineral density, blood pressure and may result in increased risk of adverse health effects.

NAT2 [PMID: 19996973, 24470392]
NAT2 [PMID: 19996973, 24470392]
CYP1A1/1A2 [PMID: 183980, 14616429, 25288136, 27509179, 15849225]

Detoxification Profile Report

Legend

- No Effect
- Pay Attention
- Pay Close Attention
- - Wild type
- - + Heterozygous
- + + Homozygous

Dietary and Lifestyle Considerations

0 / 2 Increase intake of sulfur-rich foods

Sulfides, such as those found in onions and garlic, have anti-inflammatory properties and may reduce oxidative stress by up-regulating antioxidant enzymes.

- CYP2A6 [PMID: 11408364]
- PON1 [PMID: 25328927]

4 / 6 Avoid exposure to endocrine disruptors

Endocrine disrupting chemicals (EDCs) can alter the expression of many genes and subsequent functions involving the synthesis of antioxidant enzymes, testosterone, thyroid hormones, oestrogens and androgens.

Limiting exposure to EDCs may improve adverse health outcomes associated with an imbalance of these hormone and enzyme systems.

- NAT2 [PMID: 30303517, 29610665]
- NAT2 [PMID: 30303517, 29610665]
- CYP1B1 [PMID: 21600235, 26063868, 23762054]
- MAO-A [PMID: 25485457, 20442063]

- GSTP1 [PMID: 11923879, 29298499, 27540362]
- GSTP1 [PMID: 11923879, 29298499, 27540362]
- GPX1 [PMID: 23554813, 14978233, 21397294, 26991849]
- SOD2 [PMID: 21397294, 26991849, 27384531]
- PON1 [PMID: 29035403, 26340881]
- COMT [PMID: 23762054, 24772967, 24629213]

3 / 1 Avoid smoking and exposure to smoke

Certain allele carriers may be more susceptible to nicotine addictive behaviour patterns and may require support to reduce nicotine exposure.

- NAT2 [PMID: 27495060, 21037224, 20180012]
- NAT2 [PMID: 27495060, 21037224, 20180012]
- MAO-A [PMID: 30456877, 28858992, 27300740]

- GPX1 [PMID: 28070146, 26897098, 19428376]

0 / 1 Consider doing regular aerobic and strength training exercise

Regular strength and endurance exercise increases antioxidant enzyme activity, and improves insulin sensitivity and cardiovascular function. Aerobic and strength fitness is associated with reduced risk of cardiovascular disease and cognitive decline.

SOD2 [PMID: 29765980, 29109056, 28482710]

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1

Maintain a healthy weight

Excessive weight can induce adverse metabolic and physiological outcomes. Certain allele variants may have an altered response to particular dietary weight loss interventions, so assistance and support with a weight loss program may be required.

CYP19A1 [PMID: 22106445, 26415088, 26049585, 20004389]

CLINICAL SERVICES

Prescribing practitioner :
Leigh Shinde
Kids Development Centre

Report for:
Chantel Keogh
Swab #3717541314 | Jan 25, 2021

Detoxification Profile Report

Pathology Considerations

1 **0**

Ceruloplasmin

Ceruloplasmin is the major copper-carrying protein in the blood, tested in conjunction with serum copper to help evaluate free copper levels. Also assists in determining zinc and copper balance.

- CBS

1 **1**

Comprehensive hormone test

This test helps determine hormone levels that may impact hormonal balance and endocrine-related disorders.

- CYP1B1
- CYP19A1

1 **0**

Comprehensive hormone test (progesterone)

As part of a full hormone panel, progesterone levels are measured to assess hormonal balance and endocrine-related disorders.

- MAO-A

1 **0**

Comprehensive hormone test (testosterone)

This test helps determine hormone levels that may impact hormonal balance and endocrine-related disorders.

Included in this test is a measurement of testosterone and its metabolites.

- MAO-A

Legend

- No Effect
- Pay Attention
- Pay Close Attention
- - Wild type
- - + Heterozygous
- + + Homozygous

Detoxification Profile Report

Legend

- No Effect
- Pay Attention
- Pay Close Attention
- - Wild type
- - + Heterozygous
- + + Homozygous

Pathology Considerations

1
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Copper

This is best conducted in conjunction with plasma zinc and ceruloplasmin to understand zinc to copper ratios and the binding of copper.

CBS

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1

Cortisol

Cortisol is a steroid hormone, produced by the adrenal gland, in response to the pituitary hormone ACTH. It is increased in times of stress and regulates the immune system.

Testing is appropriate as part of the investigation into the stress response, hormone balance and adrenal health.

COMT

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C-reactive protein (CRP)

A marker of inflammation, CRP may help determine chronic inflammation (low levels) or acute infection (high levels).

hs-CRP (high sensitive) is often ordered in conjunction with other tests, such as a lipid profile, which are performed to assess risk of cardiovascular disease.

CBS

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1

Dehydroepiandrosterone (DHEA)

DHEA is produced by the adrenal cortex with smaller amounts being produced by a woman's ovaries and a man's testes.

DHEA is useful as a marker for adrenal function and can help determine hormone levels that may impact hormonal balance and endocrine-related disorders.

 COMT

Detoxification Profile Report

Legend

- No Effect
- Pay Attention
- Pay Close Attention
- - Wild type
- - + Heterozygous
- + + Homozygous

Pathology Considerations

● 1
◐ 1

Folate

This test examines folate levels in the blood (serum folate) and/or in the red blood cell (RBC folate).

The amount of folate inside the RBC may be at a higher concentration than in the serum and reflects folate levels over a longer period.

● MTHFR

◐ COMT

● 1
◐ 1

Full blood count (FBC)

This test provides information about the types and numbers of cells in the blood: red blood cells (RBCs), white blood cells (WBCs) and platelets.

Abnormalities in any of these types of cells can indicate the presence of medical disorders, such as anaemia, infection and nutritional status.

● MTHFR

◐ COMT

● 2
◐ 1

Homocysteine

This test determines the level of homocysteine in the blood (plasma).

Altered levels can be an indication of impaired methylation.

● MTHFR
CBS

◐ COMT

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Liver function

Liver function tests help determine the health of the liver by measuring the levels of proteins, liver enzymes and bilirubin in the blood.

Altered levels can be associated with chronic inflammation, oxidative stress and health disorders.

- MAO-A

Detoxification Profile Report

Legend

- No Effect
- Pay Attention
- Pay Close Attention
- - Wild type
- - + Heterozygous
- + + Homozygous

Pathology Considerations

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Magnesium

There are various types of magnesium tests including RBC and serum.

COMT

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1

Methylmalonic acid (MMA)

This is the gold standard for measuring vitamin B12 levels.

MMA is produced in very small amounts and is necessary for human metabolism and energy production.

Vitamin B12 promotes the conversion of methylmalonyl-CoA (a form of MMA) to succinyl-CoA. If there is not enough B12 available, then the MMA concentration begins to rise, resulting in an increase of MMA in the blood and urine.

The measurement of elevated amounts of MMA in the blood or urine serves as a sensitive and early indicator of vitamin B12 deficiency.

COMT

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Neurotransmitter profile

Consider testing for neurotransmitters including serotonin, GABA, dopamine, noradrenaline, adrenaline and glutamate that may influence mood and cognition.

MAO-A

COMT

0
1

Oxidise glutathione (GSSG) to glutathione (GSH) ratio

The ratio of reduced GSH to oxidised GSH (GSSG) is an indicator of cellular health and oxidative stress.

GSTP1

Detoxification Profile Report

Legend

- No Effect
- Pay Attention
- Pay Close Attention
- - - Wild type
- - + Heterozygous
- + + Homozygous

Pathology Considerations

2
0

Plasma zinc

To measure the amount of zinc in the blood (serum/plasma) in order to identify and diagnose deficiency.

Zinc is an important cofactor in methylation and many other enzyme-dependant pathways.

- CBS
- MAO-A

2
1

S-adenosylmethionine (SAMe), S-adenosylhomocysteine (SAH), SAM:SAH ratio

This test provides the methylation index – a ratio of SAMe to SAH. The SAMe:SAH profile provides a functional assessment by evaluating the plasma levels of methionine, cysteine, SAMe, SAH, homocysteine and cystathionine.

- MTHFR
- CBS

- COMT

0
1

Selenium

Selenium biomarkers can be assessed as part of a thyroid function panel or antioxidant status test.

- GSTP1

1
1

Vitamin B12

Serum B12 and holotranscobalamin can help determine vitamin B12 levels.

Methylmalonic acid (MMA) is the gold standard for measuring vitamin B12 levels.

The measurement of elevated amounts of MMA in the blood or urine serves as a sensitive and early indicator of vitamin B12 deficiency.

MTHFR

COMT

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Pathology Considerations

2
1

Whole blood histamine

Whole blood histamine levels are used as a marker for methylation status and to determine the presence of histadelia or histapenia.

Histamine, in its whole blood form, is utilised as an accurate marker for methylation status.

- MTHFR
- CBS

- DAO

Legend

- No Effect
- Pay Attention
- Pay Close Attention

- - Wild type
- + Heterozygous
+ + Homozygous