Case Study
What would you do w/o genetics?

Patient History:

- 42 yr. old female
- When drinking alcohol, legs tingle in seconds
- Rheumatoid arthritis dx at 17
- Headaches easily and often – mild typically but annoying
- Post-exercise joint pain, muscle pain – significant
- HBOT -> makes her worse – joints flare
- Liposomal glutathione makes her worse
- PQQ really, really helps prevent post-exercise joint pains
- Found that liposomal glutathione with cofactors really helps > PQQ
- Gut health up and down a lot – alternating good and bad days
- PMS at times - generally can be quick to anger and slow to calm down
Genetic Testing

Do you use it currently? Why?

Used it before and stopped – why?

Haven’t ever used it – why not?
Genetic Testing

What encourages you to use genetic testing?
Genetic Testing

As a health professional, why should you use it?
Genetic Testing

Why do your patients want it?
Why do your patients *avoid* it?
Genetic Testing

Ultimately, what do you need to know about a gene?

eg. MTHFR                         MAOB

Ultimately, what do you need to know about a SNP?

eg. MTHFR C677T +/-               MAOB 36A>G +/-
<table>
<thead>
<tr>
<th>RS#</th>
<th>Call</th>
<th>Risk Allele</th>
<th>Gene</th>
<th>Variation</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>rs1051266</td>
<td>CT</td>
<td>T</td>
<td>SLC19a1</td>
<td>G80A</td>
<td>+/-</td>
</tr>
<tr>
<td>rs2236225</td>
<td>AG</td>
<td>A</td>
<td>MTHFD1</td>
<td>G1958A</td>
<td>+/-</td>
</tr>
<tr>
<td>rs1801131</td>
<td>GT</td>
<td>G</td>
<td>MTHFR</td>
<td>A1298C</td>
<td>+/-</td>
</tr>
<tr>
<td>rs1801133</td>
<td>AG</td>
<td>A</td>
<td>MTHFR</td>
<td>C677T</td>
<td>+/-</td>
</tr>
<tr>
<td>rs1801394</td>
<td>AG</td>
<td>G</td>
<td>MTRR</td>
<td>A66G</td>
<td>+/-</td>
</tr>
<tr>
<td>rs1532268</td>
<td>CT</td>
<td>T</td>
<td>MTRR</td>
<td>C524T</td>
<td>+/-</td>
</tr>
<tr>
<td>rs72558181</td>
<td>NA</td>
<td>T</td>
<td>MAT1A</td>
<td>R264H</td>
<td>NA</td>
</tr>
<tr>
<td>rs28934891</td>
<td>CC</td>
<td>T</td>
<td>CBS</td>
<td>D444N</td>
<td>+/-</td>
</tr>
<tr>
<td>rs4920037</td>
<td>AG</td>
<td>A</td>
<td>CBS</td>
<td>C19150T</td>
<td>+/-</td>
</tr>
<tr>
<td>rs234706</td>
<td>AG</td>
<td>A</td>
<td>CBS</td>
<td>C699T</td>
<td>+/-</td>
</tr>
<tr>
<td>rs4880</td>
<td>GG</td>
<td>A</td>
<td>SOD2</td>
<td>A16V</td>
<td>+/-</td>
</tr>
<tr>
<td>rs1799895</td>
<td>NA</td>
<td>G</td>
<td>SOD3</td>
<td>Ex3-631C&gt;G</td>
<td>NA</td>
</tr>
<tr>
<td>rs1695</td>
<td>AG</td>
<td>G</td>
<td>GSTP1</td>
<td>Ile105Val</td>
<td>+/-</td>
</tr>
<tr>
<td>rs1138272</td>
<td>CT</td>
<td>T</td>
<td>GSTP1</td>
<td>A114V</td>
<td>+/-</td>
</tr>
<tr>
<td>rs1050828</td>
<td>CC</td>
<td>T</td>
<td>G6PD</td>
<td>G202A</td>
<td>+/-</td>
</tr>
<tr>
<td>rs1050829</td>
<td>TT</td>
<td>C</td>
<td>G6PD</td>
<td>A376G</td>
<td>+/-</td>
</tr>
<tr>
<td>rs5030868</td>
<td>GG</td>
<td>A</td>
<td>G6PD</td>
<td>C563T (Medit.)</td>
<td>+/-</td>
</tr>
<tr>
<td>rs1050450</td>
<td>NA</td>
<td>A</td>
<td>GPX1</td>
<td>Pro199Leu</td>
<td>NA</td>
</tr>
<tr>
<td>rs1800783</td>
<td>NA</td>
<td>A</td>
<td>NOS3/eNOS</td>
<td>-1495A&gt;T</td>
<td>NA</td>
</tr>
<tr>
<td>rs1800779</td>
<td>AG</td>
<td>G</td>
<td>NOS3/eNOS</td>
<td>A(-922)G</td>
<td>+/-</td>
</tr>
<tr>
<td>rs6018900</td>
<td>NA</td>
<td>T</td>
<td>SULT1A1</td>
<td>638G&gt;A</td>
<td>NA</td>
</tr>
<tr>
<td>rs6323</td>
<td>NA</td>
<td>G</td>
<td>MAOA</td>
<td>T941G</td>
<td>NA</td>
</tr>
<tr>
<td>rs1137070</td>
<td>NA</td>
<td>T</td>
<td>MAOA</td>
<td>1410T&gt;C</td>
<td>NA</td>
</tr>
<tr>
<td>rs1799836</td>
<td>NA</td>
<td>C</td>
<td>MAOB</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>rs4680</td>
<td>AG</td>
<td>A</td>
<td>COMT</td>
<td>V158M</td>
<td>+/-</td>
</tr>
<tr>
<td>rs4633</td>
<td>CT</td>
<td>T</td>
<td>COMT</td>
<td>H62H</td>
<td>+/-</td>
</tr>
<tr>
<td>rs10156191</td>
<td>NA</td>
<td>T</td>
<td>AOC1 (DAO)</td>
<td>Thr16Met</td>
<td>NA</td>
</tr>
</tbody>
</table>

+/− = not present; +/− = one mutation; ++/− = double mutation; +/−* = mutation on the X chromosome in a male.

Predicted NAT2 acetylator phenotype with probability estimate: SLOW (0.997581)
Genetic Testing

**Asking again...**

*Ultimately, what do you need to know about a gene?*

eg. *MTHFR*  

MAOB

*Ultimately, what do you need to know about a SNP?*

eg. *MTHFR C677T* +/-  

MAOB *36A>G* +/-
THE MTHFR GENE

**Ultimately, what is the gene’s JOB?**

The MTHFR (methylenetetrahydrofolate reductase) gene expresses an enzyme which produces the body’s primary form of folate called 5-MTHF (aka 5-methyl THF, L-5-MTHF, methylfolate), which represents over 80% of the body’s folate. In the process, the MTHFR enzyme uses FAD, a form of riboflavin (B2), as a cofactor.

5-MTHF is utilized in the production of S-adenosylmethionine (SAM), which subsequently regulates around 200 processes including DNA methylation, neurotransmitter and phospholipids production. Since the MTHFR gene is the rate-limiting step in the generation of 5-MTHF, it is subsequently also the rate-limiting enzyme in the whole process of SAM production.

The MTHFR gene connects the folate pathway, via 5-MTHF, with the SAM cycle via the MTR gene. This is why a slow MTHFR may increase homocysteine levels.

**Dirties your MTHFR gene**

**Environment:** Avoid lead and arsenic. Living in sunny areas leads to increased folate demand to repair sun-damaged skin. Naturally dark skin can reduce demand, but not entirely.

**Lifestyle:** Hyper and hypothyroidism, insulin resistance

**Food:** Foods or beverages enriched with synthetic folic acid

**Supplements and Medications:** Avoid synthetic folic acid, aspirin, other salicylates (NSAIDs). Many medications interact with this enzyme. Consult your healthcare provider or pharmacist.

**Cleans your MTHFR gene**

**Environment:** Protect skin from strongest sun rays of the day (10 a.m. to 4 p.m.) by using zinc oxide, hats and sun protective clothing.

**Food:** Riboflavin (B2) rich, choline and betaine rich, natural folate rich, polyphenol rich, low sugar. See "Your Clean Genes Recipes" in the Dirty Genes book.

**Notable variation:**

- SNP: MTHFR A1298C rs1801131 (+/-, TG)
  This TG variant reduces enzyme activity by approximately 20% less than wild type. The activity and stability of the enzyme improves by consuming sufficient folate (B9) and riboflavin (B2).

**Ultimately, what is the SNPs impact on expression?**

**What hurts the gene’s performance at work?**

**What enhances the gene’s performance at work?**

**And how to do it?**
What enhances the gene’s performance at work? And how to do it?

 Cleans your MTHFR gene, continued...

**Supplements and Medications:** The MTHFR enzyme produces methylfolate (5-MTHF). Thus, supplementing with L-5-MTHF may be useful. Be careful, however, as this is a very powerful type of folate. Often it is over-prescribed and leads to many side effects. If using it, consider lower amounts such as 400 mcg to 1,000 mcg of L-5-MTHF.

A way to support MTHFR with fewer side effects is to optimize the cofactor riboflavin (B2), although sufficient B2 cannot help if one is folate deficient.

Another way to support this gene is by indirectly supporting methylation by using supplements which conserve SAM. The body’s production of both creatine and phosphatidylcholine use up nearly 80% of SAM; so by supplementing with them, one conserves SAM and generates less homocysteine. Choose non-GMO soy or sunflower derived phosphatidylcholine. Consider calcium, betaine, omega-3: alpha-linolenic acid (ALA) and docosahexaenoic acid (DHA) fatty acids. Vitamin C showed ability to decrease hypermethylation of MTHFR in a positive way. Consider more folic acid, L-5-MTHF or choline, whichever is well tolerated, during exposure to summer sun especially while pregnant or breastfeeding.
# Folate

<table>
<thead>
<tr>
<th>Gene</th>
<th>SNP rsID</th>
<th>Call</th>
<th>Impact</th>
<th>Variant Allele</th>
<th>Alias</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLC19A1</td>
<td>rs1051266</td>
<td>TC</td>
<td>🟥</td>
<td>T</td>
<td>G80A</td>
<td>+/-</td>
</tr>
<tr>
<td>DHFR</td>
<td>rs70991108</td>
<td>II</td>
<td>🇨mscorlib</td>
<td>D</td>
<td>19bp Del/Ins</td>
<td>-/-</td>
</tr>
<tr>
<td>MTHFD1</td>
<td>rs2236225</td>
<td>GA</td>
<td>🟢</td>
<td>A</td>
<td>G1958A</td>
<td>+/-</td>
</tr>
<tr>
<td>MTHFD1</td>
<td>rs1076991</td>
<td>TT</td>
<td>🇨mscorlib</td>
<td>T</td>
<td>T105C</td>
<td>+/-</td>
</tr>
<tr>
<td>MTHFR</td>
<td>rs1801133</td>
<td>GG</td>
<td>🇨mscorlib</td>
<td>A</td>
<td>C677T</td>
<td>-/-</td>
</tr>
<tr>
<td>MTHFR</td>
<td>rs1801131</td>
<td>TG</td>
<td>🇨mscorlib</td>
<td>G</td>
<td>A1298C</td>
<td>+/-</td>
</tr>
<tr>
<td>FTCD</td>
<td>rs61735836</td>
<td>CC</td>
<td>🇨mscorlib</td>
<td>T</td>
<td>C301T</td>
<td>-/-</td>
</tr>
<tr>
<td>SHMT1</td>
<td>rs1979277</td>
<td>-</td>
<td>🇨mscorlib</td>
<td>A</td>
<td>C1420T</td>
<td>NC</td>
</tr>
<tr>
<td>TYMS</td>
<td>rs779037237</td>
<td>DD</td>
<td>🇨mscorlib</td>
<td>D</td>
<td>Ins/Del</td>
<td>+/-</td>
</tr>
</tbody>
</table>

-/-: variant allele not present; +/-: heterozygous genotype; +/+: homozygous genotype; +/-*: hemizygous genotype (male X);

= much slower; = slower; = intermediate speed;

= faster; = much faster; = ambiguous; = unknown
Case Study
These ALL Explained with StrateGene®

Use the ‘Glutathione Pathway’

Patient History:
• Post-exercise joint pain, muscle pain – significant
• HBOT -> makes her worse – joints flare
• Liposomal glutathione makes her worse
• PQQ really helps prevent post-exercise joint pains
• Found that liposomal glutathione with cofactors really helps > PQQ
Ultimately, what is the gene’s JOB?

The NOX (NADPH oxidase) genes express enzymes which catalyze the production of a superoxide free radical (O₂⁻). NOX2 is composed of 2 cytochrome subunits coded by the genes CYBA and CYBB and uses riboflavin (B2), niacin (B3) and heme as cofactors.

NOX is found in two places: one in white blood cells (neutrophilic) and the other in vascular cells. Neutrophilic NOX produces superoxide almost instantaneously, whereas the vascular version produces superoxide in minutes to hours.

The enzymes become rapidly activated in the presence of bacteria and other pathogens and generates superoxide in an attempt to kill and eliminate them. However, persistent stimulation of NOX2 may lead to excessive production of superoxide in vascular cells, increasing susceptibility to cardiovascular disease.

This is yet another reason why it’s so important to identify infections of any type (bacterial, viral, mold, parasites) in every part of the body (nose, mouth, ears, sinuses, bones, blood, digestive system to name a few).

⚠️ Dirty your NOX gene

Environment:
- People with heme synthesis issues such as sideroblastic anemia or one of the many porphyria disorders may be at disadvantage as heme is the required cofactor for this enzyme.

- Also, many parasites and gram negative bacteria need heme to reproduce and cause infection. These pathogens must synthesize their own heme or steal heme from the host. Thus, untreated chronic parasite or bacterial infections may create a heme deficiency. (Work with your healthcare provider to identify and treat intestinal dysbiosis or other infections rather than just correcting a heme deficiency.)

- Be mindful of tick infested areas as they increase the risk of Lyme disease.

- Pay attention to indoor air quality of home, school or workplace, especially if history of water damage and potential for mold exposures. Cooking itself, especially without proper ventilation or with low smoke point oils like walnut, flaxseed, wheatgerm can dramatically reduce indoor air quality.
**THE GCLC/GCLM GENE** Ultimately, what is the gene’s JOB?

The GCLC/M (glutamate-cysteine ligase) gene expresses an enzyme which catalyzes the combining of glutamate with cysteine to form a glutamate-cysteine complex (g-glutamylcysteine). This reaction requires ATP and either magnesium or manganese as co-factors, and is the first step and rate-limiting enzyme of glutathione synthesis.

This gene is stimulated by oxidants such as hydrogen peroxide (H₂O₂) to produce additional glutathione as required.

This gene’s environmental sensitivity to mycotoxins (mold) demonstrates the significance of why it may not be possible to increase glutathione merely by supplementing with N-acetylcysteine.

Cysteine has to get through GCLC/M in order to become glutathione, but in the presence of mycotoxins and infections, this step is greatly slowed.

The next gene in line after GCLC/M to help synthesize glutathione is GSS. While the GSS gene does not have common variants which alter its function, it’s important to note that if GSS is not functioning well, it may lead to hemolytic anemia due to low glutathione synthesis. Be sure to support the GSS gene as indicated on your pathway planner.

⚠️ **Dirties your GCLC/GCLM gene**

**Environment**: Pay attention to indoor air quality of home, school or workplace. This is especially important if history or evidence of water damage as there is potential for mold and mycotoxin exposures. Identify heavy metal exposure, especially mercury.

**Food**: Avoid oxidized omega-6 fatty acids from rancid or processed oils. Also avoid foods with potential for mycotoxin exposure such as meat, milk, eggs, corn, coffee, nuts, seeds. Note that farmed fish can be high in heavy metals, therefore avoid Atlantic salmon or other fish or shellfish not labeled as wild-caught. Large ocean fish such as tuna, swordfish, king mackerel or bluefish may be high in mercury too.

🌈 **Cleans your GCLC/GCLM gene**

**Food**: Magnesium, manganese, cysteine and glutamate rich foods

**Supplements and Medications**: Optimize magnesium, manganese, especially in those with kidney disease and heavy alcohol use. Consider alpha lipic acid and sulforaphane. May be useful to support downstream from this gene by using liposomal glutathione or 5-acetyl glutathione, PQQ (pyrroloquinoline quinone), vitamin E.

Postmenopausal women: Discuss with your healthcare provider the prescription use of bio-identical estrogen (and progesterone if intact uterus), if you are under 55 and within 4 years of the onset of menopause, or if there are other indications for its use.

---

**SNP: GCLM -588C>T rs41303970 (+/-, GA)**

This GA variant in the GCLM gene may reduce the induction of the enzyme by oxidants like hydrogen peroxide (H₂O₂) resulting in lower levels of reduced glutathione (GSH).
Patient History:

• Headaches easily and often – mild typically but annoying
• PMS at times - generally can be quick to anger and slow to calm down
Ultimately, what is the gene’s JOB?

The COMT (catechol-O-methyltransferase) gene expresses a phase II enzyme which degrades and inactivates catechol-containing compounds such as the catecholamines (dopamine, epinephrine, and norepinephrine), catechol estrogens, and various drugs and substances that have a catechol structure. Magnesium is needed for the reaction.

COMT acts by catalyzing the transfer of a methyl group from S-adenosylmethionine (SAM), resulting in the generation of S-adenosylhomocysteine (SAH). A build-up of SAH inhibits SAM binding and reduces COMT activity.

Genetic variants that decrease the activity of COMT can lead to elevations in 4-hydroxy-estrogens, which have been shown to damage DNA and have carcinogenic potential.

If COMT enzyme is functioning slowly, there is also more potential for the neurotoxic compound dopamine quinone to form, especially in the presence of other reactive oxygen species.

If both COMT and MAOA are functioning slowly, there is more potential for neurotoxic adrenochrome to form.

A faster COMT enzyme may be more protective against the reactive neurotoxic compounds of dopamine quinone and adrenochrome, however higher levels of COMT activity result in the depletion of levels of dopamine and norepinephrine.

Dirty your slow COMT gene

Environment:
- Research shows a noisy sleep environment (near highway, train tracks, airports, city life, college dorms) increases catecholamine levels and workload on the COMT enzyme thereby making this slow COMT even slower.
- Avoid clutter and disorganization (e.g., desk, closet, kitchen, garage).

Notable variation:

A Slow COMT Haplotype

Your COMT haplotype pattern is calculated as SLOW. This is based on a combination of 4 SNPs, which is the best way to determine COMT SNP effects. This combination confers low COMT activity and high pain sensitivity.

In vivo analysis of this combination indicates that this haplotype shows a dramatic reduction in gene expression and activity of this haplotype may increase a tendency to higher levels of dopamine and estrogen catechols. Higher dopamine and estrogen catechols may increase symptoms of anxiety, irritability, difficulty falling asleep, significant PMS, migraines, headaches and increased cardiovascular risk. When this slow haplotype is optimized, it may lead to increased executive function meaning increased focus, drive and enhanced learning (e.g., Type A personality).

Although you were born with this genotypic slow speed for COMT, it does not mean that it functions at a slow speed all the time. In fact, it fluctuates many times a day. Your lifestyle, foods, environment, supplements and medications easily influence COMT to function faster or slower. The key is knowing how your daily choices influence your COMT. Then you can learn to keep it balanced. Read Dirty Genes and take the quizzes to see how your COMT and MAOA are expressing. This haplotype may be further amplified by a slow MAOA and lessened by a fast MAOA.
Plants and Flowers

Place one on the edge of your slide for a custom feel.

Important!
Please alternate slides between plants and blanks.

Dirties your slow COMT gene, continued...

Lifestyle: A fast-paced, high stress lifestyle may be unsuited for this haplotype.

Food:
- GAPPS, Paleo, Carnivore or otherwise high protein diet may exacerbate the effects of this haplotype especially in the evening.
- Any catechol containing foods (e.g., curries, golden milk or chai with turmeric, curcumin) and caffeine drinks (e.g., energy drinks, coffee, green tea) may also exacerbate.
- Caffeine may increase cardiovascular risk susceptibility especially when combined with caffeine-sensitivity variations in ADORA2A (adenosine receptors), ADA (breaks down adenosine), DRD2 (dopamine receptor) and CYP1A2 (breaks down caffeine).

Supplements and Medications: These may exacerbate: tyrosine, EGCG from green tea, inositol, 5-HTP, adrenal cortex, nootropics (e.g., huperzine A, choline, methylfolate, methylcobalamin), stimulants (e.g., Panax ginseng, caffeine), Mucuna pruriens, stimulating ADHD medications (e.g., methamphetamines), birth control and steroids (e.g., cortisol). Many medications interact with this enzyme. Consult your healthcare provider or pharmacist.

Clean your slow COMT gene

Environment:
- Create low stress, safe, nurturing environments and sources of joy. Nature settings may be best.
- Implement KonMari method (Marie Kondo) to organize and create a healing space.
- Feng shui to assist in creating harmony and ease of flow.
- Sleep with airplane mode enabled on phone. Turn off Bluetooth and WiFi. Aim to use wired ethernet versus WiFi.
- Test electrical outlets for dirty electricity and clean up using Greenwave devices.
- Supportive and nurturing parenting techniques are especially important for slow COMT children.

Lifestyle: Use acute and chronic stress management techniques (e.g., breathing meditations, mindfulness); exercise which nourishes (e.g., yoga, hiking in nature, non-competitive team sports, cross country skiing, paddleboarding, walking your dog, gardening).

Food: Start your day with a balanced meal (protein, carbs and fat). Dinner should be lighter protein, higher fat and some carbs as excess protein may disturb sleep. Consider ketogenic diet, intermittent fasting or time-restricted eating.
Supplements and Medications:

- Optimize magnesium and vitamin D.

- Optimize methylation: Be mindful with L-5-MTHF as it is most stimulating for neurotransmission. Folinic acid is a gentler support and often tolerated better for those with a slow COMT. Natural folates from food help to optimize, but not over-stimulate neurotransmitters.

- Lithium orotate 5 mg per day may be supportive along with herbal adaptogens like *Passiflora*, *Eleuthrococcus*, *Withania somnifera* (ashwagandha).

- *Silybum marianum* (milk thistle), Curcumin, DIM (diindolylmethane), calcium-D-glucarate, indole-3-carbinol can indirectly reinforce COMT activity by lowering estrogens, supporting liver or slowing conversion of testosterone to estrogen.

- Consider creatine and phosphatidylcholine as two supplements that support methylation by sparing the utilization of S-adenosylmethionine (SAMe). Choose non-GMO soy or sunflower derived phosphatidylcholine.

- Supporting a slow MAO-A may be supportive as well so consider using riboflavin (B2).

- If combined with other genetic variants which enhance neurotransmission, one must really focus on balancing stress reduction techniques and not just use supplements. It won’t work. -- Be mindful that these supplement recommendations are for those truly experiencing a Slow COMT (as determined by quiz scores in Dirty Genes, your health professional and/or lab testing), not just having a Slow COMT haplotype.
Case Study
Explained with StrateGene®

Use the ‘Histamine Pathway’

Patient History:
• When drinking alcohol, legs tingle in seconds
• Rheumatoid arthritis dx at 17 - (leaky gut)
• Headaches easily and often – mild typically but annoying
• Gut health up and down a lot – alternating good and bad days
StrateGene® v1
using 23andMe or Ancestry
StrateGene® v2
using StrateGene® DNA Kit

Histidine → Folate Pathway

Histamine

Storage

HDC

H2O2, bile, inflammation, infection:
LPS & viral, acute high stress, exercise, lack of sleep

Histamine, EGCG, grapefruit, coffee, quercetin and curcumin

NAT2

Acetylhistamine

(to urine)

MAOA

H2O2, NH4

Imidazole acetaldehyde

DAO

Alcohol, Metformin, Alcohol, Acetaldehyde

Imidazole Acetic Acid

(to urine)

Feedback Inhibition

DAO

ALDH Family

ROS, RNS, aspirin, NSAIDS, oxidized fatty acids, age

N-Methylhistamine

MAOB

H2O2, NH4

N-Methylimidazol acetaldehyde

Feedback Inhibitor to HNMT

ROS, RNS, aspirin, NSAIDS, oxidized fatty acids, age

N-Methylimidazol acetic acid

(to urine)
THE DAO/AOC1 GENE

The DAO (diamine oxidase or amine oxidase aka AOC1) gene expresses an enzyme which catalyzes the degradation of compounds such as histamine and polyamines (putrescine, spermine, and spermidine) to form hydrogen peroxide (H2O2) and ammonia (NH4). Copper (Cu) and calcium (Ca) are cofactors for this reaction.

Histamine metabolized by DAO comes from foods, drinks and bacteria found in the digestive tract.

Polyamines are involved in allergic and immune responses as well as cell proliferation, tissue differentiation, tumor formation, and possibly pre-programmed cell death (apoptosis).

Placental DAO is thought to play a role in healthy pregnancy as high histamine during pregnancy leads to many pregnancy complications. Thus, DAO is a very important gene to keep clean during pregnancy. DAO is feedback inhibited by its end product so be sure the ALDH family of genes is functioning well.

Important Notes:

- The more the DAO enzyme reduces histamine, the more hydrogen peroxide and ammonia are produced. These compounds are quite reactive and may damage the intestinal lining and contribute to numerous problems.

- As with many genes, DAO is heavily influenced by the environment, food and lifestyle. Even if one does not have variants, their DAO gene may be significantly underperforming leading to histamine intolerance.

- Histamine intolerance is extremely common and really impacts one’s quality of life. Be sure to read the DAO chapter in Dirty Genes and take the quiz to see how your DAO is acting in real time.

⚠️ Dirties your DAO/AOC1 gene

Environment: Avoid aldehydes from the environment such as smog, vehicle emissions, smoking (especially secondhand exposures), cooking fumes, formaldehyde from building materials; xenoestrogens. The harder the DAO enzyme need to work in order to detoxify these environmental chemicals, the more ammonia (NH4) and hydrogen peroxide (H2O2) are produced as by-products.

Notable variation:

- **SNP: DAO/AOC1 -691G-T rs2052129 (+/-, GT)**
  This GT variant may exhibit slightly less activity compared to wild type.

- **SNP: DAO/AOC1 47C-T rs10156191 (+/+, TT)**
  This TT variant exhibited approximately 30% less activity compared to wild type.

**Ultimately, what is the SNPs impact on expression?**
Lifestyle: Avoid alcohol, especially red wine and champagne. Alcohol is especially problematic if individuals have inherited either a fast \textit{ADH1B} (not present) or fast \textit{ADH1C} (not present) and/or slow \textit{ALDH2} (present). Work with your healthcare provider to identify and treat intestinal dysbiosis or other infections. Some gastrointestinal tract bacteria are big producers and/or stimulators of histamine as well as the common parasite: \textit{Blastocystis hominis}.

Food: Avoid known food allergies and intolerances, leftovers, histamine liberating foods, non-fresh foods especially fish and meat.

Supplements and Medications:
- Be very mindful of what probiotics you are taking. \textit{Lactobacillus fermentum} and \textit{L. bulgaricus} are known to increase histamine.
- If side effects from the DAO enzyme supplement occur, it may be due to the increased ammonia and hydrogen peroxide produced as reactive metabolites. Consult your healthcare provider or pharmacist.
- Many medications interact with this enzyme. Metformin is known to slow DAO.

Clean your DAO/AOC1 gene

Environment: When traveling in high risk countries, use a quality water filter which removes bacteria and parasites such as \textit{Blastocystis hominis}.

Lifestyle: Healthy digestion with good levels of pancreatic enzymes, bile and stomach hydrochloric acid. Pregnancy increases DAO enzyme as the placenta produces DAO. This is a big reason why some women feel better during pregnancy.

Food:
- Focus on calcium and copper rich foods, and identify lower histamine containing foods and choose them as staples. Typically, the more aged a food or drink is, the more histamine it contains.
- Rinsing meat and meat prior to cooking is not recommended by food safety guidelines and may spread bacteria in the kitchen. However, carefully doing so may wash off histamine produced by bacteria.
- Rinsing lunch deli meats and patting dry prior to assembling sandwich or eating may support reduction in histamine.
- Frying and grilling increases histamine level in meat while stewing/braising/boiling has little influence or even decreases it. These methods may help those histamine-sensitive as compared with frying and grilling.
Distress your DAO/AOC1 gene, continued...

**Lifestyle:** Avoid alcohol, especially red wine and champagne. Alcohol is especially problematic if individuals have inherited either a fast ADH1B (not present) or fast ADH1C (not present) and/or slow ALDH2 (present). Work with your healthcare provider to identify and treat intestinal dysbiosis or other infections. Some gastrointestinal tract bacteria are big producers and/or stimulators of histamine as well as the common parasite: *Blastocystis hominis.*

**Food:** Avoid known food allergies and intolerances, leftovers, histamine liberating foods, non-fresh foods especially fish and meat.

**Supplements and Medications:**
- Be very mindful of what probiotics you are taking. *Lactobacillus fermentum* and *L. bulgaricus* are known to increase histamine.
- If side effects from the DAO enzyme supplement occur, it may be due to the increased ammonia and hydrogen peroxide produced as reactive metabolites. Consult your healthcare provider or pharmacist.
- Many medications interact with this enzyme. Metformin is known to slow DAO.

**Cleans your DAO/AOC1 gene**

**Environment:** When traveling in high risk countries, use a quality water filter which removes bacteria and parasites such as *Blastocystis hominis.*

**Lifestyle:** Healthy digestion with good levels of pancreatic enzymes, bile and stomach hydrochloric acid. Pregnancy increases DAO enzyme as the placenta produces DAO. This is a big reason why some women feel better during pregnancy.

**Food:**
- Focus on calcium and copper rich foods, and identify lower histamine containing foods and choose them as staples. Typically, the more aged a food or drink is, the more histamine it contains.
- Rinsing meat and meat prior to cooking is not recommended by food safety guidelines and may spread bacteria in the kitchen. However, carefully doing so may wash off histamine produced by bacteria.
- Rinsing lunch deli meats and patting dry prior to assembling sandwich or eating may support reduction in histamine.
- Frying and grilling increases histamine level in meat while stewing/braising/boiling has little influence or even decreases it. These methods may help those histamine-sensitive as compared with frying and grilling.
Is StrateGene® DNA Test better than 23andMe or Ancestry?

<table>
<thead>
<tr>
<th></th>
<th>StrateGeneV1.txt</th>
<th>AncestryDNA_v2.txt</th>
<th>23andMe_v3.txt</th>
<th>23andMe_v4.txt</th>
<th>23andme_v5.txt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available</td>
<td>154</td>
<td>110</td>
<td>114</td>
<td>110</td>
<td>92</td>
</tr>
<tr>
<td>Missing</td>
<td>0</td>
<td>44</td>
<td>40</td>
<td>44</td>
<td>62</td>
</tr>
<tr>
<td>Missing %</td>
<td>0%</td>
<td>29%</td>
<td>26%</td>
<td>29%</td>
<td>40%</td>
</tr>
</tbody>
</table>
Prepared For: Nadia

What you’re about to uncover in these upcoming pages is extremely powerful!

You finally have the opportunity to ‘peek under the hood’ and see You.

By discovering your unique genetic makeup using StrateGene®, you’ll learn how you can truly optimize your life.

There is no such thing as a “bad” report, or a “good” report—just unique. You won’t find any ‘red’ or ‘yellow’ colors here that symbolize ‘bad’ or ‘warning’. Instead, you’ll learn that some of your genes naturally work slower and some naturally work faster. It’s important that you know this information so you can adapt. If you don’t know how your genes are built, you’ve no idea how your choices impact you.

You can change the way your genes function by changing your environment, mindset, food, and lifestyle. Your StrateGene® Report helps you make targeted choice after targeted choice which creates the optimal environment for your genes—one choice at a time. The result? You’ll ultimately function at your best—and you’ll know why.

Your journey to the best version of You is about to begin!

To get the most out of your report, we encourage you to have a health professional help you analyze your StrateGene® Report. They will help you implement specific recommendations. It will be more efficient, cost-saving, and rewarding.

Important Disclaimer:

Although this report may provide useful diagnostic information, StrateGene.Me, Dirty Genes LLC, and Seeking Health LLC do not make or suggest any specific diagnosis or therapeutic course of treatment or action. Any such diagnosis and/or treatment plan is strictly a matter between the patient and his or her qualified healthcare professional.

The StrateGeneV1 array is a single-nucleotide polymorphism (SNP)-based assay, used to detect variants for the generation of the StrateGene report. It demonstrates a 99.98% concordance internally and 99.67% concordance with previously validated SNP-based assay.

To best navigate this report, we highly recommend saving and reading it on Acrobat Reader (For PC users) or Preview (For Mac users).

Lab Work Completed Date: 03-09-20 UTC
Specimen Collection Date: 09/23/20 UTC
Kit Type / Kit ID: Spit Tube 5101811556732

Report Date: 09-24-20 19:38:50 UTC
Report Version: StrateGene® Core v1.0 {21.1}
Report ID: Nadia_399824513-002

Go To:
The Super Seven | Histamine | Dopamine | Serotonin | Folate | SAM | Methylation | Glutathione | Biopterin | Advanced Tables | Education
Dirty Genes | Seeking Health
Understanding StrateGene®

Your body is beautiful and extremely complex. Knowing this is key to appreciating how StrateGene® is designed. StrateGene® makes it as simple as possible for you while also honoring the complexity.

Genetic reports featuring fast, easy solutions are the norm. They are ineffective and potentially dangerous. Your body is beautifully complex and so should be your genetic report.

Use StrateGene® Report with Dirty Genes

There are no shortcuts when working with StrateGene®.

Take your time and learn the fundamentals.

We’ve provided you the fundamentals via:

- the book, Dirty Genes,
- the online course, Dirty Genes Course,
- additional videos in the Education area.

Your StrateGene® Report is best understood after reading Parts 1 and 2 of the book, Dirty Genes, and completing the online Dirty Genes Course.

Why? The genetic variations you find within your StrateGene® Report are demonstrating susceptibilities or tendencies. Genetic variations are fixed.

Despite genetic variations being fixed, your genes are not. You are a living, dynamic being. On any given day, or even any given moment, your genes may act ‘fast,’ ‘slow’ or just plain ‘dirty.’ You must understand this concept before approaching your StrateGene® Report. The Dirty Genes book and online course help you understand these concepts very well.
Amplify the Usefulness of your StrateGene Report

GET STARTED
Quick Start Guide
Download PDF

GET STARTED
How to Understand Your StrateGene® Report
Download PDF

GET STARTED
Dirty Genes Course
In the Dirty Genes course, Dr. Lynch will share the key wisdom from his many years of studying, teaching, experimenting and helping people resolve their exceptionally complex medical problems. Air, Food, Water, Shelter, Mindset and Nutrition are all at the heart of genetic expression and are covered in the course.
10 LESSONS (4 HRS 39 MINS)
StrateGene®
WHOLESALE
PRICING

$250 per Kit*
MSRP: $295

*StrateGene® cannot be sold to New York residents or international customers at this time due to legal restrictions.
You will receive:

- 1 StrateGene® DNA Kit (Collection Options: Saliva or Cheek Swab)
- 1 physical copy of Dirty Genes book
- All the digital bonuses

Client/Patient Bonuses:
- StrateGene® Core Report (updated pathways)
- The ABC's of Clean Genes (eBook)
- Dirty Genes Course (10 videos)
- Dirty Genes Summit (2 interviews)
- Access to members-only Facebook group for support
- Online Education Portal (tons of bonus materials)

Wholesale Bonuses:
- Ability to view your client’s data & reports online
- The ABC’s of Clean Genes (eBook)
- Dirty Genes Course (10 videos)
- Dirty Genes Summit (2 interviews)
- StrateGene® Pathway Planner (5 case studies)
- Pathway Planner workshops (2+ hours)
- Dirty Genes Consults (GST & DAO)
- Online Education Portal (tons of bonus materials)
- Access to members-only Facebook group for support
Stop Guessing.

Get Awesome Outcomes.

Optimize your Patient’s Life.
Optimize your Clinic.

Order StrateGene® Kits for Your Office Now!

Get StrateGene® Here

Questions? Call (800) 547-9812

“I use StrateGene® to cut through all the noise and identify the key genes that provide actionable insights about nutrition. No other report is as useful, as streamlined, or as easy to work with. I use it in my consulting practice, incorporate it into my system for managing nutritional status, and recommend it to anyone who asks me for advice about how to analyze their genome.”

— Chris Masterjohn, Ph.D.