**KEY ASPECTS OF YOUR VARIANT ALLELE**

VARIOUS STUDIES ON CHILDREN AND ADULTS SUGGEST THAT INDIVIDUALS WITH THIS VARIANT ALLELE ARE MORE LIKELY TO EXPERIENCE:

- Weight gain when consuming a high carbohydrate diet
- Larger fat cells and higher amounts of fat mass
- Longer timeframe to achieve weight loss results due to a lower level of fat burn after exercise
- Increased insulin levels and higher BMI

**SCIENCE:**

ADRB2, also known as the Beta-2 adrenergic receptor, is a gene found on chromosome 5 that codes for a receptor located on cells of various tissues including liver and fat. A growing body of research suggests that mutations in the ADRB2 gene that code for this receptor may be important risk factors for the development of obesity, and may affect how an individual’s weight changes in response to exercise, or a carbohydrate rich diet.

Additional work provided evidence about how the ADRB2 variant impacts weight reduction. This study found that obese women who were homozygous carriers of the risk allele had significantly lower rates of fat metabolism during recovery after a workout compared to obese participants who did not have a risk allele. Collectively these findings suggest that although exercise is beneficial to all populations, women with the ADRB2 risk allele may not respond as effectively to exercise based weight loss programs as women who do not carry this allele.

Another study discovered that women who have the ADRB2 risk allele could benefit more from a diet with a lower level of carbohydrates to reduce weight gain and prevent insulin resistance.

**STEPS TOWARD WEIGHT MANAGEMENT SUCCESS**

**LIFESTYLE**

- Sleep hygiene
- Mindful eating habits
- Exercise and movement
- Stress management & Meditation
- Central Nervous System
- Vagal Nerve Modulation

**DIET RECOMMENDATIONS**

- Avoid fructose
- Low carb diet
- Polyunsaturated fats in diet
- *Withania Somnifera*
- Incorporate green tea
- Incorporate curcumin in diet
- Incorporate flavonoids in diet
- Incorporate probiotics
ADRB2 GENE VARIANT

LIFESTYLE RECOMMENDATIONS

SLEEP

- **Sleep hygiene.** Sleep is important in regulating hormones in the body, especially leptin, which is increased at night and regulated by eating habits. Research suggests that sleep debt is associated with low leptin levels, and risk of obesity increases for those that sleep less than 6 hours per night.5,7

MINDFUL-BASED

- **Chew your food.** Chewing food can decrease hunger and improve satiety. Chewing your food also improves digestion of proteins, which increases absorption of amino acids in the colon. Chewing is important to release lingual lipase in order to absorb free fatty acids.8,9
- **Chewing** your food and changing the choices you make about food can be viewed as mindful-based, and research demonstrates its usefulness and efficacy in weight loss.10

EXERCISE

- **Regular exercise is important for how your body uses carbohydrates.** ADRB2 variant allele carriers can exercise at a lower intensity (50 to 70% intensity, or light effort) such as brisk walking.11
- **Starting a new exercise program may take time.** Start at 20 minutes of exercise daily and work your way up to 60 minutes daily most days of the week. The more exercise you engage in the better results.11
- **Perceived Level of Exertion “Feels Like” Light to Moderate.** Aim for 50 to 70% intensity to build fitness levels and achieve weight loss.
- **Be Patient.** As you improve your eating habits and increase your physical activity, know that results may take a little longer to achieve because of a reduced response to physical activity.12

LIFESTYLE

- **The adrenal glands produce catecholamines in response to stress.** While ADRB2 allele carriers show resistance to stress and catecholamine induced lipolysis, it is possible to alter or modulate the stress response, and subsequent adrenal response and production of catecholamines by stress management.16
- **Research demonstrates a clear relationship between obesity and adipocyte cortisol, thus it is important to manage stress and cortisol levels.** 17

MEDITATION

- **Meditation has shown to modulate activity in the brain associated with emotional self-regulation and attention, and decreasing the amygdala activity in the brain associated with stress response.** Stress management is important in maintaining energy homeostasis and weight. 18
- **Meditation has demonstrated useful in weight management.**19,20
- **Meditation(s) can vary in duration, from 5 minutes to 20 minutes.** Start with a meditation that is convenient for your lifestyle.

NERVOUS SYSTEM

- **Central Nervous System & Vagal Nerve Modulation:** The vagus nerve is a neuronal pathway between the brain and the gastrointestinal system, and regulates energy expenditure via hypothalamic peptides and gastrointestinal hormones.
- **Additionally, the vagal nerve is important in the regulation of insulin sensitivity and secretion, and is altered by increased sympathetic tone.**21-23
**ADRB2 GENE VARIANT**

---

**SPECIFIC DIET RECOMMENDATIONS**

**AVOID FRUCTOSE**

- Avoid excess sugar, specifically fructose (high-fructose corn syrup). Fructose causes energy (ATP) depletion and redirects energy to be stored as fat. Most cells cannot use fructose as an energy source. The brain does not detect it as a fuel source resulting in a dysregulation of the hunger response to increased blood fructose levels. Ghrelin, leptin, and insulin do not stimulate, or suppress appropriate signals with fructose ingestion as compared to ingestion of glucose.

- **Diets high in fructose can result in leptin resistance and increased motivation to eat foods for reward.** Avoid foods that are rich in fructose such as soft drinks, agave nectar, and other highly processed foods.¹⁴⁻²⁶

**Withania Sominfera**

- **Withania sominfera** has demonstrated to be useful in the management of stress and cortisol levels in individuals experiencing chronic stress and anxiety. Effects of the herb include improved regulation of blood glucose and lipid levels.³²,³³

**GREEN TEA**

- **Research demonstrates consumption of Green Tea** daily for 12 weeks can decrease abdominal fat.³⁴

- Additionally, green tea may influence the regulation weight. Incorporating green tea can be achieved by drinking green tea daily or through dietary supplementation.³⁵

**CURCUMIN**

- **Incorporate curcumin (Tumeric) into diet.** Curcumin can improve leptin resistance by down regulation of TNFa and NFkB pathways, and prevent and suppress adiposity tissue growth.³⁶,³⁷

- **NFkB modulates both leptin and insulin via genetic activation in the hypothalamus.**³⁸ Curcumin can be easily incorporated through dietary supplementation.

**FLAVONOIDs**

- **Incorporate flavonoid rich food, which improves insulin levels and sensitivity.** Foods that are high in flavonoids include onions, apples, kale, nuts, and seeds.³⁹⁻⁴⁰

**POLYUNSATURATED FATS**

- **Incorporate polyunsaturated fats, such EPA and DHA in diet.** These fats will help stabilize leptin and insulin sensitivity and secretion, and may modulate epigenetic markers. Foods that are high in polyunsaturated fats include vegetable oils, fish oil, and seed oils.²⁹⁻³¹

**PROBIOTICS**

- The probiotic, *Lactobacillus gasseri*, may influence the regulation of abdominal fat mass and assist in weight loss.⁴¹
KEY ASPECTS OF YOUR VARIANT ALLELE

VARIOUS STUDIES ON CHILDREN AND ADULTS SUGGEST THAT INDIVIDUALS WITH THIS VARIANT ALLELE ARE MORE LIKELY TO EXPERIENCE:

- Increased ability for the body to produce and store fat
- Higher fasting plasma glucose and lipid concentrations
- Potential of developing insulin resistance
- Greater possible risk of developing cardiovascular disease and diabetes
- Resistance to weight loss by traditional aerobic exercise from compromised resting metabolic rate

SCIENCE:

FABP2, also known as fatty acid binding protein, is a gene found on chromosome 4 that codes for an intracellular protein. The FABP2 protein helps in fat transportation and absorption. Specifically, the FABP2 protein mobilizes fat from the small intestine into circulation for downstream deposit and storage in fat cells and the liver. Excess fat deposition in the liver can be harmful to overall health through its effect on insulin resistance.

Your genetic profile shows that you are a carrier of the variant allele for the FABP2 gene. This variation leads to an altered FABP2 protein, leading to increased absorption and transportation of fats in the body. The key to successful weight loss and health management in FABP2 variant allele carriers is to control the amount and types of fat consumed. Choosing the right types of fats may improve insulin sensitivity in FABP2 variant allele carriers.

STEPS TOWARD WEIGHT MANAGEMENT SUCCESS

LIFESTYLE

- Sleep hygiene
- Mindful eating habits
- Exercise & movement
- Stress management & Meditation
- Central Nervous System
- Vagal Nerve Modulation

DIET RECOMMENDATIONS

- Avoid fructose
- Incorporate curcumin in diet
- High fiber diet
- Incorporate EPA & DHA oils in diet
- Promote CCK production
- Incorporate coffee & green tea
- Incorporate probiotics
**LIFESTYLE RECOMMENDATIONS**

### SLEEP
- **Sleep hygiene.** Sleep is important in regulating hormones in the body, especially leptin, which is increased at night and regulated by eating habits. Research suggests that sleep debt is associated with low leptin levels, and risk of obesity increases for those that sleep less than 6 hours per night.\(^{10-12}\)

### MINDFUL-BASED
- **Chew your food.** Chewing food can decrease hunger and improve satiety. Chewing your food also **improves digestion of proteins,** which increases absorption of amino acids in the colon. Chewing is important to release lingual lipase in order to absorb free fatty acids.\(^{13,14}\)
- **Chewing your food and changing the choices you make about food can be viewed as mindful-based,** and research demonstrates its usefulness and efficacy in weight loss.\(^{15}\)

### EXERCISE
- **Exercise before your biggest meal of the day.** By exercising on an empty stomach before your largest meal, you can improve fat removal both during and after the meal. This causes less fat deposits in fat cells, and more fat used for energy.\(^{16}\)
- **Exercising at a lower intensity helps the body to preferentially burn fat over carbohydrates for better weight loss.**\(^{17}\) Because FABP2 variant allele carriers have a higher tendency for fat uptake and delivery, it is important to tap into these stores for energy.
- **Incorporate resistance training into exercise routine.** Research suggests resistance training is more effective than aerobic exercise in reducing post meal consumption blood fat concentrations in risk allele carriers.\(^{18}\)
- **Perceived Level of Exertion: “Feels like” light to moderate effort.** An effort similar to a brisk walk (50 to 70 percent of maximum heart rate) for the majority of your workout.

### LIFESTYLE
- **Habitual exercise** over 12 weeks, with dietary interventions, can influence lipid profiles in overweight and sedentary populations with stable coronary artery disease. Specifically, **aerobic exercise may improve abdominal adiposity and metabolic markers in FABP2 genotypes.**\(^{19,20}\)

### MEDITATION
- **Meditation has shown to modulate activity in the brain associated with emotional self-regulation and attention, and decreasing the amygdala activity in the brain associated with stress response. Stress management** is important in maintaining energy homeostasis and weight.\(^{21}\)
- **Meditation has demonstrated useful in weight management.**\(^{22,23}\)
- **Meditation(s) can vary in duration, from 5 minutes to 20 minutes.** Start with a meditation that is convenient for your lifestyle.

---

**FABP2 GENE VARIANT**
**AVOID FRUCTOSE**
- Avoid excess sugar, specifically fructose (high-fructose corn syrup). Fructose causes energy (ATP) depletion and redirects energy to be stored as fat. Most cells cannot use fructose as an energy source. The brain does not detect it as a fuel source resulting in a dysregulation of the hunger response to increased blood fructose levels. Ghrelin, leptin, and insulin do not stimulate, or suppress appropriate signals with fructose ingestion as compared to ingestion of glucose.
- **Diets high in fructose can result in leptin resistance and increased motivation to eat foods for reward.** Avoid foods that are rich in fructose such as soft drinks, agave nectar, and other highly processed foods.\(^{28-30}\)

**PROMOTE CCK**
- **Decreased plasma levels of the enteroendocrine hormone, peptide YY (PYY), is associated with insulin resistance.**\(^{37}\) **Increasing the production of PYY, which can be achieved by stimulating gastric acid and CCK in the stomach results in decreased appetite and decreased expression of FABP2 in the small intestine.**
- **Promoting the gastrointestinal hormone cholecystokinin (CCK) can be achieved with specific foods that improve satiation.**
  - These foods can be eaten at the start of a meal, and include greens with olive oil and walnuts.\(^{38,39}\) Certain amino acids such as tyrosine and tryptophan, also promote the production of CCK.\(^{40}\)
  - Additionally, some fermented foods, such as pickles or capers, may assist in the production of CCK to improve satiation and limit the total amount of food consumed at a meal.

**RECOMMEND: Low fat diet**
- **Keep fat intake low.** FABP2 variants have increased absorption of fats, so decreasing intake through your diet is important.
- **Eat mainly monounsaturated fats.** Excess fat in the liver leads to high levels of insulin and glucose in the bloodstream which can lead to weight gain, insulin resistance, metabolic syndrome, and eventually diabetes.\(^{7}\) By substituting monounsaturated fats for saturated fats your body generates less free fatty acids which can negatively affect your insulin and glucose levels.\(^{2}\) Examples: olive oil, nuts – particularly almonds or cashews, avocados.
- **Control carbohydrate intake.** FABP2 variant allele carriers have a tendency towards higher insulin levels.\(^{31}\) By controlling fat and carbohydrate intake you can reduce this trend.
- **Aim for 25 grams or more of fiber each day.** Fiber is very important for FABP2 variant allele carriers through its action on stabilizing blood sugar levels, insulin, and blood lipid levels.\(^{32}\)
- **Choose complex carbohydrates.** Complex carbohydrates like whole grains, fruits, and vegetables have a higher amount of fiber.\(^{33}\) This is important for controlling hunger, insulin levels, and fat in the bloodstream.\(^{32}\)

**GREEN TEA**
- **Coffee, caffeinated and decaffeinated, and green tea may suppress weight gain and fat accumulation from high-fat diets.**\(^{41,42}\)
- The mechanism of inhibition may be attributed to the regulation of PPARγ, which is a receptor found in fat tissue responsible for regulating energy homeostasis, and is activated by over-expression of FABP2.\(^{42}\) **Research demonstrates consumption of Green Tea daily for 12 weeks can decrease abdominal fat.**\(^{43}\)

**CURCUMIN**
- **Curcumin and its active constituent, curcuminoids, improve cholesterol and lipids while altering fatty acid metabolism. Specifically, it alters PPARγ activation and TNFa, which regulates the gene expression of FABP in the liver and intestinal tissues.**\(^{44-46}\)
- **Incorporate curcumin (Tumeric) into diet.** Curcumin can improve leptin resistance by down regulation of TNFα and NfκB pathways, and prevent and suppress adiposity tissue growth.\(^{47-49}\)
- **NfκB modulates both leptin and insulin via genetic activation in the hypothalamus.** Curcumin can be easily incorporated through dietary supplementation.
KEY ASPECTS OF YOUR VARIANT ALLELE

VARIOUS STUDIES ON CHILDREN AND ADULTS SUGGEST THAT INDIVIDUALS WITH THIS VARIANT ALLELE ARE MORE LIKELY TO EXPERIENCE:

- An increase in hunger due to leptin resistance \(^1\)\(^-\)\(^3\)
- Overeating calorie dense food groups \(^4\)
- Weight gain from diets high in fats, particularly saturated fats \(^5\)
- Eating larger than normal portions \(^4\)
- Increased chance for insulin and leptin resistance \(^6\),\(^7\)

SCIENCE:

SH2B1, also known as SH2B adapter protein 1, refers to a gene found on chromosome 16 and the protein that the gene produces. The SH2B1 non-variant protein helps maintain the balance of insulin and leptin in your body. \(^1\)\(^-\)\(^3\) Insulin helps to control blood sugar levels and is strongly influenced by fat and carbohydrates in your diet. \(^8\),\(^9\) Most people know insulin as the hormone involved in diabetes. Diabetic patients either do not make enough insulin or do not respond appropriately to the hormone. The leptin hormone may not be as well known, but it is key in controlling hunger and, like insulin, the body can respond inappropriately to inadequate levels. \(^10\)

Your genetic profile indicates that you carry a version of the gene that has changed the SH2B1 adapter to have a reduced response to insulin and leptin. This variation means you may experience weight gain from the loss of the body’s natural response to insulin and leptin. The key to successful weight loss and health management in SH2B1 variant allele carriers is to control the fat and carbohydrates ingested, to eat more frequently (reducing the stress on the insulin system), and to exercise regularly to improve leptin signaling. \(^5\),\(^11\),\(^12\)

STEPS TOWARD WEIGHT MANAGEMENT SUCCESS

LIFESTYLE

- Sleep hygiene
- Mindful eating habits
- Exercise and movement
- Stress management & Meditation
- Central Nervous System
- Vagal Nerve Modulation

DIET RECOMMENDATIONS

- Avoid fructose
- Low carb diet
- Frequent meals
- Incorporate cinnamon in diet
- Incorporate green tea
- Incorporate curcumin in diet
- Incorporate flavonoids in diet
- Incorporate psyllium husk in diet
LIFESTYLE RECOMMENDATIONS

SLEEP

- **Sleep hygiene.** Sleep is important in regulating hormones in the body, especially leptin, which is increased at night and regulated by eating habits. Research suggests that sleep debt is associated with low leptin levels, and risk of obesity increases for those that sleep less than 6 hours per night.¹³⁻¹⁵

MINDFUL-BASED

- **Chew your food.** Chewing food can decrease hunger and improve satiety. Chewing your food also improves digestion of proteins, which increases absorption of amino acids in the colon. Chewing is important to release lingual lipase in order to absorb free fatty acids.¹⁶⁻¹⁷
- **Chewing your food and changing the choices you make about food can be viewed as mindful-based,** and research demonstrates its usefulness and efficacy in weight loss.¹⁸

EXERCISE

- **Exercise 30 to 60 minutes at a moderate intensity each day.** Frequent, moderate intensity exercise helps to keep insulin and leptin levels balanced to reduce weight gain and to control hunger.¹⁹⁻²¹
- **Perceived Level of Exertion: “Feels like” moderate effort.** Exercise at a moderate intensity (60 to 80 percent of maximum heart rate) for the majority of your workout.

LIFESTYLE

- **SH2B1 protein is distributed throughout the peripheral tissues and within the central nervous system.** Hormones and dietary signals regulate the expression of SH2B1 in peripheral tissues and the brain.²²

MEDITATION

- **Meditation has shown to modulate activity in the brain associated with emotional self-regulation and attention, and decreasing the amygdala activity in the brain associated with stress response. Stress management is important in maintaining energy homeostasis and weight.**²³
- **Meditation has demonstrated useful in weight management.²⁴⁻²⁵**
- **The hypothalamus is located in the central nervous system, where SH2B1 signaling proteins are expressed, which suggests that the central nervous system is important in weight regulation and management in these allele carriers.²²**
- **Meditation(s) can vary in duration, from 5 minutes to 20 minutes. Start with a meditation that is convenient for your lifestyle.**

NERVOUS SYSTEM

- **Central Nervous System & Vagal Nerve Modulation:** The vagus nerve is a neuronal pathway between the brain and the gastrointestinal system, and regulates energy expenditure via hypothalamic peptides and gastrointestinal hormones.
- **Additionally, the vagal nerve is important in the regulation of insulin sensitivity and secretion, and is altered by increased sympathetic tone.²⁶⁻²⁸**
SPECIFIC DIET RECOMMENDATIONS

AVOID FRUCTOSE

- Avoid excess sugar, specifically fructose (high-fructose corn syrup). Fructose causes energy (ATP) depletion and redirects energy to be stored as fat. Most cells cannot use fructose as an energy source. The brain does not detect it as a fuel source resulting in a dysregulation of the hunger response to increased blood fructose levels. Ghrelin, leptin, and insulin do not stimulate, or suppress appropriate signals with fructose ingestion as compared to ingestion of glucose.
- Diets high in fructose can result in leptin resistance and increased motivation to eat foods for reward. Avoid foods that are rich in fructose such as soft drinks, agave nectar, and other highly processed foods.29-31

RECOMMEND: Low-glycemic diet

- Eat Low-Glycemic Carbohydrates. The Glycemic Index measures the elevation in blood glucose caused by carbohydrates in the body. This glucose elevation is followed by a proportional insulin secretion; the higher the glucose levels the more insulin your body produces.32 The goal in SH2B1 variant allele carriers is to keep leptin and insulin levels low for improved weight loss success.33-36
  - Ideal: carbohydrates with a glycemic index less than 55.
  - Acceptable in moderation: carbohydrates with a glycemic index of 55 to 70.
  - Avoid as much as possible: carbohydrates with a glycemic index greater than 70.

- Eat a low fat diet. Controlling fat intake in the diet helps to maintain an appropriate insulin level.8 Choose monounsaturated fats over saturated fats to reduce the burden on the liver.
- Eat a high-fiber diet. A high-fiber diet helps you feel full, and aids in maintaining insulin and glucose levels in the blood.37 Aim for 25 to 30 grams of fiber each day.
- Eat fiber and protein at every meal. By eating fiber and protein at each meal, you help control hunger and improve insulin response. Choose lean proteins like poultry and fish to reduce saturated fat and polyunsaturated fat intake.

FREQUENT MEALS

- Eat at least five small meals a day. Eating smaller, more frequent meals helps to control hunger and to improve how much insulin is released to help digest the meal.11,38

CINNAMON

- Cinnamon appears to be effective in reducing HbA1c in patients with type 2 diabetes and improving glucose control. Research has demonstrated the use of cinnamon in the regulation of insulin sensitivity, and lipid metabolism.39,40

GREEN TEA

- Research demonstrates consumption of Green Tea daily for 12 weeks can decrease abdominal fat.41
- Additionally, green tea may influence the regulation weight. Incorporating green tea can be achieved by drinking green tea daily or through dietary supplementation.42

CURCUMIN

- Incorporate curcumin (Tumeric) into diet. Curcumin can improve leptin resistance by down regulation of TNFa and NFkB pathways, and prevent and suppress adiposity tissue growth.43,44
- NFkB modulates both leptin and insulin via genetic activation in the hypothalamus.45 Curcumin can be easily incorporated through dietary supplementation.

FLAVONOIDs

- Incorporate flavonoid rich food, which improves insulin levels and sensitivity. Foods that are high in flavonoids include onions, apples, kale, nuts, and seeds.46,47

PSYLLIUM HUSK

- Increase fiber in the diet to decrease the production of large chylomicrons following meals. Psyllium husk is a great option for supplemental fiber, which improves lipid profiles and glucose tolerance.48
# SALIVA TEST REPORT

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</tr>
<tr>
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## YOUR RESULTS AT A GLANCE

### Estradiol (pg/mL)

- **< 0.6**
- **0.6 - 3.1**
- **> 3.1**

### Progesterone (pg/mL)

- **< 1.1**
- **< 9**
- **9 - 126**
- **> 126**

### Pg/ E2 Ratio

- **NA**
- **< 100**
- **100 - 500**
- **> 500**

### Testosterone (pg/mL)

- **< 10**
- **10 - 61**
- **> 61**

### DHEA (pg/mL)

- **< 34**
- **34 - 496**
- **> 496**

#### Your Steroid Hormones

- **Your Progesterone is low.**

#### Your Adrenals

- **Your DHEA is normal.**

- **Your Cortisol is normal through the day.**

---

**Cortisol**

- **Low**
- **High**
- **Your Levels**

---

### Time of Day (Hours)

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**Ayumetrix, LLC**

6655 SW Hampton St. Suite 110B

Portland, OR 97223 Ph: (503)344-1344; 800-215-8898

Sonia Kapur, PhD, HCLD

Laboratory Director
Steroid Hormone Tests (Saliva)

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<td>Testosterone</td>
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<td>Cortisol Night</td>
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*Only when Estradiol is within normal premenopausal range

Symptom Summary

The following figures explain the summary of indicated symptoms and how problematic is the patient’s condition based on their symptoms. A few common conditions due to hormone imbalance have been shown below. The green, yellow and red zones represent the degree of complexity in a specific symptom category and provide the health care provider and their patient some idea about the possible cause of hormone imbalance.
What do your hormone results mean?

**ESTRADIOL**
Estradiol acts mainly as a growth hormone for the reproductive structures in females. In addition, estradiol works in conjunction with progesterone during the menstrual cycle and pregnancy. Low estrogen levels can cause low libido or diminished sex drive and too much estrogens can cause symptoms of estrogen dominance. In males, estradiol is involved in sperm maturation and also helps to maintain a healthy libido.

Estradiol has a significant role in maintaining healthy bone growth and improving blood flow in coronary arteries in addition to offering neuroprotective effects. Estrogens have been known to contribute to risk of breast cancer as well as some non-cancerous conditions like endometriosis and uterine fibroids.

Your estradiol levels are within the expected normal range.

**PROGESTERONE**
Progesterone in females is known to be involved in maintaining normal menstrual cycles and early stages of pregnancy. Low levels of progesterone can cause abnormal cycles or conception problems. Low progesterone levels could also result in higher estrogen levels, which has been known to decrease sex drive and cause weight gain. High progesterone levels have been known to be responsible for symptoms like mood swings, bloating, breast tenderness.

In men, progesterone acts as a precursor to testosterone. As men age, the testosterone levels decrease, the estradiol increases, and progesterone levels decline. Low progesterone levels in men can cause problems like weight gain, low sex drive, hair loss, depression or erectile dysfunction.

Your progesterone levels are lower than the expected normal range. Low progesterone levels with normal estradiol levels could result in symptoms of estrogen dominance by causing a shift in the Pg/E2 ratio. This is consistent with your symptoms such as fibrocystic breasts, low libido. Estrogen dominance could contribute to thyroid issues, which are consistent with the symptoms of overall fatigue and less stamina indicated in your requisition form. It is worthwhile to discuss natural progesterone therapy with your healthcare provider.

**TESTOSTERONE**
Testosterone has an important role in maintaining bone strength, muscle mass and energy level. In women, testosterone contributes to sex drive or libido. Menopause causes significant decline in the testosterone levels. In men, testosterone is responsible for growth and development of sexual characteristics, facial and body hair, increased sexual drive and sperm production.

Low testosterone levels can result in conditions like hair loss, reduced muscle mass, hot flashes, depression and increased breast size. High testosterone levels have been linked with aggressive behavior, acne, low sperm count, liver disease and heart muscle damage.

Your testosterone levels are within the expected normal range.

**DHEA**
DHEA is produced by the adrenal glands and is a precursor to both testosterone and estrogens. DHEA is also a neurohormone as small quantities are produced in the brain. It has a broad spectrum of benefits including improved energy, mood, memory, increased testosterone levels, enhanced libido and immune function. In men, low DHEA levels can cause low libido, reduced muscle mass and strength, depression, fatigue and compromised immune function. In women, DHEA is known to balance other hormones like estrogens, progesterone and testosterone. Low DHEA levels can cause weight gain, depression, fatigue and low libido.

Your DHEA is within the expected normal range.

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CORTISOL
In addition to being called as “the stress hormone”, cortisol helps in proper glucose metabolism, converting sugars into energy. High cortisol levels in men have been associated with hyperglycemia, weight gain, compromised immune function and high blood pressure. Cortisol imbalance is known to result in conditions like irritability, fatigue, depression, foggy thinking, weight gain and bone loss. Stress reducing activities including meditation and breathing exercise have been recommended to relieve stress levels and avoid premature aging.

Your morning cortisol levels are within the expected normal range but suboptimal, and normal levels throughout the remainder of the day. Suboptimal cortisol levels during the day contribute to many of the indicated symptoms including fatigue, anxiety and increased sense of worry and decreased stamina.

Good sleep, mild exercise, meditation, adequate nutrition (protein), adrenal extracts, nutritional and herbal supplements (vitamins C, B5, ginseng, licorice root etc.) are some of the natural ways to boost adrenal function. Use of products that boost adrenal function should be discussed with a qualified health care provider.

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## AYUMETRIX Saliva Reference Ranges

<table>
<thead>
<tr>
<th>TEST</th>
<th>WOMEN</th>
<th>MEN</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Estradiol (pg/mL)</strong></td>
<td>Premenopausal – Luteal</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td>1.2-6.5</td>
<td>0.6-3.1</td>
</tr>
<tr>
<td></td>
<td>Premenopausal – Follicular</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td>0.6-3.1</td>
<td>0.6-3.1</td>
</tr>
<tr>
<td></td>
<td>Postmenopausal</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td>0.6-3.1</td>
<td>0.6-3.1</td>
</tr>
<tr>
<td></td>
<td>Estrogen Replacement</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td>1.2-17.8</td>
<td>0.6-3.1</td>
</tr>
<tr>
<td></td>
<td>Synthetic HRT, Contraceptives</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td>0.6-3.1</td>
<td>0.6-3.1</td>
</tr>
<tr>
<td><strong>Progesterone (pg/mL)</strong></td>
<td>Premenopausal – Luteal</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td>99-333</td>
<td>9-126</td>
</tr>
<tr>
<td></td>
<td>Premenopausal – Follicular</td>
<td>All</td>
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<td></td>
<td>9-126</td>
<td>9-126</td>
</tr>
<tr>
<td></td>
<td>Postmenopausal</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td>Topical, Troche, Vaginal (20-60 mg)</td>
<td>196-3304</td>
</tr>
<tr>
<td></td>
<td>Oral</td>
<td>35-400</td>
</tr>
<tr>
<td></td>
<td>Synthetic HRT, Contraceptives</td>
<td>9-75</td>
</tr>
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<td><strong>Testosterone (pg/mL)</strong></td>
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<td>All</td>
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<td>10-61</td>
<td>49-185</td>
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<tr>
<td></td>
<td>Topical</td>
<td>118-3950</td>
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<tr>
<td><strong>DHEA (pg/mL)</strong></td>
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<td>All</td>
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<tr>
<td></td>
<td>34-496</td>
<td>42-578</td>
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<tr>
<td><strong>Cortisol (ng/mL)</strong></td>
<td>Morning</td>
<td>Morning</td>
</tr>
<tr>
<td></td>
<td>1.5-9.6</td>
<td>1.5-9.6</td>
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<td></td>
<td>Noon</td>
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<td>0.6-4.1</td>
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<td></td>
<td>Evening</td>
<td>Evening</td>
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<td></td>
<td>0.2-2.3</td>
<td>0.2-2.3</td>
</tr>
<tr>
<td></td>
<td>Night</td>
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</tr>
<tr>
<td></td>
<td>0.1-1.8</td>
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</tr>
</tbody>
</table>
THYROID TEST REPORT

Patient
Jane Doe

DOB
11/22/1973 (43 yrs)

Gender
F

Systolic blood pressure
83 mmHg

Menopausal Status
Premenopausal
Irregular cycle
Last cycle on 2/8/2017

Patient ID
NB731122

Report Date and Time
3/10/2017  17:00

Received Date and Time
3/6/2017  11:30

Specimen Collection Date and
Blood Spot  3/1/2017  6:00:00

Hours of Fasting
7

Family History of
Heart Disease  Yes
Diabetes      Yes
Cancer       Yes

Non-smoker
BMI 22.5   Waist 29 in

Medications
 Estradiol Intramuscular 20 mg 1/month/day on 10/16/2016;
           Progesterone Intramuscular 1 mg 1/month/day on 10/16/2016;

See last page for extended list

Provider ID: 0064
Doctor T, MD
1556 Doctor Rd. 14A Ave.
Portland, OR 97062
Ph: 503-xxx-xxxx

YOUR TEST RESULTS

TSH (µIU/mL)

<table>
<thead>
<tr>
<th>Normal Range</th>
<th>High Risk</th>
<th>Your Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 0.5</td>
<td>0.5 - 4.7</td>
<td>&gt; 4.7</td>
</tr>
</tbody>
</table>

fT3 (pg/mL)

<table>
<thead>
<tr>
<th>Normal Range</th>
<th>High Risk</th>
<th>Your Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 2.1</td>
<td>2.1 - 4.2</td>
<td>&gt; 4.2</td>
</tr>
</tbody>
</table>

fT4 (ng/dL)

<table>
<thead>
<tr>
<th>Normal Range</th>
<th>High Risk</th>
<th>Your Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 0.8</td>
<td>0.8 - 2.0</td>
<td>&gt; 2.0</td>
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</tbody>
</table>

a-TPO (IU/mL)

<table>
<thead>
<tr>
<th>Normal Range</th>
<th>High Risk</th>
<th>Your Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 60</td>
<td>≥ 60</td>
<td></td>
</tr>
</tbody>
</table>

Hypothyroidism Risk

This figure explains the summary of indicated symptoms and how problematic is the patient's condition based on their symptoms. The green, yellow and red zones represent the degree of complexity in a specific symptom category and provide the health care provider and their patient some idea about the possible cause of hormone imbalance.

Hypothalamus-Pituitary-Thyroid Axis

Ayumetrix, LLC
CLIA #:38D2112285
6655 SW Hampton St. Suite 110B
Portland, OR 97223 Ph: (503)344-1344; 800-215-8898
Sonia Kapur, PhD, HCLD
Laboratory Director
Patient Name: Jane Doe

<table>
<thead>
<tr>
<th>Thyroid Hormone Tests</th>
<th>3/1/2017</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSH</td>
<td>3.2</td>
<td>0.5 - 4.7 µIU/mL</td>
</tr>
<tr>
<td>fT3</td>
<td>3.0</td>
<td>2.1 - 4.2 pg/mL</td>
</tr>
<tr>
<td>fT4</td>
<td>0.7</td>
<td>0.8 - 2.0 ng/dL</td>
</tr>
<tr>
<td>a-TPO</td>
<td>58</td>
<td>&lt; 60</td>
</tr>
</tbody>
</table>

What do your hormone results mean?

T3 (Triiodothyronine), Free

Normally triiodothyronine (T3) circulates tightly bound to thyroxine-binding globulin and albumin. Only 0.3% of the total T3 is unbound (free); the free fraction is the active form. In hyperthyroidism, both thyroxine (tetraiodothyronine; thyroxine: T4) and T3 levels (total and free) are usually elevated, but in a small subset of hyperthyroid patients (T3 toxicosis) only T3 is elevated.

Your fT3 levels are within the expected normal range.

T4 (Thyroxine), Free

Free thyroxine (FT4) comprises a small fraction of total thyroxine. The FT4 is available to the tissues and is, therefore, the metabolically active fraction. Elevations in FT4 cause hyperthyroidism, while decreases cause hypothyroidism.

Your fT4 levels are lower than the expected normal range, which is consistent with the indicated symptoms of hypothyroidism. As indicated by your other hormone test results, your symptoms are consistent with estrogen dominance and adrenal dysfunction (high cortisol). Both estrogen dominance and high cortisol have been shown to contribute to thyroid deficiency. It is worthwhile to discuss proper hormone balancing strategies with your healthcare provider.

Thyroid-Stimulating Hormone

In primary hypothyroidism, thyroid-stimulating hormone (TSH) levels are elevated. In primary hyperthyroidism, TSH levels are low. The ability to quantitate circulating levels of TSH is important in evaluating thyroid function. It is especially useful in the differential diagnosis of primary (thyroid) from secondary (pituitary) and tertiary (hypothalamus) hypothyroidism. In primary hypothyroidism, TSH levels are significantly elevated, while in secondary and tertiary hypothyroidism, TSH levels are low or normal. Elevated or low TSH in the context of normal free thyroxine is often referred to as subclinical hypo- or hyperthyroidism, respectively.

Your TSH levels are within the expected normal range.

Thyroperoxidase (TPO) Antibodies

Disorders of the thyroid gland are frequently caused by autoimmune mechanisms with the production of autoantibodies. Anti-TPO antibodies activate compliment and are thought to be significantly involved in thyroid dysfunction and the pathogenesis of hypothyroidism.

In patients with subclinical hypothyroidism, the presence of TPO antibodies, predicts a higher risk of developing overt hypothyroidism, 4.3% per year versus 2.1% per year in antibody-negative individuals. Such patients may be at risk of developing other autoimmune diseases, such as adrenal insufficiency and type 1 diabetes.

Your TPO antibodies are within the expected normal range.

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Cont’d Medication list:

- Valerianato de Estradiol Intramuscular 2.5 mg 1/month/day on 2/17/2017, used for 4 Months;
- Testosterone Intramuscular 50 mg 1/month/day on 2/17/2017, used for 4 Months;
### CARDIO HEALTH TEST REPORT

<table>
<thead>
<tr>
<th>Patient Name</th>
<th>Patient ID.</th>
<th>Provider ID:</th>
<th>DOB</th>
<th>Report Date and Time</th>
<th>Received Date and Time</th>
<th>Collection Date and Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jane Doe</td>
<td>JD570428</td>
<td>0045</td>
<td>04/28/1957</td>
<td>07/18/16 10:50 am</td>
<td>07/12/16 6:13 pm</td>
<td>Blood Spot 07/03/16 8:30 am</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender</th>
<th>F</th>
</tr>
</thead>
</table>

| Fasting | Yes |

| Smoker | Yes |

| Systolic Blood Pressure | 130 mm HG |

| Family History of Heart Disease | Yes |

#### YOUR TEST RESULTS

<table>
<thead>
<tr>
<th>hs-CRP (mg/L)</th>
<th>3.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1</td>
<td>1 - 3</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>HbA1c</th>
<th>5.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 5</td>
<td>5 - 6.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Triglycerides (mg/dL)</th>
<th>140</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 100</td>
<td>100 - 150</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cholesterol (mg/dL)</th>
<th>252</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 200</td>
<td>200 - 240</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HDL(mg/dL)</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 60</td>
<td>40 - 60</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LDL(mg/dL)</th>
<th>138</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 126</td>
<td>127 - 160</td>
</tr>
</tbody>
</table>

#### Cardio Health Summary

If you're a smoker with blood pressure of 130 mm/Hg but a family history of heart attack before age 60 (in one or both parents), your risk over the next 10 years is:

- Normal Range
- Elevated Risk
- High Risk
- Previous Results

- Your risk would be lowered to:
  - 6% if your blood pressure were 120 mm/Hg.
  - 5% if you quit smoking.
  - 3% if you reduced your cholesterol to 160 mg/DL.

#### What Now

1. **Diet and Exercise**
   - can improve your cholesterol levels.

2. **Avoid drinking**
   - alcohol, except in moderation: one or two drinks per day.

3. **Ask your doctor**
   - about medications that can lower cholesterol.

4. **Consider retesting**
   - in one to two weeks, in case your CRP level was caused by infection.
What do your test results mean?

**hs-C-Reactive Protein (hs-CRP).** Blood measurements of hs-CRP are often performed to assess the risk of future heart disease. C-Reactive protein (CRP) is produced by the liver and elevated CRP levels can be measured in blood in response to inflammation. High-sensitivity CRP (hs-CRP) is more precise than standard CRP when measuring baseline (ie, normal) concentrations and enables a measure of chronic inflammation. Atherosclerosis is an inflammatory disease and hs-CRP is known as a biomarker of atherosclerotic cardiovascular disease risk.

Your hs-CRP level is higher than the expected normal range. Values >2.0 mg/L suggest an increased likelihood of developing cardiovascular disease or ischemic events.

**Hemoglobin A1c (HbA1c),** is a form of hemoglobin (a blood pigment that carries oxygen) that is bound to glucose. Blood HbA1c levels are reflective of how well diabetes is controlled. The normal range for level for hemoglobin A1c is less than 6%. HbA1c levels are reflective of blood glucose levels over the past six to eight weeks and do not reflect daily ups and downs of blood glucose. High HbA1c levels indicate poorer control of diabetes than levels in the normal range.

Your HbA1c is within the expected normal range.

**Triglycerides.** Increased plasma triglyceride levels are indicative of a metabolic abnormality and, along with elevated cholesterol, are considered a risk factor for atherosclerotic disease. In the presence of other coronary heart disease risk factors, both borderline-high (150-199 mg/dL) and high values (>200 mg/dL) require attention. Triglyceride concentrations >1,000 mg/dL can lead to abdominal pain and may be life-threatening due to chylomicron-induced pancreatitis.

Your triglyceride level is within the expected normal range.

**Total cholesterol** is a measure of the total amount of cholesterol in your blood, including low-density lipoprotein (LDL) cholesterol and high density lipoprotein (HDL) cholesterol

Your total cholesterol is higher than the expected normal range.

**HDL (good) cholesterol** With HDL cholesterol, higher levels are better. Low HDL cholesterol puts you at higher risk for heart disease. People with high blood triglycerides usually also have lower HDL cholesterol. Genetic factors, type 2 diabetes, smoking, being overweight and being sedentary can all result in lower HDL cholesterol.

Your HDL is within the expected normal range.

**LDL (bad) cholesterol** A low LDL cholesterol level is considered good for your heart health. However, your LDL number should no longer be the main factor in guiding treatment to prevent heart attack and stroke, according to new guidelines from the American Heart Association. For patients taking statins, the guidelines say they no longer need to get LDL cholesterol levels down to a specific target number. A diet high in saturated and trans fats raises LDL cholesterol.

Your LDL is within the expected normal range.