CannaGx™

Personalized cannabis user guide

MOLECULAR™ TESTING LABS

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I. WELCOME TO YOUR CANNAGX™ REPORT

02/01/2018

Dear F0098 MOCK:

Congratulations, and welcome to your personalized genetic report! This CannacoGenetics™ report will provide guidance in using cannabis to help with anxiety, pain and insomnia. By understanding how your unique genes influence how your body metabolizes and reacts to cannabis, you will better equipped to maximize your desired health outcomes and minimize cannabis related adverse effects.

Maximize your health by understanding:

- How to manage anxiety if you are at high risk of developing paranoia with cannabis
- Effective approaches to managing pain and the benefits of switching from traditional pain medications to cannabis
- Assess your risk for certain sleep disorders and how to best use cannabis for a more restful sleep
- How cannabis can be used if you are at high risk for addiction
- How cannabis interact with medications and herbal supplements

This report provides general understanding of how your body processes cannabis once it enters your system, as well as the metabolism of endocannabinoids (your body's natural cannabis-like compounds).

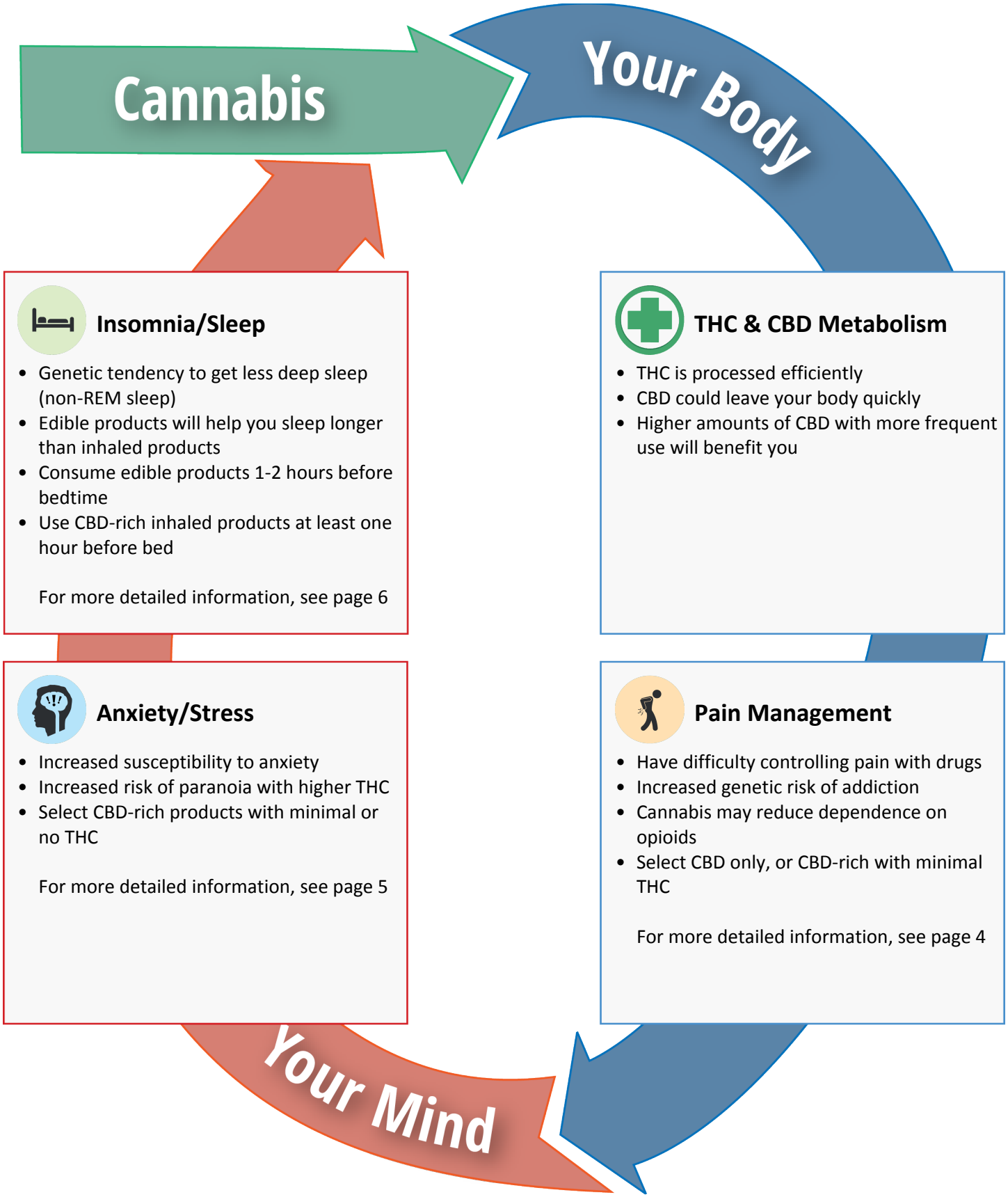
It is important to note your health is dependent on many factors. Your genes, environmental influences and lifestyle choices all contribute to the current state of your body and mind.

The research behind this report is based on the biology of an individual who has never used cannabis or has used it infrequently. Frequent users often develop a tolerance towards cannabinoids, especially THC, therefore the recommendations regarding THC and CBD levels in this report might change for more frequent users of cannabis.

Again, congratulations on caring enough about your health and mind to obtain the CannacoGenetics™ report. Let us know how this report impacts your health and how we can continue to improve our content and help manage these important aspects of your life.

Charles Sailey, M.D., M.S.
Laboratory Director

II. SUMMARY OF HOW YOUR BODY REACTS TO CANNABIS



Insomnia/Sleep

- Genetic tendency to get less deep sleep (non-REM sleep)
- Edible products will help you sleep longer than inhaled products
- Consume edible products 1-2 hours before bedtime
- Use CBD-rich inhaled products at least one hour before bed

For more detailed information, see page 6

THC & CBD Metabolism

- THC is processed efficiently
- CBD could leave your body quickly
- Higher amounts of CBD with more frequent use will benefit you

Anxiety/Stress

- Increased susceptibility to anxiety
- Increased risk of paranoia with higher THC
- Select CBD-rich products with minimal or no THC

For more detailed information, see page 5

Pain Management

- Have difficulty controlling pain with drugs
- Increased genetic risk of addiction
- Cannabis may reduce dependence on opioids
- Select CBD only, or CBD-rich with minimal THC

For more detailed information, see page 4

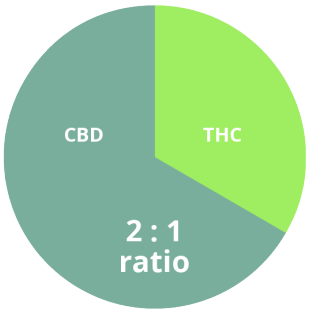
III. SUMMARY OF YOUR PERSONAL PRODUCT SELECTION

Flowers

THC less than 12% (less than 5% THC when treating pain) and CBD greater than 3%, combine with a CBD only flower if greater than 12% is needed. Infrequent users, begin with flowers containing a combined CBD:THC ratio of 2:1 or greater (at least twice as much CBD as THC). For THC containing flowers, start with 1-2 quick puffs and adjust additional inhalations accordingly. You will require more frequent use of CBD products.

Concentrates

CBD only, or combination of CBD and THC with a CBD:THC ratio of 2:1 or greater (at least twice as much CBD as THC). Avoid THC only concentrates if infrequent user. You will require more frequent use of CBD products.



Edibles

Start with 1-2mg of THC (1/3 of a 5 mg serving or 1/6 of a 10 mg serving). Wait at least 1.5 hours before taking second serving of THC product, even if no effects. Infrequent users, begin with products containing a combined CBD:THC ratio of 2:1 or greater (at least twice as much CBD as THC). You will require more frequent use of CBD products.

Topicals

Use lotions, salves, oils, tinctures or sprays infused with CBD and THC. When using transdermal patches, begin with one with a CBD:THC ratio of 1:1 or greater (at least as much CBD as THC). Use extreme caution with THC only transdermal patches as the THC may enter your bloodstream and produce unwanted effects.

IV. DETAILED GUIDANCE BASED ON YOUR GENE PROFILE

Personalized approach to managing: **Pain**

Use high CBD with less than 2% THC for greatest benefit

Your unique gene combination for pain is found in **1 out of 274** people

Your genetic profile indicates insufficient pain control with opiates and an increased risk of developing substance dependence. As a result, you could experience less pain relief and more side effects when using opiates to treat pain. However, using cannabis can reduce the amount of these medications needed, while reducing the risk of opioid addiction. If you are ether inhaling (smoking/vaping) or ingesting (edibles/tinctures), it is recommended to select high CBD products or CBD-rich strains that contain minimal or negligible THC (less than 2%). This will minimize increased pain sensations and reduce your increased risk of developing paranoia with products containing high THC. Products that also contain CBG provide benefits in controlling pain. You may requre more frequent uses of CBD products because you may have faster CBD metabolism. You may use topical products (except transdermal patches) with a CBD to THC ratio of 1:1 or greater (containing at least as much CBD as THC). Caution is advised if you use transdermal patches containing high THC, because you may experience psychoactive effects (the high). Please consult with your healthcare provider before discontinuing any medications.

Look for these strains or a product characteristically very similar:

Name	THC*	CBD*	Other cannabinoids*	Terpenes or aroma*
CBD Critical Cure / Critical Cure	5%	8%	Not reported	Earthy, sweet, pine
CBD Medi Haze	5-13%	9-13%	Not reported	Pine, earthy, spicy herbal
Harlequin	4-7%	8-16%	CBN 0.02%, CBG 0.2-0.9%, THCV 0.5%, CBC 0.04-0.4%	Linalool 0.1%, myrcene 0.2-0.8%, pinene 0.2%, limonene 0.2%, beta-caryophyllene 0.2%
Sweet Sour Widow	6-8%	6-8%	Not reported	Earthy, sweet, woody

*the contents of cannabinoids are listed based on the various database of flowers. Use as an indicator of the generally observed levels.

Look for these terpenes (fragrances):

enhancing relaxation, sedation, muscle relaxant

reduces inflammation, stress relief, helps with depression

pain relief, reduces inflammation, helps with addiction

Personalized approach to managing: **Anxiety/Stress**

Avoid high THC, use higher CBD to enhance benefit

Your unique gene combination for anxiety is found in **1 out of 134** people

Based on your gene results, you could experience excessive effects from THC due to increased risks of anxiety and paranoia with faster metabolism of CBD (reduced exposure of CBD), compared to the general population. Avoid starting with products containing only THC (does not contain any CBD) because these products may produce an uncomfortable, excessive cerebral high for you. Using these products may cause even more anxiety or paranoia because of your enhanced sensitivity to high levels of THC. Consider starting with CBD only products in general. When using a flower containing THC, choose one with high CBD and minimal levels of THC (less than 2%), or one with a CBD:THC ratio of 5:1 or greater (at least five times as much CBD as THC), to counteract psychotropic effects of THC. If you choose a flower with greater than 12% THC, be sure to combine the THC flower with a CBD only flower to counteract psychotropic effects of THC. In the presence of CBD, THC has been shown to reduce social anxiety; however, due to your sensitivity towards THC, you need to start with lower amounts of THC and adjust slowly. Cannabis has also been shown to help individuals with your genetics to reduce anxiety-related symptoms stemming from past traumatic or emotional events. Products containing certain terpenes, including myrcene, pinene and linalool, will help you feel more relaxed.

Look for these strains or a product characteristically very similar:

Name	THC*	CBD*	Other cannabinoids*	Terpenes or aroma*
CBD Medi Haze	5-13%	9-13%	Not reported	Pine, earthy, spicy herbal
CBD OG Kush	5-10%	5-10%	Not reported	Earthy, wood, pine
Critical Mass	18-20%	3-5%	CBN 2%	Sweet, earthy
Harlequin	4-7%	8-16%	CBN 0.02%, CBG 0.2-0.9%, THCV 0.5%, CBC 0.04-0.4%	Linalool 0.1%, myrcene 0.2-0.8%, pinene 0.2%, limonene 0.2%, beta-caryophyllene 0.2%
Sweet Sour Widow	6-8%	6-8%	Not reported	Earthy, sweet, woody

*the contents of cannabinoids are listed based on the various database of flowers. Use as an indicator of the generally observed levels.

Look for these terpenes (fragrances):

enhancing relaxation, sedation, muscle relaxant

enhances relaxation, improves focus, helps with asthma

stress relief, helps with depression, promotes sleep

Personalized approach to managing: **Insomnia/Sleep**

Use high CBD with a CBD:THC ratio of 5:1 or greater

Your unique gene combination for insomnia is found in **1 out of 1548** people

Your genetic profile indicates an increased risk of paranoia with products containing high levels of THC, in addition to the possibility of sleeping problems with instability of non-REM cycle (less deep sleep). Consider CBD only products, or ones with a CBD to THC ratio of at least 5:1 (five times as much CBD as THC). Recommend taking separate products for daytime and nighttime use, each with different terpene profiles. Use energizing terpenes that stimulate wakefulness throughout the day (e.g.; less than 0.3% of myrcene, and pinene). Use terpenes having sedative effects at nighttime (e.g.; greater than 0.5% myrcene, and/or greater than 1% terpinolene). Products also containing CBN may help sleep quality because CBN is known to have sedative effects. Edible products will help you sleep longer, compared to inhaled products. Edible products should be consumed approximately 1-2 hours before bedtime to stabilize deep sleep (non-REM sleep). Inhaled products (smoking/vaping) containing both THC and CBD may be used any time before bed. CBD-rich inhaled products should be consumed at least an hour before going to bed to avoid longer time to fall asleep. Compared to many prescription and over the counter sleep aids, cannabis may help you feel more rested throughout the day with less morning grogginess, while having a minimal risk of memory loss and physical dependence. Get regular exercise, skip naps and keep your mind and body fully awake during the day to prevent sleep problems at night.

Look for these strains or a product characteristically very similar:

Name	THC*	CBD*	Other cannabinoids*	Terpenes or aroma*
Afghan Kush	15-17%	5-6%	CBN 1%	Pinene 0.01%, linalool 0.01%, myrcene 1%, caryophyllene 1.6%, humulene 1.0%, beta-caryophyllene 1.6%, terpineol 0.2%, ox-caryophyllene 0.01%, limonene 0.01%
Critical Mass-CBD	5-10%	5-10%	Not reported	Earthy , pungent, menthol

*the contents of cannabinoids are listed based on the various database of flowers. Use as an indicator of the generally observed levels.

Look for these terpenes (fragrances):

stress relief, helps with depression, promotes sleep

enhancing relaxation, sedation, muscle relaxant

promotes sleep, antimicrobial

V. YOUR DETAILED PRODUCT SELECTION GUIDANCE

Flowers:

The terms, sativa- and indica-dominant strains are used to describe the well-known characteristics of these flowers (uplifting and energizing as sativa effects; relaxing and sedating as indica effects). Although these terms are still utilized at many dispensaries, it is important to know that various effects from a flower are originated from combined effects of terpenes, phytocannabinoids and cannabinoids. The majority of flowers in the US market are hybrid strains. Their unique characteristics are difficult to predict without knowing about the genetic profile and the chemical compositions of the flower.

If you are an infrequent user, consider starting with a flower having a CBD:THC ratio of 2:1 or greater (at least twice as much CBD as THC), because your genetic profile indicates an increased risk of paranoia with fast metabolism of CBD. In general, choose flowers with lower THC (less than 12%), or a flower that also contains at least 3% CBD. If you choose a flower containing greater than 12% THC, you can combine with a CBD-only flower to prevent potential THC side effects. When treating pain, be sure to choose one with low THC (less than 5%) to prevent enhanced pain sensations by THC. Individuals with your genetic profile will have increased benefits from flowers containing the following terpenes (smells): myrcene (cloves), linalool (lavender), and pinene (pine).

Concentrates (oil extracts, tincture):

Concentrates include cartridges for vaping and ingestible tinctures and lozenges that can be use orally or sublingually (under the tongue), as well as topically (rubbing on skin). Because your genetic profile indicates an increased risk of paranoia with fast metabolism of CBD, consider starting with a CBD only product or one having a CBD:THC ratio of 2:1 or greater (at least twice as much CBD as THC). If you choose a product for vaping that contains any amount of THC, start with only one quick puff then wait at least 20 min before taking the next inhalation. For tinctures or liposome products containing greater than 12% THC, it is recommended to initiate them as topical use of multiple applications a day to saturate, instead of using under the tongue or orally.

Edibles:

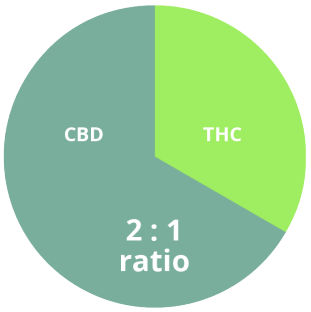
Consider starting with a CBD only product or a product having a CBD:THC ratio of 2:1 or greater (at least twice as much CBD as THC), because your genetic profile indicates an increased risk of paranoia and fast metabolism of CBD. For any product containg THC, start with 1-2mg (of THC) per serving. This amount may be less than the standard serving size depending on where you live (for example: 5mg in Oregon state and 10mg in Colorado state). Be sure to wait at least 1.5 hrs before taking a second serving, even if you are not feeling any effects.

VI. YOUR DETAILED SELF-ADMINISTRATION GUIDANCE

Smoking/Vaping flower

- Begin with flowers containing CBD only or a combined CBD:THC ratio of 2:1 or greater (at least twice as much CBD as THC)
- Choose flowers with less than 12% THC and greater than 3% CBD
- When treating pain, choose flowers with less than 5% THC
- If greater than 12% THC is needed, combine with a CBD-rich flower to counteract potential adverse THC effects
- For THC containing flowers, start with 1-2 quick puffs and adjust additional inhalations accordingly
- Between self-administrations, wait at least 20 min before taking the next inhalation. May require more frequent use of CBD products

Vaping with concentrates



- Infrequent users: avoid THC only concentrates
- Begin with CBD only products or one containing a CBD:THC ratio of 2:1 or greater (at least twice as much CBD as THC)
- Concentrates containing THC: start with only one quick puff, then wait 20 min before the next inhalation
- CBD only concentrates: start with 1-2 puffs and then take additional inhalations as needed, may require more frequent use of CBD-only products

Edibles/tinctures

Edibles:

- Begin with a CBD only product or one having a CBD:THC ratio of 2:1 or greater (at least twice as much CBD as THC)
- THC containing edibles: start with 1-2mg of THC (1/3 of a 5 mg serving or 1/6 of a 10 mg serving)
- Wait at least 1.5 hrs before taking 2nd serving of THC product, even if no effects. May require more frequent use of CBD only products

Tinctures:

- Consider CBD only products
- For products containing greater than 12% THC, use as topical, instead of under the tongue or orally

Topicals

- When used appropriately, topicals are non-psychoactive
- Apply to affected areas for localized pain relief, muscle soreness, tension, and inflammation. Massage gently to clean, dry skin
- Apply generously, may need to repeat 2-3 times to saturate
- When using transdermal patches, begin with a CBD:THC ratio of 1:1 or greater (at least as much CBD as THC)
- When using a THC only patch, be cautious about psychotropic effects or the high
- Do not take a hot bath after application. Do not use on broken skin

VII. MANAGING YOUR POTENTIAL SIDE EFFECTS FROM CANNABIS

Based on your genetic profile, you have increased risks of experiencing paranoia with cannabis products containing THC. If you are currently under stress, THC may exacerbate your condition. To minimize these risks, choose CBD-rich strains, or high-CBD products to counteract THC's psychoactive effects. Additionally, some individuals experience sensations of a pounding heart (increased heart rate) and dry mouth. Hydrate yourself before using cannabis products. If dry mouth and dry eyes are excessive, avoid products containing the terpene, "delta 3-carene".

If you need medical attention, seek assistance, do not drive.

Smoking/vaping	Sublingual (under the tongue)	Edibles	Topicals
If you are feeling unpleasant effects, try to relax and hydrate yourself. Consuming food makes your symptoms worse. The side effects might last from a few minutes to a few hours.	If you're feeling unpleasant effects, try to relax and hydrate yourself. Consuming food makes your symptoms worse. The side effects might last from a few minutes to a few hours.	Infused foods including baked goods may take longer for you to feel the effects, compared to other forms of cannabis products. Be patient. If you‘re feeling unpleasant effects, try to relax and hydrate yourself. Consuming additional fatty food will make your symptoms worse. This side effect might last a half hour to 2-3 hours.	Minimal risk of adverse psychotropic effects. Avoid hot tubs and hot baths after applications. If you‘re feeling unpleasant effects, hydrate yourself.

Hydrating before and during cannabis use will help in preventing dry eyes and dry mouth, common effects of many compounds in cannabis. If you overconsume it, hydration will decrease the concentration of THC and speed up elimination. Hydration can also help with headaches, as well as only using clean, organic cannabis products.

Standard Initial Doses and Precautions

Smoking/vaping	Sublingual (under the tongue)	Edibles	Topicals
Flower buds, concentrates (oil extracts)	Concentrates (tincture, liposomes, losenges)	Cooked and baked foods and drinks containing infused oil or flower buds	Concentrates (liposomes, tincture, oil extract)
Hydrate first. Start with 1-2 quick puffs, then exhale, do not hold in air. May feel immediate and intense effects within 15 min. Wait for 30 min before 2nd dose. The peak effect may be at 30 min to 1 hour after inhalation, and you may feel the effects for 2-4 hr.	Hydrate first. Read the direction on the package for dosing guidance. Common dose for tincture is 1mL and 1 push for liposomes. The peak effects may be at 30 min to 1 hour after use, and you may feel the effects for 2-4 hr.	Eat meal first, then take a dose. Hydrate yourself. Standard serving size (dose) is 5mg for THC.* Wait at least 1.5 hr before taking 2nd dose. Do not exceed 10mg THC per day. *You may consider sending your own baked goods to laboratory if necessary.	Read the directions on the package for recommended dose. Apply on your skin as needed. May be combined with other methods of administrations. For THC sensitive individuals, topical application is recommended initially.

VIII. POTENTIAL INTERACTIONS WITH MEDICATIONS

Using cannabis while taking herbal supplements

Kava - You may experience excessive drowsiness while using kava and cannabis products together.

St. John's wort (SJW) - SJW is known to interact with several drugs by altering metabolism and concentrations. If you are using SJW daily, you should consult with your healthcare provider before discontinuing SJW and/or initiating treatment with cannabis.

Ginseng - Ginseng may alter the distribution, affecting the concentrations of certain drugs including THC and CBD, in the blood and target tissues. If you smoke or vape while regularly using ginseng, you may initially feel less effects from the cannabis. However, you may not want to overdo it because THC and CBD are still accumulating in your body.

Sleep aids (includes supplements containing GABA, melatonin, 5-HTP, skullcap, or valerian) - Use caution when taking these products and cannabis products together because you may experience increased drowsiness.

Using cannabis while taking pharmaceuticals

Anxiety:

Sedatives (alprazolam, clonazepam, and lorazepam) - Using these medications with cannabis may result in increased sedation and memory loss. Use caution, do not drive or operate machinery. Consult with your healthcare provider before discontinuing or adjusting medication doses.

Pain:

Opioid pain relievers (for example, hydrocodone, morphine and oxycodone) – Cannabinoids, including THC and CBD may increase sedation, while enhancing the pain relieving effects of these medications. Use cautions while driving or operating machinery. Speak with your healthcare provider before adjusting medication doses.

Anti-inflammatory pain relievers (aspirin, ibuprofen and naproxen) – Cannabinoids, including THC and CBD may enhance the pain relieving and/or anti-inflammatory effects of these medications.

Other pain relievers (acetaminophen and tramadol) – These medications may increase the risk of hepatic toxicity, and cannabinoids are metabolized by liver. If you are taking these medications regularly, you may want to consult your healthcare provider before using cannabis.

Sleep aids:

Sedative hypnotics (zolpidem, temazepam, and oxazepam) – Consult with your healthcare provider if you wish to discontinue these drugs and use cannabis for sleep. When using cannabis products and these medications together, you may experience excessive sedation and short term memory loss.

Other sleeping medications (diphenydramine, doxylamane, and doxepin) - Combining cannabis use with these medications may result in increased sedation, dry mouth and excessive daytime drowsiness (morning grogginess).

IX. A MEMO FOR YOUR PRODUCT CONSULTANT

This individual may have:

- Increased risk of anxiety and paranoia with THC
- Increased benefits from high-CBD
- May have faster metabolism of CBD (recommend more frequent use)
- Efficient processing of THC
- Normal pain tolerance, predict good relief with medication
- Increased genetic risk of addiction

This individual may benefit from:

Flowers
THC less than 12% (less than 5% THC when treating pain), combine with flower containing at least 3% CBD if greater than 12% THC is needed. Guide infrequent users toward CBD only flowers or one having a CBD:THC ratio of 2:1 or greater (at least twice as much CBD as THC), or combine THC flower with a CBD-rich one.

Concentrates
CBD only, or combination of CBD and THC with a CBD:THC ratio of 2:1 or greater (at least twice as much CBD as THC). Avoid THC only concentrates if infrequent user.

Edibles
Combination of CBD and THC with a CBD:THC ratio of 2:1 or greater (at least twice as much CBD as THC), or CBD only. For THC only products, no more than 1-2 mg of THC per serving (1/3-1/6 of standard serving size).

Topicals
Guide toward lotions, salves, oils, tinctures or sprays infused with CBD and/or THC. If recommending transdermal patches, select CBD only or one having a CBD:THC ratio of 1:1 or greater (at least as much CBD as THC). Use caution with THC only transdermal patches.

Recommended strains for this person:

If these strains are not available, a strain with similar cannabinoid/terpene profile is recommended.

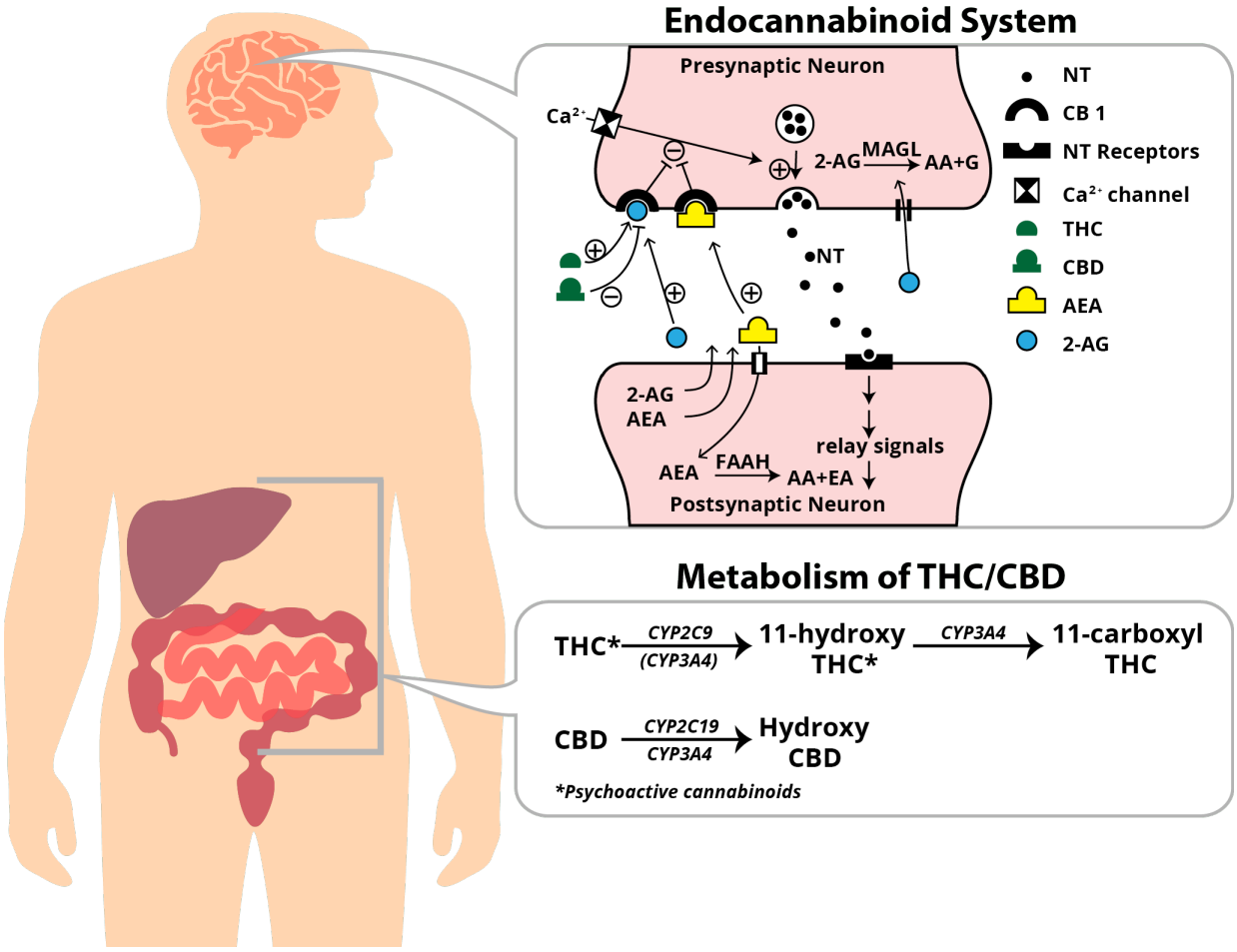
For Pain	For Anxiety	For Insomnia
CBD Critical Cure / Critical Cure	CBD Medi Haze	Afghan Kush
CBD Medi Haze	Critical Mass	Critical Mass-CBD
Harlequin	Harlequin	
Sweet Sour Widow	CBD OG Kush	
	Sweet Sour Widow	

X. EDUCATION

Endocannabinoid system and tested genes

THC, CBD, and other cannabinoids from cannabis are exogenous compounds that are foreign, or unnatural to the human body and influence the endocannabinoid system. The endocannabinoids (AEA 2-AG and others) are naturally produced compounds in body that have several important roles, such as regulating neurotransmitters in the brain, and influencing inflammatory and pain reactions. Those endocannabinoids are metabolized within cells by the enzymes FAAH and MAGL. Cannabinoid receptor 1 (CB1) is highly expressed in the brain to balance the levels of excitatory and inhibitory neurotransmitters (NT). When CB1 is activated by endocannabinoids binding to the CB1 receptor, this action leads to inhibition of the calcium channel (CA) transporters. Normally, calcium (Ca2+) influx by the CA leads to a release of NT. However, by inhibiting CA, the NT release would be decreased. Without releasing NT, postsynaptic neurons can't relay the signals from upper levels of neurons. For example, it is believed that serotonin, an inhibitory NT, is low in the brain of anxiety and depression patients. Thus, it has been hypothesized that cannabinoids could correct imbalanced serotonin levels.

We test for genes encoding the enzymes and transporters involved in the endocannabinoid system, as pictured below:



Abbreviations used in figure:
NT: neurotransmitter; CB1: cannabinoid receptor 1; THC: tetrahydrocannabinol; CBD: cannabidiol; AEA: anandamide; 2-AG: 2-arachidonoylglycerol

Definitions

Δ9 THC (delta 9-tetrahydrocannabinol): The major psychoactive compound in cannabis.

2-AG (2-Arachidonoylglycerol): An endocannabinoid, a neurotransmitter present at relatively high levels in the brain that binds to cannabinoid receptors, CB1 and CB2. It is degraded primarily by the enzyme, monoacylglycerol lipase (MAGL), which converts 2-AG into arachidonic acid and glycerol.

5-HT (Serotonin): A neurotransmitter that regulates anxiety, happiness and mood. It also affects appetite, nausea and sleep. The serotonin receptors are the target of a variety of pharmaceutical drugs used to treat anxiety, depression and nausea. Serotonin acts to balance the effects of the neurotransmitter, dopamine.

AEA (Anandamide): An endocannabinoid, a neurotransmitter produced in the brain that binds to cannabinoid receptors, CB1 and CB2. It is degraded primarily by the fatty acid amide hydrolase (FAAH) enzyme, which converts anandamide into ethanolamine and arachidonic acid.

Balanced CBD: A cannabis product that contains a 1:1 ratio of CBD:THC, with truly balanced effects for the general population.

Beta-caryophyllene (Carophyllene): A terpene that contributes to the spiciness of black pepper and is also present in cinnamon, cloves, oregano, hops, rosemary, and cannabis. Because carophyllene binds to CB2 receptors, some consider this terpene as a cannabinoid. Carophyllene may help with pain, inflammation, alcohol addiction and depression. This compound is often used in topical anti-inflammatory ointments and salves.

Body high: Primarily physical effects, includes tingling sensations, sedation, feelings of lethargy, clumsiness and loss of balance. You may feel like relaxing on the couch or even sleepy after using a strain known for causing body high.

Ca^{2+} channel: A voltage dependent calcium transporter found in the body. The gene mutation we test causes a calcium imbalance in the brain that alters the endocannabinoid system, and response to cannabis.

Cannabinoids: Chemical compounds (alkaloids) found in cannabis plants. More than 600 compounds have been identified, but only Δ-8 THC, Δ-9 THC, and hydroxyl metabolites of those are psychoactive.

CannacoGenetics™ (CannaGx™): The study of inherited genetic differences in cannabinoid metabolism and response which can affect an individual's experience.

CB1 receptor: The cannabinoid receptor type 1, primarily expressed in the brain, encoded by the gene CNR1. Mutations on this gene alter the endocannabinoid system and its response to THC. Genetic variants are associated with an increased risk of anxiety paranoia, and addiction.

CB2 receptor: The cannabinoid receptor type 2, is encoded by the gene CNR2. It is primarily expressed in the periphery, but may also be expressed in the brain following neuroinflammatory conditions. Mutations on this gene are associated with difficulty in controlling pain, including neuropathic pain and diabetic neuropathy.

CBG: Cannabigerol is a non-psychoactive cannabinoid found in the fresh cannabis plant. CBG is made by the decarboxylation of CBGA. CBG is a highly potent agonist for α2 adrenoceptor and a blocker of serotonin 5-HT1A receptor. This activity can decrease anxiety and muscle tension.

CBN: Cannabinol is a non-psychoactive cannabinoid found in fresh cannabis plant, usually in low amounts. Unlike other cannabinoids, CBN does not stem from cannabigerol (CBG). CBN is formed by decarboxylation of CBNA. CBN has exhibited pain relief properties.

CBDV: Cannabidivarin (CBDV) is a non-psychoactive cannabinoid known for its anticonvulsant effects. CBDV and cannabidiol (CBD) activate and desensitize transient receptor potential vanilloid 1 (TRPV1) channels in vitro.

CBD (Cannabidiol): A non-psychoactive compound in cannabis that has significant medical benefits. In the general population, high doses of CBD is expected to produce sedative and calming effects, while lower CBD doses have been shown to enhance mood.

CBDA (Cannabidiolic acid): CBDA is a phytocannabinoid found in raw cannabis, meaning fresh flowers and leaves that are unheated. CBDA is decarboxylated to CBD with heat and light exposure.

CBD-rich/high-CBD: Cannabis strains that have equal or higher percent concentration of CBD, compared to THC. Products listing a 1:1 ratio of THC:CBD, or containing even more CBD than THC. For example a product listing: Total CBD: 8% and Total THC: 2%.

Cerebral high: Mind-high, highly stimulating feelings of increased alertness, motivation and energy. When you use a strain known for causing cerebral high, you may feel more creative, motivated and focused. However, some people may experience paranoia from strains characterized by producing a cerebral high.

Concentrates (Cannabis concentrates): Cannabis-derived extracts that contain concentrated amounts of cannabinoids and terpenes. Concentrates are more potent than flowers (buds). Flower potency typically does not exceed 25%, whereas concentrates typically fall between 50-80% THC and/or CBD. Concentrates are often vaporized, or dissolved in the mouth or under the tongue; typically consisting of: oil extracts, tinctures, liposomes and lozenges.

CYP2C19: A highly expressed enzyme in the liver, belonging to the cytochrome P450 family. This enzyme is responsible for metabolizing CBD, as well as many other medications including some anti-anxiety and antidepressant medications. Enzymatic activity is affected by an individual's genetics. Metabolism can be either fast, normal, intermediate, or slow (abolished enzymatic activity), also known as UM, EM, IM and PM, respectively.

CYP2C9: An enzyme belonging to the cytochrome P450 family that is highly expressed in the liver, and to a lesser extent in the gut. This enzyme is responsible for metabolizing Δ9-THC, as well as many other medications including some anti-inflammatory pain relievers. Enzymatic activity is affected by an individual's genetics. Metabolism can be either normal, intermediate, or slow (abolished enzymatic activity), also known as EM, IM and PM, respectively.

DA (Dopamine): A neurotransmitter that helps to control the brain's reward and pleasure centers; it regulates emotions and the motivation to seek rewards. Dopamine also helps regulate movement, as a deficiency results in Parkinson's Disease. Dopamine receptors are commonly targeted by drugs to combat psychological conditions such as schizophrenia, addiction, and ADHD. Dopamine acts to balance the effects of the neurotransmitter, serotonin. Alterations in dopamine concentrations may lead to sleep disturbances.

Delta 3-carene (Carene): A terpene found in basil, bell peppers, rosemary, and cannabis that promotes the drying up of excess liquid and has anti-inflammatory effects. Side effects often associated with this terpene are dry mouth and red eyes. Carene has a pungent and pleasant earthy aroma that is piney in resemblance.

Enzyme: A protein in the body that facilitates a chemical reaction, turning substrates (compounds before metabolized) into products. Enzymes are required for the metabolism and elimination of drug substrates, including cannabinoids. For example, the substrate THC can be metabolized by the enzyme CYP2C9 to 11-hydroxy-THC, and then further metabolized by other enzymes to be excreted.

FAAH: A gene that codes for fatty acid amide hydrolase, an enzyme that breaks down the endocannabinoid, anandamide. A mutation on this gene alters the endocannabinoid system by increasing anandamide levels.

GABA (γ-Aminobutyric acid): The primary inhibitory neurotransmitter in the brain. GABA regulates muscle tone, reduces anxiety and promotes sleep by reducing neuronal excitability. GABA receptors are the target for many drugs used to treat anxiety, insomnia and muscle spasms. GABA acts to balance the excitatory effects of the neurotransmitter, glutamate.

Glu (Glutamate): The primary excitatory neurotransmitter, involved in memory and learning centers in the brain. Glutamine acts to balance the inhibitory effects of the neurotransmitter, GABA.

Hepatic toxicity: Liver injury cause by medications, may affect the metabolism of other substances that are processed by the liver.

Indica dominant: A hybrid strain that shows traits typically related to the indicas, causing a relaxed and full-body high. Because of the wide variety of cannabis strains, very few are strictly sativa or indica. Strains are commonly referred to as dominant of one or the other.

Limonene: A terpene found in certain strains of cannabis that conveys a pleasant citrus aroma. Limonene has been shown to help with inflammation, anxiety, acid reflux, allergies and depression.

Linalool: A minor terpene found in certain strains of cannabis that is also produced in a variety of mints and herbs, including lavender. When combined with other major terpenes and cannabinoids, linalool may alleviate a number of conditions including pain, inflammation, depression, insomnia, anxiety and substance abuse.

MAGL: A gene that codes for monoacylglycerol lipase, an enzyme that breaks down the endocannabinoid, 2-arachidonylglycerol (2-AG) in the brain and is also involved in lipid signaling. A mutation on this gene alters the endocannabinoid system by increasing 2-AG levels.

Metabolism: The process of a chemical reaction carried out in a living cell by an enzyme. For example, the metabolism of drugs and other compounds takes place in the body to be processed and eliminated. Genetics may affect the rate or speed of metabolism.

Myrcene: The most commonly detected terpene in cannabis; it is also widely identified in plants, such as cloves, hops, lemon grass, and bay leaf. It has been associated with having sedative, muscle relaxant and hypnotic properties and is commonly used for aromatic therapy of stress-relief. Cannabis that smells earthy and spicy is likely to contain a lot of myrcene.

Neurotransmitter (NT): A chemical that nerve cells use to send signals to other cells.

Pinene: A terpene in cannabis that is easy to identify because it carries the aroma of pine. It is also present in orange peels, basil, pine needles and parsley. Pinene may help with asthma and anxiety, while reducing inflammation, enhancing relaxation and improving focus.

Postsynaptic neuron: A neuron (nerve cell) that receives the neurotransmitter after it has crossed the synapse (gap between neurons) to relay the signal to target tissues.

Presynaptic neuron: A neuron (nerve cell) that releases the neurotransmitter after receiving a signal from other parts of the body.

Sativa dominant: A hybrid strain that shows traits typically related to the sativas, creating an uplifting and cerebral high. Because of the wide variety of cannabis strains, very few are strictly sativa or indica. Strains are commonly referred to as dominant of one or the other.

Terpenes: Fragrant compounds produced by a variety of plants, including the cannabis plant. It's what gives cannabis its aromatic diversity, what you smell, and/or the flavor. Terpenes may play a role in boosting or differentiating the therapeutic effects of various cannabis strains.

Compound Name	Formula	Fragrance / Scent
α-Bisabolol	C15H26O	Mild floral, peppery, clean
Borneol	C10H18O	Piney, camphoric
Camphene	C10H16	Piney, camphoric
Camphor	C10H16O	Camphoreous
β-Caryophyllene	C15H24	Clove, sweet spice
Citral	C10H16O	Lemon, citrus, sweet, woody
Citronellol	C10H20O	Floral, leather, waxy, rose bud, citrus
Δ-3-Carene	C10H16	Sweet, citrus, Terpenic, fir needle
Eucalyptol	C10H18O	Minty, eucalyptus, herbal, camphor
Eugenol	C10H12O2	Sweet, spicy, clove, woody
Farnesene	C15H24	Sweet, herbal
α-Fenchone	C10H16O	Camphoric
Fenchol	C10H18O	Camphoric, pine, woody, dry, sweet, lemon
Geraniol	C10H18O	Citrus, herbal, lavender, green
Humulene	C15H24	Woody
Linalool	C10H18O	Fresh floral, lavender, sweet pea, rose
D-Limonene	C10H16	Citrus, orange, fresh, terpenic
L-Limonene	C10H16	Terpenic, pine, herbal, peppery
Menthol	C10H20O	Peppermint, cooling, mentholic, minty
β-Myrcene	C10H16	Mango, peppery
Nerolidol	C15H26O	Floral, green, waxy, citrus, woody
Ocimene	C10H16	Tropical, green, woody, floral, vegetable
α-Pinene	C10H16	Woody, piney, earthy
β-Pinene	C10H16	Cooling, woody, piney, turpentine, mint
α-Phellandrene	C10H16	Citrus, herbal, green, woody, peppery
Phytol	C20H40O	Floral, balsamic, waxy
α-Terpineol	C10H18O	Pine, lilac, citrus, woody, floral
γ-Terpinene	C10H16	Sweet, natural, citrus, magnolia
Terpinolene	C10H16	Fresh, woody, sweet, pine, citrus
Valencene	C15H24	Woody, lemon, tropical, herbal

Terpinoline: A terpene with a complex smoky, floral, herbal, or woody odor, commonly used in perfumes and soaps. It is naturally found in cannabis as well as other pleasantly fragrant plants including nutmeg, lilac, tea tree and apples. Terpinoline aids with sleep and may also be used to help fight bacterial or fungal infections.

THC (Tetrahydrocannabinol): Refers to the primary psychoactive cannabinoid in cannabis. Primarily, Δ9-THC is detected, with negligible or trace amounts of Δ8-THC.

THCA (Tetrahydrocannabinolic acid): A non-psychoactive phytocannabinoid found in raw cannabis, meaning fresh flowers and leaves that are unheated. THCA is decarboxylated to psychoactive THC with heat and light exposure. This decarboxylation is what happens when you vaporize or smoke flower.

THCV: Tetrahydrocannabivarin is a non-psychoactive cannabinoid in cannabis, and a precursor of THC and CBD. THCV acts like a CB1 antagonist, and may aid in weight reduction. [4] THCV has also shown to be useful for glycemic control in patients with type 2 diabetes.

Total CBD: The overall percentage of concentration of CBD and CBDA in a cannabinoid product. Total CBD(%) = CBD(%) + 0.877 x CBDA(%).

CBD			
High	Intermediate	Low	Minimal
6% and higher	3-6%	1-3%	0-1%

Total THC: The overall percentage of concentration of THC and THCA in a cannabinoid product. Total THC(%) = Δ9-THC(%) + 0.877 x THCA(%).

THC			
High	Intermediate	Low	Minimal
18% and higher	12-18%	2-12%	0-2%

XI. DISCLAIMER

Disclaimer

Molecular Testing Labs™ (also known as Molecular or MTL) is a CLIA certified and CAP accredited diagnostic testing laboratory specializing in the areas of Molecular Genetics, Toxicology, and Infectious Disease. Using your self-collected cheek swab, Molecular is able to extract DNA and analyze it for specific variants (called SNPs) related to how your body metabolizes and processes compounds found in cannabis products.

This research behind this report is based on the biology of an individual who has never used cannabis or has used it infrequently. Frequent users often develop a tolerance towards cannabinoids, especially THC, therefore the recommendations regarding THC and CBD levels in this report might not be as accurate for those individuals. Your genetic profile is a part of a highly complex system in your body and your personal experiences may vary from individuals reported in peer reviewed publications.

The CannacoGenetic™ (also known as CannaGx™ or CannacoGenomic™) DNA Test is a proprietary laboratory developed test. This test was developed and its performance characteristics determined by Molecular. It has not been approved by the US Food and Drug Administration (FDA). The FDA has determined that such clearance or approval is not necessary. The laboratory is regulated under the Clinical Laboratory Improvement Act of 1988 as qualified to perform high complexity clinical testing.

Liability

Molecular Testing Labs shall not be held liable to you, or anyone else, for loss or injury caused in the use of this test or information/test results provided. Also, in no event shall Molecular Testing Labs be held liable to you or anyone else for any decisions made or action taken or not taken by you in reliance on such information. As with any healthcare related product, you should always consult your healthcare provider prior to use.

Molecular does not take responsibility for side effects experienced by cannabis use, and recommends a full consultation with a health care provider that specializes in medical marijuana before attempting to replace prescribed medications. Results from this test are not intended to provide a medical diagnosis or to provide medical recommendations. Results from this test are considered informational only. Use of this test kit and reported test results are not considered a medical treatment or a substitute for treatment by your doctor or health care provider. This test kit is not to be considered a replacement for consulting your doctor or health care provider. No guarantee of your personal health is given, implied or otherwise, based on the results provided by this test.

Beta-testing report

This current report was generated using our beta-testing algorithm. The beta-testing algorithm was thoroughly validated, and the accuracy of our interpretations have been confirmed. Our guidance and recommendations in this report are created based on current peer-reviewed scientific publications as well as testimonies of cannabis users. The scientific interests of cannabis in healthcare is exponentially growing, and interpretations of a gene result may be different from our current knowledge. As we continue our research, and as new research is made available, we may update accordingly, without notice.

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