

UNDER- STANDING MEDICAL CANNABIS

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In continuing its efforts to provide the best holistic wellness care to its members, **Elemental Wellness** is pleased to provide this educational material to its members, staff and community physicians. The purpose of this information is to educate us on the latest scientific concepts and understanding of medical cannabis so that we may better benefit from its diverse medicinal properties. Understanding this “pharmaceutical treasure trove” will hopefully make its utilization more efficient and effective (and less daunting for those who are new to this ancient herbal medicine).

Helping us to better understand medical cannabis are the advances in laboratory analysis (now available to collectives) combined with the ongoing research taking place around the world. Much of this research is aimed at delineating the therapeutic effects of the various chemical compounds in cannabis, especially the cannabinoids and terpenoids. Two recent articles illustrating this development are those by Izzo, et al. (2009) and Russo (2011). An excellent video by Lindsey Ward on medical cannabis and its impact on human health can be found online at: <http://www.youtube.com/watch?v=8Md2WNqxxTQ>.

Another key to better understanding of medical cannabis is awareness that the chemical compounds available in the plant change with how the plant is processed and administered. Potential therapeutic benefits will vary if the cannabis is processed/administered in raw (unheated), heated or aged (degraded) form.

Also knowing that the various compounds in cannabis may modulate each other in synergistic or antagonistic ways is important. For example, the cannabinoid CBD will lessen to some degree the psychotropic effects of the cannabinoid THC, while the terpenoid α -pinene will synergize the bronchodilator effects of THC. This complexity of interaction means that medical cannabis should be seen in the light of an herbal medicine, where to extract a so-called “active ingredient” will not necessarily result in the full range of therapeutic effects, or may produce unwanted side effects that usually do not occur when the whole herb is administered.

Finally, knowing that each strain of cannabis has potentially vastly different proportions of cannabinoids and terpenoids (often expressed in terms of color, smell and taste) means that one needs to be strain specific when discussing cannabis as medicine. This is a difficult step, but one that modern laboratory analysis and scientific research is now making possible. **Elemental Wellness** is working in this direction and hopes that this educational material will assist caregivers and recipients in making a choice as to which strain, in what form, and administered in which way, will be most beneficial to them.

As new research in medical cannabis becomes available, this educational material will be revised to reflect the latest insights. In this way we hope that our understanding and use of medical cannabis will continue to grow in effectiveness in order to meet the needs and maximize the wellness of our members.



MEDICINE INFORMATION SHEET

Cannabis

Pronunciation: kan-uh-bis

This medicine is USED FOR:

Although cannabis is used for a wide variety of ailments, rigorous clinical research is still relatively limited due to federal government regulations. Around the globe, however, controlled trials are taking place and more scientific information on the therapeutic effects of cannabis is being established.

Some of the more accepted medical uses of cannabis are for the following ailments:

Alzheimer's Disease: reduce agitation and nighttime tossing and turning, stimulate weight gain.

Amyotrophic Lateral Sclerosis: slow disease progression; reduce pain, appetite loss, depression, drooling.

Chronic Pain: reduce nerve-related (neuropathic) pain, allow opioid treatment at lower doses.

Diabetes Mellitus: slow disease progression, protect from eye disease, reduce neuropathic (nerve) pain, reduce symptoms of heart-muscle disease (cardiomyopathy).

Dystonia: reduce muscle tension and involuntary, painful muscle contractions.

Fibromyalgia: reduce pain and muscle stiffness, improve sleep quality.

Gastrointestinal Disorders: reduce cramping, abdominal pain, acid reflux, intestinal secretion, disease activity.

Glaucoma: reduce intraocular (eye) pressure. Gliomas/Cancer: inhibit tumor growth, reduce nausea and vomiting from cancer chemotherapy.

HIV/AIDS: reduce neuropathic pain, anxiety, nausea, appetite and weight loss.

Incontinence: improve bladder control, reduce bladder inflammation/overactivity.

Multiple Sclerosis: reduce pain, spasticity, depression, fatigue, incontinence.

Parkinson's Disease: alleviate L-dopa induced dyskinesias (L D), reduce tremor, rigidity and psychosis symptoms.

Pruritus: reduce itching in conditions such as kidney and liver diseases.

Rheumatoid Arthritis: reduce joint pain and swelling, suppress joint destruction and disease worsening.

Insomnia: induce sleep and/or improve sleep quality.

Tourette's Syndrome: improvement of tics and obsessive-compulsive behavior.

What the active compounds might be:

Cannabichromene (CBC), Cannabidiol (CBD), Cannabidiolic acid (CBDA), Cannabidivarin (CBDV), Cannabigerol (CBG), Cannabinol (CBN), Tetrahydrocannabinol (THC), Tetrahydrocannabinolic acid (THCA), Tetrahydrocannabivarin (THCV), Terpenoids.

What the other compounds might be:

There may be more than 60 other cannabinoids and more than 200 terpenoids in cannabis.

How this medicine is supplied:

Cannabis comes in various forms: dried plant material ("buds", tea leaves), concentrate (hash, "wax", tincture, oil, capsules), topical salve, edible (including drinks).

Do NOT USE this medicine if:

- You are allergic to any cannabinoid or terpenoid.
- You have a history of serious mental disorder such as schizophrenia or severe depression.
- You are pregnant or planning to get pregnant. In addition to the risk of smoking, the use of cannabis when you are pregnant may be a risk factor for sudden infant death syndrome. Uterine exposure to cannabis may also cause behavioral (attention) problems in the child.
- You are nursing.
- Important: there may be other conditions where this product should not be used but which are unknown due to limited scientific information.

BEFORE USING this medicine:

ALWAYS TALK TO YOUR PHYSICIAN, PARTICULARLY F:

- You have heart disease.
- You have asthma, chronic obstructive pulmonary disease or other disease of the airways.
- You have a history of alcohol abuse or dependence.
- You have a history of drug abuse or dependence.
- You have a history of a serious mental disorder.

HOW TO USE this medicine:

Use this medicine as directed by your doctor. Dosage and frequency of administration will vary according to route of administration (smoke, vaporization, ingestion, skin), percentage of therapeutic ingredients, and other medicines taken. Ask your doctor or collective consultant to explain what dosage, route and frequency is best for you. Remember that concentrates have higher dosages per weight of medicine than other forms. Make sure you give the medicine sufficient time to take effect. This is especially important with the edible form of cannabis where therapeutic effect may take up to 1-2 hours before taking effect. Eating too much medicine too fast may easily occur causing unwanted side effects. Use this medicine only for the length of time recommended by your doctor. It is not recommended to use this medicine in combination with tobacco.

Important SAFETY INFORMATION about this medicine:

- If you have not consumed cannabis before, it would be prudent to have someone with you the first time you use it. It is important to start by using small quantities. Stop if you begin to feel confused or agitated.
- After you stop using cannabis, it remains in your system for several weeks to months. Therefore, during this time, tests that screen for cannabis may be positive.
- Cannabis may interact with several drugs. Tell your doctor which prescription drugs, nonprescription drugs and herbal products you are currently taking, particularly:
 - Any drugs that slow down the central nervous system, causing drowsiness. This may include sleeping pills, tranquilizers, some pain medications, some antihistamines or cold medications or seizure medications.
 - Antiviral drugs used in the treatment of HIV/AIDS.
- CANNABIS MAY IMPAIR YOUR ABILITY TO DRIVE OR OPERATE HEAVY MACHINERY. This can last up to 24 hours after consuming.

Possible SIDE EFFECTS of this medicine:

- From Initial use:
 - When you first start consuming cannabis, you may experience mood reactions such as euphoria, relaxation, time-distortion, perception of enhanced sensory experiences, loss of inhibitions, anxiety, paranoia, agitation, amnesia, delusions or hallucinations.
 - Fast heartbeat; this may be more of a problem if you have heart disease.
 - Facial flushing or red eyes, dry mouth, headache.
 - Right after consuming cannabis you may get dizzy or feel faint when you get up from a lying or sitting position. Try getting up more slowly. If lying down, sit on the edge of the bed and let your feet dangle for 1 to 2 minutes, then stand up slowly.
- From Long-term use:
 - Wheezing or a chronic cough, if the medicine is smoked.
 - May impair short-term memory attention and concentration. These effects usually disappear after you stop using cannabis.

If OVERDOSE is suspected:

It is possible that the above mentioned side effects occur. Usually these will resolve themselves within a short period of time when medication is stopped. Often fresh air, staying hydrated and eating will help. Contact your doctor immediately if symptoms persist.

Proper STORAGE of this medicine:

Store in a tightly closed container in a cool, safe and secure place. Store away from heat, moisture and light.

GENERAL INFORMATION:

- If you have any questions about this medicine, please talk with your doctor, collective consultant or other health care provider.
- This medicine is to be used only by the patient for whom it is recommended. Do not share it with other people.
- If your symptoms do not improve or if they become worse, check with your doctor.
- Check with your collective consultant about how to dispose of unused medicine.
- This information is a summary only. It does not contain all information about this medicine.

KEEP THIS MEDICINE OUT OF REACH OF CHILDREN AND PETS.

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CANNABINOIDS

CBGA	Cannabigerolic Acid
CBGVA	Cannabigerivarinic Acid
CBG	Cannabigerol
CBGV	Cannabigerivarin
THCA	Tetrahydrocannabinolic Acid
THCVA	Tetrahydrocannabivarinic Acid
THC (Δ9)	Δ 9-tetrahydrocannabinol
THCV	Tetrahydrocannabivarin
CBNA	Cannabinolic Acid
THC (Δ8)	Δ 8-tetrahydrocannabinol
CBN	Cannabinol
CBDA	Cannabidiolic Acid
CBDVA	Cannabidivarinic Acid
CBD	Cannabidiol
CBDV	Cannabidivarin
CBCA	Cannabichromic Acid
CBCVA	Cannabichromivarinic Acid
CBC	Cannabichromene
CBCV	Cannabichromivarin
CBLA	Cannabicyclol Acid
CBL	Cannabicyclol

TERPENOIDS

Smells and Therapeutic Effects

α-PINENE	 <p>Pine needles</p>	Anti-bacterial Anti-fungal Anti-inflammatory Bronchodilator
β-CARYOPHYLLENE	 <p>Black Pepper Clove</p>	Anti-bacterial Anti-cancer Anti-fungal Anti-inflammatory Anti-septic
BORNEOL	 <p>Camphor</p>	Analgesic Anti-insomnia Anti-septic Bronchodilator
CARYOPHYLLENE OXIDE	 <p>Eucalyptus</p>	Anti-fungal Anti-ischemic
CINEOL	 <p>Tea Tree</p>	Anti-bacterial Anti-depressant Anti-inflammatory Anti-ischemic Bronchodilator
CITRONELLOL	 <p>Rose</p>	Anti-cancer Anti-inflammatory Anti-insomnia Anti-spasmodic
HUMULENE	 <p>Hops</p>	Anorectic Anti-cancer Anti-bacterial Anti-inflammatory

LIMONENE

Citrus

Anti-anxiety
 Anti-bacterial
 Anti-cancer
 Anti-depressant
 Anti-fungal
 Bronchodilator

LINALOOL

Lavender

Anti-anxiety
 Anti-bacterial
 Anti-convulsive
 Anti-depressant
 Anti-insomnia

MYRCENE

Lemongrass



Mango

Analgesic
 Anti-cancer
 Anti-inflammatory
 Anti-insomnia
 Anti-spasmodic

NEROLIDOL

Wood



Citrus rind

Anti-fungal
 Anti-insomnia

PHYTOL

Green Tea

Anti-insomnia

TERPINOLENE

Lilac



Apple

Anti-bacterial
 Anti-fungal
 Anti-insomnia
 Anti-septic

NOTES ON CHARTS 1, 2 and 3

The following charts reflect most of what is presently known on the potentially therapeutic chemical compounds in cannabis, how they are formed, and how they relate to each other. Only 21 cannabinoids and 13 terpenoids are listed. There is still much to be learned.

The charts should be read horizontally and vertically:

Horizontally: which cannabinoids can be found in which physical state of cannabis (raw, heated, aged). Raw refers to the fresh plant. Aged refers to the effects of UV-light, oxidation, and isomerization; in other words: degradation.

Vertically: how do the cannabinoids relate to each other; where do they come from?

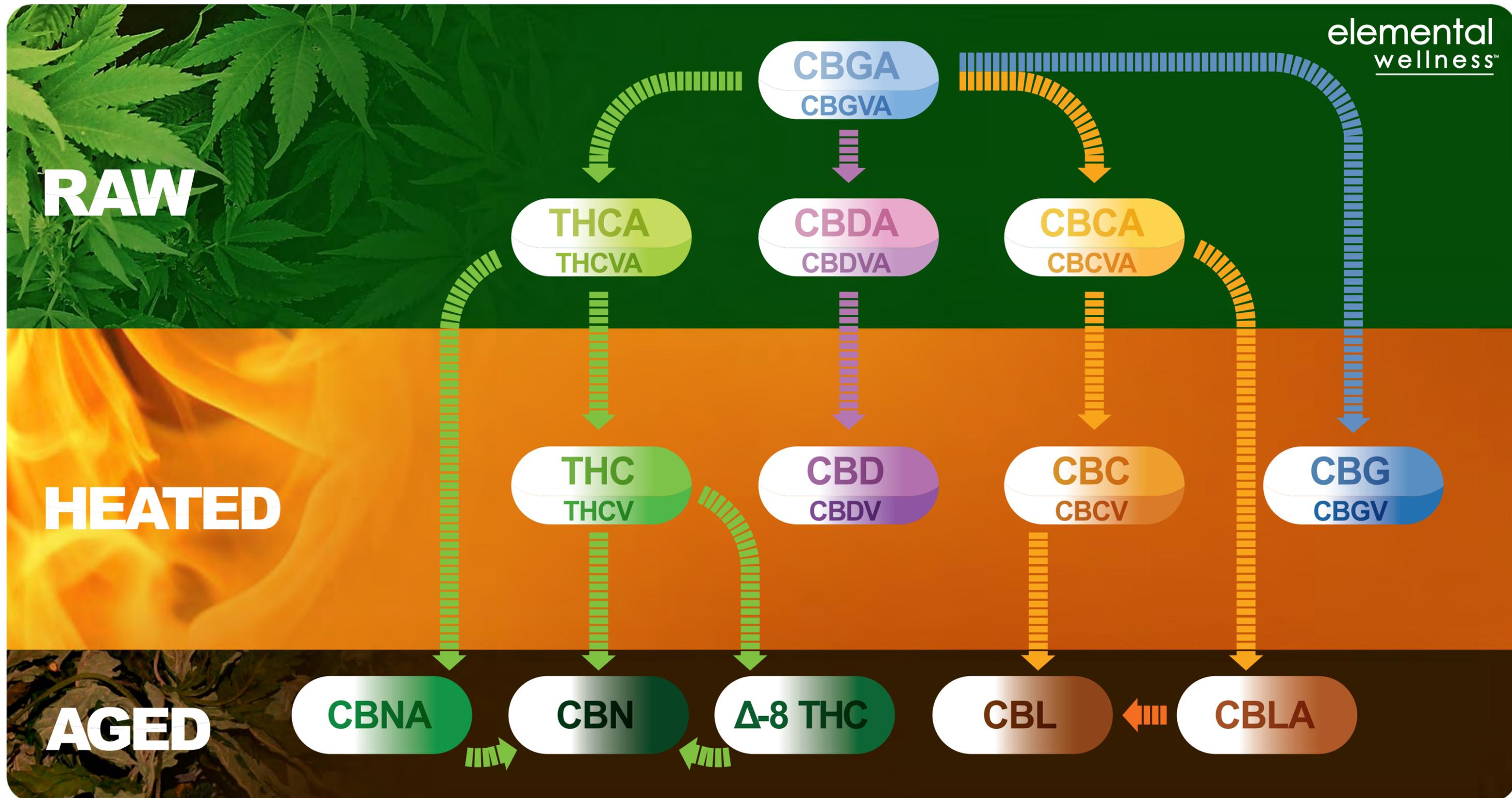
In general, the amount of divarinic cannabinoid (those with "V" in the acronym) is always less than the olivetolic cannabinoid. In the charts, this is reflected in the smaller font size of the acronym.

The charts do not imply that all cannabinoids listed are always detectable in the various strains currently available. Breeding has mainly focused on increasing the amount of THC. Recently CBD has come under attention and strains high in CBD are now being bred. Hopefully other strains with significant amounts of other cannabinoids will be available soon.

Since terpenoids are more volatile than cannabinoids, their presence is more closely related to freshness and temperature. The fresher and cooler the cannabis (upper part of the chart), the more the terpenoids peculiar to the strain are preserved. Therefore, as one goes down the chart, terpenoids listed in the different physical states of cannabis may or may not be available in amounts of therapeutic significance.

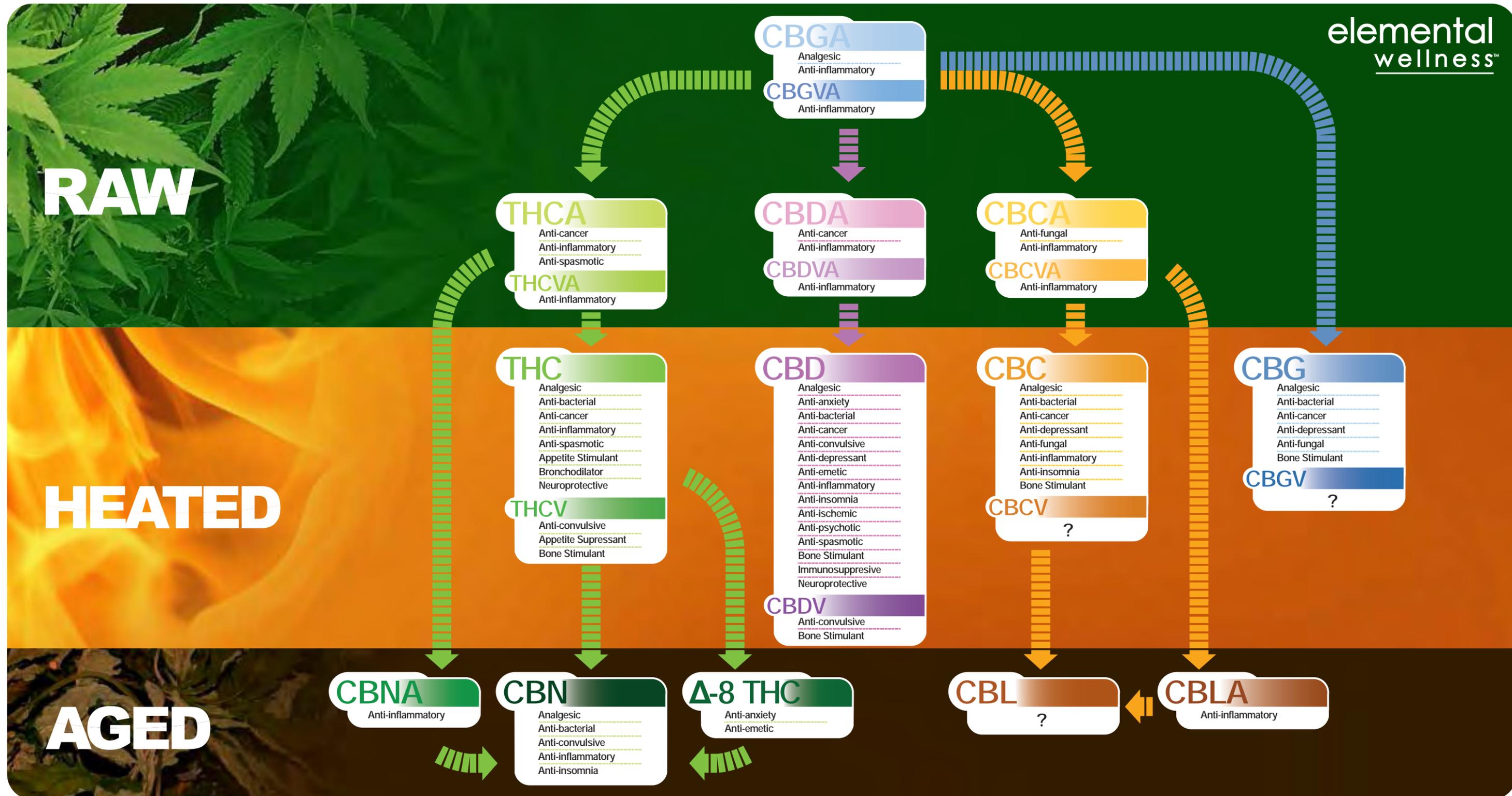
UNDERSTANDING MEDICAL CANNABIS

Cannabinoids and Their Relationships



UNDERSTANDING MEDICAL CANNABIS

Cannabinoids and Their Therapeutic Effects



CBGA

Analgesic

Borneol, Myrcene

Anti-inflammatory

α -Pinene, β -Caryophyllene, Cineol,
Citronellol, Humulene, Myrcene

CBGVA

Anti-inflammatory

α -Pinene, β -Caryophyllene, Cineol,
Citronellol, Humulene, Myrcene

CBG

Analgesic	Borneol, Myrcene
Anti-bacterial	α -Pinene, β -Caryophyllene, Cineol, Humulene, Limonene, Linalool, Terpinolene
Anti-cancer	β -Caryophyllene, Citronellol, Humulene, Limonene, Myrcene
Anti-depressant	Cineol, Limonene, Linalool
Anti-fungal	α -Pinene, β -Caryophyllene, Caryophyllene oxide, Limonene, Nerlidol, Terpinolene
Bone Stimulant	

CBGV

?

THCA

Anti-cancer

β -Caryophyllene, Citronellol,
Humulene, Limonene, Myrcene

Anti-inflammatory

α -Pinene, β -Caryophyllene, Cineol,
Citronellol, Humulene, Myrcene

Anti-spasmodic

Citronellol, Myrcene

THCVA

Anti-inflammatory

α -Pinene, β -Caryophyllene, Cineol,
Citronellol, Humulene, Myrcene

THC

Analgesic	Borneol, Myrcene
Anti-bacterial	α -Pinene, β -Caryophyllene, Cineol, Humulene, Limonene, Linalool, Terpinolene
Anti-cancer	β -Caryophyllene, Citronellol, Humulene, Limonene, Myrcene
Anti-inflammatory	α -Pinene, β -Caryophyllene, Cineol, Citronellol, Humulene, Myrcene
Anti-spasmodic	Citronellol, Myrcene
Appetite Stimulant	
Bronchodilator	α -Pinene, Borneol, Cineol
Neuroprotective	

THCV

Anti-convulsive	Linalool
Appetite Supressant	Humulene
Bone Stimulant	

CBNA

Anti-inflammatory

α -Pinene, β -Caryophyllene,
Cineol, Citronellol,
Humulene, Myrcene

Δ-8 THC

Anti-anxiety

Anti-emetic

Linalool, Limonene

CBN

Analgesic	Borneol, Myrcene
Anti-bacterial	α -Pinene
Anti-convulsive	Linalool
Anti-inflammatory	α -Pinene, β -Caryophyllene, Cineol, Citronellol, Humulene, Myrcene
Anti-insomnia	Borneol, Citronellol, Linalool, Myrcene, Nerolidol, Phytol, Terpinolene

CBDVA

Anti-cancer β -Caryophyllene, Citronellol, Humulene, Limonene, Myrcene

Anti-inflammatory α -Pinene, β -Caryophyllene, Cineol, Citronellol, Humulene, Myrcene

CBDVA

Anti-inflammatory α -Pinene, β -Caryophyllene, Cineol, Citronellol, Humulene, Myrcene

CBD

Analgesic	Borneol, Myrcene
Anti-anxiety	Linalool, Limonene
Anti-bacterial	α -Pinene, β -Caryophyllene, Cineol, Humulene, Limonene, Linalool, Terpinolene
Anti-cancer	β -Caryophyllene, Citronellol, Humulene, Limonene, Myrcene
Anti-convulsive	Linalool
Anti-depressant	Cineol, Limonene, Linalool
Anti-emetic	
Anti-inflammatory	α -Pinene, β -Caryophyllene, Cineol, Citronellol, Humulene, Myrcene
Anti-insomnia	Borneol, Citronellol, Linalool, Myrcene, Nerolidol, Phytol, Terpinolene
Anti-ischemic	Caryophyllene oxide
Anti-psychotic	
Anti-spasmodic	Citronellol, Myrcene
Bone Stimulant	
Immunosuppressive	
Neuroprotective	

CBDV

Anti-convulsive	Linalool
Bone Stimulant	

CBCA

Anti-fungal

α -Pinene, β -Caryophyllene,
Caryophyllene oxide,
Limonene, Nerlidol, Terpinolene

Anti-inflammatory

α -Pinene, β -Caryophyllene, Cineol,
Citronellol, Humulene, Myrcene

CBCVA

Anti-inflammatory

α -Pinene, β -Caryophyllene,
Cineol, Citronellol, Humulene, Myrcene

CBC

Analgesic	Borneol, Myrcene
Anti-bacterial	α -Pinene, β -Caryophyllene, Cineol, Humulene, Limonene, Linalool, Terpinolene
Anti-cancer	β -Caryophyllene, Citronellol, Humulene, Limonene, Myrcene
Anti-depressant	Cineol, Limonene, Linalool
Anti-fungal	α -Pinene, β -Caryophyllene, Caryophyllene oxide, Limonene, Nerlidol, Terpinolene
Anti-inflammatory	α -Pinene, β -Caryophyllene, Cineol, Citronellol, Humulene, Myrcene
Anti-insomnia	Borneol, Citronellol, Linalool, Myrcene, Nerolidol, Phytol, Terpinolene
Bone Stimulant	

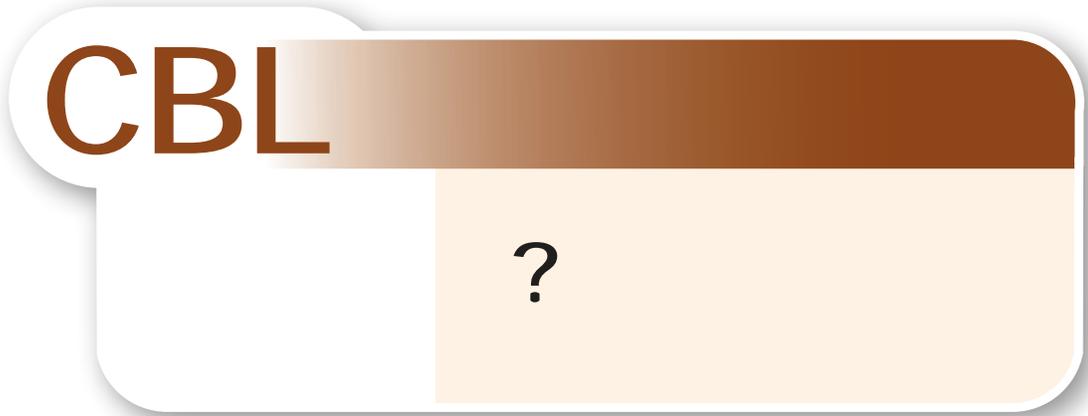
CBCV

?

CBLA

Anti-inflammatory

α -Pinene, β -Caryophyllene, Cineol,
Citronellol, Humulene, Myrcene



PROCESSING AND ADMINISTERING MEDICAL CANNABIS

Medical cannabis is processed for administration in various ways: fresh, dried, cold extractions/concentrates and heated extractions/concentrates.

Although rarely done due to the large quantities usually needed, cannabis can be ingested **raw**, freshly cut from the plant, in order to primarily benefit from the acid cannabinoids and their anti-inflammatory effects. Terpenoids remain intact. Psychoactivity is minimized.

Dried cannabis is most often consumed by inhaling the burned or vaporized buds. Cannabinoid acids are converted to their neutral forms and the amount of terpenoids available will vary according to the method of administration chosen and the instruments used (pipe, joint, vaporizer).

Cold extractions/concentrates result in various products:

1. **Kief:** powder of the trichomes that have fallen off the plant. May be ingested raw but is usually smoked or ingested in cooked edibles.
2. **Slurry:** extraction using olive oil or alcohol. Usually ingested raw.
3. **Hash:** extraction using cold water and ice. May be ingested raw, smoked or used in cooking. Variety names reflect differences in the proportion of plant material to trichomes and how the variety reacts to heat:
 - a. **Bubble** = initially bubbles when exposed to heat.
 - b. **Full bubble** = continues to bubble throughout the heating process.
 - c. **Melt** = melts or turns into goeey oil when exposed to heat.
 - d. **Full melt** = almost pure trichomes, fully melts when exposed to heat leaving little or no residue.
4. **Wax:** extraction using a solvent, most commonly butane, CO₂ or O₂. Removal ("purging") of the solvent may be through cold or heat evaporation (which changes the compounds available). Waxes are usually burned or vaporized, but may be used in cooking and in topical salves. Variety names usually refer to consistency. Examples:
 - a. *Honeycomb/Crumble* = dry, crumbly texture, often has small holes like a honeycomb.
 - b. *Budder* = more viscous, consistency like butter.
 - c. *Shatter/Glass* = consistency similar to a hard candy.
 - d. *Sap* = sticky texture similar to honey.
 - e. *Taffy* = firmer than sap but not brittle like shatter.

Heated extractions/concentrates convert the cannabinoid acids into their neutral forms and usually removes most of the terpenoids. Various products:

1. **Tea:** extraction into hot water and then drunk.
2. **Tincture:** heated cannabis that is extracted in alcohol. Usually administered directly under the tongue.
3. **Edible:** extraction into a fat (butter, oil) and then used in cooking food.
4. **Oil:** slow heating of cannabis in olive or coconut oil. Usually used in food or topically on skin.
5. **Salve/Cream/Lotion:** low heating of cannabis oil with beeswax. Used topically on skin.



DOSING MEDICAL CANNABIS

Understanding how to dose medical cannabis is difficult. We are not talking about a single active ingredient, but rather a complex of chemical compounds that modulate each other. Up to now, most attention in dose determination has focused on the psychoactive effect of THC. It is now obvious that the other (non-psychoactive) cannabinoids may be of greater therapeutic importance, depending on the ailment to be treated. Unfortunately, scientific research in dosing of these cannabinoids is still in its infancy.

Since the psychoactive effects of THC remain the main determinant of normal or “altered” daily functioning for most people, it is wise to continue to refer to the THC content of a strain when discussing dose of medicine. Some patients will want and need a high percentage of THC effect, while others will want and need a low percentage of THC effect. Determining the therapeutic dose of medical cannabis remains a very personal determination. The patient has the final say as to how much is enough. In addition, one person may react differently than another person to the same strain. Also keep in mind that THC in amounts in excess of 25 mg may sporadically cause THC toxicity.

In this regard, route of administration will also be an important consideration in determining dose. For example, due to liver metabolism, cooked edibles may be 3-5 times more psychoactive than inhaled cannabis.

In trying to understand dosage, there are a few helpful **rules-of-thumb**:

1. Normal adult dosage of THC for:
beginners: 2.5-5 mg
more experienced patients: 10-20 mg
heavy users: 25 mg or more.
2. To convert percentage to milligrams:
 move decimal one place over to the right. For example,
 21.23% THC = 212.3 mg of THC per gram of cannabis.
 The same conversion can be done for other cannabinoids and terpenoids (e.g., 0.39% β -caryophyllene = 3.9 mg per gram of cannabis).
3. Under ideal conditions, only about 63% of the cannabinoids will get absorbed when smoked. Multiplying the milligrams of THC by 0.63 will result in a more accurate calculation of dose.

Beginners
2.5-5 mg

More Experienced Patients
10-20 mg

Heavy Users
25 mg

21.23 % = **212.3** mg

0.39 % = **3.9** mg per gram of cannabis

β -caryophyllene

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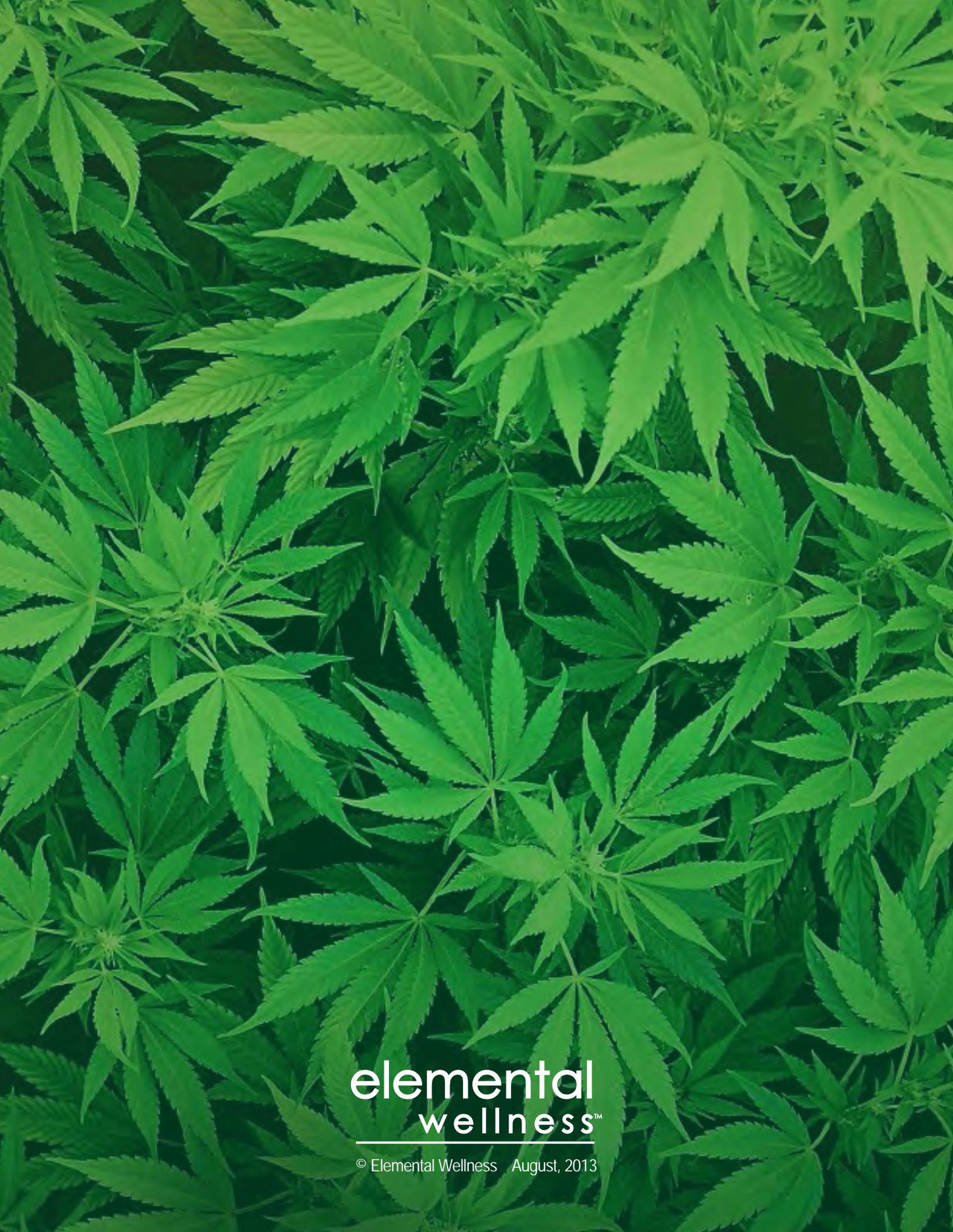
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