ESSENTIA SCIENTIFIC

Pioneering Clean Cannabinoid Extraction

Water-based Solvent Technology for Purity and Sustainability

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The Essentia Difference

ESSENTIA SCIENTIFIC

Founded in 2021, Essential Scientific is led by a team of pharmacists and scientists looking to transform and innovate the extraction and purification process of cannabinoids.

We are revolutionizing cannabinoid extraction by using water as a solvent, providing **a safer, more sustainable, consistent solution** for producing high-purity cannabinoids.

Water-as-a-solvent

Our process uses water to leach the cannabinoids from the plant without the use of heat, harsh chemicals, or hydrocarbons. The process also removes contaminants such as pesticides, heavy metals, microbials and mycotoxins.

Acidic Cannabinoid Offerings

Leading the industry to cleaner extraction we deliver an array of cannabinoids, including the rare offerings of acidic cannabinoids such as CBGA and CBDA.

- Water as a solvent removes the need for volatile solvents and remediation, ensuring a safer process.
- It reduces waste and harmful chemicals, delivering pure cannabinoids with minimal environmental impact
- Produces cannabinoids with precise control over THC levels, ensuring regulatory compliance and product quality.

Cookies · Charlotte's Web Stanley Brothers · CV Sciences · True Terpenes · Open Book Extracts · Covalent Custom Cannabinoids · mc nutraceuticals · Oregon Health & Science University · Marshall University · GVB Biopharma

Why Water?

THE ESSENTIA WAY OF EXTRACTION

Traditional extraction methods utilize harmful solvents such as butane and ethanol for extraction needing remediation to rid the product of volatile solvents.

Our process harnesses the power of water to leech cannabinoids from the plant without heat or harsh chemicals

The process also removes contaminants such as pesticides, heavy metals, microbials and mycotoxins.

Additionally, it can effectively remove or limit the amount of THC, yielding a more consistent and compliant product.

- No Heat
- No Harsh Chemicals
- No Hydrocarbons

Essentia vs Traditional Extraction

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Traditional methods use solvents like ethanol and butane, requiring extra steps for cleanup.
Our process extracts cannabinoids only; avoiding contaminants such as residue pesticides, heavy metals, microbials, and mycotoxins.

Additionally, it can effectively remove or limit the amount of THC, yielding a more consistent and compliant product.

Most Traditional Extraction Processes

Extraction using solvents such as ethanol, Co2, butane, etc

FILTRATION

Solvent recovery (heat is applied)

Distillation, crystallization, or isolation where heat is applied

TRADITIONAL PROCESSED

CBD / THC

WATER EXTRACTION

Water leeches cannabinoids off plant which acts as extraction

FILTRATION

Selective isolation of cannabinoids from water

DRYING OF CANNABINOIDS

WATER EXTRACTED

CBDA / CBD
CBG / CBGA

Natural Cannabinoids = Acidic Cannabinoids

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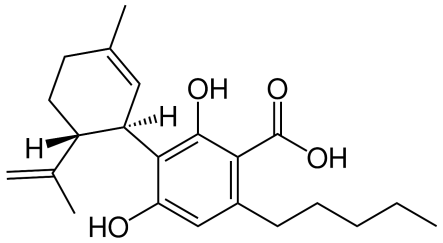
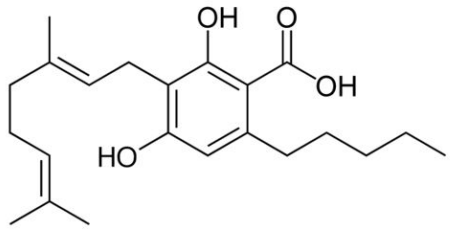
Without the use of heat, we are able to extract cannabinoids in its raw natural state.

CBDA and CBGA are natural precursors to other cannabinoids found naturally in hemp plants.

Cannabidiolic acid
CBDA



Cannabigerolic acid
CBGA

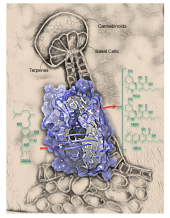


Acidic Cannabinoids

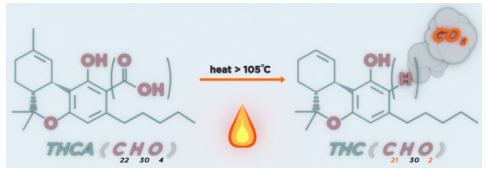
are the foundation of all cannabinoids, serving as the natural precursors produced by the hemp plant

The hemp plant naturally produces ONLY acidic cannabinoids.

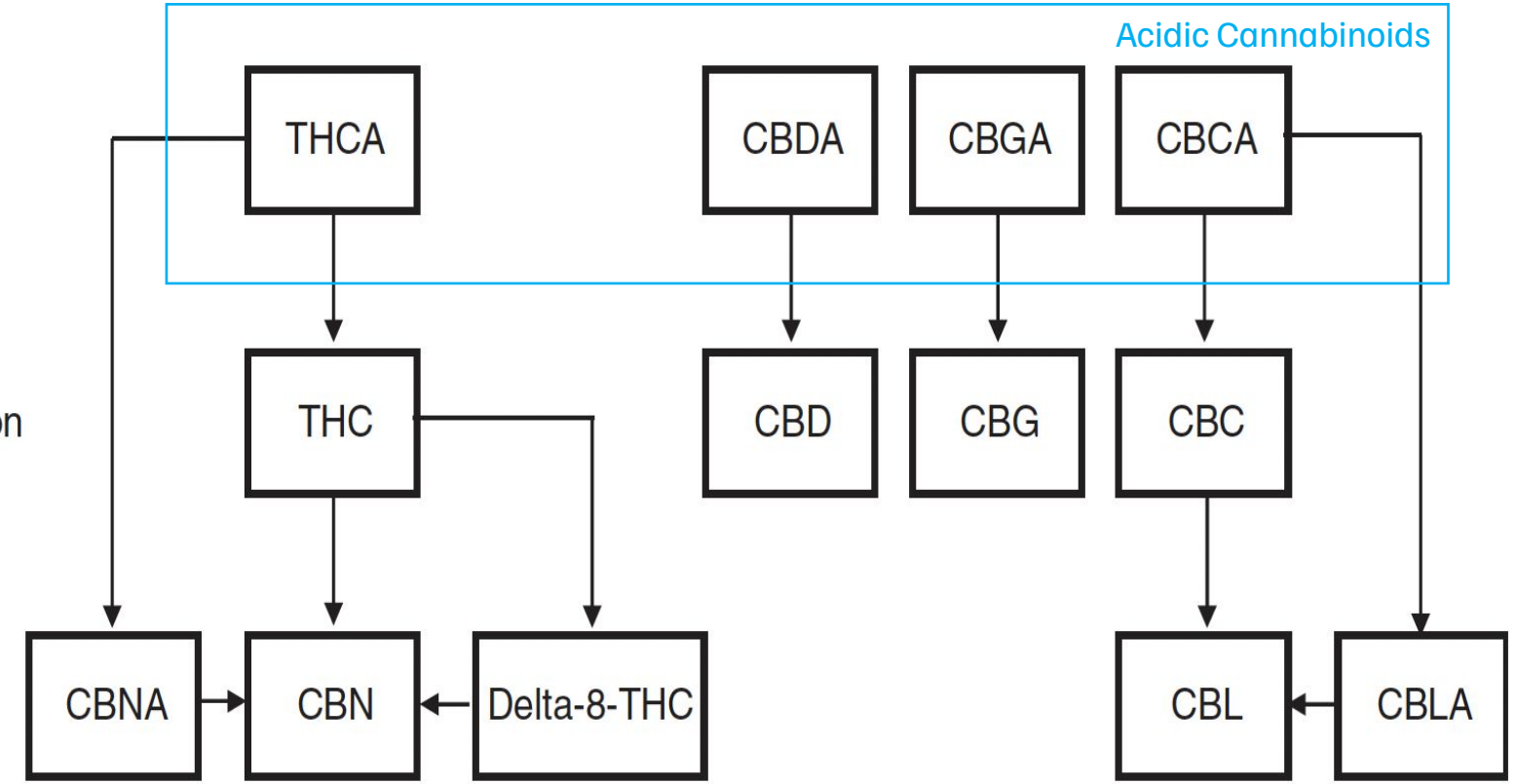
(1) Products of biosynthesis



(2) Products of decarboxylation



(3) Products of degradation



Key target for cannabinoids-based therapy starts with Endocannabinoid System (ECS)

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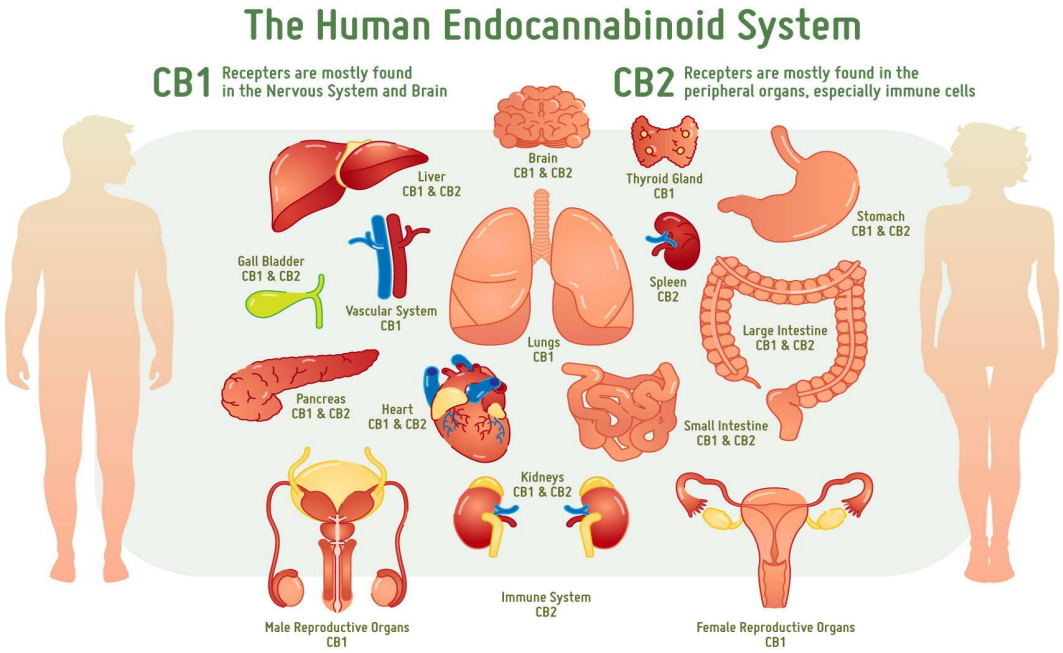
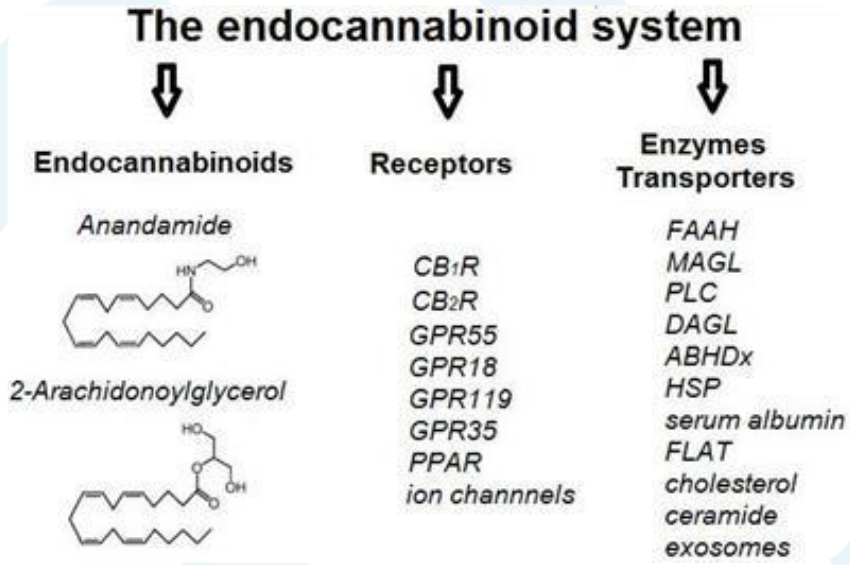
The **endocannabinoid system (ECS)** is a complex cell-signaling system found in the human body (and in all vertebrates) that plays a key role in regulating a wide range of physiological processes.



The ECS plays a role in regulating numerous bodily functions, including:

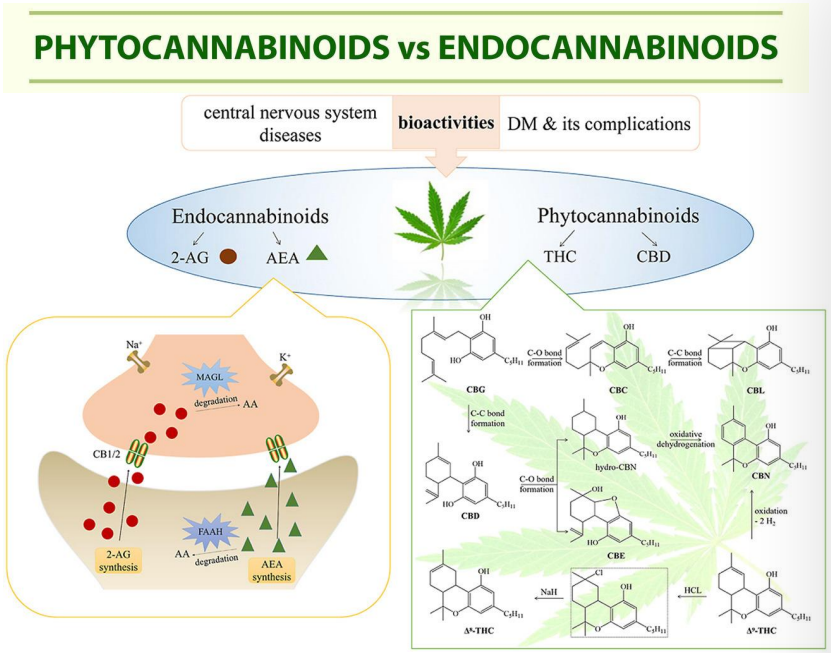
- **Pain and inflammation**
- **Mood and stress response**
- **Appetite and metabolism**
- **Sleep**
- **Immune system function**
- **Memory and learning**
- **Reproductive health**
- **Motor control**



Kumar et al. Int J Mol Sci. 2018 Mar; 19(3): 833.

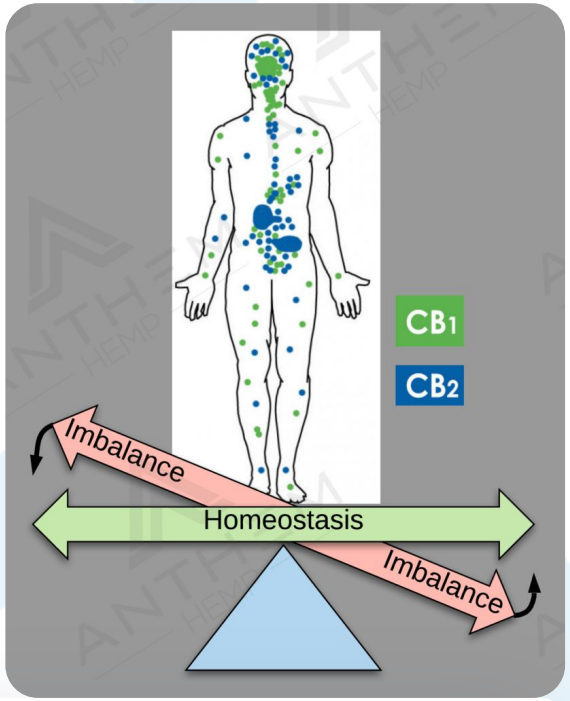
The Endocannabinoid System…

The interactions between ECS and Phytocannabinoids leads to the medicinal benefits of cannabinoids



Phytocannabinoids: These are cannabinoids that are produced by plants The most well-known phytocannabinoids include **THC** and **CBD**, among others like **CBDA, CBGA, CBN**, and **CBC**.
vs Endocannabinoids are cannabinoids naturally produced by the body, as part of the **ECS**

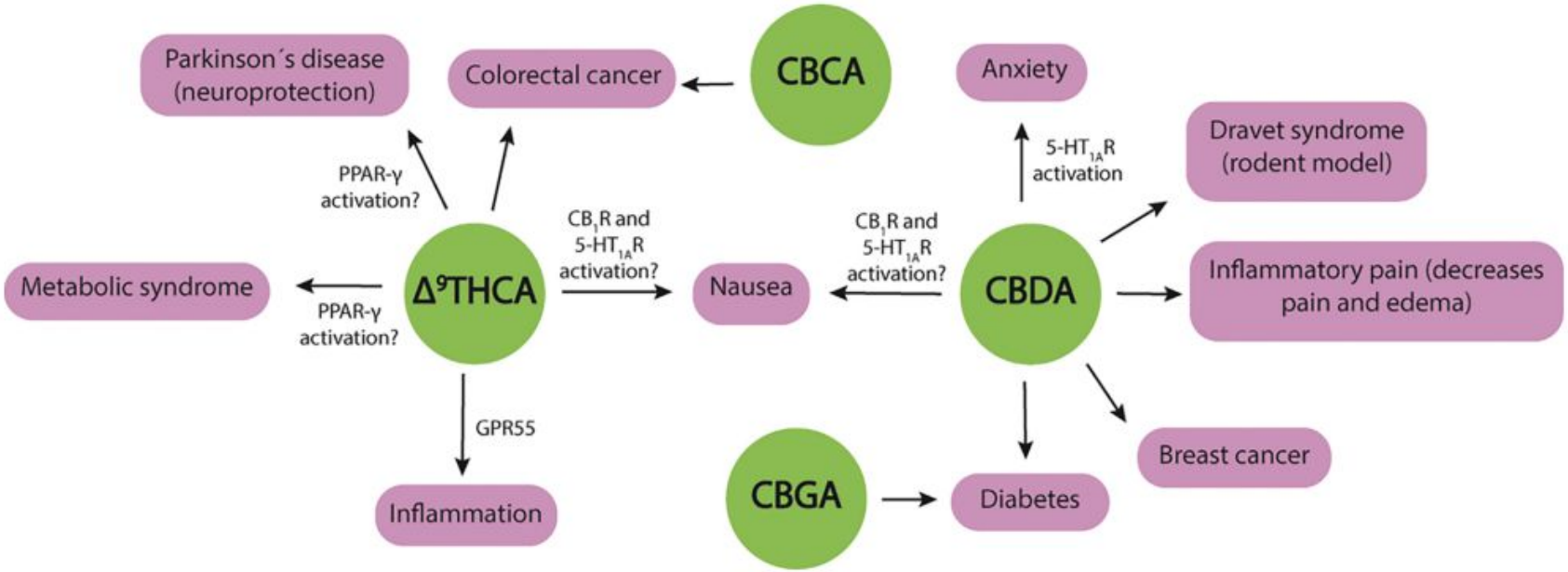
Phytocannabinoids can interact with and support the body's endocannabinoid system (ECS), offering external assistance when the ECS requires a boost to maintain equilibrium.



The ECS helps maintain homeostasis, or balance, in the body, so physiological systems operate within optimal ranges.

Marzo et al. Nature Reviews Neurology volume 16, 9–29 (2020)

Therapeutic applications of acidic cannabinoids and its interactions with ECS



- CBDA and CBGA modulate ECS and other receptors
- Potential to reduce inflammation, pain, and nausea
- Preliminary studies show positive effects in conditions like epilepsy, anxiety, and inflammation.

Franco et al. Pharmacol Res. 2020 May 13:158:104801

Acidic Cannabinoids have superior Bioavailability and Shelf Stability

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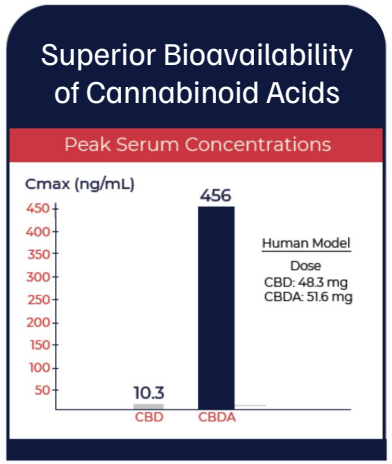
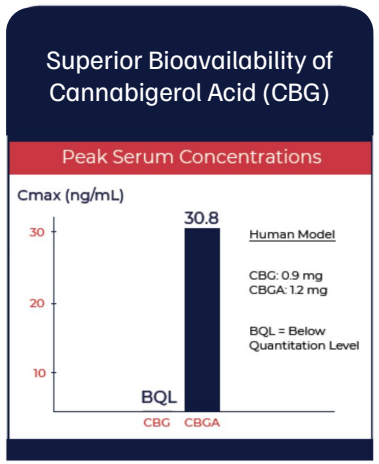
Bioavailability refers to the amount of an active substance that enters the bloodstream in its usable form. **Substances with higher bioavailability are more effective because the body can absorb more of them without needing to take larger amounts.**

CBD:CBDA



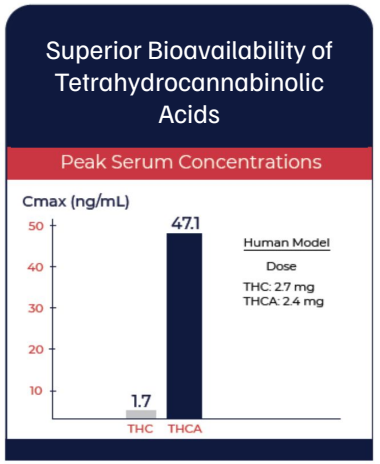
CBDA = 45x Absorbtion

CBG:CBGA

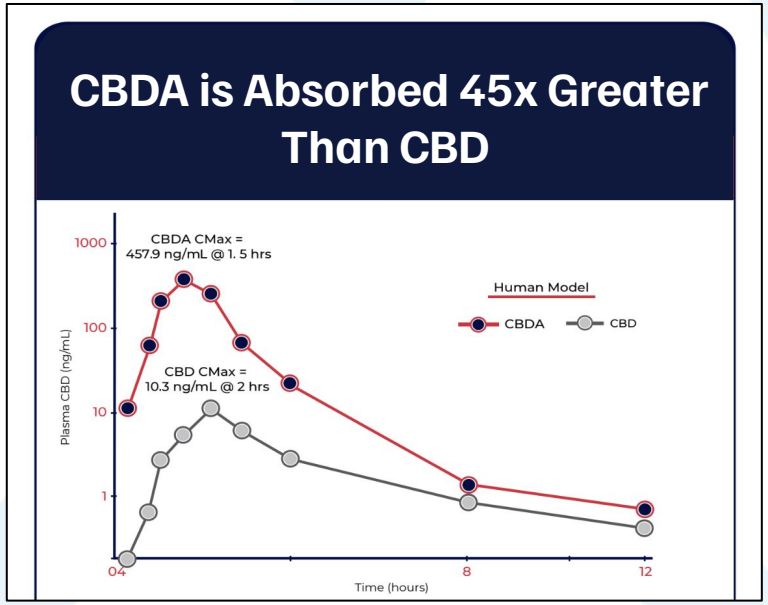


CBGA = 30x Absorbtion

THC:THCA



THCA = 40x Absorbtion



Cannabinoid Acid Stability – Ambient

- Cannabinoid acids are stable at room temperature for >8 months

Time (days)	CBDA (%)	THC-A (%)	CBCA (%)	CBGA (%)
0	16.69	0.66	0.82	0.24
30	17.11	0.66	0.78	0.29
60	17.11	0.65	0.73	0.30
240	17.09	0.60	0.83	0.29

Anti-inflammatory and Analgesic Properties

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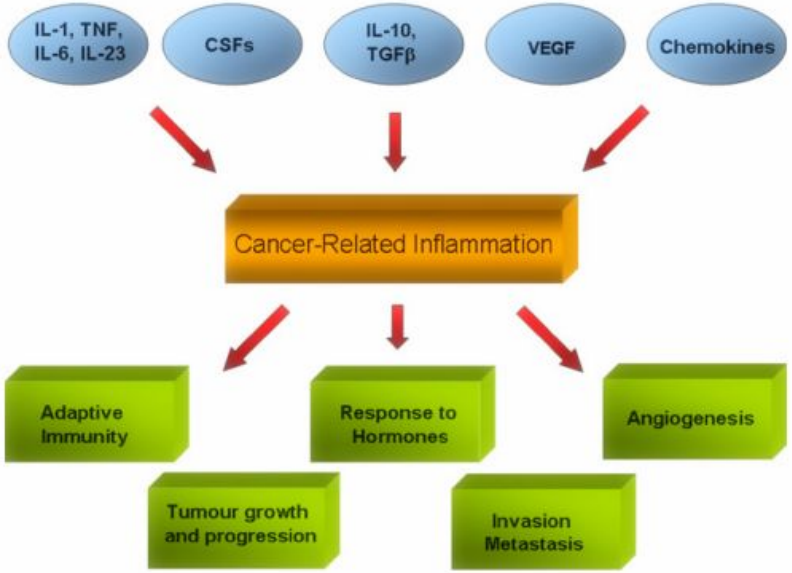
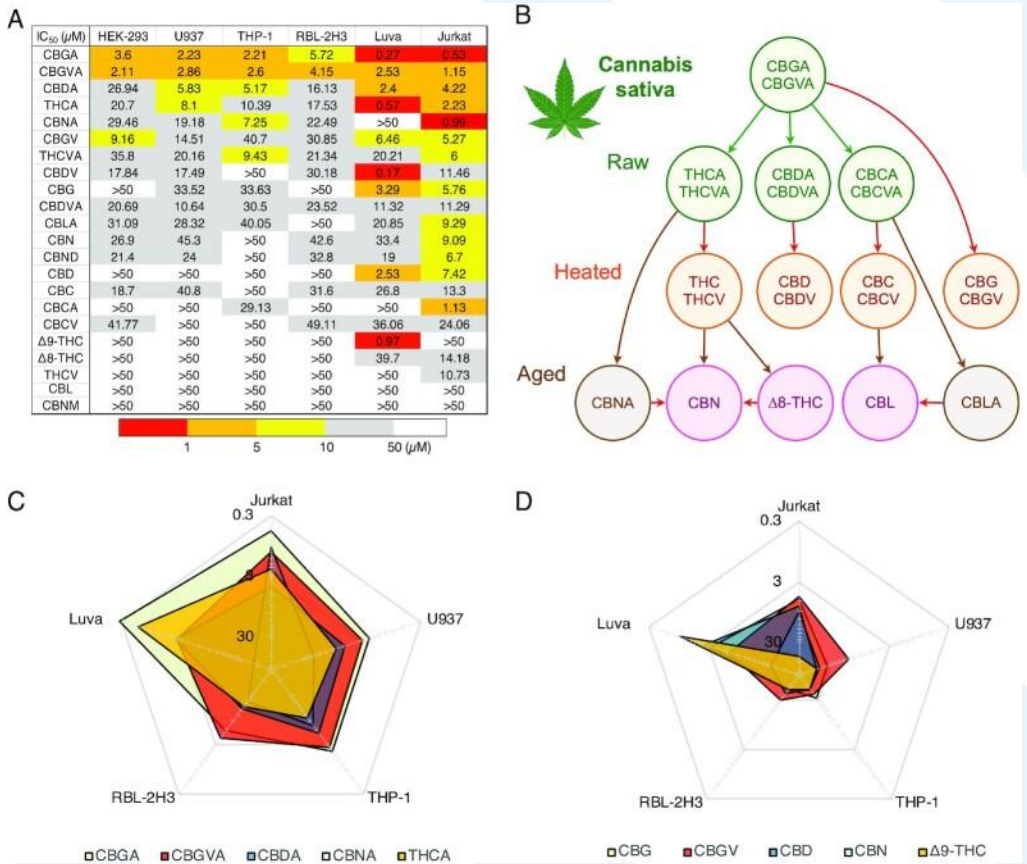
- Acidic Cannabinoids Suppress Proinflammatory Cytokine Release by Blocking Store-operated Calcium Entry (SOCE), reducing inflammation
- CBDA and CBGA have stronger anti-inflammatory effects than their CBD and CBG.
- They offer pain relief through COX-2 enzyme inhibition, similar to anti-inflammatory drugs.





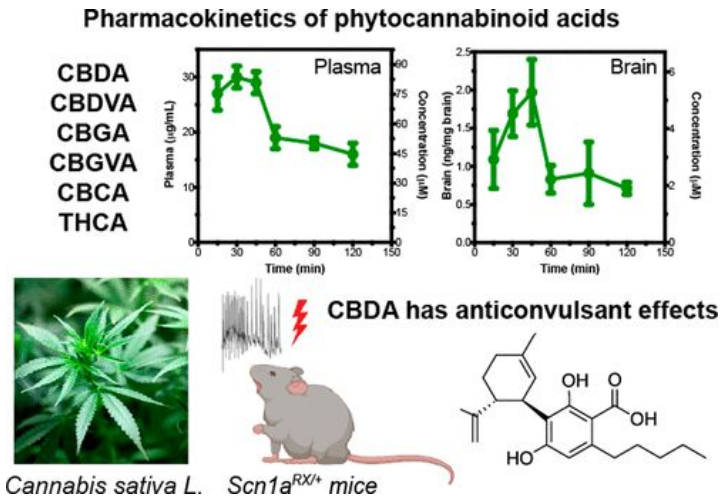
IC_{50} (μM)	HEK-293	U937	THP-1	RBL-2H3	Luva	Jurkat
CBGA	3.6	2.23	2.21	5.72	0.27	0.53
CBGVA	2.11	2.86	2.6	4.15	2.53	1.15
CBDA	26.94	5.83	5.17	16.13	2.4	4.22
THCA	20.7	8.1	10.39	17.53	0.57	2.23
CBNA	29.46	19.18	7.25	22.49	>50	0.99
CBGV	9.16	14.51	40.7	30.85	6.46	5.27
THCVA	35.8	20.16	9.43	21.34	20.21	6
CBDV	17.84	17.49	>50	30.18	0.17	11.46
CBG	>50	33.52	33.63	>50	3.29	5.76
CBDVA	20.69	10.64	30.5	23.52	11.32	11.29
CBLA	31.09	28.32	40.05	>50	20.85	9.29
CBN	26.9	45.3	>50	42.6	33.4	9.09
CBND	21.4	24	>50	32.8	19	6.7
CBD	>50	>50	>50	>50	2.53	7.42
CBC	18.7	40.8	>50	31.6	26.8	13.3
CBCA	>50	>50	29.13	>50	>50	1.13
CBCV	41.77	>50	>50	49.11	36.06	24.06
Δ9-THC	>50	>50	>50	>50	0.97	>50
Δ8-THC	>50	>50	>50	>50	39.7	14.18
THCV	>50	>50	>50	>50	>50	10.73
CBL	>50	>50	>50	>50	>50	>50
CBNM	>50	>50	>50	>50	>50	>50

1 5 10 50 (μM)

Differential potency of cannabinoids in modulating SOCE across various immune cells

Medical application of CBDA/CBGA in Epilepsy

- CBDA and CBGA shows strong anticonvulsant effects in models of epilepsy.
- CBDA and CBGA reduces harmful proteins and calcium buildup in Alzheimer's models, helping to protect memory.

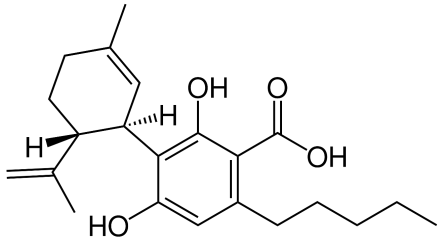


- Lynsdey et al 2021 shows for the first time that CBDA, CBGA, and other acidics—have anticonvulsant effects against hyperthermia-induced seizures in the Scn1a+/– mouse model of Dravet syndrome.
- CBDA was highly brain penetrant when administered in a Tween-based vehicle and exhibited significant anticonvulsant properties in the *Scn1a*$^{RX/+}$ mouse model of Dravet syndrome.

The U.S. Food and Drug Administration approved Epidiolex (cannabidiol) [CBD] oral solution in 2018 for the treatment of seizures associated with two rare and severe forms of epilepsy, Lennox-Gastaut syndrome and Dravet syndrome

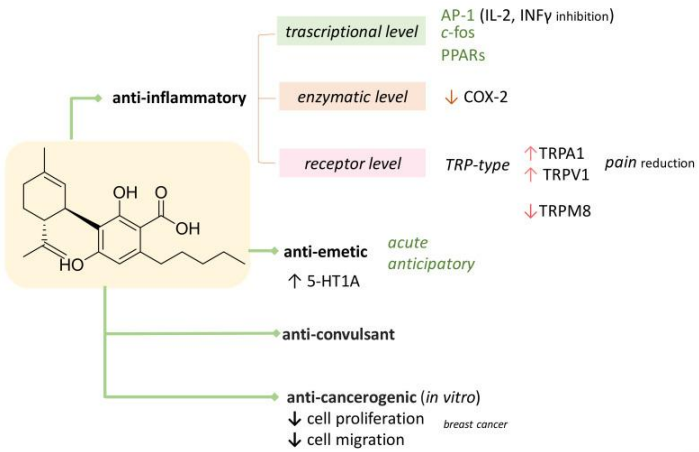
CBDA

What is CBDA?



CANNABIDIOLIC ACID

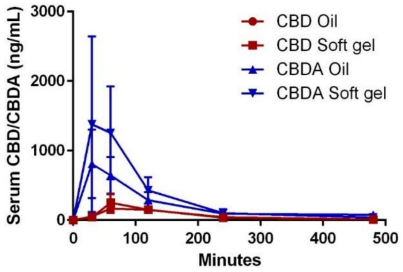
- **Precursor** to **CBD** meaning that when CBDA is heated it transforms into CBD.
- CBDA interacts with the body's **ECS**, which helps regulate balance (homeostasis) in areas like mood, pain, and inflammation. However, **CBDA does this differently than CBD because it primarily affects receptors outside of the ECS.**
- CBDA is thought to work by inhibiting the **COX-2 enzyme**, which is associated with inflammation. This is similar to how some anti-inflammatory drugs, like aspirin, work.



Research indicates that CBDA interacts with various receptors and pathways within the body. [1]

Therapeutic Benefits

Less CBDA is needed to sustain therapeutic effects



Using similar amounts, more CBDA is found circulating through the bloodstream than CBD. [2]

- Decreases Inflammation [3]
- Antibacterial Agent [4]
- Reduces pain 10x better than CBD [5]
- Reduces Seizures [6]
- Helps to reduce nausea [7]

Sources: (1) Martino, Molecules. 2020 Jun; 25(11): 2638. (2) TITTLE, David J. et al. Twenty-Four Hour and One-Week Steady State Pharmacokinetics of Cannabinoids in Two Formulations of Cannabidiol and Cannabidiolic Acid Rich Hemp in Dogs. Medical Research Archives, [S.l.], v. 10, n. 7, july 2022. ISSN 2375-1924. Available at: <https://esmed.org/MRA/mra/article/view/2907>. doi: https://doi.org/10.18103/mra.v10i7.2907. (3) Nigro, E.; Pecoraro, M.T.; Formato, M.; Piccolella, S.; Ragucci, S.; Mallardo, M.; Russo, R.; Di Maro, A.; Daniele, A.; Pacifico, S. Cannabidiolic acid in Hemp Seed Oil Table Spoon and Beyond. Molecules 2022, 27, 2566. https://doi.org/10.3390/molecules27082566 (4) Nigro E, Pecoraro MT, Formato M, Piccolella S, Ragucci S, Mallardo M, Russo R, Di Maro A, Daniele A, Pacifico S. Cannabidiolic acid in Hemp Seed Oil Table Spoon and Beyond. Molecules. 2022; 27(8):2566. https://doi.org/10.3390/molecules27082566 (5) Rock, E.M., Limebeer, C.L. & Parker, L.A. Effect of cannabidiolic acid and Δ9-tetrahydrocannabinol on carrageenan-induced hyperalgesia and edema in a rodent model of inflammatory pain. Psychopharmacology 235, 3259–3271 (2018). https://doi.org/10.1007/s00213-018-5034-1 (6) Lyndsey L. Anderson, Ivan K. Low, Samuel D. Banister, Iain S. McGregor, and Jonathon C. Arnold; Pharmacokinetics of Phytocannabinoid Acids and Anticonvulsant Effect of Cannabidiolic Acid in a Mouse Model of Dravet Syndrome; Journal of Natural Products 2019 82 (11), 3047-3055; DOI: 10.1021/acs.jnatprod.9b00600 (7) Rock, E. and Parker, L. (2013), Effect of low doses of cannabidiolic acid and ondansetron on LiCl-induced conditioned gaping (a model of nausea-induced behaviour) in rats. Br J Pharmacol, 169: 685-692. https://doi.org/10.1111/bph.12162

CBDA In Cyclodextrin Complex improves Physicochemical and Biological Performance

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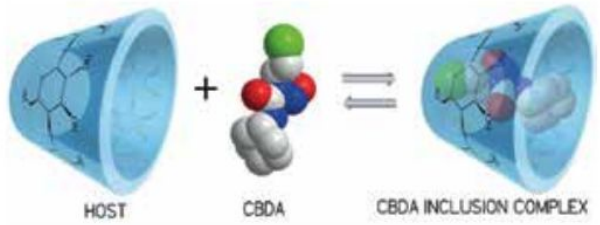
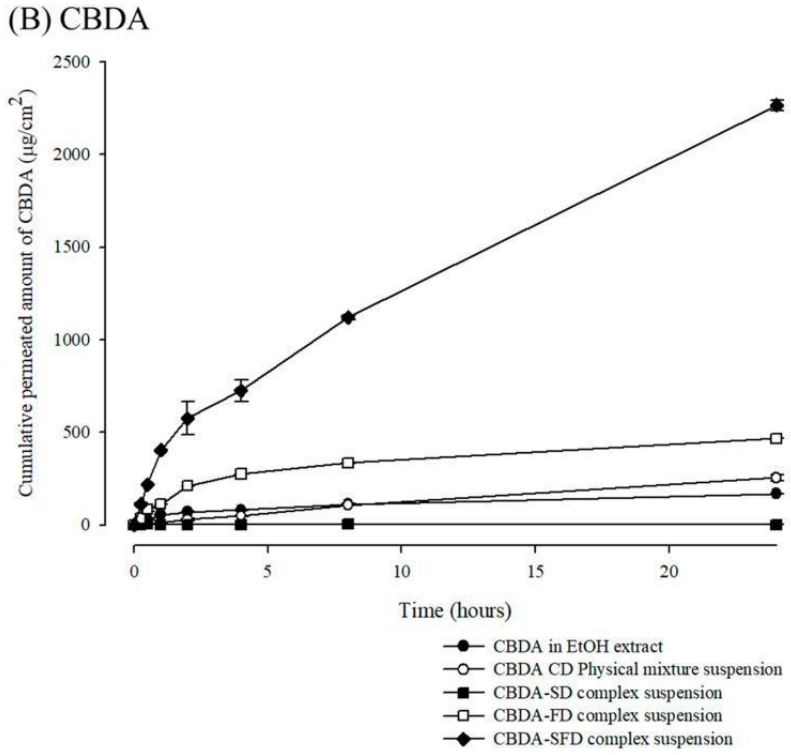
CBDA is naturally more bioavailable. Moreover, our water-soluble formulations are made with cyclodextrin complexes, which enhance cannabinoid permeability more effectively than traditional nanoemulsions.



CBDA in cyclodextrin complex increases the permeability as compared to suspension and physical mixture.

CBD derivatives could stably permeate lipophilic compounds that pass through the biological membrane via the paracellular route. CD molecules could act as organic cosolvents to induce the molecular mobility of lipophilic molecules, maximizing the thermodynamic activity. As a result, the complexation of cannabinoid acid in CDs could be an alternative way to reduce the adverse effects of surfactant overuse.



Nigro, E.; Pecoraro, M.T.; Formato, M.; Piccolella, S.; Ragucci, S.; Mallardo, M.; Russo, R.; Di Maro, A.; Daniele, A.; Pacifico, S. Cannabidiolic acid in Hemp Seed Oil Table Spoon and Beyond. Molecules 2022, 27, 2566. https://doi.org/10.3390/molecules27082566

Cannabidiolic Acid (CBDA)'s interaction with 5-HT Receptors

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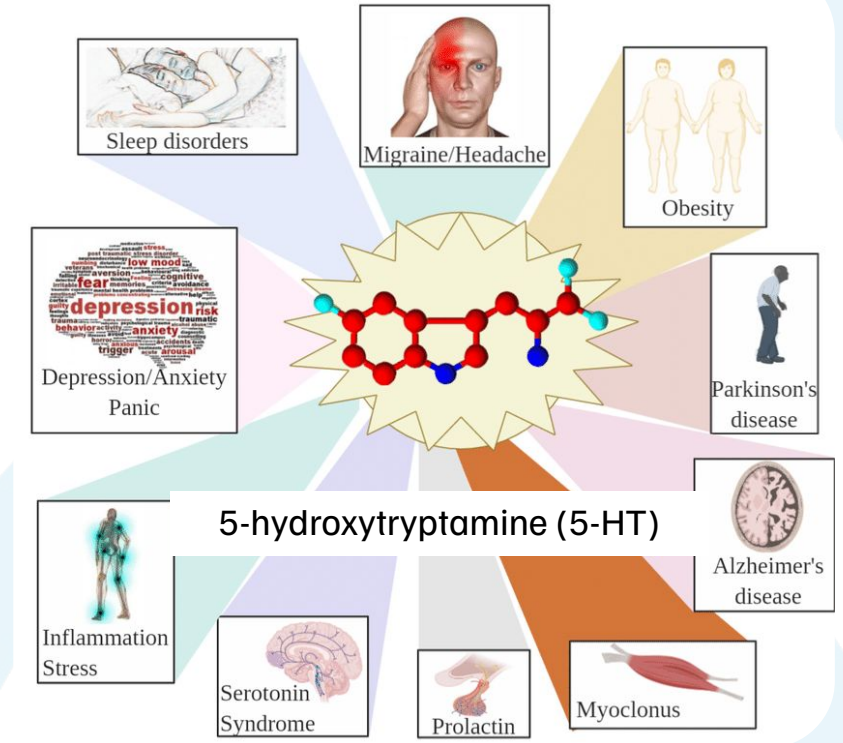
- CBDA was reported to be **1,000 times more potent than CBD** in stimulating (^{35}S)GTPγS binding at the 5-HT$_{1a}$ receptor.
- (D'Aniello, et al., 2019).

- CBDA was found to be 1000-fold more potent than CBD in reducing nausea-induced conditioned gaping disgust responses (Rock et al., 2020).

- CBDA may be more effective than CBD in reducing seizures in humans. According to a patent application by GW Pharmaceuticals, the makers of Epidiolex® (a sublingual spray containing 100 mg of CBD/100 ml of solution), CBDA displays greater bioavailability and potency in treating epilepsy (GW PHARMA LTD, 2015).

5-hydroxytryptamine (5-HT), also known as serotonin, is a neurotransmitter and hormone that has many functions in the body, including:

Brain/Mood/Memory/Stress/Appetite
Gastrointestinal tract
Ocular/muscle fiber
Cardiovascular system/inflammation/wound healing



Because 5-HT receptors are involved in various disease pathologies, which indicates CBDA to be a potential therapeutic marker.

Martino, Molecules. 2020 Jun; 25(11): 2638.

CBDA Reduces Pain

CBDA reduces pain 10X more potently than CBD.

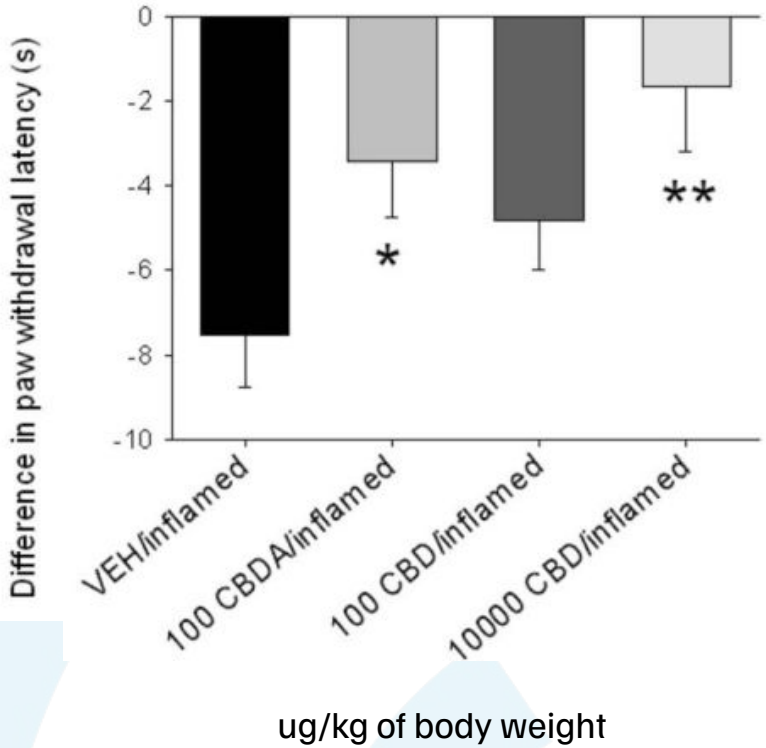
100ug of CBDA per kg of body weight reduced pain sensitivity.

VS

1,000ug/kg CBD is needed to reduce pain sensitivity.

Statistical Significance Rating
* = p < 0.05 significant
** = p < 0.03
*** = p < 0.001
**** = p < 0.0001 highest significance

Mouse model of Pain Tolerance



ug/kg of body weight

Rock, E.M., Limebeer, C.L. & Parker, L.A. Effect of cannabidiolic acid and Δ9-tetrahydrocannabinol on carrageenan-induced hyperalgesia and edema in a rodent model of inflammatory pain. Psychopharmacology 235, 3259–3271 (2018). https://doi.org/10.1007/s00213-018-5034-1

Cannabinoids and Cancer

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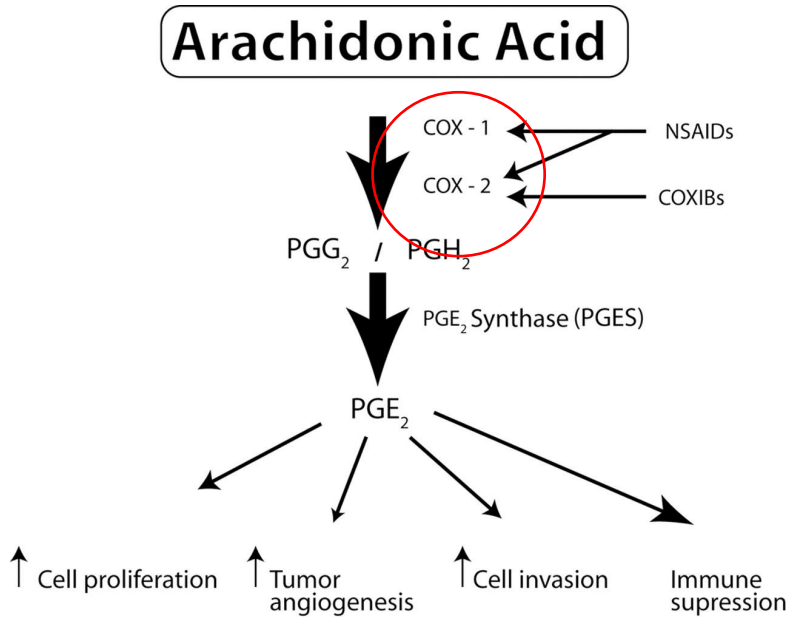
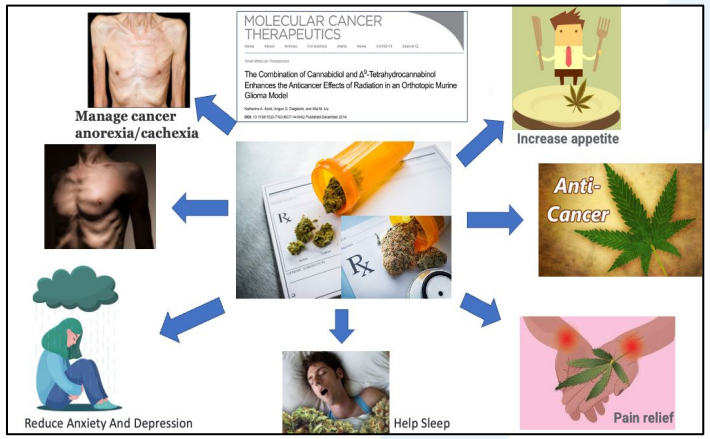
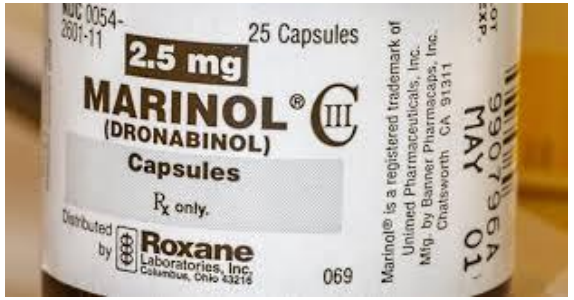
- Cannabinoids have potential in cancer treatment by improving appetite, reducing pain, and controlling nausea.
- CBDA inhibits breast cancer cell migration by downregulating COX-2.
- Cannabinoid therapies may reduce the impact on healthy cells, unlike conventional treatments.

Medical cannabis benefits in cancer therapy





CBDA down-regulates cyclooxygenase-2 (COX-2) expression in human breast cancer cells.



Dronabinol and Nabilone, are approved cannabis drugs for the treatment of cancer-related side effects

Takeda et al. Toxicol Lett. 2012 Nov 15; 214(3): 314–319.

CBDA benefits in Alzheimer's Disease (AD)

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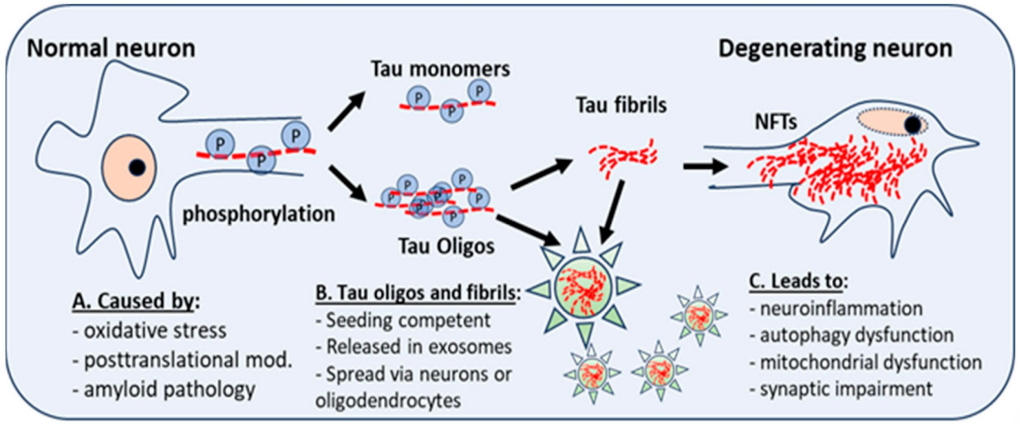


The Role of Tau Pathology in Alzheimer's Disease

CBDA Rescue Memory Deficits and Reduce Amyloid-Beta and Tau Pathology in an Alzheimer's Disease-like Mouse Model

KEY ISSUES IN ALZHEIMER'S DISEASE (AD)

1. **Memory Loss:** A major symptom of AD.
2. **Build-up of Harmful Substances:** Proteins like **amyloid-beta (Aβ)** and **phosphorylated tau (p-tau)** build up in the brain, damaging brain cells.
3. **Calcium Overload:** Increased levels of **calcium (Ca^{2+})** in a brain area called the **hippocampus** (which is critical for memory) can cause further damage.

HOW CBDA HELP

- **Reduce Memory Loss:** These compounds seem to protect memory, making it less likely to be affected by Alzheimer's.
- **Lower Harmful Protein Levels:** They can help prevent the buildup of the damaging proteins (Aβ and p-tau) that are common in Alzheimer's patients.
- **Regulate Calcium Levels:** They also help balance calcium levels in the brain, which can otherwise worsen the damage in Alzheimer's.

CONCLUSION

CBDA could potentially be useful as **therapeutic agents** to treat Alzheimer's by protecting memory and reducing harmful changes in the brain that contribute to the disease. While more research is needed, these early results are promising for using these cannabinoids in Alzheimer's treatment.

Vasileios et al. Int J Mol Sci. 2023 Apr; 24(7): 6827.

The Antimicrobial Activity of Acidic Cannabinoids

ESSENTIA SCIENTIFIC

Efficacy of CBDA preparations against Staphylococcu saureus

Compound	Source	Strain(s)	Antibiotic Sensitivity	Efficacy	Reference
Cannabidiolic acid (CBDA)	Purified from *Cannabis sativa*, fiber types	USA300	MRSA	4 μg/mL **	Martinenghi et al., 2020 [37]
CBDA	Purified from *Cannabis sativa*, fiber types	ATCC 25923	Methicillin- sensitive	2 μg/mL **	Martinenghi et al., 2020 [37]

Efficacy of CBDA preparations against Gram-positive bacteria

Compound	Source	Target	Strain(s)	Efficacy	Reference
CBDA	Purified from *Cannabis sativa*, fiber types	*Staphylococcus epidermidis*	CA#71, ATCC 51625	4 μg/mL **	Martinenghi et al., 2020 [37]

Anti-viral efficacy of CBDA and CBGA molecules and preparations

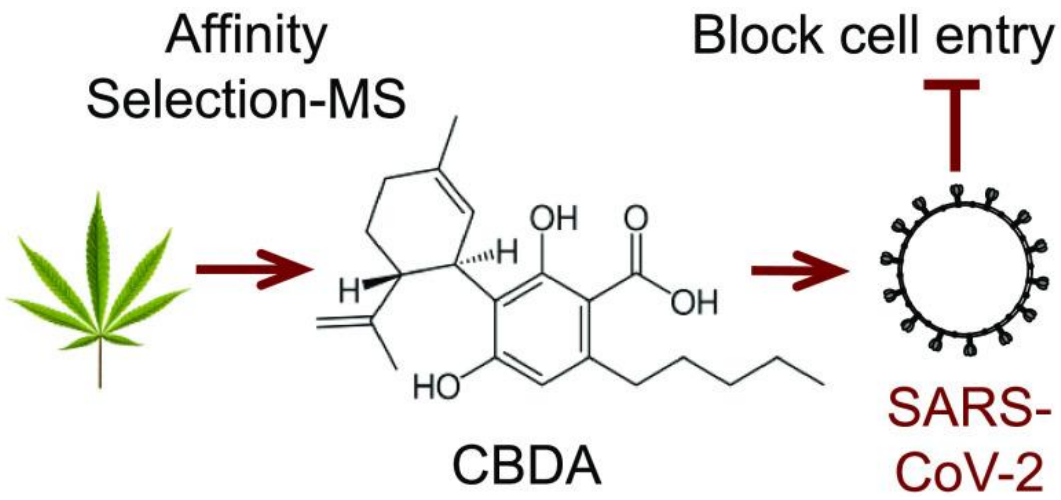
Compound	Source	Target	Variant	Microbe	Efficacy	Reference
Cannabigerolic acid (CBGA)	Commercial	SARS-CoV-2	WA1; B.1.1.7; B.1.351	ssRNA virus	26–37 μg/mL *	Van Breemen et al., 2022 [49]
CBDA	Commercial	SARS-CoV-2	WA1; B.1.1.7; B.1.351	ssRNA virus	11–24 μg/mL *	Van Breemen et al., 2022 [49]

- CBDA and CBGA demonstrate potent antibacterial properties, particularly against drug-resistant strains like MRSA.
- Lab studies have shown that CBDA and CBGA can inhibit viral infections, including COVID-19 variants, and their antimicrobial effects may help treat conditions such as MRSA, viral infections like COVID and flu, skin allergies, and fungal infections.
- These compounds hold potential for use in both human and veterinary antimicrobial products.

Hong et al. Biomedicines. 2022 Aug; 10(8): 1959.

Acidic Cannabinoid (CBDa) Block Cellular Entry of SARS-CoV-2 and the Emerging Variants

ESSENTIA SCIENTIFIC



Cannabigerolic acid CBGA and cannabidiolic acid CBDA were equally effective against the SARS-CoV-2 alpha variant B.1.1.7 and the beta variant B.1.351 in-vitro.

CBDA/CBGA inhibits COVID19 viral infection

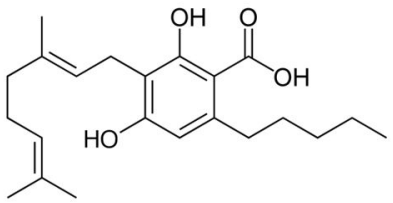
COVID is a form of a common flu, and through its antiviral mechanism, CBDA may help prevent both the flu and common cold by boosting the immune system.

Breemen et al. J Nat Prod. 2022 Jan 28; 85(1): 176–184.

CBGA?

ESSENTIA SCIENTIFIC

What is CBGA?



CANNABIGEROLIC ACID

- CBGA is the raw state and the acidic counterpart of the cannabinoid CBG when no heat is involved in extraction.
- CBGA is the "mother cannabinoid" in cannabis, as it is the precursor to all other cannabinoids, including CBDA and CBCA.

Therapeutic Benefits

Acts as an Antioxidant

CBGA is a better antioxidant than Vitamin E. [1]

Aids in Sugar Metabolism

CBGA decreases blood glucose levels. [2]

Acts as an Antibacterial

CBGA kills more oral bacteria than toothpaste. [3]

Anti Inflammatory

CBGA blocks calcium channels to reduce inflammation. [4]

Sources: (1) Dawidowicz, A.L., Typek, R. & Olszowy-Tomczyk, M. Natural vs. artificial cannabinoid oils: the comparison of their antioxidant activities. Eur Food Res Technol 249, 359–366 (2023). https://doi.org/10.1007/s00217-022-04121-9 (2) Har Govind Garg, Ashish Jain, Parul MehtaANTI-DIABETIC EFFECT OF CANNABIGEROLIC ACID (CBGA) IN STREPTOZOTOCIN-INDUCED DIABETIC RATS. Journal of Cardiovascular Disease Research VOL12,ISSUE04,2021 (3) Stahl V, Vasudevan K (January 29, 2020) Comparison of Efficacy of Cannabinoids versus Commercial Oral Care Products in Reducing Bacterial Content from Dental Plaque: A Preliminary Observation. Cureus 12(1): e6809. doi:10.7759/cureus.6809 (4) Malika Faouzi, Clay Wakano, Mahealani K Monteilh-Zoller, Ram P Neupane, John G Starkus, Jayanti Bhandari Neupane, Aaron J Cullen, Brandon E Johnson, Andrea Fleig, Reinhold Penner, Acidic Cannabinoids Suppress Proinflammatory Cytokine Release by Blocking Store-operated Calcium Entry, Function, Volume 3, Issue 4, 2022, zqac033, https://doi.org/10.1093/function/zqac033

CBGA Acts as an Antioxidant

CBGA is a better antioxidant than Vitamin E.

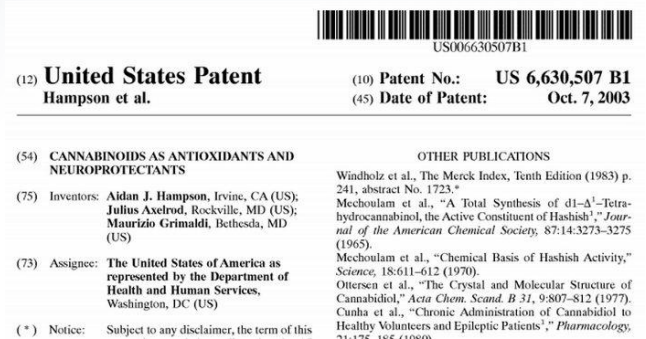
CBGA is a more potent antioxidant than Vitamin E (Trolox). At similar concentrations, hemp-derived CBGA shows higher antioxidant activity compared to Vitamin E. Three forms of CBGA tested include:

CBGA-NAT:
10.93 % CBGA
1.37% CBDA

CBGA-ART:
10.93 % CBGA
1.37% CBDA

CBGA-MONO:
10.93% CBGA

NAT = hemp extracts dissolved in hemp oil
ART = synthesized cannabinoids
MONO = singular synthesized cannabinoid
TROLOX = Vitamin E



US006630507B1

(12) **United States Patent**
Hampson et al.

(10) **Patent No.: US 6,630,507 B1**
(45) **Date of Patent: Oct. 7, 2003**

(54) **CANNABINOIDS AS ANTIOXIDANTS AND NEUROPROTECTANTS**

(75) Inventors: **Aidan J. Hampson**, Irvine, CA (US); **Julius Axelrod**, Rockville, MD (US); **Maurizio Grimaldi**, Bethesda, MD (US)

(73) Assignee: **The United States of America as represented by the Department of Health and Human Services**, Washington, DC (US)

(*) Notice: Subject to any disclaimer, the term of this

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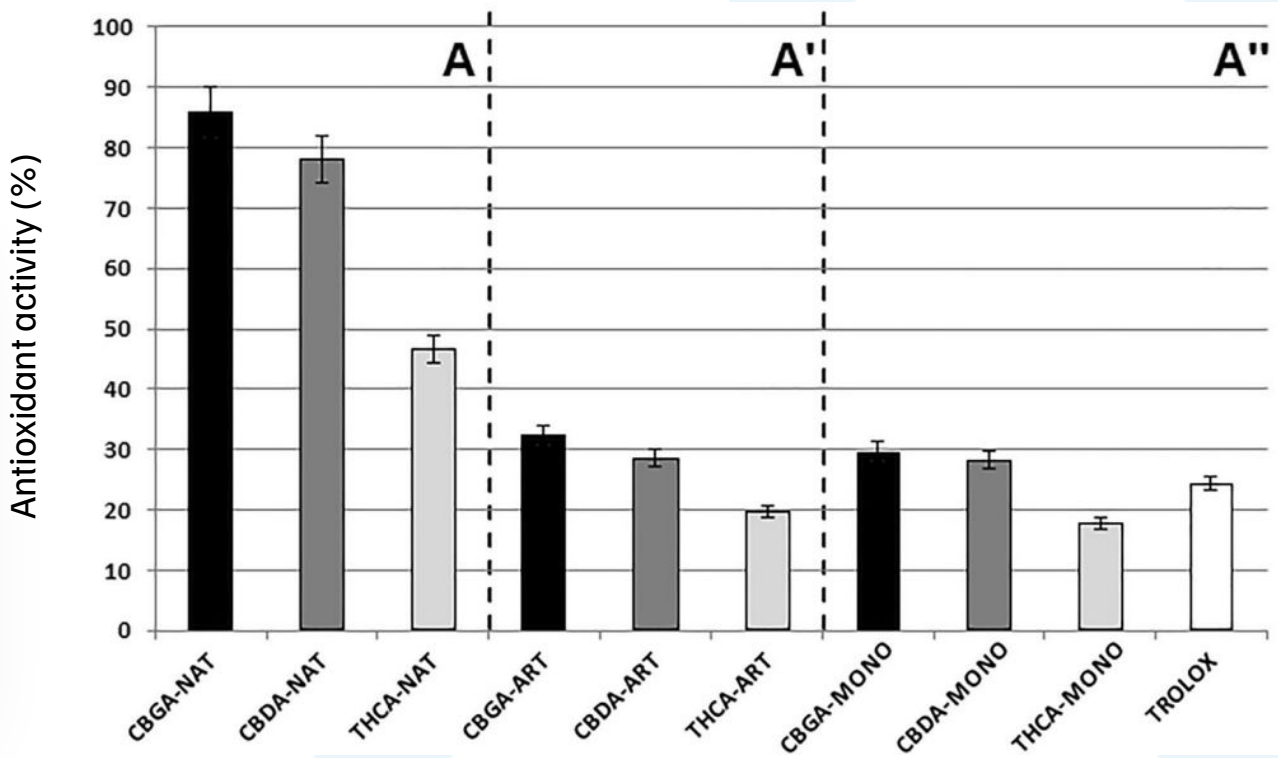
Windholz et al., The Merck Index, Tenth Edition (1983) p. 241, abstract No. 1723.*
Mechoulam et al., "A Total Synthesis of d1–Δ¹–Tetrahydrocannabinol, the Active Constituent of Hashish¹," *Journal of the American Chemical Society*, 87:14:3273–3275 (1965).
Mechoulam et al., "Chemical Basis of Hashish Activity," *Science*, 18:611–612 (1970).
Ottersen et al., "The Crystal and Molecular Structure of Cannabidiol," *Acta Chem. Scand. B 31*, 9:807–812 (1977).
Cunha et al., "Chronic Administration of Cannabidiol to Healthy Volunteers and Epileptic Patients¹," *Pharmacology*,



Dawidowicz, A.L., Typek, R. & Olszowy-Tomczyk, M. Natural vs. artificial cannabinoid oils: the comparison of their antioxidant activities. Eur Food Res Technol 249, 359–366 (2023). https://doi.org/10.1007/s00217-022-04121-9

CBGA Aids in Sugar Metabolism

ESSENTIA SCIENTIFIC

CBGA decreases blood glucose levels

CBGA has been shown to significantly reduce blood glucose levels in diabetic rats. By Day 8, CBGA lowers blood glucose levels to the same extent as a common diabetes drug, resulting in a 62% decrease compared to untreated diabetic rats. By Day 21, CBGA maintains this effect, with a 68% reduction in blood glucose levels compared to no treatment.

STUDY GROUPS

Normal = non-diabetic rats
Control = diabetes induced rats without treatment
Glibenclamide = diabetes induced rats with common diabetes treatment
CBGA = diabetes induced rats with CBGA treatment

Groups	Treatment	Dose	Blood glucose (mg/dl)		
			Days 1	Days 8	Days 21
I	Normal	1 % saline	81.00 ± 5.00	86.00 ± 5.00	100.00 ± 5.00
II	Control	40 mg/kg i.p.	291.00 ± 7.00	387.00 ± 8.00$^{\#}$	390.00± 8.00$^{\#}$
III	Glibenclamide	5 mg/kg p.o.	250.00± 6.40	150.00 ± 6.50**	115.00 ± 5.00***
IV	Cannabigerolic acid (CBGA)	50 mg/kg p.o.	251.00 ± 7.00	150.20 ± 7.00*	129.00 ± 6.50*
V	Cannabigerolic acid (CBGA)	100 mg/kg p.o.	250.00± 7.00	148.10 ± 7.00*	122.00 ± 7.00**

Statistical Significance Rating
* = $p < 0.05$ significant
** = $p < 0.03$
*** = $p < 0.001$
**** = $p < 0.0001$ highest significance

Har Govind Garg, Ashish Jain, Parul MehtaANTI-DIABETIC EFFECT OF CANNABIGEROLIC ACID (CBGA) IN STREPTOZOTOCIN-INDUCED DIABETIC RATS.
Journal of Cardiovascular Disease Research VOL12,ISSUE04,2021

CBGA Acts as an Antibacterial

ESSENTIA SCIENTIFIC

CBGA kills more oral bacteria than toothpaste.

CBGA has been shown to reduce oral bacteria more effectively than toothpaste, with a 48% decrease in bacterial content compared to undiluted toothpaste in samples collected from 10 patients.

DPSI group / Treatments	Mean colony count										Total	Average
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10		
DPSI 0												
CBGA	13	5	13	7	8	14	18	4	17	16	115.00	11.5
CBN	4	14	8	15	16	9	5	12	8	13	104.00	10.4
CBG	20	25	18	19	14	11	14	9	4	12	146.00	14.6
CBD	7	12	4	20	12	21	9	15	13	3	116.00	11.6
CBC	11	11	12	9	6	17	17	18	9	9	119.00	11.9
Oral b	35	4	9	34	12	24	24	24	18	22	206.00	20.6
Colgate	12	40	25	12	28	12	12	35	19	34	229.00	22.9

Study Details:
CBGA = 12.5% CBGA
Oral b = undiluted toothpaste
Colgate = undiluted toothpaste
Mean colony count = amount of bacteria groups
P = patient

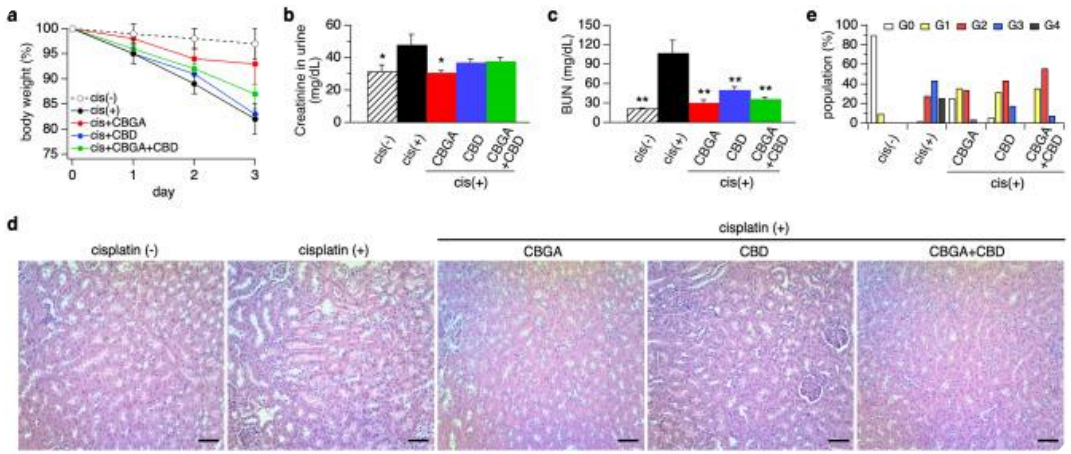
Stahl V, Vasudevan K (January 29, 2020) Comparison of Efficacy of Cannabinoids versus Commercial Oral Care Products in Reducing Bacterial Content from Dental Plaque: A Preliminary Observation. Cureus 12(1): e6809. doi:10.7759/cureus.6809

CBGA ameliorates inflammation and fibrosis in nephropathy

ESSENTIA SCIENTIFIC

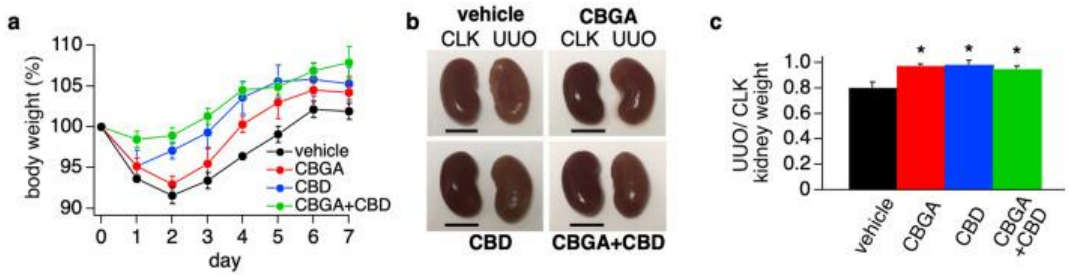
Nephropathy refers to damage to the kidneys, which can be caused by things like diabetes, high blood pressure, or autoimmune diseases. Two key problems in nephropathy are **inflammation** (the body's immune response going into overdrive) and **fibrosis** (the formation of scar tissue in the kidneys, which can impair kidney function).

CBGA: Some studies are showing that CBGA has potential anti-inflammatory and anti-fibrotic properties. This means that CBGA might help calm down the immune system's response (reducing inflammation) and also prevent or slow down the formation of scar tissue (fibrosis) in the kidneys.



CBGA suppress inflammation invitro

CBGA and CBD prevent kidney functional loss and damage in the cisplatin-induced acute nephropathy mouse model.

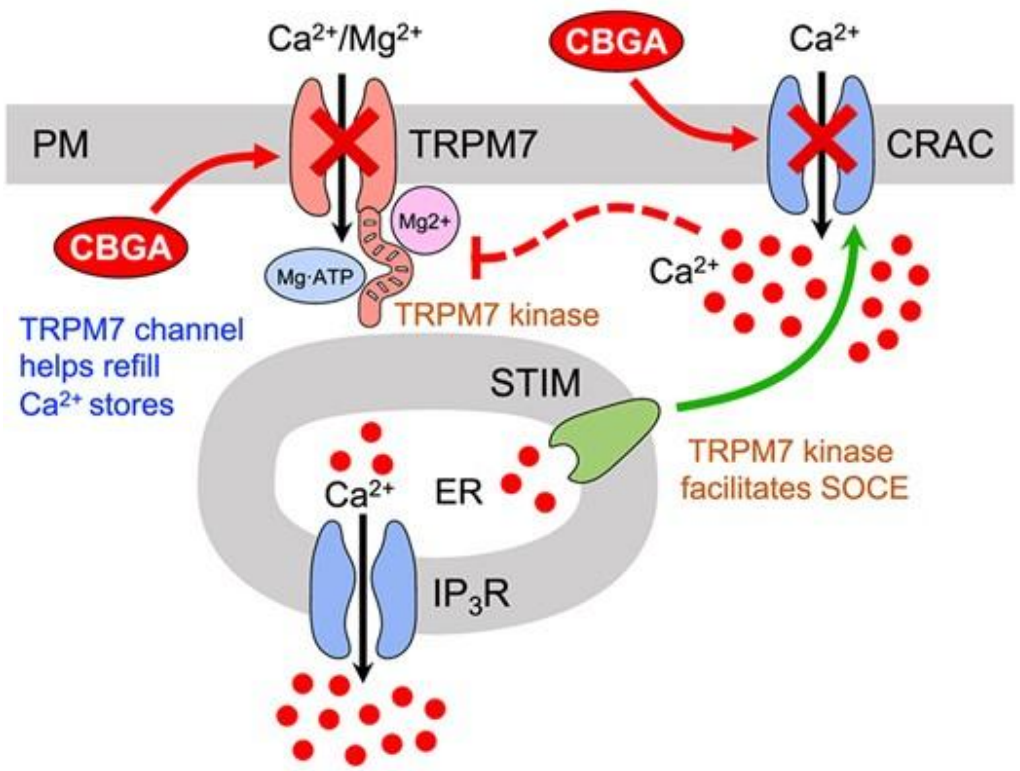


CBGA suppress inflammation in-vivo

CBGA and CBD prevent kidney atrophy in the UUO mouse model.

Suzuki et al. Sci Rep. 2023; 13: 6341.

Role of CBGA in Cancer, Stroke and Kidney Disease



CBGA shows great potential for treating diseases like cancer, stroke, and kidney disease by blocking a protein called TRPM7, which is often overactive in these conditions. When TRPM7 is too active, it can lead to harmful cell growth, inflammation, and tissue damage.

CBGA is the strongest cannabinoid when it comes to stopping TRPM7 from working. It affects both the ion channel and the chemical reactions inside cells controlled by TRPM7.

POTENTIAL BENEFITS OF CBGA

CANCER

TRPM7 is often overactive in cancer, promoting uncontrolled cell growth and metastasis. By inhibiting TRPM7, CBGA could offer a new avenue for controlling tumor progression.

STROKE

During stroke, overactivity of TRPM7 can lead to increased cell death and inflammation. CBGA's inhibition of TRPM7 might help protect cells and reduce the extent of damage.

KIDNEY DISEASE

TRPM7's dysregulation is linked to inflammation and tissue injury in kidney diseases. CBGA's action could mitigate these effects, potentially slowing disease progression.

Role of TRPM7 in Neurodegenerative Disorders

ESSENTIA SCIENTIFIC

TRPM7's Role in the Nervous System: Normal vs. Disease Conditions

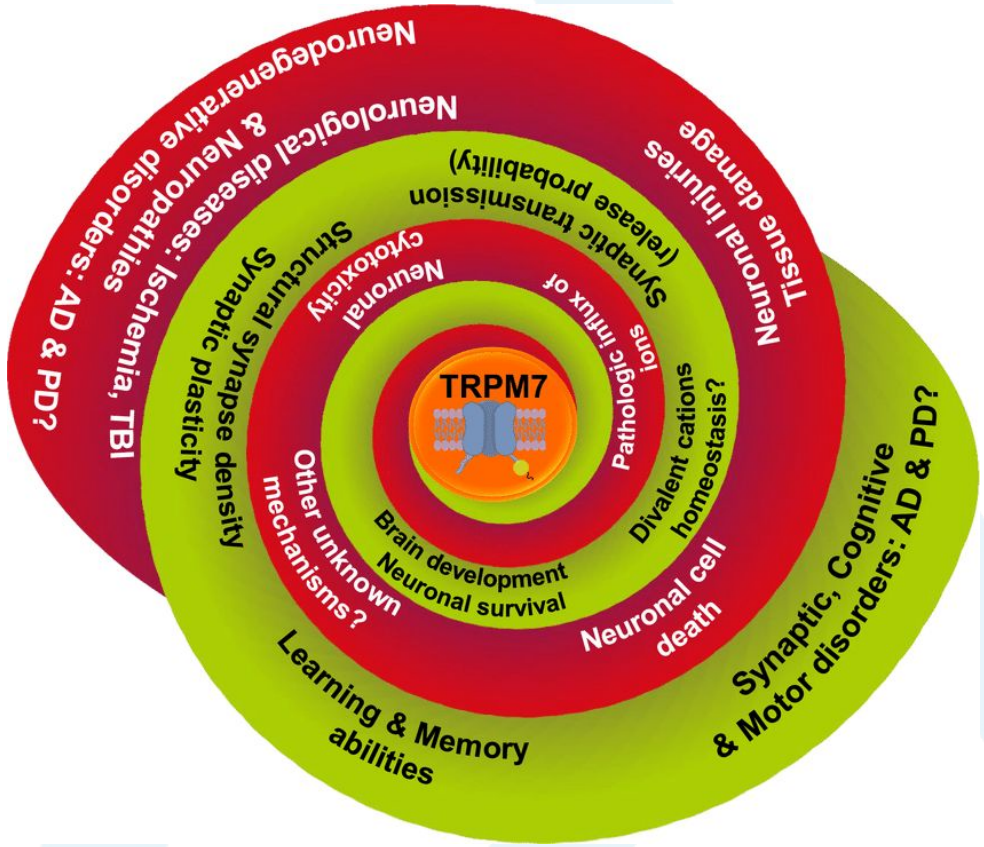
In normal conditions (yellow), TRPM7 helps control important processes in nerve cells, like ion balance and communication. But in disease conditions (red), like brain disorders and neurodegenerative diseases, TRPM7 can become overactive, leading to cell damage and neuron death.

TRPM7's Impact on Neurodegenerative Diseases

When TRPM7 is overactive, it can make neurodegenerative diseases, like Alzheimer's and Parkinson's, worse by causing more cell damage. CBGA can regulate TRPM7, which means it might help protect nerve cells and slow down these diseases.

TRPM7 in Neurodegenerative Diseases

Nashat et al. (2019) showed that TRPM7 plays a key role in the development of neurodegenerative disorders, suggesting that CBGA could be helpful in treating these conditions.



Potential products related to acidic cannabinoids

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CBDa /CBGa tincture

- PAIN
- ANXIETY
- SLEEP
- INFLAMMATION
- NAUSEA
- ANTIMICROBIAL
- SEIZURES

- PAIN
- CHRONIC INFLAMMATORY DISEASE
- SKIN CANCER TREATMENT
- SKIN CONDITIONS
- ANTIEMETIC, APPETITE STIMULANT
- EPILEPSY
- ANXIETY
- WOUND HEALING

CBDa /CBGa Edible

- PAIN
- ANXIETY
- SLEEP
- INFLAMMATION
- NAUSEA
- ANTIMICROBIAL
- SEIZURES

- PAIN
- ANXIETY
- CANCER
- DEPRESSION
- INFLAMMATION AND ARTHRITIS
- FIBROMYALGIA
- SEIZURES
- PARKINSON'S DISEASE

- PAIN
- CHRONIC INFLAMMATORY DISEASE
- SKIN CANCER TREATMENT
- SKIN CONDITIONS
- ANTIEMETIC, APPETITE STIMULANT
- EPILEPSY
- WOUND HEALING
- SEIZURES

ECS is not only present in humans but also in dogs and cats, leading to effective treatments in various cat and dog conditions similar to humans. Below applications applies to both humans and pet products like bone disorder, cancer, stress, pain, epilepsy.

What is cancer and Cancer Immunotherapy

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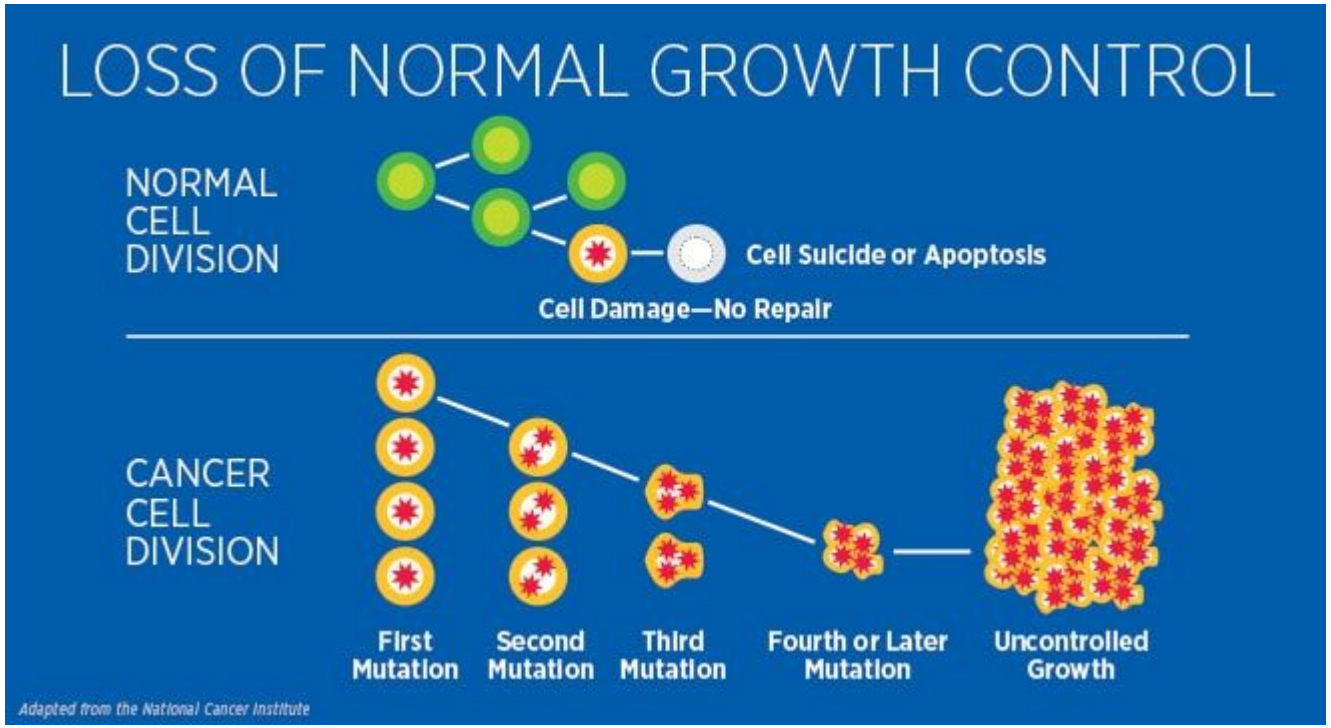

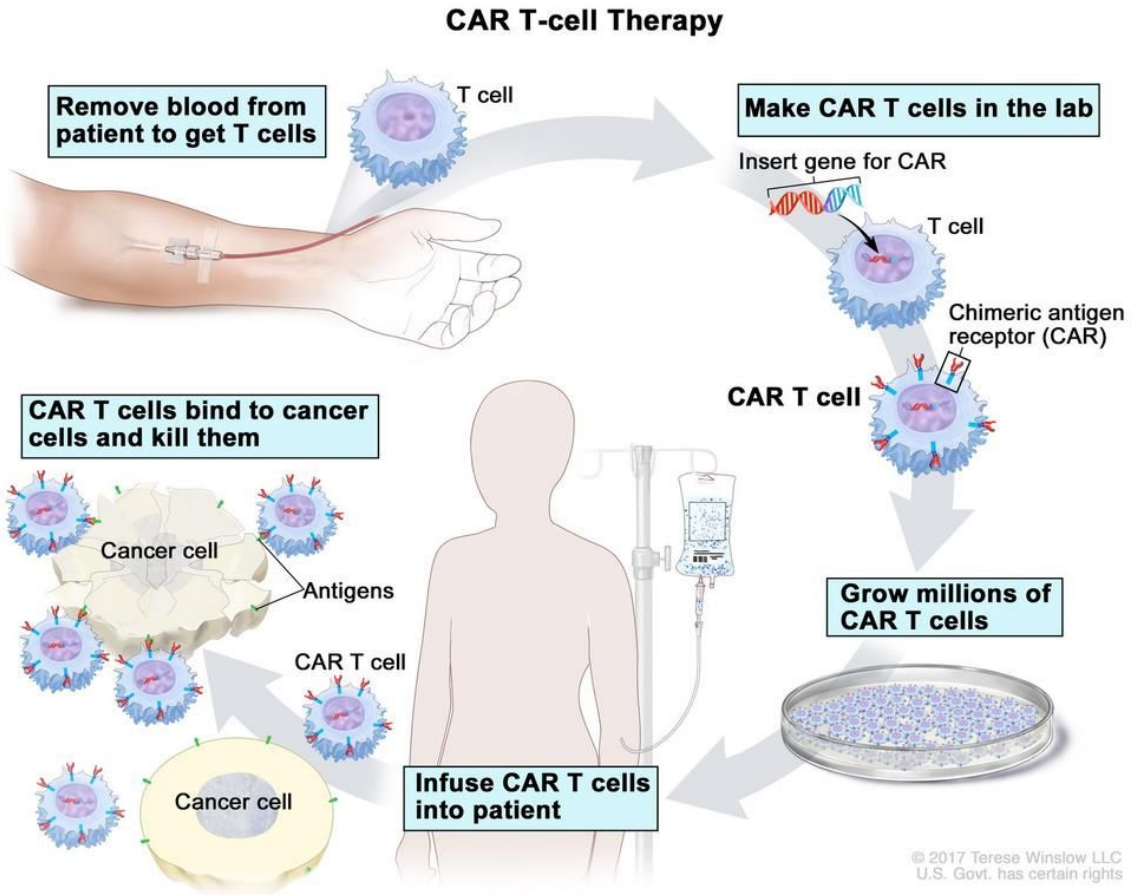

Cancer immunotherapy is a type of cancer treatment that uses the body's immune system to fight cancer. It can help the immune system find and attack cancer cells and can be used in combination with other treatments like chemotherapy, radiation, or surgery.