Cannabigerol (CBG)

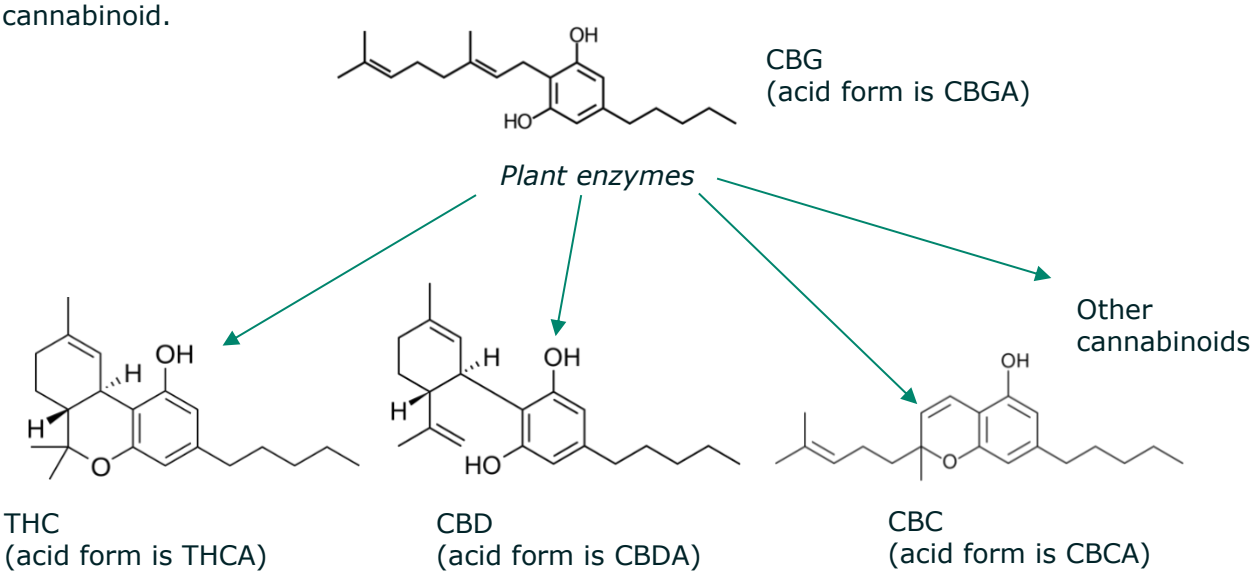
Introduction and selected scientific references

Updated: Mar 18, 2021

Cannabigerol (CBG)

Introduction

CBG, sometimes called the "**mother cannabinoid**" or "**skin cannabinoid**", is the parent molecule from which other cannabinoids are made in both marijuana and hemp. But since it's mostly converted into other cannabinoids, such as THC and CBD, very little of it remains intact in the plant (typically <0.5% by weight). Due to its scarcity, up until now, customers and patients have struggled to access the benefits of this important non-intoxicating cannabinoid.



Plant cannabinoids are naturally produced in the acid form. Prior to consumption, they are typically converted into their better-known neutral form by heating. In this way, CBG is made from CBGA.

Potential benefits

There is a growing body of primary scientific research exploring the potential benefits of CBG, both on its own as well as in combination with other cannabinoids (e.g. CBD). Below is a summary of some of the main areas under investigation:

1. Antibacterial (e.g. MRSA, dental plaque);
2. Dry skin;
3. Inflammation (general);
4. Skin inflammation;
5. GI inflammation;
6. Neuroinflammation and neurodegeneration;
7. Insulin resistance;
8. Ocular tension;
9. Loss of appetite;
10. Mood disorders;
11. Neuropathic pain;
12. Cancer (in vitro studies);
13. Bladder dysfunction.

Scientific literature

Subject	Quotation	Ref.
Antibacterial	"CBG potently inhibit[s] **MRSA**, repress[es] biofilm formation (Fig. 1b) and effectively eradicate[s] persister cells…CBG (Fig. 2a) exhibiting the most potent anti-biofilm activity…CBG was the most potent cannabinoid against persisters."	1
	"In conclusion, our study shows that CBG is a potential **anti-biofilm** agent via inhibition of the QS cascade."	2
Dental health	"In our study, cannabinoids were found to be more effective in reducing the colony count of the bacterial strains (**dental plaque** biofilm) as compared to the well-established synthetic oral care products such as Oral B or Colgate…In the DPSI (-3) group (chalk hardened dental plaque biofilm), the maximum number of colonies was found in the Oral B treatment and the minimum number in the CBGA treatment."	3
	"Cannabinoids (CBD/CBG) infused mouthwashes together with other natural key ingredients shows promising bactericidal activity in vitro against total-culturable aerobic bacterial content in **dental plaque**, with efficiency equivalent to or better than that of the gold standard (0.2% chlorhexidine)."	4
Dry skin	"CBG and CBGV, in contrast to CBC, CBDV and THCV, behaved in an 'endocannabinoid-like' way, and increased sebaceous lipid synthesis of the sebocytes (Fig. 1a,b) raising the possibility of their administration in the management of conditions, such as **dry-skin syndrome**, **xerosis** and even **skin ageing**."	5
Inflammation	"Cannabigerol (CBG) can have anti-inflammatory effects, i.e., suppress degranulation, by either (1) suppressing a pro-secretory pathway or (2) stimulating an anti-secretory pathway, or both…We further demonstrated **strong synergistic effects** of the minor cannabinoid, cannabigerol (CBG), on mast cell degranulation when it is combined with other cannabinoids and/or terpenes."	6
Skin inflammation	"Not only THCV, but also CBG, CBGV, CBC and CBDV sup-pressed LPS-induced pro-inflammatory response of the sebocytes (Figure S9a–e). These findings together with the known antiproliferative actions of the pCBs (Fig. 3) (33) raise the possibility that administration of these substances may be beneficial not only in acne, but also in other **inflammation-accompanied skin diseases**, for example in **psoriasis**."	5

Subject	Quotation	Ref.
GI inflammation	"Our results show that the non-psychotropic plant cannabinoid CBG exerts protective effects in a murine experimental model of **IBD**…Also, CBG exerts antioxidant effects in the **inflamed gut** as well as in intestinal epithelial cells exposed to **oxidative stress**…Our results suggest that CBG may represent a new therapeutic opportunity in IBD."	7
	"CBG, but not CBC, given by oral gavage, ameliorated DNBS-induced colonic inflammation. FO [fish oil] pretreatment (at the inactive dose) increased the **anti-inflammatory** action of CBG and rendered oral CBD effective while reducing endocannabinoid levels. Furthermore, the combination of FO, CBD, and a per se inactive dose of CBG resulted in intestinal anti-inflammatory effects."	8
Neuroinflammation/ neurodegeneration	"CBG pre-treatment, both alone and association with CBD at all doses tested, was able to **reduce neuroinflammation**…The benefits shared by CBD and CBG are **enhanced when they are combined**…In the present study, we confirmed the **anti-inflammatory, antioxidant**, and **anti-apoptotic** effects of CBG and CBD previously described."	9
	"On the bases of these results, thanks to its **neuroprotective effects**, we encourage the use of CBG against neurodegeneration and in those pathological conditions where neuroinflammation and oxidative stress play a main role…We have already demonstrated the CBG antioxidant properties in macrophages stimulated with hydrogen peroxide (H2O2). Also anti-inflammatory and neuroprotective effects were reported for CBG…"	10
	"CBG was extremely active as **neuroprotectant** in mice intoxicated with 3-nitropropionate (3NP) (HD mouse model), improving motor deficits and preserving striatal neurons against 3NP toxicity."	11
	"Studies indicate that CBG may have therapeutic potential in treating **neurological disorders** (e.g. Huntington's disease, Parkinson's disease, and multiple sclerosis), inflammatory bowel disease, as well as having antibacterial activity."	12

Subject	Quotation	Ref.
Insulin resistance	"Our study highlights phytocannabinoids as a potential novel pharmacological tool to regain control of functional adipose tissue in unregulated energy homeostasis often occurring in metabolic disorders including **type 2 diabetes** mellitus (T2DM), aging and lipodystrophy...We provide evidence that CBD, CBDA, CBGA and THCV (5 μM) increase the number of viable BM-MSCs; whereas only CBG (5 μM) and CBD (5 μM) alone or in combination promote BM-MSCs maturation into adipocytes via distinct molecular mechanisms…CBD and CBG might be an **effective treatment for insulin sensitization**."	13
Ocular tension	"These results suggest that cannabigerol and related cannabinoids may have therapeutic potential for the treatment of **glaucoma**."	14
Ocular tension	"These results indicate that chronic administration of these cannabinoids lowers **ocular tension** considerably. Like marihuana and delta-9-tetrahydrocannabinol, cannabinol produced both ocular toxicity and neurotoxicity. As cannabigerol lacked these toxicities, it appears that the ocular hypotensive effect of this cannabinoid is somewhat dissociable from both the adverse central and ocular effects accompanying marihuana intake."	15
Loss of appetite	"The data presented here demonstrate that CBG has protective effects against multiple components of **chemotherapy-induced cachexia** pathophysiology, including anorexia, weight loss, muscle atrophy, and metabolic dysregulation."	16
Mood disorders	"The data presented suggest that CBG may induce **antidepressant** effects. Moderate doses of CBG produced behaviours that were consistent to imipramine in the tail suspension test and as such the use of this naturally occurring cannabinoid may have beneficial effects over that of HCA antidepressants such as imipramine which are known to cause many side effects in users."	17
Neuropathic pain	"This finding demonstrates that the cannabinoids CBDV, THCV and CBG are superior to CBD in their ability to treat the **neuropathic pain** brought about by the animal model used in this experiment."	18
Cancer	"CBG inhibited the growth of xenograft tumours as well as chemically induced **colon carcinogenesis**. CBG hampers colon cancer progression in vivo and selectively inhibits the growth of CRC cells…CBG should be considered translationally in CRC prevention and cure."	19

Subject	Quotation	Ref.
Cancer	"Geraniol (1), olivetol (2), cannabinoids (3 and 4) and 5-fluorouracil (5) were tested for their growth inhibitory effects against **human oral epitheloid carcinoma** cell lines (KB) and NIH 3T3 fibroblasts using two different 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl-2H-tetrazolium bromide (MTT) assay and sulforhodamine B protein (SRB) assay. Cannabigerol (3) exhibited the highest growth-inhibitory activity against the cancer cell lines."	20
	"Cannabigerol(3) was synthesized and evaluated for its inhibitory activity against mouse **skin melanoma** cells. Cannabigerol displayed significant antitumor activity [inhibitory concentration (IC50)=31.3l μ/mL] in vitro assay."	21
	"This study evaluated the synergistic **anti-cancer** potential of cannabinoid combinations across…human breast cancer cell lines…The most promising cannabinoid combination (C6) consisted of tetrahydrocannabinol, cannabigerol (CBG), cannabinol (CBN), and cannabidiol (CBD), and displayed favorable dose reduction indices and limited cytotoxicity against the non-cancerous breast cell line, MCF-10A."	22
	"Among primary brain tumors, glioblastoma is the most aggressive...[N]ontoxic cannibigerol (CBG), being recently shown to exhibit anti-tumour properties in some carcinomas, is assayed here for the first time in glioblastoma with the aim to replace THC…CBG can destroy therapy-resistant **glioblastoma** cells, which are the root of cancer development and extremely resistant to various other treatments of this lethal cancer. CBG should present a new yet unexplored adjuvant treatment strategy for glioblastoma."	23
Bladder dysfunction	"There are anecdotal reports that some Cannabis preparations may be useful for **bladder dysfunctions**… The rank order of efficacy was CBG=THCV>CBD>CBDV. In depth studies on CBG showed that the effect of this phytocannabinoid on acetylcholine-induced contractions was not affected by CB1 or CB2 receptor antagonists. Additionally, CBG also reduced acetylcholine-induced contractions in the human bladder."	24

References

1. Farha et al. ACS Infectious Diseases. March 2020; 6, 3, 338-346. *Uncovering the Hidden Antibiotic Potential of Cannabis.*
2. Aqawi et al. Front Microbiol. May 2020; 11(article 858). *Cannabigerol Prevents Quorum Sensing and Biofilm Formation of Vibrio harveyi.*
3. Stahl V et al. Cureus 12(1): e6809, January 2020. *Comparison of Efficacy of Cannabinoids versus Commercial Oral Care Products in Reducing Bacterial Content from Dental Plaque: A Preliminary Observation.*
4. Vasudevan et al. Journal of Cannabis Research. June 2020; 2, 20 (2020). *Cannabinoids infused mouthwash products are as effective as chlorhexidine on inhibition of total-culturable bacterial content in dental plaque samples.*
5. Olah et al. Exp Dermatol. September 2016; 25(9):701-7. *Differential effectiveness of selected non-psychotropic phytocannabinoids on human sebocyte functions implicates their introduction in dry/seborrhoeic skin and acne treatment.*
6. WO2018144637. 2018. *Cannabinoid containing complex mixtures for the treatment of mast cell-associated or basophil mediated inflammatory disorders.*
7. Borrelli et al. Biochem Pharmacol. May 2013; 1;85(9):1306-16. *Beneficial effect of the non-psychotropic plant cannabinoid cannabigerol on experimental inflammatory bowel disease.*
8. Pagano E et al. Phytother Res. January 2021 35(1): 517-529. *Efficacy of combined therapy with fish oil and phytocannabinoids in murine intestinal inflammation.*
9. Mammana et al. Medicina (Kaunas). November 2019; 55(11): 747. *Could the Combination of Two Non-Psychotropic Cannabinoids Counteract Neuroinflammation? Effectiveness of Cannabidiol Associated with Cannabigerol.*
10. Gugliandolo et al. Int J Mol Sci. July 2018; 19(7): 1992. *In Vitro Model of Neuroinflammation: Efficacy of Cannabigerol, a Non-Psychoactive Cannabinoid.*
11. Valdeolivas et al. Neurotherapeutics. January 2015;12(1):185-99. *Neuroprotective properties of cannabigerol in Huntington's disease: studies in R6/2 mice and 3-nitropropionate-lesioned mice.*
12. Nachnani R et al. J Pharmacol Exp Therapeut. Feburary 2021; 376(2): 204-212. *The pharmacological case for cannabigerol CBG.*
13. Fellous et al. Biochemical Pharmacology. May 2020; Volume 175: 113859. *Phytocannabinoids promote viability and functional adipogenesis of bone marrow-derived mesenchymal stem cells through different molecular targets.*
14. Colasanti. Journal of Ocular Pharmacology and Therapeutics. March 2009; Vol. 6, No. 4. *A Comparison of the Ocular and Central Effects of Δ9-Tetrahydrocannabinol and Cannabigerol.*
15. Colasanti et al. Exp Eye Res. September 1984; 39(3):251-9. *Intraocular pressure, ocular toxicity and neurotoxicity after administration of cannabinol or cannabigerol.*
16. Brierley et al. J. of Cachexia, Scarcopenia and Muscle. April 2019; Volume10 (4): 844-859. *Chemotherapy-induced cachexia dysregulates hypothalamic and systemic lipoamines and is attenuated by cannabigerol.*
17. US8481085. 2013. *Pharmaceutical compositions comprising cannabigerol.*
18. WO2012160358. 2011. *Cannabinoids for use in the treatment of neuropathic pain.*
19. Borrelli et al. Carcinogenesis. September 2014; vol.35 no.12 pp.2787–2797. *Colon carcinogenesis is inhibited by the TRPM8 antagonist cannabigerol, a Cannabis- derived non-psychotropic cannabinoid.*

20. Baek et al. Arch. Pharm. Res. 21, 353, June 1998. *Boron trifluoride etherate on silica-A modified lewis acid reagent (VII). Antitumor activity of cannabigerol against human oral epitheloid carcinoma cells.*
21. Beak et al. Arch. Pharm. Res. 19, 228–230, June 1996. *Synthesis and antitumor activity of cannabigerol.*
22. Schoeman R et al. Molecules. 25(20): 4682, October 2020. *Cannabinoid combination induces cytoplasmic vacuolation in MCF-7 breast cancer cells.*
23. Lah TT et al. Cells. 10(2): 340, February 2021. *Cannabigerol is a potential therapeutic agent in a novel combined therapy for glioblastoma.*
24. Pagano E et al. Natural Prod Commun: 10(6): 1009-1012, June 2015. *Effect of non-psychotropic plant-derived cannabinoids on bladder contractility: focus on cannabigerol.*

Disclaimer

USE OF CREO PRODUCTS IN CONSUMER PACKAGED GOODS MAY BE REGULATED BY THE FOOD AND DRUG ADMINISTRATION ("FDA"). THE PRODUCTS OFFERED FOR SALE BY CREO HAVE NOT BEEN APPROVED FOR A SPECIFIC PURPOSE BY THE FDA NOR HAVE ANY OF THE STATEMENTS CONTAINED HEREIN BEEN EVALUATED FOR SAFETY OR EFFICACY BY THE FDA. THE PRODUCTS SOLD BY CREO ARE NOT INTENDED TO DIAGNOSE, TREAT, CURE OR PREVENT ANY DISEASE. CREO HAS PROVIDED RESEARCH MATERIALS PERTAINING TO CANNABIGEROL ("CBG") SOLELY TO PROVIDE THE READER WITH INFORMATION ON THE TYPES OF STUDIES BEING CONDUCTED ON CBG AND/OR OTHER CANNABINOIDS.

CREO MAKES NO REPRESENTATION AS TO THE ACCURACY OR VALIDITY OF THE RESEARCH REFERENCED HEREIN OR AS TO THE SAFETY OR VALIDITY OF ANY CONCLUSIONS DRAWN BY ANY STUDIES REFERENCED HEREIN. SUCH STUDIES MAY OR MAY NOT BE PEER-REVIEWED AND MAY HAVE NOT BEEN REVIEWED BY THE FDA. ANY QUOTED EXCERPTS PROVIDED HEREIN MAY NOT BE AN ACCURATE SUMMARY OF THE RESEARCH CONTAINED IN THE REFERENCED STUDY AND ARE MERELY INCLUDED TO INDICATE THAT SOME RESEARCH IS BEING CONDUCTED WITH RESPECT TO CANNABINOIDS AND THE REFERENCED SUBJECT. READERS SHOULD READ THE ENTIRE STUDY IN ORDER TO DRAW THEIR OWN CONCLUSIONS REGARDING THE VALIDITY OF SUCH STUDY.

ANY CUSTOMER OF CREO THAT DESIRES TO USE CREO'S PRODUCTS SHOULD NOT MAKE ANY CLAIMS REGARDING THE EFFECTIVENESS OF SUCH PRODUCTS IN DIAGNOSING, TREATING, CURING OR PREVENTING ANY DISEASE OR MEDICAL CONDITION UNLESS SUCH CUSTOMER HAS INDEPENDENTLY RECEIVED APPROVAL FROM THE RELEVANT REGULATORY BODY OR BODIES (E.G. FDA) TO MAKE SUCH CLAIMS.