External Epithelial Environment- change your external environment

- Baths – Be sure to not bathe in regular tap water- locate a water filter shower head to keep your aqueous solution free of as many extra chemicals and particulates as possible! You may even wish to use UVc light to destroy any exogenous DNA that the water may contain.
  - Baking Soda
    - Scaly skin and bath pH: Rediscovering baking soda
      - https://www.jaad.org/article/S0190-9622(09)00493-9/fulltext
    - Old fashioned sodium bicarbonate baths for the treatment of psoriasis in the era of futuristic biologics: an old ally to be rescued
      - https://pubmed.ncbi.nlm.nih.gov/15897164/
    - Effects of sodium bicarbonate bath on the quality of sleep: An assessor-blinded, randomized, controlled, pilot clinical trial
      - https://pubmed.ncbi.nlm.nih.gov/36528983/
    - Antibacterial activity of baking soda
      - https://pubmed.ncbi.nlm.nih.gov/12017929/
    - The effects of bathing in neutral bicarbonate ion water
      - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8576025/
      - Taken together, our results show that percutaneously absorbed carbon dioxide changes to bicarbonate ions, which act directly on endothelial cells to increase NO production by phosphorylation of eNOS and thus improve blood flow.
    - Efficacy of a Topical Formulation of Sodium Bicarbonate in Mild to Moderate Stable Plaque Psoriasis: a Randomized, Blinded, Intrapatient, Controlled Study
      - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6704198/
    - Antifungal activity of sodium bicarbonate against fungal agents causing superficial infections
      - https://pubmed.ncbi.nlm.nih.gov/22991095/
  - Epsom Salts
    - Permeation of topically applied Magnesium ions through human skin is facilitated by hair follicles
      - https://pubmed.ncbi.nlm.nih.gov/27624531/
    - Bathing in a magnesium-rich Dead Sea salt solution improves skin barrier function, enhances skin hydration, and reduces inflammation in atopic dry skin
      - https://pubmed.ncbi.nlm.nih.gov/15689218/
    - The effect of salt-water bath in the management of treatment-related peripheral neuropathy in cancer patients receiving taxane and platinum-based treatment
      - https://pubmed.ncbi.nlm.nih.gov/34340926/

- Coffee/Green tea (Caffeine and catechins)
  - Transdermal delivery of anticancer drug caffeine from water-in-oil nanoemulsions
    - https://www.sciencedirect.com/science/article/abs/pii/S0927776509004202
  - In vitro transdermal delivery of the major catechins and caffeine from extract of Camellia sinensis
    - https://www.sciencedirect.com/science/article/abs/pii/S0378517304003436

- Ion/Mineral sprays
  - Transdermal Mg sprays
  - Schweizer formula mineral spray
    - https://www.schweitzerformula.com/the-formula/technical-details/
  - Silver lotions
    - Transdermal uptake and organ distribution of silver from two different wound dressings in rats after a burn trauma
      - https://pubmed.ncbi.nlm.nih.gov/25139317/
    - Topical Silver for Infected Wounds
      - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2742464/
    - Electromagnetic Shielding Properties of Knitted Fabric Made from Polyamide Threads Coated with Silver
      - https://www.mdpi.com/1996-1944/14/5/1281
    - Room-temperature production of silver-nanofiber film for large-area, transparent and flexible surface electromagnetic interference shielding
      - https://www.nature.com/articles/s41528-019-0050-8
  - Oxygenated lotions
    - Topical Oxygen Emulsion: A Novel Wound Therapy
      - https://jamanetwork.com/journals/jamadermatology/fullarticle/654413
    - A Supersaturated Oxygen Emulsion for Wound Care and Skin Rejuvenation
      - https://pubmed.ncbi.nlm.nih.gov/32550688/
    - The antibacterial effect of topical ozone on the treatment of MRSA skin infection
      - https://www.spandidos-publications.com/10.3892/mmr.2017.8148
    - Ozonated Oils as Antimicrobial Systems in Topical Applications. Their Characterization, Current Applications, and Advances in Improved Delivery Techniques
      - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7024311/

- Silver tooth paste/mouth wash
  - Applications of Silver Nanoparticles in Dentistry: Advances and Technological Innovation
    - https://www.mdpi.com/1422-0067/22/5/2485
  - Dental Pulp Response to Silver-Containing Solutions: A Scoping Review
    - https://www.mdpi.com/2304-6767/11/5/114

- Bactericidal Activity of Silver Nanoparticles on Oral Biofilms Related to Patients with and without Periodontal Disease
  - https://www.mdpi.com/2079-4983/14/6/311

- Nebulization (clean lungs)
  - H20:H202 (1 part food grade hydrogen peroxide to 2 parts purified water + 3 drops of food grade iodine)
    - Use of a Hydrogen Peroxide Nebulizer for Viral Disinfection of Emergency Ambulance and Hospital Waiting Room
      - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8934245/
    - Inhalation Pneumonitis Caused by Nebulized Hydrogen Peroxide
      - https://www.cureus.com/articles/147548-inhalation-pneumonitis-caused-by-nebulized-hydrogen-peroxide#!/
    - Prospective Randomized Double-blind Placebo-controlled Study to Assess the Effects of Nano-ozonized Hydrogen Peroxide Nebulization on Results of RTPCR for Novel Coronavirus thus Infectivity and Clinical Course among Moderately Sick COVID-19 Patients
      - https://www.jsafog.com/doi/JSAFOG/pdf/10.5005/jp-journals-10006-1986
    - Efficacy assessment of different time cycles of nebulized hydrogen peroxide against bacterial and yeast biofilms
      - https://www.sciencedirect.com/science/article/pii/S0195670122001529
  - Colloidal silver
    - Colloidal silver for lung disease in cystic fibrosis
      - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2443992/
    - Treatment of infection and inflammation associated with COVID-19, multi-drug resistant pneumonia and fungal sinusitis by nebulizing a nanosilver solution
      - https://www.sciencedirect.com/science/article/pii/S1549963423000059
    - Silver colloidal nanoparticles: antifungal effect against adhered cells and biofilms of Candida albicans and Candida glabrata
      - https://pubmed.ncbi.nlm.nih.gov/21756192/
    - Silver Nanoantibiotics Display Strong Antifungal Activity Against the Emergent Multidrug-Resistant Yeast Candida auris Under Both Planktonic and Biofilm Growing Conditions
      - https://www.frontiersin.org/articles/10.3389/fmicb.2020.01673/full
    - Silver colloidal nanoparticle stability: influence on Candida biofilms formed on denture acrylic
      - https://academic.oup.com/mmy/article/52/6/627/2804956?login=false
    - Striking Back against Fungal Infections: The Utilization of Nanosystems for Antifungal Strategies
      - https://www.mdpi.com/1422-0067/22/18/10104
    - Antifungal activity of silver nanoparticles against Candida spp.
      - https://www.sciencedirect.com/science/article/abs/pii/S0142961209008023

- Sinus rinse with silver
    - The silver lining: towards the responsible and limited usage of silver
        - https://ami-journals.onlinelibrary.wiley.com/doi/10.1111/jam.13525
    - Topical Colloidal Silver for the Treatment of Recalcitrant Chronic Rhinosinusitis
        - https://www.frontiersin.org/articles/10.3389/fmicb.2018.00720/full
    - Evaluation of silver nanoparticles for the prevention of SARS-CoV-2 infection in health workers: In vitro and in vivo
        - https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0256401
- Menthol

Biological properties [edit]

This section **needs additional** citations **to** **secondary or tertiary sources** such as review articles, monographs, or textbooks. Please add such references to provide context and establish the relevance of any primary research articles cited. Unsourced or poorly sourced material may be challenged and removed. *(September 2018) (Learn how and when to remove this template message)*

Menthol's ability to chemically trigger the cold-sensitive TRPM8 receptors in the skin is responsible for the well-known cooling sensation it provokes when inhaled, eaten, or applied to the skin.[3] In this sense, it is similar to capsaicin, the chemical responsible for the spiciness of hot chilis (which stimulates heat sensors, also without causing an actual change in temperature).

Menthol's analgesic properties are mediated through a selective activation of κ-opioid receptors.[4] Menthol blocks calcium channels[5] and voltage-sensitive sodium channels, reducing neural activity that may stimulate muscles.[6]

Some studies show that menthol acts as $GABA_A$ receptor positive allosteric modulator and increases Gabaergic transmission in PAG neurons.[7] Menthol also shares anaesthetic properties similar to propofol, by modulating the same sites of the $GABA_A$ receptor.[8]

Menthol is widely used in dental care as a topical antibacterial agent, effective against several types of streptococci and lactobacilli.[9] Menthol also lowers blood pressure and antagonizes vasoconstriction through TRPM8 activation.[10]

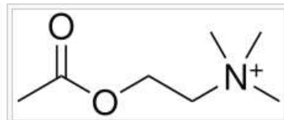
- Menthol cigarettes
    - Cellular and Molecular Targets of Menthol Actions
        - https://www.frontiersin.org/articles/10.3389/fphar.2017.00472/full
    - MAMMALIAN CILIATED RESPIRATORY EPITHELIUM: Studies with Particular Reference to Effects of Menthol, Nicotine, and Smoke of Mentholated and Nonmentholated Cigarettes
        - https://jamanetwork.com/journals/jamaotolaryngology/article-abstract/597075
    - Menthol Cigarette Smoke Induces More Severe Lung Inflammation Than Non-menthol Cigarette Smoke Does in Mice With Subchronic Exposure – Role of TRPM8

- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6305452/
- Human Lung Epithelial Cells Express a Functional Cold-Sensing TRPM8 Variant
    - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2551706/
- Inflammatory Effects of Menthol vs. Non-menthol Cigarette Smoke Extract on Human Lung Epithelial Cells: A Double-Hit on TRPM8 by Reactive Oxygen Species and Menthol
    - https://www.frontiersin.org/articles/10.3389/fphys.2017.00263/full

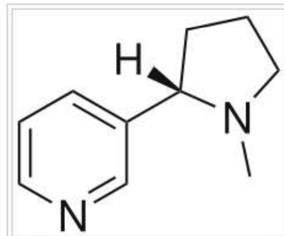
- Vape peppermint leaf
- Peppermint essential oil
    - The actions of peppermint oil and menthol on calcium channel dependent processes in intestinal, neuronal and cardiac preparations
        - https://pubmed.ncbi.nlm.nih.gov/2856502/
    - Menthol blocks dihydropyridine-insensitive Ca2+ channels and induces neurite outgrowth in human neuroblastoma cells
        - https://pubmed.ncbi.nlm.nih.gov/2154507/

- Tobacco

Nicotinic acetylcholine receptors, or **nAChRs**, are receptor polypeptides that respond to the neurotransmitter acetylcholine. Nicotinic receptors also respond to drugs such as the agonist nicotine. They are found in the central and peripheral nervous system, muscle, and many other tissues of many organisms. At the neuromuscular junction they are the primary receptor in muscle for motor nerve-muscle communication that controls muscle contraction. In the peripheral nervous system: (1) they transmit outgoing signals from the presynaptic to the postsynaptic cells within the sympathetic and parasympathetic nervous system, and (2) they are the receptors found on skeletal muscle that receive acetylcholine released to signal for muscular contraction. In the immune system, nAChRs regulate inflammatory processes and signal through distinct intracellular pathways.[1] In insects, the cholinergic system is limited to the central nervous system.[2]



Acetylcholine



Nicotine

The nicotinic receptors are considered cholinergic receptors, since they respond to acetylcholine. Nicotinic receptors get their name from nicotine which does not stimulate the muscarinic acetylcholine receptors but selectively binds to the nicotinic receptors instead.[3][4][5] The muscarinic acetylcholine receptor likewise gets its name from a chemical that selectively attaches to that receptor — muscarine.[6] Acetylcholine itself binds to both muscarinic and nicotinic acetylcholine receptors.[7]

As ionotropic receptors, nAChRs are directly linked to ion channels. New evidence suggests that these receptors can also use second messengers (as metabotropic receptors do) in some cases.[8] Nicotinic acetylcholine receptors are the best-studied of the ionotropic receptors.[3]

Since nicotinic receptors help transmit outgoing signals for the sympathetic and parasympathetic systems, nicotinic receptor antagonists such as hexamethonium interfere with the transmission of these signals. Thus, for example, nicotinic receptor antagonists interfere with the baroreflex[9] that normally corrects changes in blood pressure by sympathetic and parasympathetic stimulation of the heart.

- Cigarettes or Nicotine gum
    - Effects of cigarette smoking on SARS-CoV-2 receptor ACE2 expression in the respiratory epithelium
        - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7986690/
    - ACE-2 Expression in the Small Airway Epithelia of Smokers and COPD Patients: Implications for COVID-19
        - https://erj.ersjournals.com/content/early/2020/03/26/13993003.00688-2020
    - Nicotine Impairs the Response of Lung Epithelial Cells to IL-22
        - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7066416/
    - Vaping Away Epithelial Integrity

- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6670025/

- Cigarette smoke impairs airway epithelial barrier function and cell–cell contact recovery
  - https://erj.ersjournals.com/content/39/2/419
- Smoking, immunity, and DNA damage
  - https://tlcr.amegroups.com/article/view/27925/html
- Nicotine exposure and bronchial epithelial cell nicotinic acetylcholine receptor expression in the pathogenesis of lung cancer
  - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC151841/
- Control of Lung Epithelial Growth by a Nicotinic Acetylcholine Receptor
  - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2770708/
  - As ligand-gated ion channels, nAChRs undergo complex allosteric changes in response to binding either the endogenous ligand acetylcholine or exogenous ligands, including nicotine. Although nAChRs are classically linked to the plasma membrane depolarization required for neurotransmission, non-neuronal nAChRs in the lung act most frequently as calcium channels and have been linked to regulatory proteins such as src and phosphatidylinositol 3-kinase, which can control cell proliferation.
- Contribution of α7 nicotinic receptor to airway epithelium dysfunction under nicotine exposure
  - https://www.pnas.org/doi/10.1073/pnas.1216939110
- Electronic cigarette vapor with nicotine causes airway mucociliary dysfunction preferentially via TRPA1 receptors
  - https://www.thoracic.org/about/newsroom/press-releases/ecigs-and-mucociliary-dysfunction.pdf
- Nicotine induces cell proliferation, invasion and epithelial-mesenchymal transition in a variety of human cancer cell lines
  - https://onlinelibrary.wiley.com/doi/full/10.1002/ijc.23894
- Nicotine signals through muscle-type and neuronal nicotinic acetylcholine receptors in both human bronchial epithelial cells and airway fibroblasts
  - https://respiratory-research.biomedcentral.com/articles/10.1186/1465-9921-5-27
- Nicotinic alpha 7 receptor expression and modulation of the lung epithelial response to lipopolysaccharide
  - https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0175367

- Cannabinoids

The **endocannabinoid system** (**ECS**) is a biological system composed of endocannabinoids, which are endogenous lipid-based retrograde neurotransmitters that bind to cannabinoid receptors (CBRs), and cannabinoid receptor proteins that are expressed throughout the vertebrate central nervous system (including the brain) and peripheral nervous system.[1][2] The endocannabinoid system remains under preliminary research, but may be involved in regulating physiological and cognitive processes, including fertility,[3] pregnancy,[4] pre- and postnatal development,[5][6][7] various activity of immune system,[8] appetite, pain-sensation, mood, and memory, and in mediating the pharmacological effects of cannabis.[9][10] The ECS plays an important role in multiple aspects of neural functions, including the control of movement and motor coordination, learning and memory, emotion and motivation, addictive-like behavior and pain modulation, among others.[11]

Two primary cannabinoid receptors have been identified: CB1, first cloned (or isolated) in 1990; and CB2, cloned in 1993. CB1 receptors are found predominantly in the brain and nervous system, as well as in peripheral organs and tissues, and are the main molecular target of the endogenous partial agonist, anandamide (AEA), as well as exogenous THC, the most known active component of cannabis. Endocannabinoid 2-arachidonoylglycerol (2-AG), which was found to be two and three orders of magnitude more abundant in mammalian brain than AEA, acts as a full agonist at both CB receptors.[12]

Binding and neuronal excitability [edit]

This section **provides insufficient context for those unfamiliar with the subject**. Please help improve the article by providing more context for the reader. *(January 2014)* *(Learn how and when to remove this template message)*

The molecular mechanisms of CB_1-mediated changes to the membrane voltage have also been studied in detail. Cannabinoids reduce calcium influx by blocking the activity of voltage-dependent N-, P/Q- and L-type calcium channels.[42][43] In addition to acting on calcium channels, activation of Gi/o and Gs, the two most commonly coupled G-proteins to cannabinoid receptors, has been shown to modulate potassium channel activity. Recent studies have found that CB_1 activation specifically facilitates potassium ion flux through GIRKs, a family of potassium channels.[43] Immunohistochemistry experiments demonstrated that CB_1 is co-localized with GIRK and Kv1.4 potassium channels, suggesting that these two may interact in physiological contexts.[44]

In the central nervous system, CB_1 receptors influence neuronal excitability, reducing the incoming synaptic input.[45] This mechanism, known as presynaptic inhibition, occurs when a postsynaptic neuron releases endocannabinoids in retrograde transmission, which then bind to cannabinoid receptors on the presynaptic terminal. CB_1 receptors then reduce the amount of neurotransmitter released, so that subsequent excitation in the presynaptic neuron results in diminished effects on the postsynaptic neuron. It is likely that presynaptic inhibition uses many of the same ion channel mechanisms listed above, although recent evidence has shown that CB_1 receptors can also regulate neurotransmitter release by a non-ion channel mechanism, i.e. through Gi/o-mediated inhibition of adenylyl cyclase and protein kinase A.[46] Direct effects of CB_1 receptors on membrane excitability have been reported, and strongly impact the firing of cortical neurons.[47] A series of behavioral experiments demonstrated that NMDAR, an ionotropic glutamate receptor, and the metabotropic glutamate receptors (mGluRs) work in concert with CB_1 to induce analgesia in mice, although the mechanism underlying this effect is unclear.[citation needed]

Immune system [edit]

In laboratory experiments, activation of cannabinoid receptors had an effect on the activation of GTPases in macrophages, neutrophils, and bone marrow cells. These receptors have also been implicated in the migration of B cells into the marginal zone and the regulation of IgM levels.[62]

Autonomic nervous system [edit]

Peripheral expression of cannabinoid receptors led researchers to investigate the role of cannabinoids in the autonomic nervous system. Research found that the CB_1 receptor is expressed presynaptically by motor neurons that innervate visceral organs. Cannabinoid-mediated inhibition of electric potentials results in a reduction in noradrenaline release from sympathetic nervous system nerves. Other studies have found similar effects in endocannabinoid regulation of intestinal motility, including the innervation of smooth muscles associated with the digestive, urinary, and reproductive systems.[25]

Analgesia [edit]

At the spinal cord, cannabinoids suppress noxious-stimulus-evoked responses of neurons in the dorsal horn, possibly by modulating descending noradrenaline input from the brainstem.[25] As many of these fibers are primarily GABAergic, cannabinoid stimulation in the spinal column results in disinhibition that should increase noradrenaline release and attenuation of noxious-stimuli-processing in the periphery and dorsal root ganglion.

The endocannabinoid most researched in pain is palmitoylethanolamide. Palmitoylethanolamide is a fatty amine related to anandamide, but saturated and although initially it was thought that palmitoylethanolamide would bind to the CB1 and the CB2 receptor, later it was found that the most important receptors are the PPAR-alpha receptor, the TRPV receptor and the GPR55 receptor. Palmitoylethanolamide has been evaluated for its analgesic actions in a great variety of pain indications[66] and found to be safe and effective.

Modulation of the endocannabinoid system by metabolism to N-arachidinoyl-phenolamine (AM404), an endogenous cannabinoid neurotransmitter, has been discovered to be one mechanism[67] for analgesia by acetaminophen (paracetamol).

Endocannabinoids are involved in placebo induced analgesia responses.[68]

Thermoregulation [edit]

Anandamide and *N*-arachidonoyl dopamine (NADA) have been shown to act on temperature-sensing TRPV1 channels, which are involved in thermoregulation.[69] TRPV1 is activated by the exogenous ligand capsaicin, the active component of chili peppers, which is structurally similar to endocannabinoids. NADA activates the TRPV1 channel with an EC_{50} of approximately of 50 nM.[clarify] The high potency makes it the putative endogenous TRPV1 agonist.[70] Anandamide has also been found to activate TRPV1 on sensory neuron terminals, and subsequently cause vasodilation.[25] TRPV1 may also be activated by methanandamide and arachidonyl-2'-chloroethylamide (ACEA).[13]

Types [edit]

CB_1 [edit]

Main article: Cannabinoid receptor type 1

Cannabinoid receptor type 1 (CB_1) receptors are thought to be one of the most widely expressed $G_{\alpha i}$ protein-coupled receptors in the brain. One mechanism through which they function is endocannabinoid-mediated depolarization-induced suppression of inhibition, a very common form of retrograde signaling, in which the depolarization of a single neuron induces a reduction in GABA-mediated neurotransmission. Endocannabinoids released from the depolarized post-synaptic neuron bind to CB_1 receptors in the pre-synaptic neuron and cause a reduction in GABA release due to limited presynaptic calcium ions entry.[medical citation needed]

They are also found in other parts of the body. For instance, in the liver, activation of the CB_1 receptor is known to increase de novo lipogenesis.[21]

CB_2 [edit]

Main article: Cannabinoid receptor type 2

CB_2 receptors are expressed on T cells of the immune system, on macrophages and B cells, in hematopoietic cells, and in the brain and CNS (2019).[22] They also have a function in keratinocytes. They are also expressed on peripheral nerve terminals. These receptors play a role in antinociception, or the relief of pain. In the brain, they are mainly expressed by microglial cells, where their role remains unclear. While the most likely cellular targets and executors of the CB_2 receptor-mediated effects of endocannabinoids or synthetic agonists are the immune and immune-derived cells (e.g. leukocytes, various populations of T and B lymphocytes, monocytes/macrophages, dendritic cells, mast cells, microglia in the brain, Kupffer cells in the liver, astrocytes, etc.), the number of other potential cellular targets is expanding, now including endothelial and smooth muscle cells, fibroblasts of various origins, cardiomyocytes, and certain neuronal elements of the peripheral or central nervous systems (2011).[8]

- Full spectrum hemp/Delta-8 THC/Medical Cannabis
  - Impact of Cannabis, Cannabinoids, and Endocannabinoids in the Lungs
    - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5023687/
  - Cannabinoids and Inflammations of the Gut-Lung-Skin Barrier
    - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8227007/
  - Inhaled marijuana smoke disrupts mitochondrial energetics in pulmonary epithelial cells in vivo
    - https://journals.physiology.org/doi/full/10.1152/ajplung.00371.2005

- The potential of cannabinoids and inhibitors of endocannabinoid degradation in respiratory diseases
    - https://www.sciencedirect.com/science/article/pii/S0014299921007160
- Cannabis compounds exhibit anti-inflammatory activity in vitro in COVID-19-related inflammation in lung epithelial cells and pro-inflammatory activity in macrophages
    - https://www.nature.com/articles/s41598-021-81049-2
- Differential inflammatory profile in the lungs of mice exposed to cannabis smoke with varying THC:CBD ratio
    - https://link.springer.com/article/10.1007/s00204-023-03514-3
- Not all vaping is the same: differential pulmonary effects of vaping cannabidiol versus nicotine
    - https://thorax.bmj.com/content/early/2023/05/16/thorax-2022-218743
- Effects of Marijuana Smoking on the Lung
    - https://www.atsjournals.org/doi/full/10.1513/annalsats.201212-127fr
- Cannabidiol inhibits SARS-CoV-2 replication through induction of the host ER stress and innate immune responses
    - https://www.science.org/doi/10.1126/sciadv.abi6110
- In search of preventive strategies: novel high-CBD Cannabis sativa extracts modulate ACE2 expression in COVID-19 gateway tissues
    - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7746344/
- Modulation of pulmonary immune function by inhaled cannabis products and consequences for lung disease
    - https://respiratory-research.biomedcentral.com/articles/10.1186/s12931-023-02399-1
- Involvement of the ACE2/Ang-(1–7)/MasR Axis in Pulmonary Fibrosis: Implications for COVID-19
    - https://www.mdpi.com/1422-0067/22/23/12955
- New AKT-dependent mechanisms of anti-COVID-19 action of high-CBD Cannabis sativa extracts
    - https://www.nature.com/articles/s41420-022-00876-y
- ACE2 Expression in Organotypic Human Airway Epithelial Cultures and Airway Biopsies
    - https://www.frontiersin.org/articles/10.3389/fphar.2022.813087/full
- Cannabinoids Block Cellular Entry of SARS-CoV-2 and the Emerging Variants
    - https://pubs.acs.org/doi/10.1021/acs.jnatprod.1c00946