Chapter X: Dental Health and Dental Disease

Learning Objectives

1. Discuss assessment protocols to determine level of endocannabinoid deficiencies of the dental system.
2. Discuss therapeutic strategies to address endocannabinoid deficiencies of the dental system.
3. Discuss patient care guidelines to implement cannabinoid therapy with standard of care pharmaceutical regimens pertaining to the dental system.
4. Discuss educational guidelines for patients to monitor clinical outcomes when implementing cannabinoid protocols for dental disorders.

The Endocannabinoid System and Cannabidiol (CBD) - Introduction

The endocannabinoid system (ECS) is a lipid-derived signaling system discovered within the past decade. Cannabinoids, which are homeostatic regulators, circulate throughout human and animal systems continuously, affecting all physiological processes. The endocannabinoid system is comprised of CB1 and CB2 receptors, which bind directly or indirectly to cannabinoids and phyto cannabinoids. CB1 receptors are excitatory and are located in the central nervous system, lungs, liver, and kidney. CB2 receptors regulate immunological responses and are located in the immune and circulatory systems. Endogenous compounds, such as anandamide and arachidonylglycerol (2-AG), are made by mammals from lipids and bind directly to the CB1 and CB2 receptors, serving as neurotransmitters for cannabinoids. Cannabidiol (CBD oil), a non-psychotropic cannabinoid naturally occurring in human and animal species, is also a phytocannabinoid, derived from the industrial hemp plant. While CBD does not bind directly with receptors, it does affect stress genes, such as Soat2 and Cyp27a1, which control sterol (i.e., cholesterol) metabolism. CBD increases the amount of anandamide and other vital lipids, thereby indirectly increasing the availability of circulating cannabinoids to bind with CB1 and CB2 receptors.

Research has shown that cannabidiol, in the form of CBD oil, has therapeutic benefits individually and adjunctively with other interventions. Cannabidiol (CBD) made from legal, industrial hemp contains less than .3% THC, rendering it non-psychoactive. CBD oil has antiemetic, anxiolytic, antitumoral, and immunologically inhibitory properties. Three categories differentiate the types of clinical endocannabinoid deficiency (CECD), which are associated with different disease process and disorders: genetic, acquired, and idiopathic autoimmune. Many disorders have a combination of CECD origins, and supplementation with cannabidiol (CBD) requires ongoing assessment to facilitate optimal benefit for the individual.

The Human Endocannabinoid System

The human endocannabinoid system is responsible for memory networks in the brain, both excitatory and inhibitory, including the neurogenesis of hippocampal granule cells, which regulate the timing of the endocannabinoids in accordance with the brain’s needs, pain perception, mood, synaptic plasticity, motor learning, appetite and taste regulation, and metabolic function, which regulates the storage of energy and transport of cellular nutrition. Cannabinoid receptor binding sites are located in the forebrain areas associated with higher cognitive function, forebrain, midbrain, and hindbrain areas associated with movement control,
and hindbrain areas associated with motor and sensory functions attributed to the autonomic nervous system. The endocannabinoid system affects the lipocytes and fat cells, collectively known as adipocytes, hepatocytes, in the gastrointestinal tract, musculoskeletal system, and endocrine system. The endogenous arachidonate-based lipids, anandamide and 2-arachidonoylglycerol (2-AG) are physiological ligands for the cannabinoid receptors. Cannabinoid receptors CB1 and CB2, two G-protein-coupled receptors, facilitate the responses of the endocannabinoid system in the body, which are critical to maintaining homeostasis. CB1 receptors are located in the central and peripheral nervous systems, as well as the lungs, kidneys, and liver. CB2 receptors are predominantly expressed in the immune system and hematopoietic cells.

The direct effect of the endocannabinoid deficiency (CECD) correlates with multisystemic clinical outcomes in such conditions as hyperinsulinemia, osteoporosis, diabetes, dementia, cardiovascular disease, multiple sclerosis, and obesity. Three primary categories are herein defined to discuss endocannabinoid deficiency (CECD): genetic, acquired, and idiopathic autoimmune. Genetic endocannabinoid deficiency (CECD) relates to hereditary acquisition of a disorder; acquired refers to an infectious of traumatic origination, and idiopathic autoimmune refers to etiologies for endocannabinoid deficiencies (CECD) which do not have direct associations. Diseases and disorders are assigned to one or more of these categories because often secondary disorders arise with physiological changes associated with the primary diagnosis. For example, periodontal disease has been associated with endocannabinoid deficiency and the disease is categorized as acquired, originating from an extrinsic source. The presentation of oral cancer, which affects the immune system, supports adding the category of idiopathic autoimmune as well to the assessment. Because the endocannabinoid system facilitates communication and coordination between various cell types, deficiencies directly affect physiological homeostasis.

Cannabidiol (CBD), a non-psychotropic cannabinoid naturally occurring in human and animal species, occurs as a phytocannabinoid, CBD oil, which is derived from the industrial hemp plant. The restorative effects of cannabidiol (CBD oil), which increases anandamide and other lipid neurotransmitters, thereby restoring the endocannabinoid system, are of interest in the medical management of multiple disorders, including disorders of the dental system, which is directly affected by the immunological system. Indeed, research supports that plant-derived cannabidiol (CBD) has analgesic and anti-inflammatory benefits.

Cannabidiol (CBD) is a non-psychotropic and non-toxic compound, which has been demonstrated to positively affect the human endocannabinoid system. Cannabidiol (CBD), derived from the hemp plant, demonstrates anti-inflammatory and immune-modulating properties. Cannabidiol (CBD) has a low affinity for CB1 and CB2 receptors in the human body, but acts as an indirect antagonist of their agonists. (Antagonists are defined as substances that stop or inhibit the effects of another substance on the cellular surface, producing the same effect as a substance which would normally bind to the receptor. Agonists are chemicals that bind to receptors and elicit a biological response.) Therefore, cannabidiol may enhance the therapeutic effects of THC, possibly by increasing the density of the CB1 receptors. Cannabidiol (CBD) has been demonstrated to cross the blood-brain barrier and exert antioxidant,
antimicrobial, and analgesic properties, rendering it valuable in the prevention and treatment of
dental disorders and diseases.

Tetrahydrocannabinol (THC) is the active ingredient in the cannabis plant. THC, a cannabinoid
compound, binds to CB1 cannabinoid receptors in the human brain, simulating the naturally
occurring cannabinoids produced by the human body. In the human body, CB1 receptors are
located in the cerebral cortex, which describes the frontal regions of the brain, the basal ganglia,
the cerebellum, the hypothalamus, the anterior conglute cortex, and the hippocampus. THC
inhibits the release of neurotransmitters, including Glutamate, GABA, noradrenalin, dopamine,
5-HT, and acetylcholine. Despite the rapid inactivation of THC by the fatty acid amide hydrolase,
THC, and other exogenous cannabinoids, are sustainable for extended periods of time and are
associated with physiological effects which are beneficial in the prevention and management of
certain dental disorders.

Human Dental System
The human dental system includes teeth, gum, and oral cavity structures. Twenty primary and
twenty-eight to thirty-two permanent teeth are included in the anatomical naming of tooth
structures. Endocannabinoid receptors, both CB1 and CB2, are disseminated throughout the
gums, tongue, salivary glands, maxillary and mandibular structures and glands, and oral cavity.
Clinical endocannabinoid deficiency (CECD) in dental disease increases the incidence of
infections and systemic disorders, including dissemination to the brain and heart.

Dental Disorders and Diseases: Periodontal Disease
Periodontal disease is generally considered an acquired Clinical Endocannabinoid Deficiency
(CECD), secondary to behaviors which increase the incidence of disease: poor oral hygiene,
cigarette smoking, and oral tobacco use. As adjunctive treatment with oral rinses and improved
dental hygiene, cannabidiol (CBD) is recommended to alleviate the discomfort associated with
the disease and also reduce the inflammatory processes. Research indicates improvement with
administration of cannabidiol (CBD) and reduction in painful tissues within the oral cavity.

Submandibular Gland Inflammation
Submandibular gland inflammation is an acquired clinical endocannabinoid deficiency (CECD)
associated with dehydration, poor oral hygiene, and chronic inflammatory disorders.
Painful and swollen submandibular glands characterize this disorder, which responds to the
analgesic and anti-inflammatory effects of cannabidiol (CBD). Consideration of adjunctive CBD
oil with standard of care is warranted given research outcomes.

Endocannabinoid Deficiency (CECD) Classification: Dental Disorders
<table>
<thead>
<tr>
<th>Disorder</th>
<th>Origin of CECD</th>
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<tbody>
<tr>
<td>Periodontal Disease</td>
<td>Acquired</td>
</tr>
<tr>
<td>Submandibular Gland Inflammation</td>
<td>Acquired, Idiopathic Autoimmune</td>
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CEN Medical Cannabis Pharmacological Prescription and Coding System Application

The CEN Medical Cannabis Pharmacological Prescription and Coding System (CEN/MCPPCS) provides language that enables the health care practitioner to communicate with the dispenser of medical cannabis. The first two letters of the system refer to the cannabis type: cannabis sativa, cannabis indica, or cannabis hybrida. The numerical value in percentage to the right of the colon refers to the recommended THC content in percentage, and the numerical value in sequence to the right of the THC percentage refers to the recommended CBD content.

Example: Cannabis sativa for periodontal disease may be purchased at a dispensary. An example prescription follows:

Larry Calder
DOB: 08-09-1966
Diagnosis: Diabetes Mellitus, ICD-9: 523.0
CS: 18%/1-3%
Use via vaporizer every six hours as needed.
Gregory Pines, D.D.S.

Composition Assignments

1. Please answer the following question. Medical cannabis is a suitable adjunctive therapy for the patient with periodontal disease.
   a. True
   b. False

2. Please go to www.libraryworld.com and enter username CEN. Select an article from the CEN library on an aspect of cannabidiol (CBD) and the dental system. Write a two hundred word critical analysis paper on this research article and determine the following in your paper:
   a. Author and affiliation
   b. Study population
   c. Purpose
   d. Outcome of the study
   e. Importance of the research
Bibliography


