Medical Marijuana for Pain
How Does Cannabis Work on Your Body?

Jeremy Spiegel, MD
Medical Director - Casco Bay Medical
Westbury, Long Island, New York
Intro

➔ Brief History of Cannabis
➔ Physiology of Cannabis
➔ Pain studies
➔ Ehlers-Danlos Syndrome
➔ Cannabis in Clinical Practice
Cannabis has been used spiritually, recreationally, and medicinally for thousands of years.

“My doctor is old school, he doesn’t go in for medical marijuana.”
- CBM Patient, 2016
“My doctor is old school, he doesn't go in for medical marijuana.”
- CBM Patient, 2016
“My doctor is old school, he doesn't go in for medical marijuana.”

- CBM Patient, 2016
Cannabis was legal in the USA until 1937

It was on the US Formulary until 1942 -- Removed AGAINST the advice of the AMA.

Reefer Madness
Harry Anslinger was a government official - the US's first commissioner of Federal Bureau of Narcotics.
Harry Anslinger was a government official - the US’s first commissioner of Federal Bureau of Narcotics.
Cannabis is a safe, natural, and effective treatment for chronic pain

Chronic pain may originate in the body generally, or from the brain or spinal cord. The brain changes over time in patients with chronic pain.
Chemical compounds called **CANNABINOIDs** (such as THC and CBD) are secreted from cannabis flowers providing relief from pain, nausea, and have anti-inflammatory properties.
CANNABINOIDs (such as THC and CBD) are C$_{21}$-Oxygen containing organic molecules.
Endocannabinoid system

→ **Phytocannabinoids are ligands**
Ligand binding to a receptor protein

→ **Phytocannabinoids are agonists (and partial agonists, antagonists, inhibitors)**
Agonist is a ligand that binds, alters the function of the receptor, and triggers a physiological response.
Endocannabinoid system

Our Bodies Naturally Produce Cannabinoids

Anandamide and 2-AG regulate brain and mood, eating, pain, immune function, sleep.

We have receptors on our cells in our brain and nervous system (CB1) and other parts of our body (CB2)
Endocannabinoid system

➔ Phytocannabinoids are ligands for CB1 and CB2, which are G-Protein coupled receptors in the cell membrane.
Endocannabinoid system ➔ Our Bodies Naturally Produce These:

- Anandamide and 2-AG regulate brain and mood, eating, pain, immune function, sleep.

➔ We have receptors on our cells in our brain and nervous system (CB1) and other parts of our body (CB2).

THC binds to CB1 in the brain, where CBD binds to CB2 elsewhere in the body.
THC

- Binds to CB1 and CB2
THC

- Binds to CB1 and CB2
- Affects Movement
THC

- Binds to CB1 and CB2
- Affects Movement

Parkinson’s patients I have treated demonstrate improvement in tremor and muscle rigidity with the use of MMJ. Onset of improvement may be quite rapid.
THC

- Binds to CB1 and CB2
- Affects Movement
- Affects Memory
THC

- Binds to CB1 and CB2
- Affects Movement
- Affects Memory

This is helpful for those suffering with PTSD -- Post Traumatic Stress Disorder, who benefit from an ability to let go of strongly recalled traumatic memories (recalled both mentally and physically).
THC

- Binds to CB1 and CB2
- Affects Movement
- Affects Memory
- Affects Cognition (Thinking)
THC

- Binds to CB1 and CB2
- Affects Movement
- Affects Memory
- Affects Cognition (Thinking)

Attention Deficit Disorder responds nicely to MMJ, with greater focus, concentration and productivity.
THC

- Binds to CB1 and CB2
- Affects Movement
- Affects Memory
- Affects Cognition (Thinking)
- Affects Sensory Perception
THC

- Binds to CB1 and CB2
- Affects Movement
- Affects Memory
- Affects Cognition (Thinking)
- Affects Sensory Perception

Pain is reduced. Things taste better. Things feel better to the touch. Vision is brighter. Colors become more vivid.
THC

- Binds to CB1 and CB2
- Affects Movement
- Affects Memory
- Affects Cognition (Thinking)
- Affects Sensory Perception
- Affects Mood
THC

- Binds to CB1 and CB2
- Affects Movement
- Affects Memory
- Affects Cognition (Thinking)
- Affects Sensory Perception
- Affects Mood

With proper dosing and repeated use, an innocuous pleasant feeling of well-being accompanies reductions in pain sensation and other physical symptoms.
THC

- Binds to CB1 and CB2
- Affects Movement
- Affects Memory
- Affects Cognition (Thinking)
- Affects Sensory Perception
- Affects Mood
- Affects Appetite
THC

- Binds to CB1 and CB2
- Affects Movement
- Affects Memory
- Affects Cognition (Thinking)
- Affects Sensory Perception
- Affects Mood
- Affects Appetite

It is a strong anti-nausea medication. Inflammatory bowel diseases benefit from THC as there are cannabinoid receptors in the gastrointestinal tract.
THC

- Binds to CB1 and CB2
- Affects Movement
- Affects Memory
- Affects Cognition (Thinking)
- Affects Sensory Perception
- Affects Mood
- Affects Appetite
- Reduces inflammation
THC

- Binds to CB1 and CB2
- Affects Movement
- Affects Memory
- Affects Cognition (Thinking)
- Affects Sensory Perception
- Affects Mood
- Affects Appetite
- Reduces inflammation

Arthritis symptoms improve, as do the neurodegenerative disorders such as multiple sclerosis, with reduced spasticity of muscles.
Pain Tracts

Pain travels through nerves, special tracts, the lateral spinothalamic tract carries pain and temperature.
Pain Tracts

Pain travels through nerves, special tracts, the lateral spinothalamic tract carries pain and temperature.
Perception

Voltage gated Na+ channels
TRP (Transient Receptor Protein) Channels modulate ion entry mediating neuronal signaling: PAIN and PRESSURE perception, temperature, smell, taste, vision.

Delta-9 THC is a multitarget ligand. Δ9-THC has also been proposed to be a serotonin 5HT3 receptor antagonist and an allosteric modulator of the opioid receptors.
<--Perception

<--Voltage gated Na+ channels

<--Reduces inflammation
### CB activity

<table>
<thead>
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<th>pCBs</th>
<th>Target</th>
<th>Functionality</th>
<th>References</th>
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<tbody>
<tr>
<td></td>
<td>CB₁</td>
<td>Partial Agonist</td>
<td>[2–4]</td>
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<tr>
<td></td>
<td>CB₂</td>
<td>Partial Agonist</td>
<td>[3, 4, 78]</td>
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</table>

### Non-CB₁/Non-CB₂ activity

<table>
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<tr>
<td>GPR55</td>
<td>Agonist</td>
<td>[8]</td>
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<tr>
<td>GPR18</td>
<td>Agonist</td>
<td>[13, 14]</td>
</tr>
<tr>
<td>5HT₃A</td>
<td>Antagonist</td>
<td>[15, 16]</td>
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<tr>
<td>μ- and δ-OPR</td>
<td>Allosteric Modulator</td>
<td>[17]</td>
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<tr>
<td>PPARγ</td>
<td>Agonist</td>
<td>[18]</td>
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<tr>
<td>GlyR</td>
<td>α₁ Positive Allosteric Modulator</td>
<td>[21]</td>
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<tr>
<td></td>
<td>α₂ NR</td>
<td>[20]</td>
</tr>
<tr>
<td></td>
<td>α₃ Positive Allosteric Modulator</td>
<td>[20]</td>
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<tr>
<td>TRPV₁</td>
<td>NR</td>
<td>[22]</td>
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<td>TRPV₂, 3, 4</td>
<td>Agonist</td>
<td>[22–24]</td>
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<td>TRPM8</td>
<td>Antagonist</td>
<td>[25]</td>
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<td>TRPA₁</td>
<td>Agonist</td>
<td>[22, 25]</td>
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CBD

- So interesting
- **PLEIOTROPIC** - So Many functions
- Little affinity for CB1 AND CB2 RECEPTORS
- DELAYS reuptake of neurotransmitters such as anandamide and adenosine
CBD

- **NON-PSYCHOTROPIC**
- At HIGH concentrations it activates a SEROTONIN receptor 5HT-1A implicated in:

  Anxiety, addiction, sleep, pain perception, nausea and vomiting
CBD

BLOCKS GRP55 Signaling

GRP 55 signals osteoclast formation--which reabsorbs bone. Therefore: Putatively

REDUCE OSTEOPOROSIS and JOINT PROBLEMS by antagonizing this process.
<table>
<thead>
<tr>
<th>CB₁</th>
<th>CB₂</th>
<th>CBD</th>
<th>CB₁</th>
<th>[37, 38]</th>
<th>CB₂</th>
<th>[38]</th>
<th>CBD</th>
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<tr>
<td>Endocannabinoid system</td>
<td>Phytocannabinoids are ligands</td>
<td>Phytocannabinoids are agonists (and partial agonists, antagonists, inhibitors)</td>
<td>CB₁</td>
<td>Antagonist*</td>
<td>CB₂</td>
<td>Antagonist*</td>
<td>CBD</td>
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<td>5-HT₂A</td>
<td>5-HT₃A</td>
<td>A₁A</td>
<td>GPR55</td>
<td>GPR18</td>
<td>5-HT₁A</td>
<td>5-HT₂A</td>
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<tr>
<td>Agonist</td>
<td>Partial agonist*</td>
<td>Antagonist</td>
<td>Agonist</td>
<td>[43, 44]</td>
<td>[13, 14]</td>
<td>[43]</td>
<td>[45]</td>
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<tr>
<td>Negative Allosteric Modulator</td>
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<td></td>
<td></td>
<td>[39]</td>
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<td>AEA uptake</td>
<td>Inhibitor</td>
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<td>[23]</td>
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<td>GlyR</td>
<td>α₁</td>
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<td></td>
<td>α₂</td>
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<td>α₃</td>
<td>Positive Allosteric Modulator</td>
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</table>
THC:CBD RATIO
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- The MOST IMPORTANT factor in your choice of MMJ
THC:CBD RATIO

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- The CBD tempers the THC such that you will have milder effects -- elimination of nausea without full blown “munchies”.
THC:CBD RATIO

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Blue Dream Genetics and Grow Info
The MOST IMPORTANT factor in your choice of MMJ

The CBD tempers the THC such that you will have milder effects -- elimination of nausea without full blown “munchies”.
THC: CBD
20:1
THC: CBD
1:1
THC: CBD 1:20
Chronic pain in patients with the hypermobility type of Ehlers–Danlos syndrome: evidence for generalized hyperalgesia

L. Rombaut Sr., M. Scheper Jr., I. De Wandele Jr., J. De Vries Jr., M. Meeus Sr., F. Malfait Sr., R. Engelbert Sr., P. Calders Sr.

734

Open Archive

DOI: https://doi.org/10.1016/j.joca.2014.02.769

Open access funded by OsteoArthritis Society International

Abstract

Purpose: The Ehlers–Danlos Syndrome (EDS) is one the most prevalent heritable connective tissue disorders. Generalized severe joint hypermobility, which is frequently associated with joint dislocations, chronic joint and limb pain, and premature osteoarthritis, are the dominant clinical manifestations of the hypermobility type of EDS (EDS-HT). Chronic widespread pain is highly present in this patient group, but up to now, evidence for generalized hyperalgesia is lacking. Several studies in chronic pain disorders examined whether central hyperexcitability could be existent by using algometry.
Therefore, the primary objective of the study was to investigate whether pressure pain thresholds (PPTs) at both symptomatic and asymptomatic body areas differ in EDS-HT patients compared to healthy subjects. In addition, we examined the type of chronic pain EDS-HT patients experience.

**Methods:** Twenty-three women with EDS-HT and 23 gender- and age-matched healthy controls participated. All subjects marked on Margolis Pain Diagram where they felt pain lasting longer than 24 hours in the past 4 weeks. Then, they completed several questionnaires assessing pain cognitions (Pain Catastrophizing Scale, Pain Vigilance and Awareness Questionnaire, Hospital Anxiety and Depression Scale), fatigue (Checklist Individual Strength subscale fatigue), disability (Health Assessment Questionnaire), and general health status (Short Form Health Survey-36), in order to take the possible influence of these factors on PPTs into account. Patients also completed the Pain Detect Questionnaire regarding the severity, course, quality and nature of the pain they experienced. Thereupon, a blinded researcher assessed PPTs at 14 body locations on the trunk and extremities. The pressure was gradually increased at a rate of 1 kg/s until the subject indicated that the pain level has been reached. The threshold was determined as the mean of the 2 last values out of the 3 consecutive measurements. This method has been found to be efficient and reliable in the exploration of pathophysiological mechanisms involved in pain. PPTs were compared for the 2 complete groups. In addition, PPTs of patients and controls who did not report pain in a respective zone were compared.

**Results:** The EDS-HT patient group demonstrated significantly lower PPTs compared to the control group for all zones. The mean (SD) PPT was 2.9 (1.62) kg/cm² in the EDS-HT patients and 6.2 (1.88) kg/cm² in the controls (P < 0.001). Also at asymptomatic (pain-free) zones, EDS-HT patients systematically showed significantly lower pain thresholds compared to the healthy subjects. No confounding factors responsible for the observed differences could be revealed.

According to the Margolis Pain Diagram, EDS-HT patients experienced pain on an average of 31% (±17.8) of their body surface, compared to 1% (±2.4) in the control subjects. Furthermore, approximately 40% of the patients presented with a nociceptive pain pattern, whereas in about 50% a predominantly neuropathic pain component was likely present.

**Conclusion:** This study shows that several forms of pain coexist in EDS-HT which are likely the result of different pain-triggering mechanisms. The widespread pain lacking local distinction together with the lower PPTs in body zones outside and remote to the symptomatic zone provide evidence for the existence of generalized secondary hyperalgesia in patients with EDS-HT, which may represent the involvement of a sensitized central nervous system as an important mechanism in the chronic pain problems of this challenging patient group.
Activation of cannabinoid CB₁ and CB₂ receptors suppresses neuropathic nociception evoked by the chemotherapeutic agent vincristine in rats

E J Rahn,¹ A Makriyannis,² and A G Hohmann¹,*

Abstract

Background and purpose:
The ability of cannabinoids to suppress mechanical hypersensitivity (mechanical allodynia) induced by treatment with the chemotherapeutic agent vincristine was evaluated in rats. Sites of action were subsequently identified.

Experimental approach:
Mechanical hypersensitivity developed over the course of ten daily injections of vincristine relative to groups receiving saline at the same times. Effects of the CB₁/CB₂ receptor agonist WIN55,212-2, the receptor-inactive enantiomer WIN55,212-3, the CB₂-selective agonist (R,S)-AM1241, the opiate agonist morphine and vehicle on chemotherapy-induced neuropathy were evaluated. WIN55,212-2 was administered intrathecally (i.t.) or locally in the hindpaw to identify sites of action. Pharmacological specificity was established using competitive antagonists for CB₁ (SR141716) or CB₂ receptors (SR144528).
EDS relief with MMJ

- Scoliosis pain relief
- Relief from unstable joints prone to subluxation, strain, dislocation, hyperextension
- Arthritis
- Migraine
- Chronic inflammation
- Muscular pain
- Improvement of chronic fatigue
- Relief from IBS
- Improvement in foot pain from flat feet
- Carpal tunnel relief
- Gastroparesis relief
- Allodynia/Hyperalgesia
Cannabis may reduce the need for opioid painkillers

University of Michigan researchers found a 64% decrease in users of medical marijuana.
Medical Cannabis Use Is Associated With Decreased Opiate Medication Use in a Retrospective Cross-Sectional Survey of Patients With Chronic Pain

Kevin F. Boehrke *, Evangelos Litinas T, Daniel J. Clauw T

Highlights

- Cannabis use was associated with 64% lower opioid use in patients with chronic pain.
- Cannabis use was associated with better quality of life in patients with chronic pain.
- Cannabis use was associated with fewer medication side effects and medications used.

Abstract

Opioids are commonly used to treat patients with chronic pain (CP), though there is little evidence that they are effective for long term CP treatment. Previous studies reported strong associations between passage of medical cannabis laws and decrease in opioid overdose statewide. Our aim was to examine whether using medical cannabis for CP changed individual patterns of opioid use. Using an online questionnaire, we conducted a cross-sectional retrospective survey of 244 medical cannabis patients with CP who patronized a medical cannabis dispensary in Michigan between November 2013 and February 2015. Data collected included demographic information, changes in opioid use, quality of life, medication classes used, and medication side effects before and after initiation of cannabis usage. Among study participants, medical cannabis use was associated with a 64% decrease in opioid use (n = 118), decreased number and side effects of medications, and an improved quality of life (45%). This study suggests that many CP patients are essentially substituting medical cannabis for opioids and other medications for CP treatment, and finding the benefit and side effect profile of cannabis to be greater than these other classes of medications. More research is needed to validate this finding.
Cannabis is safe

→ CB1 Receptors are virtually nonexistent in the brainstem, medulla, thalamus.

So we don’t get the life-threatening effects on vital physiological functions.
Terpenes are fragrant essential oils secreted by cannabis plants

These active molecules are among the 500 different compounds found in cannabis, of which there are 85 different cannabinoids.
**Know Your Terpenes**

We at pan-sink.com want our customers to understand what Terpenes are and what these amazing molecules can do for them. So we've created the chart below to introduce you to each unique, naturally created Terpene that we use in our products.

<table>
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<tr>
<th>Terpene Type</th>
<th>Formula &amp; Structure</th>
<th>Scent Profile</th>
<th>Scent Descriptors</th>
<th>Physiological FX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caryophyllene</td>
<td>C_{15}H_{24}</td>
<td>Spicy</td>
<td>Aromatherapy</td>
<td>Antidepressant</td>
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<tr>
<td>Linalool</td>
<td>C_{10}H_{16}O</td>
<td>Sweet</td>
<td>Scent</td>
<td>Relaxes</td>
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<tr>
<td>Pinene</td>
<td>C_{10}H_{16}</td>
<td>Spicy</td>
<td>Scent</td>
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<td>Myrcene</td>
<td>C_{16}H_{20}</td>
<td>Terpenoid</td>
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<td>Scent</td>
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<td>Limonene</td>
<td>C_{10}H_{14}O</td>
<td>Fruity</td>
<td>Scent</td>
<td>Scent</td>
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<tr>
<td>Terpinolide</td>
<td>C_{13}H_{20}O</td>
<td>Terpenoid</td>
<td>Scent</td>
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</tr>
</tbody>
</table>

*Note: The chart includes images of each Terpene's chemical structure, scent profile, and their physiological effects.*
How Do I Get My New York Medical Marijuana Card?
1. See the Doctor for the MMJ evaluation.

I perform these either:
   In-Person in Westbury
   or
   Online via videochat
2. Register with the New York State Department of Health
www.health.ny.gov

(We can help you with this.)
3. Wait about a week for your ID card to come in the mail.
4. Go to the Dispensary to get your medicine.

(We will give you a list of conveniently located dispensaries.)
New York Listed Conditions

➔ Chronic Pain \(\geq 3\) months duration
➔ Post Traumatic Stress Disorder
➔ Cancer
➔ ALS
➔ HIV/AIDS
➔ Inflammatory Bowel Disease
New York Listed Conditions

➔ Epilepsy
➔ Huntington’s Disease
➔ Parkinson’s Disease
➔ Spinal Cord Injury
➔ Multiple Sclerosis
About Us

Casco Bay Medical is a private practice located in Portland, Maine, Danvers, Massachusetts, and Westbury, Long Island, New York providing evaluations and recommendations for medical marijuana. Jeremy Spiegel, MD, is a prominent and tireless advocate for the use of cannabis as medicine and will treat you with respect and compassion. Please do not hesitate to contact us for more information or to schedule an initial consultation.

For New York residents only: Please call (516) 508-3316 to schedule an appointment. You may be evaluated in person or via this secure telemedicine portal where you also may request an appointment online.

In our Portland, Maine office exclusively, we provide office-based addiction treatment with Suboxone (buprenorphine) for opiate addiction (Oxycontin, Oxycodeone, Heroin, Vicodin, or Percocet addiction).
In The Media

November 13, 2017 PTSD approved as a listed condition for the New York Medical Marijuana Program | Article

July 30, 2015 | The Creativity and Madness Conference: The Psychology of Really Bad Art | Video
Dr. Spiegel gives an edgy and thought-provoking talk concerning beauty, art, and body dysmorphic disorder at the annual Santa Fe, New Mexico conference.

July 29, 2015 | An Iraq vet fights to treat PTSD with pot | Article
Dr. Spiegel is quoted in this Boston.com article about an Army veteran who is a medical marijuana activist.

June 24, 2013 | Hardcore Hobbies on National Geographic | TV
Watch Dr. Spiegel’s Intervention on National Geographic’s Hardcore Hobbies that aired on June 24th. Dr. Spiegel acts as an interventionist for a hardcore collector of action figures who cannot stop buying these figurines.
Watch Dr. Spiegel’s Intervention

April 7, 2013 | Cell phones promote serious social, psychological issues | Article
What started out as a means of adult communication has become a teen status symbol and a new age addiction, and it is not a drug. It’s a cell phone. Recent research at Baylor University finds the link between materialism and IT devices are creating a generation of learned compulsive behavior. With four billion cell phones in use today, that’s a substantial amount of compulsion. More
Art Healing: Visual Art for Emotional Insight and Well-Being
Paperback – June 15, 2011
by Jeremy Spiegel (Author), Patrick Nagatani (Foreword)

Note: Not eligible for Amazon Prime. Available with free Prime shipping from other sellers on Amazon.

Art Healing: Visual Art for Emotional Insight and Well-Being reveals a method psychiatrist and art lover Jeremy Spiegel, MD, devised over many years to unlock our more elusive thoughts and feelings, leading to an enhanced understanding of the inner self, catharsis, a sense of comfort and happiness, and personal transformation for a more productive life.

990 Westbury Road
Suite 204
Westbury NY 11590
(516) 508-3316
References


References (cont’d)

➔ Annals of Internal Medicine, 2017. *Benefits and Harms of Plant-Based Cannabis for Posttraumatic Stress Disorder: A Systematic Review.*

➔ *Cannabis Pharmacy: The Practical Guide to Medical Marijuana* by Michael Backes

➔ Leafly.com

➔ CannaSOS.com