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# The Endocannabinoid System and Medical Marijuana: A Pending Revolution In Healthcare

JCAC (Japanese Clinical Association of Cannabinoids)  
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First of all, I would like to thank the sponsors for providing me with this opportunity to speak with you. What I want to share with you is new information that will change the way you view life and health, while at the same time providing you with novel opportunities to improve health and extend life.

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1. The Biophysical basis of life: dissipative structures-order from disorder,
2. The evolution of the endocannabinoid system: the all pervasive, global homeostatic regulator of all vertebrate body systems
3. The profound holistic anti-aging properties of cannabis are achieved through metabolic manipulation. Autoimmune diseases, neurological and mental disorders, cardiovascular conditions, skeletal disorders, cancer and viral diseases (HIV, Kaposi sarcoma, influenza, etc) have metabolic origins and can be modulated.
4. The future: societal benefits from the evolutionarily mandated increasing cannabinoid activity.








I want to start the presentation with what I call the physics of life. It's my contention that every healthcare practitioner should understand what life is before one considers efforts to maintain and restore health. Think about it, would you bring your car to a mechanic who did not know how a car works? Tragically, in the United States people are admitted into medical school without any real scientific background or understanding of it. Once we gain a fundamental understanding of the

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## Presentation Topics


1. The Physics of Life
  - flowing energy organizes matter
  - the emergence of life
  - oscillations and limit cycles
2. Endocannabinoids: The Great and Powerful Wizard behind the curtain
3. Cannabinoids and Aging
4. Cannabinoids and Cancer
  - sugar vs fats for energy production
  - the role of acetyl choline in dysphoria
5. Cannabinoids and Viral Infections (HIV, Kaposi sarcoma)
6. Cannabinoids and Society
  - BLPs and FLPs Racism

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### Far From Equilibrium Thermodynamics

"The more deeply we study the nature of time, the better we understand that duration means invention, creation of forms, continuous elaboration of the absolutely new."



"We are actually the children of the arrow of time of evolution, not its progenitors"

Ilya Prigogine  
Phoenix Tears Foundation

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Prigogine's work makes life a natural phenomena rather than an impossible miracle. It makes sense that the better we understand the nature of life, the more in harmony with nature we can become, the more we will benefit as an individual and as a component of society.

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### Benard Instability



"Impossible" order generated by a thermal gradient

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This petri dish shows the Benard instability and how flow can generate organized hexagonal convection cells out of a previously random disorganized collection of molecules. As long as there is a source of heat and an environment to dissipate the heat, along with the right temperature, these organized structures spontaneously form even though there are greater than 10 to the 20 molecules that would otherwise, from an equilibrium perspective, never make this improbable organization possible

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### Belousov-Zhabotinsky-Reaction



"Impossible" Order generated by a chemical gradient

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This petri dish shows the Belousov-Zhabotinsky redox reaction. In this case, it is the flow of electrons that drive the organization of otherwise random molecules in a liquid. In many respects, this reaction is a mimic of the Krebs cycle.

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In order to more fully appreciate the vast potential of cannabis-based medicines to positively impact human health, an understanding of the physical basis of life must be considered.

The all pervasive endocannabinoid system is a unique manifestation of evolution driven by the basic principles of far-from-equilibrium thermodynamics.

Flowing energy organizes matter and results in emergent oscillatory behavior (the balance of opposing forces)





A critical concept that arises from the work of Nobel laureate Ilya Prigogine, who created the field of far from equilibrium thermodynamics, is that flowing energy and mass has an intrinsic creative capacity to create order out of disorder. Flow dependent systems, collections of organized molecules, are consistent with the 2nd law of thermodynamics as long as they produce more entropy to their surroundings than would occur if the organized structure, that is intrinsically negentropic, did not

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Evolution selects for adaptability.

As invertebrate complexity increased, a new level of adaptability was required to enable a further increase in complexity.

Vertebrates emerged with novel mechanisms of adaptability homeostatic regulation by endocannabinoids and their receptors.





Evolution selects for is adaptability to the ever-changing environment. With the development of eukaryotic and multicellular invertebrates evolution proceeded up to a point when a new paradigm was required, higher level of adaptability. The emergence of vertebrates was the solution. Whereas invertebrates are very linear and preprogrammed, vertebrates achieved a new level of biochemical plasticity. Skin stretches muscles grow, bones adapt, we even make new genes.

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A Far From Equilibrium Thermodynamic Perspective of Metabolically Generated Free Radicals as the Foundation of Homeostasis

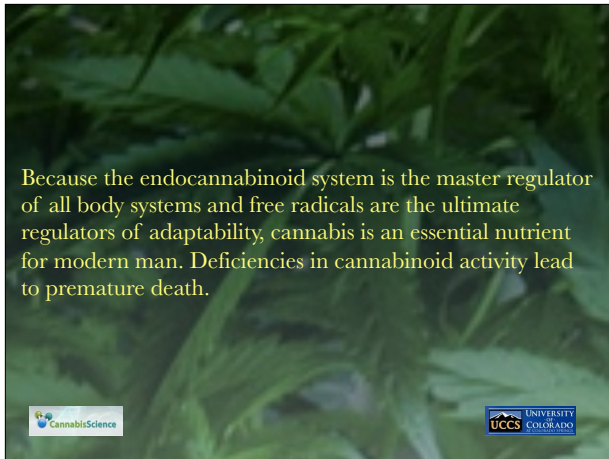
Life, liberty, and the Pursuit of Happiness



A novel hypothesis that I want to present is that while free radicals are dangerous because of their reactivity, it is this very reactivity that creates signal molecules that are responded to by modifying biochemical pathways in such a fashion as to reduce excess free radical production. This homeostatic activity is accomplished by epigenetic modifications to the DNA and histones as well as by numerous post-translational modifications to enzymes themselves. Thus, excess free radical

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Because the endocannabinoid system is the master regulator of all body systems and free radicals are the ultimate regulators of adaptability, cannabis is an essential nutrient for modern man. Deficiencies in cannabinoid activity lead to premature death.



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Prigogine's work makes life a natural phenomena rather than an impossible miracle.

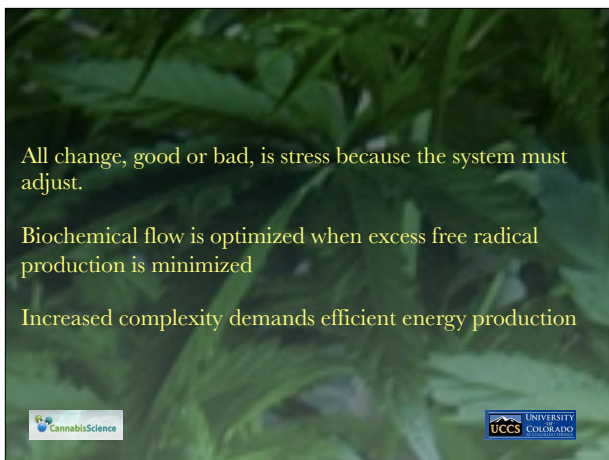
The nervous system monitors all information that comes into the system (body). The nervous system monitors all mass that comes in the system. Together these two systems create the interface with our environment.

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All change, good or bad, is stress because the system must adjust.

Biochemical flow is optimized when excess free radical production is minimized

Increased complexity demands efficient energy production




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Living systems are dynamic fractals. All of the biochemical circuitry manifests as dynamic harmony, whether or not the circuits are creating and sustaining health or illness. They are all constantly adapting to the ever-changing environment as defined by the overall collection of sustaining redox reactions and the associated free radical reactions that are generated. All change, whether good or bad, is manifest as stress that creates free radicals. The more complexity that a

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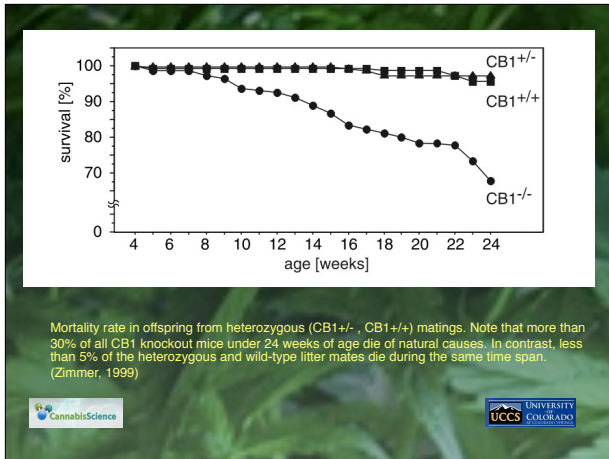
**What is Aging?**

**As an Organism Ages, the System Moves Closer to Equilibrium**



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The natural health that we associate with you reflects the movement of the system further from equilibrium as it grows both in free energy and negative entropy. In contrast, aging is the movement back towards equilibrium. When a critical point is reached, the system undergoes a nonlinear, far from equilibrium phase change (Death) that brings the collection of molecules closer to equilibrium.



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The CB1 receptor is part of the most prevalent neurotransmitter system in the human brain. However, is found throughout the human body and protects against excessive free radical production. As you can see from this graph the absence of CB1 activity dramatically shortens lifespan in knockout mice. These mice are so stressed that they barely move.



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The Japanese population has benefited tremendously from its diet high in the polyunsaturated fatty acids that are found in fish. The low levels of cardiovascular disease found in Japanese men compared to Americans is attributed to their diet and the high intake of omega-3 fatty acids. While most physicians are well aware of the benefits that result from the high levels of fish consumption, they are unaware of the fact that omega-3 fatty acids are converted into



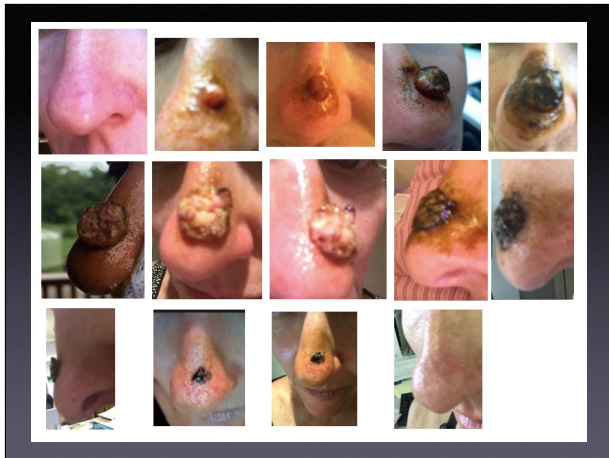
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This woman was 120 years old when the picture was taken. She attributed her longevity and health to her consumption of ganja and palm wine tea every day. She died a few years later at 123.



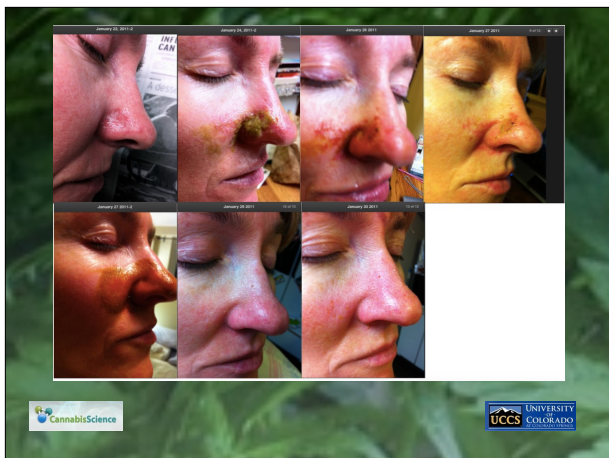
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The intent of this slide is to show that there are many peer-reviewed references that address the cancer-killing properties of cannabinoids. Additionally, the specific abstract shows that the anticancer activity proceeds by a variety of pathways that are both receptor-dependent and receptor-independent in their actions. It's a sad commentary on how political correctness can cause pain, suffering, and death. The anticancer properties of THC were first demonstrated back in the 1970s and



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This is one of the series of slide collections that dramatically show the cancer-killing properties of cannabis extracts. Keep in mind that the topical applications used to treat these cancers mimic what occurs internally when high doses are consumed. This specific cancer is a squamous cell carcinoma. Unlike basal cell carcinoma, which quickly dries up and falls off, squamous cell carcinoma grows initially and then undergoes necrotic death. This series of photographs



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This is the same woman with a basal cell carcinoma. After two weeks of topical application, the cancer is gone, as confirmed by the dermatologist.



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This is what the doctors described as the worst case of squamous cell carcinoma they had ever seen. The 1st oncologist wanted to cut off the scalp and cut off the skull and mounted in the person's body for treatment. That offer was rejected and in the 2nd slide you see the man's head after hundred and 30 or radiation treatments. Obviously this oncologist was slow and recognizing that the treatment was not working. And the 3rd photograph topical extracts of cannabis were



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Here's another squamous cell carcinoma again demonstrating how the extract initially makes this type of cancer grow prior to killing it.

**Why I changed my mind on weed**  
 By **Dr. Sanjay Gupta**, CNN Chief Medical Correspondent  
 updated 8:44 PM EDT, Thu August 8, 2013

**Families looking to cure epileptic children find first dose of hope with special Colorado marijuana oil**

312 5 email 323

Long before I began this project, I had steadily reviewed the scientific literature on medical marijuana from the United States and thought it was fairly unimpressive. Reading these papers five years ago, it was hard to make a case for medicinal marijuana. Kevin wrote about this in a TIME magazine article. Back in 2009, he wrote "Why I Gave Up on Weed."

Well, I am here to apologize. I apologize because I didn't look hard enough, until now. I didn't look far enough. I didn't read papers from smaller labs in other countries doing some remarkable research, and I was too dismissive of the loud chorus of legitimate patients whose symptoms improved on cannabis.

Charlotte Figi scoops dirt from the medical marijuana plant that was named for her. Charlotte suffers from Dravet Syndrome and is using MMJ to control her seizures. Monday, May 27, 2013  
 Photo by Nichole Montanez, The Gazette

Dr. Sanjay Gupta is a neurosurgeon and CNN's chief medical correspondent.




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Sanjay Gupta did a special report on the effects of cannabidiol containing cannabis extracts as a treatment for severe seizure disorders such as Dravet's syndrome. Children who had hundreds of seizures a day frequently had none after treatment. CBD is recognized as a natural food product in Europe and its acceptance as a health aide is rapidly spreading around the world.

Who in their right mind would make illegal an anti-aging drug, that kills cancer and whose activity is found in mother's milk?

Should mothers who breastfeed be arrested for getting their infants high and for possessing drug paraphernalia?






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Psychoactive cannabinoids that humans produce from essential fatty acids are naturally found in mother's milk. It protects the infant upon exposure to the higher dose of oxygen that the newborn is exposed to. Oxygen is highly reactive and pure oxygen is in fact toxic to newborns resulting in blindness, an affect sadly discovered when pure oxygen was used to treat premature babies with immature respiratory systems. A dominant characteristic of mammals is their childcare. The fact that mother nature has selected for the presence of psychoactive cannabis compounds in mother's milk hints at how beneficial these compounds are.

**Ignorance Is Not Bliss!**  
Results

The results of the study are predictable, so no one should be surprised! Not one of the medical schools surveyed had a department of endocannabinoid science or an ECS director. None of them taught the endocannabinoid science as an organized course. Only 21 of the 157 schools surveyed had the ECS mentioned in any course. 21/157 = 13.3%



**Conclusion**

The purpose of this study was to point out the absurdity of ignoring a new science. We would hope this study causes medical schools to rethink their position and welcome this new science. We call on the Deans of all medical schools to start organized courses in cannabinoid receptor science and its modulating effects on homeostasis. If the medical schools in your state do not teach the endocannabinoid science, you can discuss ways to incorporate the study of the ECS into their curriculum.

*Nathan Stewart, Sioux Colombe, Ron Mullins, David Allen M.D.*  
Medical Cannabis Evaluations, Sacramento, CA

**Summer 2013**



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The current medical education system is pathetically inadequate with respect to the endocannabinoid system. Here we have a system found in all vertebrates, that regulates everything in the human body from conception until death, is the major neurotransmitter system in the human brain, and yet we do not teach the topic in our medical schools. Only 13% of the United States medical schools mentioned the word endocannabinoid.

**Cannabinoids Regulate Open-Mindedness**

Intrinsically, in a population there will be people above and below average endocannabinoid activity with respect to open-mindedness

What are the consequences?

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The short-term forgetfulness that is associated with marijuana use actually has a very important function in maintaining health. Imagine if all of your worst memories constantly intruded into your consciousness. It's very important to be able to forget some things. The inability to do so produces stress including PTSD. Importantly, half of the population is going to have below average levels of cannabinoids activity for any of the many phenotypes that the control. All change is stress. If a person does not make sufficient endocannabinoids they will be abnormally stressed by change and will avoid it. I have coined the term BLIP (Backward Looking People) for those with below average levels of endocannabinoids activity regulating open-mindedness. These people are fear oriented and try to control things so they're not subjected to the stress of change. Sadly I believe these are the people who run the world and that of mankind is to survive the blips must be replaced by the



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### Evaluation of CB<sub>1</sub> Receptor Knockout Mice in the Morris Water Maze

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Department of Pharmacology and Toxicology, Medical College of Virginia Campus, Virginia Commonwealth University, Richmond, Virginia  
Received November 29, 2001; accepted February 13, 2002. This article is available online at <http://jpet.aspetjournals.org>

**ABSTRACT**  
The endocannabinoid system has been proposed to modulate a variety of physiological processes, including those that underlie cognition. The present study tested whether this system is tonically active in learning and memory by comparing CB<sub>1</sub> receptor knockout mice (CB<sub>1</sub><sup>-/-</sup>) to wild-type mice (CB<sub>1</sub><sup>+/+</sup>) in several Morris water maze tasks. Also, the effects of three cannabinoid agonists, Δ<sup>9</sup>-tetrahydrocannabinol (Δ<sup>9</sup>-THC), R(+)-[2,3-dihydro-5-methyl-3-morpholinylmethyl]pyrrol[1,2,3-de]-1,4-benzoxazinyl[1-naphthalenyl]methanone mesylate (WIN 55,212-2), and methanandamide, were evaluated in a working memory procedure. Both genotypes exhibited identical acquisition rates in a fixed platform procedure; however, the CB<sub>1</sub><sup>-/-</sup> mice demonstrated significant deficits in a reversal task in which the location of the hidden platform was moved to the opposite side of the tank. This genotype difference was most likely due to an increased perseverance of the CB<sub>1</sub><sup>-/-</sup> mice in that they continued to return to the original platform location, despite being repeatedly shown the new platform location. In addition, Δ<sup>9</sup>-THC (ED<sub>50</sub> = 1.3 mg/kg), WIN 55,212-2 (ED<sub>50</sub> = 0.35 mg/kg), and methanandamide (ED<sub>50</sub> = 3.2 mg/kg) disrupted the performance of CB<sub>1</sub><sup>+/+</sup> mice in the working memory task at doses that did not elicit motivational or sensorimotor impairment as assessed in a cued version of the task. Furthermore, doses of each drug that were maximally disruptive in CB<sub>1</sub><sup>+/+</sup> mice were ineffective in either *N*-(piperidin-1-yl)-5-14-chlorophenyl-1-(2,4-dichlorophenyl)-4-methyl-1*H*-pyrazole-3-carboxamide HCl (SR-141716A)-treated CB<sub>1</sub><sup>+/+</sup> or CB<sub>1</sub><sup>-/-</sup> mice. These results provide strong evidence that cannabinoids disrupt working memory through a CB<sub>1</sub> receptor mechanism of action, and suggest that the endocannabinoid system may have a role in facilitating extinction and/or forgetting processes.

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### BLPs and FLPs

Backward looking people

Forward looking people



Who do we want to run the world, those representing the violent ignorance of man's history of those that embrace a new direction of peace and harmony?

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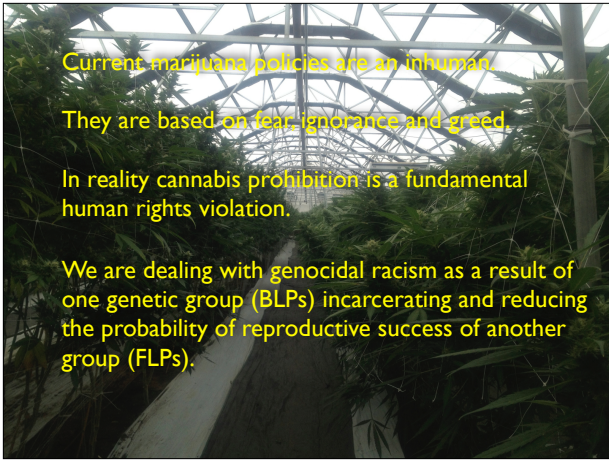
The cannabis awakening will never be turned back



It's time for mankind to pull its head out of the hole. We need to embrace the modern science of far from equilibrium thermodynamics and use science as a framework for understanding the endocannabinoid system and man's role at the forefront of evolution.

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