

## 4. Lifestyle & Your Endocannabinoid System

By Kevin Baiko, MD

Cannabis is amazing medicine. In addition to being far safer than the majority of available "drugs" available over-the-counter or by prescription, it effectively treats a wide variety of conditions – so wide that no other known medicine, man-made or natural comes close to being a rival. This is because of the endocannabinoid (eCB) system, whose profound role in human physiology is only just beginning to be understood in modern scientific terms. Cannabis affects us so is because we intrinsically produce our own forms of its cannabinoid constituents and receptors which respond to both our intrinsically produced eCBs as well as the phytocannabinoids found in the cannabis plant. The primary role of this system seems to be to maintain a healthy internal balance (homeostasis) amongst all the organ systems and throughout the body-mind in general. Whether or not we supplement this system with cannabis, we are still "wired" with its homeostatic mechanism. And so questions arise... How can we optimize its function? And more specifically, how do daily lifestyle choices affect its function?

By the term "lifestyle" I mean the way we tend to live on a day-in-day-out basis. This includes the foods we tend to eat, the exercise we tend to get, the way we tend to deal with stress, the habits we tend to cultivate and the healthcare interventions we tend to employ. For the most part, our lifestyle is the sum of all the choices we make, consciously and unconsciously, and these choices affect the way our eCB system works. In fact, this is probably where most disease processes start. If our goal is to optimize our health, it makes sense to optimize the function of the system that manages our body's homeostasis. This starts with the foods we eat.

Endocannabinoids are synthesized from essential fatty acids – specifically from the Omega-6 fatty acid -aracidonic acid (AA). Since essential fatty acids cannot be synthesized in our bodies, we need AA in our diet to synthesize the eCB anandamide. Dietary supplementation with AA increases levels of anandamide and another eCB, 2-acyl-glycerol (2-AG) (Berger, Di Marzo *et al*). eCBs are paracrine hormones, because (rather than being released into the bloodstream for transport to other portions of the body) they are made locally for local use and quickly degraded. It turns out our bodies also use AA to synthesize several other types of paracrine hormones – leukotrienes, thromboxanes and a subtype of prostaglandin (PG2) – all of which contribute to inflammation. Our bodies make two other types of prostaglandins (PG1 & PG3) – which are both anti-inflammatory – from Omega-3 fatty acids. eCBs are also anti-inflammatory, but curiously, supplementing with Omega-3 fatty acids decreases serum endocannabinoid levels. However, Omega-3 fatty acids seem to be required for eCB-mediated neuronal function (Lafourade *et al*). So, how might this information guide us in our dietary choices?

The easiest answer is to balance our intake of Omega-6 & Omega-3 fatty acids. Both are necessary for our eCB system to function optimally and while a little passing inflammation here and there is part of our body's natural healing process, chronic inflammation leads to chronic pain, disease and disability. Suggested optimal ratios of Omega-6 to Omega-3 fatty acid dietary intake vary from 1:1 up to 4:1. The average

American consumes a ratio of well over 10:1, and often as high as 30:1. Omega-6 fatty acids are abundantly found in corn, many cooking oils (corn, safflower, sunflower, soy), as well as corn-fed livestock. The fattier the meat, the more AA that is found therein. Unless from free range sources, our meat, dairy and egg products drive our fatty acid ratios into ranges that tend to lead to inflammatory based disease. Foods rich in omega-3 fatty acids include wild fish and game (and their byproducts) as well as certain seeds (flax, pumpkin, walnut). Not surprisingly, hempseed oil boasts a ratio of 3:1. Practically speaking, we seem to be better off by limiting our meat and dairy intake to wild sources while steering away from oils high in AA content towards oils high in Omega-3 fatty acid content.

Exercise also seems to influence how our eCB system functions. Exercise increases eCB receptor expression. In other words, the more we exercise the more sensitive we are to cannabinoids – be they intrinsically sourced (endocannabinoids) or extrinsically sourced (phytocannabinoids). Exercise also leads to a release of the eCB anandamide. Many are familiar to the "runner's high" phenomenon, wherein extended exercise leads to euphoria. It turns out this is not caused by "endorphins", but rather – you guessed it – by our endocannabinoids (Sparling *et al*). It is a "high" afterall.

Most people associate the word "dieting" with an attempt to lose weight. It turns out being overweight directly influences our endocannabinoid system, which in turn influences overall health. Many disease states are associated with obesity. Fat cells (adipocytes) produce excessive eCBs, which stimulate appetite, encouraging weight gain and development of worsening obesity. This vicious cycle makes weight loss all the more difficult. Caloric restriction (fasting) reduces both eCB and eCB receptor CB1 expression. The eCB system may be our link between pleasure and eating. Rimonabant, a CB1 receptor blocking pharmaceutical, was developed as a weight loss drug. It truly helps people lose weight, but it also tends to cause such severe depression that people are much more prone to suicide when using it, so it is not approved for use in the U.S. However, combining caloric restriction with regular aerobic exercise increases CB1 expression (You *et al*) – enabling us to both lose weight and maximize the cannabinoid mediated sense of reward simultaneously.

In this modernized world stress is a major killer. It contributes to virtually all known disease processes. This may be one of the primary reasons people supplement their eCB system with cannabinoids from the cannabis plant – to relax. Cannabis certainly aids in this process. Unfortunately, chronic stress down-regulates CB1 expression (Hill *et al*). Over time, this loss of our body's receptiveness to eCBs just leads to the experience of mounting stress. Anecdotal evidence suggests that stress reduction techniques such as meditation, yoga and deep breathing exercises reverse this down-regulation. It is worth mentioning here that while cannabis use is relaxing to body and mind, and while its mind altering properties can help us look at stressful circumstances with creativity and even humor, it does not make those stressors go away unless we integrate that creativity and humor into our daily lives. Stress is more often a matter of how we react to perceived threats than actual threats, but our bodies don't know the difference. Cannabis use can counteract the stress response, but until we learn to see things for what they really are

(and cannabis can help us do just that), we run the risk of depending on a plant to treat a delusive symptom that only self-realization can truly cure. Fortunately, cannabis use is a remarkably safe habit.

But what of the other substances of habit regularly used to cope with the stresses of modernized life? Alcohol is far more dangerous than cannabis, both in terms of what it does to a user's body and what the user's body (or motor vehicle) can do to others. Furthermore, chronic exposure to ethanol down-regulates CB1 expression (Basavarajappa *et al*). Alcoholics are less responsive to both eCBs and phytocannabinoids. The reverse seems to be true for regular coffee drinkers, as chronic caffeine exposure potentiates CB1 dependent stimulation (Rossi *et al*). Curiously, despite the recent demonization of tobacco use for its negative impacts on personal and public health, chronic nicotine exposure increases CB1 expression in parts of the brain, especially in adolescents (Gonzales *et al*). It is often cited that while cannabis is not physically addicting, its use can lead to psychological dependence. Whether or not this latter point is true, we all know that alcohol, caffeine and nicotine can be highly addicting. Could it be that our eCB system plays a role in psychological dependence to these substances? Many of my patients have confided that their cannabis use helped them not only break their habits of alcohol and tobacco use, but also their use of high strength prescription painkillers, methamphetamines, heroin and cocaine, all of which are horribly addicting. Cannabis, it turns out, is a "gateway drug" – a gateway OUT of addiction. It's not an "entry" drug – it's an exit drug.

In addition, to diet, exercise and self-medication, many rely on "alternative" health care therapies to maintain health and treat disease. Osteopathic and chiropractic doctors often employ techniques to remove restrictions to nerve flow between the central and peripheral nervous systems. This kind of bodywork has been shown to both increase anandamide levels (McPartland *et al*) and to help the transport of the CB1 receptors from where they are synthesized (in nerve cell bodies in the spinal cord) to where they do their job (at the distal nerve terminal somewhere in the body's peripheral nervous system) (Hohmann & Herkenham). Given the eCB system's role in maintaining homeostasis, this is a huge endorsement for maintaining good spinal health. Another alternative approach to health care - acupuncture, has been shown to increase anandamide levels in the skin (Chen *et al*) and to upregulate CB2 receptors in the skin (Zhang *et al*). I highly suspect that future studies will demonstrate wide-ranging changes in the eCB system throughout varying organ systems, depending on the specific acupuncture points piqued.

When we consider the endocannabinoid system's role in maintaining physiologic balance, it makes sense that its maintenance should be approached in balanced fashion. For this system to work optimally, its receptors must be fully expressed throughout the body. For these receptors to work, the body must be able to produce adequate quantities of the appropriate eCB's to signal the receptors. While simple supplementation (smoking/eating cannabis), certainly signals these receptors, it doesn't do so with the selective finesse of which a healthy eCB system, is no doubt capable. Diet, and specifically a healthy ratio of Omega-6:Omega-3 fatty acids (not exceeding 4:1), plays a crucial role in synthesizing a healthy balance of paracrine hormones (including eCBs).

While excess alcohol consumption is best avoided, exercise and weight management, as well as maintenance of proper structural and energetic health (especially of the spine) all contribute to a properly functioning endocannabinoid system.

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