

Christopher Bergland *The Athlete's Way*

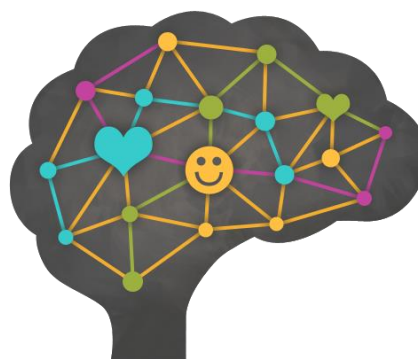
The Neurochemicals of Happiness

7 brain molecules that make you feel great.

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Life in the human body is designed to be a blissful experience. Our evolutionary biology insures that everything necessary for our survival makes us feel good. All animals seek pleasure and avoid pain. Therefore, our brain has a wellspring of self-produced neurochemicals that turn the pursuits and struggles of life into pleasure and make us feel happy when we achieve them. This biological design is generous, but lays dormant in many. In this entry I will look at 7 brain molecules linked to happiness and offer simple ways you can trigger their release in your daily life.

The premise of *The Athlete's Way: Sweat and the Biology of Bliss* is that through daily physicality and other lifestyle choices we have the power to make ourselves happier. One of the side-effects of living in a digital age is that we are increasingly removed from our



physicality and each other. Our biology is short-circuiting. The balance of neurochemicals that evolved for millennia has been disrupted by our modern lives, making us more prone to depression, anxiety and malcontent. Pharmaceutical companies are eager to readjust this imbalance with a pill. My goal is to prescribe simple lifestyle choices and changes in behavior that can improve your brain chemistry, make you feel better and motivate you to maximize your human potential.

Our body produces hundreds of neurochemicals. Only a small fraction of these have been identified by scientists. We will not know in our lifetime exactly how all of these molecules work. Albert Einstein believed that, "*Everything should be made as simple as possible, but not simpler.*" Based on this philosophy I have applied simple tags to 7 brain molecules and general descriptions of how each is linked with a feeling of well-being.

THE NEUROCHEMICALS OF HAPPINESS

1. Endocannabinoids: "The Bliss Molecule" Endocannabinoids are self-produced cannabis that work on the CB-1 and CB-2 receptors of the cannabinoid system. Anandamide

(from the Sanskrit “Ananda” meaning Bliss) is the most well known endocannabinoid. Interestingly, at least 85 different cannabinoids have been isolated from the Cannabis plant. The assumption is that each of these acts like a key that slips into a different lock of the cannabinoid system and alters perceptions and states of consciousness in various ways. It is likely that we self-produce just as many variations of endocannabinoids, but it will take neuroscientists decades to isolate them.

A study at the University of Arizona, published in April 2012, argues that endocannabinoids are, most likely, the cause for runner's high. The study shows that both humans and dogs show significantly increased endocannabinoids following sustained running. The study does not address the potential contribution of endorphins to runner's high. However, in other research that has focused on the blood–brain barrier (BBB), it has been shown that endorphin molecules are too large to pass freely across the BBB, and are probably not responsible for the blissful state associated with the runner's high.

2. Dopamine: “The Reward Molecule” Dopamine is responsible for reward-driven behavior and pleasure seeking. Every type of reward seeking behavior that has been studied increases the level of dopamine transmission in the brain. If you want to get a hit of dopamine, set a goal and achieve it.

Many addictive drugs, such as cocaine and methamphetamine, act directly on the dopamine system. Cocaine blocks the reuptake of dopamine, leaving these neurotransmitters in the synaptic gap longer. There is evidence that people with extraverted, or uninhibited personality types tend to have higher levels of dopamine than people with introverted personalities. To feel more extroverted and uninhibited try to increase your levels of dopamine naturally by being a go-getter in your daily life and flooding your brain with dopamine regularly by setting goals and achieving them.

3. Oxytocin: “The Bonding Molecule” Oxytocin is a hormone directly linked to human bonding and increasing trust and loyalty. In some studies, high levels of oxytocin have been correlated with romantic attachment. Some studies show if a couple is separated for a long period of time, the lack of physical contact reduces oxytocin and drives the feeling of longing to bond with that person again. But there is some debate as to whether oxytocin has the same effect on men as it does on women. In men, vasopressin (a close cousin to oxytocin) may actually be the “bonding molecule.” But again, the bottom line is that skin-to-skin contact, affection, love making and intimacy are key to feeling happy.

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In a cyber world, where we are often 'alone together' on our digital devices, it is more important than ever to maintain face-to-face intimate human bonds and 'tribal' connections within your community. Working out at a gym, in a group environment or having a jogging buddy is a great way to sustain these human bonds and release oxytocin.

In a 2003 study, oxytocin levels rose in both the dog and the owner after time spent 'cuddling'. The strong emotional bonding between humans and dogs may have a biological basis in oxytocin. If you don't have another human being to offer you affection and increase oxytocin your favorite pet can also do the trick.

4. Endorphin: "The Pain-Killing Molecule" The name Endorphin translates into "self-produced morphine." Endorphins resemble opiates in their chemical structure and have analgesic properties. Endorphins are produced by the pituitary gland and the hypothalamus during strenuous physical exertion, sexual intercourse and orgasm. Make these pursuits a part of your regular life to keep the endorphins pumping.

Endorphins are linked less to 'Runner's High' now than endocannabinoids, but are connected to the 'feeling no pain' aspect of aerobic exercise and are produced in larger quantities during high intensity 'anaerobic' cardio and strength training.

In 1999, clinical researchers reported that inserting acupuncture needles into specific body points triggers the production of endorphins. In another study, higher levels of endorphins were found in cerebrospinal fluid after patients underwent acupuncture. Acupuncture is a terrific way to stimulate the release of endorphins.

5. GABA: "The Anti-Anxiety Molecule" GABA is an inhibitory molecule that slows down the firing of neurons and creates a sense of calmness. You can increase GABA naturally by practicing yoga, meditation or "[The Relaxation Response](#)." Benzodiazepines (Such as Valium and Xanax) are sedatives that work as anti-anxiety medication by increasing GABA. These drugs have many side effects and risks of dependency but are still widely prescribed.

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A study from the "Journal of Alternative and Complementary Medicine" found a 27% increase in GABA levels among yoga practitioners after a 60-minute yoga session when compared against participants who read a book for 60 minutes. The study suggests yoga might increase GABA levels naturally.

6. Serotonin: “The Confidence Molecule” Serotonin plays so many different roles in our bodies that it is really tough to tag it. For the sake of practical application I call it “The Confidence Molecule.” Ultimately the link between higher serotonin and a lack of rejection sensitivity allows people to put themselves in situations that will bolster self-esteem, increase feelings of worthiness and create a sense of belonging. To increase serotonin, challenge yourself regularly and pursue things that reinforce a sense of purpose, meaning and accomplishment. Being able to say “I did it!” will produce a feedback loop that will reinforce behaviors that build self esteem and make you less insecure and create an upward spiral of more and more serotonin.

A variety of popular anti-depressants are called Serotonin-Specific Reuptake Inhibitors (SSRIs) — these are well known drugs like Prozac, Celexa, Lexapro, Zoloft, etc. The main indication for SSRIs is clinical depression, but SSRIs are frequently prescribed for anxiety, panic disorders, obsessive compulsive disorder (OCD), eating disorders, chronic pain, and post-traumatic stress disorder (PTSD).

SSRIs got their name because it was once thought they worked by keeping serotonin in the synaptic gap for longer and that this would universally make people who took these pills happier. Theoretically, if serotonin were the only neurochemical responsible for depression, these medications would work for everyone. However, some people never respond to SSRIs, but they do respond to medications that act on GABA, dopamine or norepinephrine systems.

Scientists do not fully understand the role of serotonin in mood-disorders which is why it is important that you work closely with a trusted psycho-pharmacologist if you want to find a prescription medication that works best for you. Also, the fact SSRIs take a couple weeks to kick in suggests that their effect may also have to do with neurogenesis, which is the growth of new neurons. These findings illustrate that how anti-depressants work in each person’s brain varies greatly and is not fully understood by scientists or researchers.

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7. Adrenaline: “The Energy Molecule” Adrenaline, technically known as epinephrine, plays a large role in the fight or flight mechanism. The release of epinephrine is exhilarating and creates a surge in energy. Adrenaline causes an increase in heart rate, blood pressure, and works by causing less important blood vessels to constrict and increasing blood flow to larger muscles. An “Epi-Pen” is a shot of epinephrine used in the treatment of acute allergic reactions.

An 'adrenaline rush' comes in times of distress or facing fearful situations. It can be triggered on demand by doing things that terrify you or being thrust into a situation that feels dangerous. You can also create an adrenaline rush by taking short rapid breathes and contracting muscles. This jolt can be healthy in small doses, especially when you need a pick me up.

A surge of adrenaline makes you feel very alive. It can be an antidote for boredom, malaise and stagnation. Taking risks, and doing scary things that force you out of your comfort zone is key to maximimzing your human potential. However, people often act recklessly to get an adrenaline rush. If you're an 'Adrenaline Junkie' try to balance potentially harmful novelty-seeking by focusing on behaviors that will make you feel good by releasing other neurochemicals on this list.

CONCLUSION

There is not a one-size-fits-all prescriptive when it comes to creating a neurochemical balance that correlates to a sense of happiness. Use this list of 7 neurochemicals as a rudimentary checklist to take inventory of your daily habits and to keep your life balanced. By focusing on lifestyle choices that secrete each of these neurochemicals you will increase your odds of happiness across the board.

Brain science is a triad of **electrical** (brain waves), **architectural** (brain structures) and **chemical** (neurochemicals) components working in concert to create a state of mind. This entry focuses only on the chemical elements. I will explore the electrical and architectural components in future blogs.