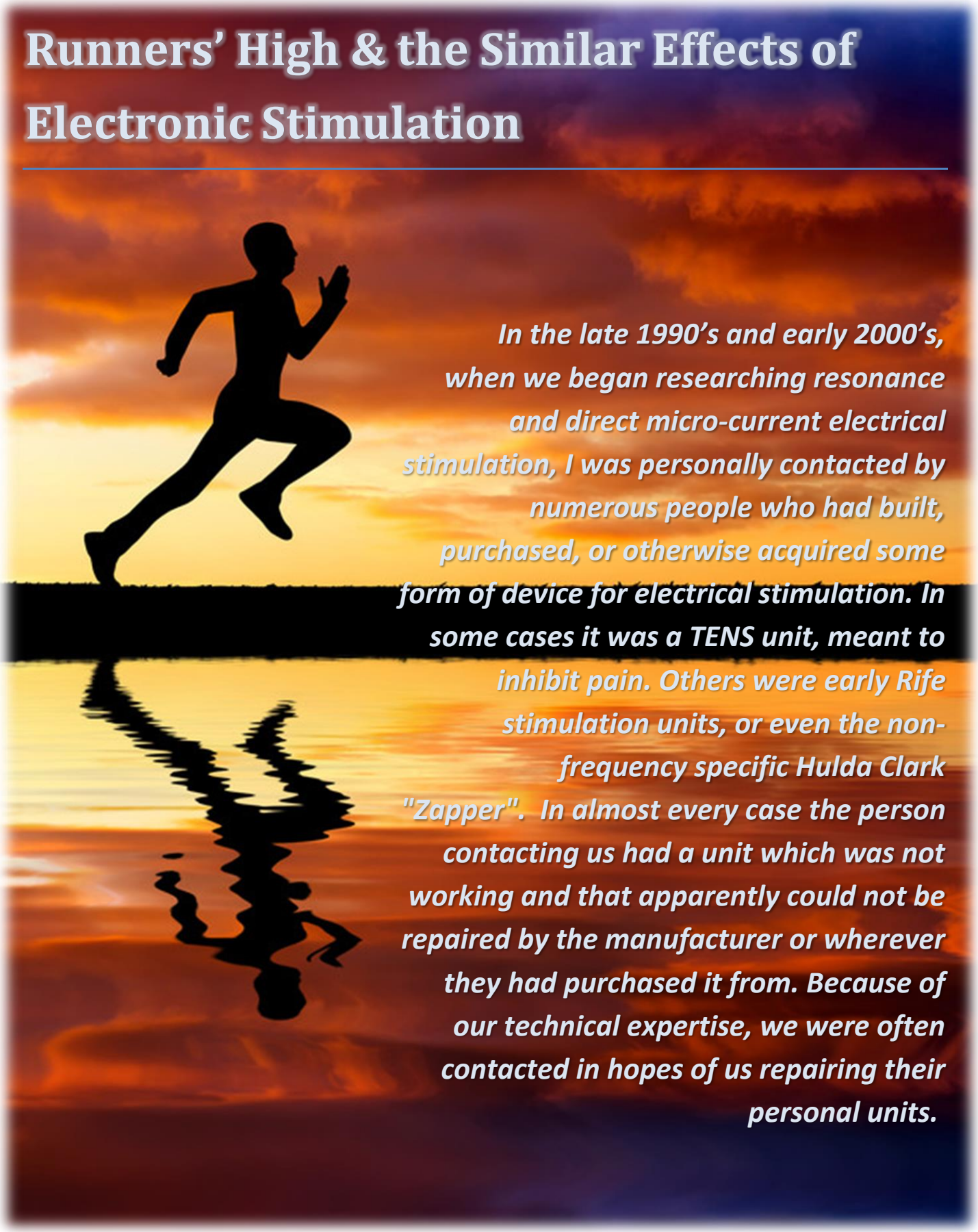
Runners' High & the Similar Effects of Electronic Stimulation



In the late 1990's and early 2000's, when we began researching resonance and direct micro-current electrical stimulation, I was personally contacted by numerous people who had built, purchased, or otherwise acquired some form of device for electrical stimulation. In some cases it was a TENS unit, meant to inhibit pain. Others were early Rife stimulation units, or even the non-frequency specific Hulda Clark "Zapper". In almost every case the person contacting us had a unit which was not working and that apparently could not be repaired by the manufacturer or wherever they had purchased it from. Because of our technical expertise, we were often contacted in hopes of us repairing their personal units.

However, one common thing stood out with each and every one of the individuals who contacted us. Working or not, their "device" seemed to be very important to them. They genuinely felt that it gave them the relief needed. They also often appeared to have almost a psychological addiction to their personal unit. As we researched more, we found that what we had observed as seeming addiction actually had solid ground in biological science and may actually be causing the same effect of "runner's high". Whether runner's high is a real (and measurable) physiological effect of running is still being definitively determined through research. However, the physiological explanation for it is that, as a defense mechanism, when the brain receives messages of high blood acidity, high pain activity, fiber damage, etc. during exercise, it then orders the release of beta-endorphins into the blood to be carried to tissues throughout the body.[1] Through an effect similar to that of dopamine, pain is neutralized, although fiber damage is not repaired by this. The intense muscle stimulation that causes all of this to occur is very similar to the muscle stimulation that can be achieved electronically using contact frequency instruments. It seems it may now be possible to induce a runner's high effect without even lacing up a pair of running shoes.

The term "runner's high" relates to a quite interesting phenomena normally experienced during strenuous exercise such as long distance running. The psychophysical effects of endurance training (i.e. stress reduction, mood elevation, and reduced pain perception) have been receiving attention for only a short amount of time since the 1980's. These effects are all part of a feeling that some, but not all, runners have claimed to experience and that is described in a number of ways; including feelings of "pleasantness", "boundless energy", and some even similar to drug-induced sensations.[2] Runners are not the only group of individuals who exercise and claim to have experienced a "high" during their workout or preferred physical activities. Long-distance swimmers and weight lifters have said they sometimes experience a similar effect as well. Although there has not been much research to determine what causes this feeling, there have been several suggestions that remain dominant as most likely. Of those several, the most supported proposal is that of an endorphin-driven runner's high. Endorphins are small neuropeptides produced by the central nervous system which act to reduce pain – the name endorphin is a shortened form of endogenous morphine.[3]

This "endorphin theory" has been considered as the most substantial explanation behind runner's high, and for good reason. Two important observations help

[1] Marx, Benjamin J. "What Is the Physiological Mechanism of Runner's High?" *Quora*. N.p., 26 Aug. 2010. Web. 06 Aug. 2015. <http://www.quora.com/What-is-the-physiological-explanation-for-runners-high>.

[2] Janal MN, Colt EW, Clark WC, Glusman M. Pain sensitivity, mood and plasma endocrine levels in man following long-distance running: effects of naloxone. Pain1984;19:13-25.

[3] Goldstein A, Lowery PJ (September 1975). "Effect of the opiate antagonist naloxone on body temperature in rats". *Life Sciences* **17**(6): 927–31.

to support the endorphin theory of runner's high; pointing out that endorphins in the peripheral blood increase during the runner's high and that the drug naloxone (an opioid receptor antagonist used to counter heroin overdose) reverses the euphoric effects of runner's high.[4] The most effective study of runner's high was conducted within recent years when 10 trained male athletes from local running and sports clubs in Munich, Germany, submitted to a positron emission tomography (PET) scan before and after two hours of running.[5] PET scans work by following an injected radioactive tracer molecule which emits positrons – whose directions are used to triangulate their origin in the brain. The tracer used for this study is a drug that binds to opioid receptors in the brain that is displaced from those receptors as endogenous opioids are released. Scientists compared images before and after the two hour run. They found that several brain regions correlated with feelings of euphoria increased endorphin activity during exercise.[6] The areas observed were the anterior cingulate (ACC), the orbitofrontal cortex (OFC), and the insular cortex (INS). The regions that were activated during the runner's high – especially the OFC – are all involved in the perception of reward.

These results help to support the suggestion that the runner's high is caused by endogenous opioid release in the brain. Similar brain activation also occurs for various other rewarding events, such as passing an exam or even drug use. This could explain why some runners say that they are "addicted" to running and the feeling it gives them. For some runners, the euphoria felt after their routine may be more incentive to keep running than the actual health benefits to be gained. Either way, the study definitely highlighted that humans do have a common system for evaluating rewards and there are many things that may activate this system, including the stimulation from a quality frequency instrument.

[4] LTP. "The Neurological Basis of the Runner's High." Web log post. *Science Blogs*. N.p., 28 Feb. 2008. Web. 06 Aug. 2015. <http://scienceblogs.com/purepedantry/2008/02/28/the-neurological-basis-of-the/>.

[5] Boecker, Henning, Till Springer, Mary E. Spilker, Marcus Koppenhoefer, Klaus J. Wagner, Michael Valet, Achim Berthele, and Thomas R. Tolle. "The Runner's High: Opioidergic Mechanisms in the Human Brain." *Cerebral Cortex* 18.11 (2008): 2523-531. 21 Feb. 2008. Web. 06 Aug. 2015. <http://cercor.oxfordjournals.org/content/18/11/2523.full#content-block>.

[6] Boecker, et al. 2008.