

## How to Distinguish Legitimate Biofeedback/Neurofeedback Devices

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The market of therapeutic biofeedback devices has become flooded with a number of machines purporting to be biofeedback machines when, in fact, they either operate on different principles or else provide an unconventional form of “feedback” to the individual. This document is meant to offer distinctions from a laboratory research perspective.

Traditionally, biofeedback machines make use of any of a number of sensors that can quantify specific physiological parameters in the body, such as heart rate, blood pressure, skin temperature, muscle tension, sweat gland activity..., etc. Neurofeedback is similar in that it employs electrodes attached with a conducting gel to certain areas of the scalp to monitor EEG (brainwave) patterns. These quantifiable parameters are all indicative of the unconscious state of the autonomic nervous system (for biofeedback) or of brain function (for neurofeedback). The devices typically utilize blinking lights, audible tones or computer software images that alert the individual to their state of being, bringing it into their conscious mind, and providing them with a means to gain control over these otherwise unconscious bodily or cognitive functions.

Sensors for biofeedback include: galvanic skin response (skin voltage is very sensitive to moisture levels from sweat glands), thermistors (to measure skin temperature), photoplethysmographs (or PPG’s for measuring peripheral blood flow and heart rate), electromyographs (for measuring muscle tension) and others. Wikipedia and other online sources provide ample examples. Biofeedback has enjoyed great success in treating numerous conditions including those related to muscle tension (temporomandibular-joint disorder, back pain, tension headaches/migraines, tendonitis, incontinence), plus anxiety, hypertension, epilepsy, some chronic pain conditions, certain breathing disorders, some types of cardiac arrhythmias, and substance abuse. Neurofeedback can also address a number of these but is more commonly used to address learning and psychological disorders such as ADHD, obsessive-compulsive disorder, and depression, to name just a few. To emphasize: biofeedback and neurofeedback allow an individual to become aware of unconscious, unhealthy physiological patterns that they can then be guided to consciously change. Repetition of this change reprograms the subconscious mind so the etched pattern of the previous, unhealthy state is erased, hence the individual experiences a healed or improved state of function and being.

By contrast, there exist other devices on the market under the guise of biofeedback that either (a) do not make use of medically-understood physiological sensing technologies or (b) do not involve the individual in the “reprogramming” process, but, instead, impart energy/information to the individual as some form of signal. If the device purports to operate on quantum principles and/or purports to balance the energy of the individual by imparting certain frequencies of energy or information, it is not a biofeedback device as has been conventionally defined. An example is used to clarify.

To be fair and very clear from the start, this example does *not* purport to be a biofeedback technology, but it includes each of the elements that other device manufacturers claim to be biofeedback. The NES machine (Nutri-Energetics System) utilizes a proprietary technology to read information encoded in the electromagnetic field emanating from the hand of an individual. This high-tech sensor, which resembles a larger computer mouse, is *not* measuring galvanic skin response. The device is said to operate on quantum physical principles, and there is a great deal of information about the physiological and energetic health of the individual that is encoded in phase information from the electromagnetic field of the individual's index and middle fingers, which is the primary area scanned by the sensor. The NES computer software then analyzes the signal and provides information – “feedback”, if you will – on specific physiological problems as well as energetic imbalances. The physiological problems cited can be as specific as “the big toe on the right foot is swollen” or that a specific complex chemical toxin is in the body. The energetic balances are much more difficult to validate. In either case, the individual has the opportunity to “treat” their imbalances by drinking water that the NES machine can “imprint” with “information” that is beneficial and tailored specifically to that individual. Is this biofeedback? It stretches the definition considerably but generally does not fit. The NES more closely approximates the combination of an MRI machine with a homeopath.

The Ondamed is another machine that, like the NES, has some unconventional mechanism for sensing the state of an individual, and then feeds back “healing frequencies.” Here is the description directly from their website ([http://www.ondamed.net/how\\_does\\_ondamed.php](http://www.ondamed.net/how_does_ondamed.php)):

ONDAMED<sup>®</sup> works by using mild sound and accompanying magnetic pulses to stimulate the body at various frequencies. A medical practitioner monitors the response of the autonomic nervous system to these frequencies by noting changes in the pulse and informs the patient of findings, thus providing the information needed for biofeedback to occur. The identified stimulating sound and magnetic frequencies are then temporarily applied to identified areas while the patient relearns how to be in a healthier state. A key feature of ONDAMED is that relaxing frequencies are part of the re-education process. Many studies have shown that tension and stress reduce feelings of wellness and the addition of relaxing frequencies help re-establish the proper balance between the sympathetic nervous system and the parasympathetic nervous system.

In this description, the Ondamed sounds more like an echocardiogram than a biofeedback machine. The practitioner is observing the “changes in the pulse” and acts as an intermediary between the device and the individual under treatment. The individual is not in the driver's seat here: a practitioner is required to interpret the findings, verbally share this with the individual, and then administer therapeutic sound and electromagnetic frequencies. Further, additional “relaxing frequencies” are imparted that aim to relax the individual – rather than allowing the individual to relax using their own will and capabilities.

This document is not addressing the efficacy of devices like NES or Ondamed to diagnose or treat real health conditions. The point of this article is simply to clarify what constitutes a

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conventional biofeedback device versus some of these other devices on the market that claim to be biofeedback or biofeedback-like. The differentiating criteria are clear.

1. Biofeedback devices utilize well-understood technologies to sense quantifiable physiological parameters.
2. This information is directly manifested to the individual who, at all times, is “in the driver’s seat”.
3. The individual, under their own conscious will, changes their physiological state until the sensors indicate the parameters are in some improved or more acceptable range.

Non-biofeedback devices can utilize unconventional sensing technologies whose output is not medically recognized as a valid reflection of physiological state. They may require a practitioner or intermediary who translates the results to the individual and directs them accordingly: the individual is *not* in the driver’s seat! In most cases, the “feedback” treatment is *not* internally generated by the individual, but arises from an external source: electromagnetic frequencies imparted directly to the individual or into water or some other substance to be ingested by the individual.

Various combinations exist: some technologies use EEG patterns as the physiological input to their proprietary computer software, but the output is, again, some sort of electromagnetic or “information” signal that is externally imparted to the individual. If any one of the three criteria above are not met, the therapeutic device is not true biofeedback.