

THE CONCEPT OF BIOFEEDBACK

The premise of biofeedback is simple - a device is used to help give information to the organism that it needs but has a hard time accessing through its own pathways.

Born in the early 1970's, biofeedback promised to change the way in which we managed health issues. It was to be a new humanistic use of technology that paralleled the ancient yogic disciplines but created short cuts to interactions with the healing forces of the body and mind. Thirty years later, it remains in the shadows of medicine and has laboured hard to create and maintain a professional following.

Conventionally, regardless of whether the process involves the measurement of skin resistance, temperature, brain waves, muscle tone, heart rate, etc., the assumption is that "biofeedback" means the use of the "conscious mind" to control "unconscious processes".

Biofeedback – a New Form of Learning or Not

The 1960's had ushered in a phase of turbulent social evolution that bordered at times on a cultural revolution. Mind altering drugs culture crossed with Eastern philosophies and the boundaries of "human potential" stretched far beyond the established horizons. Psychology went "pop" and the classical behaviourism that had commanded all of academia and imprinted itself upon a post-war modernism was suddenly being rejected in favour of a new form of learning based on the subtle multiplicities of "consciousness".

Despite the fact that there was never any consensus on the nature of the "conscious" or "unconscious" mind (Hoffman 1997) and that the "learning" involved in biofeedback has never been explained beyond conjecture, the "learning" model of biofeedback won the day and to this time has remained the basic conceptual reference.

The Other Biofeedback

In Soviet-era Russia, there also existed efforts to extend the new technologies into an interaction with organisms. Certainly, new forms of learning and consciousness were considered excellent subjects for experimentation. The Russians have always considered the ranges of conscious experience to a proper field for scientific inquiry. This attitude extended to the point where subjects considered paranormal and even mystical were studied side by side with the conventional sciences. As a result, there was in Russia a very successful development and application of the "learning" model of biofeedback. There was however also an equally successful development in a form of biofeedback that did not require the mediation of the "conscious" mind. This "other" form of biofeedback was more comfortably seated in the "conditioning" principles of behaviourism and had no requirement for "volition" or "learning". This "other" form of biofeedback can be labelled "reflex biofeedback" in contrast to "learning" biofeedback.

Reflex Biofeedback

The premise of "reflex biofeedback" is that it is possible for the organism to derive meaningful and purposeful information necessary for enhanced solution-oriented self-regulation processes without the mediation of any sort of conscious, mental processes. In "reflex biofeedback", directing electro-energetic stimulations of the organism by way of reflexive pathways in the skin evokes informational responses. These informational responses are simultaneously monitored by the device and used to modify the new preceding stimulation in a manner that is directly related to the last preceding response of the organism. In this way, a "real-time" biological "conversation" is established based on the constantly modulated circular looping of stimulation > evoked response > monitored response > modulated stimulation > new evoked response. The organism shows impressive positive changes that reflect

improved solution-oriented behaviours in “unconscious” physiological functions and processes. Considering the popular definition of “learning” style biofeedback as the “conscious mind” acting on “unconscious processes” it is reasonable to define “reflex” biofeedback as the “unconscious mind/body” acting on “unconscious processes”.

The continued progress in computer based hardware technologies, software designs and solid-state electronics has created the full capacity in devices to interact with the activities of a living organism at “real-time” biological speeds. The rates of sensory perception and cognitive determination are stubbornly slow compared to the blurring speeds of microprocessors and biological reactions. “Reflex biofeedback” centres on these super-speed reaction times and acts to co-ordinate responses that could never be tracked and catalogued by the everyday conscious mind.

SCENAR – Adaptive Therapy

In its simplest and perhaps ideal state, a complex system is capable of experiencing stimulation and responding efficiently and effectively to the stimulation. In the human body, this harmonious dynamic is fundamental to the untold number of action-reactions taking place successfully at any given moment. Delay times are minimal and little work goes on uncompleted with the result manifesting as “good health”. Generally, this ongoing event is referred to as “self-regulation” and when applied to the SCENAR is known as “Adaptive Therapy”. In such a case, “healing” is therefore not seen as an absolutely separate response to a problem but rather as a relative focusing process in the continuous activity of self-regulation. The primary ongoing nature of “self-regulation” and therefore “Adaptive Therapy”, is to constantly “keep” us well as opposed to “making” us well.

Adaptation

On stimuli considered threatening to life, the living system respond by switching to survival mechanisms and produces a cascade of the adaptive reactions, which are may be in essence are damaging but vital for survival at precise moment of time, and which are consuming great energetic recourses from the body. (“Anti-stressor reactions and activation therapy” L. Garkavy, E.Quakina, T. Kuzmenko. Moscow 1998).

When the survival task is resolved, the body focuses back to primary vital functioning like breathing, digesting, etc. and damaged function gradually becomes unattended, this disturbed function becomes “walling out” - the body adapts to exist with partially dysfunctioning parameters that are characteristic of this function. It still requires energy to run and leads to development of some chronic process. In order to help the body to resolve hidden chronic dysfunctioning various therapies are aimed to stimulate complex natural own body healing ability.

Failure comes with high ability of the body to adapt both: to the pathological processes and to the therapy. SCENAR therapy is unique in this sense as signals generated by the device are constantly various, they are mediated by the body needs. Device can be programmed additionally by the operator to various additional technical characteristics such as Frequency of the signal, Intensity, Modulation, etc., which also reduces chances to adaptation. Plus, SCENAR operators have complex methodological solutions and the choice of various reflex zones for Scenar application enabling them to break habituation to therapy.

The Mechanisms of Action: Three Hypotheses

As a form of Adaptive Therapy, the SCENAR acts to enhance the solution-seeking processes upon which self-regulation relies for both healing and the maintenance of ongoing homeo kinesis. The mechanisms of this interaction have not been entirely established and research continues in an effort to better understand the physiological dynamics by which self-regulation take place. The action of the

SCENAR is therefore best understood at this time by an evenly weighted exploration of three hypotheses. Each hypothesis presents itself in principles and a language unique to itself. It is important however to appreciate that these three hypotheses are interdependent and that it is fully expected that the physiological processes inherent to each hypothesis occur in an overlapping, simultaneous set of actions within the organism. As such, the separation of the three into distinct entities is in many ways an academic abstraction necessary for the purposes of investigation and presentation.

We shall label the three working hypotheses as:

The Neurological/Regulatory Peptide Model

1. Central;
2. Peripheral.

Scenar signal

Firstly, reflex biofeedback enables the process to overcome what is most likely to be the biggest obstacle to recovery which is the neurological accommodation or adaptation of the organism to therapy itself. The problem of neurological “accommodation” severely limits all forms of conventional “one-way” electro-therapy. In the reflex biofeedback design of the SCENAR, the constant dialogue between the device and body creates an appropriate “real-time” response to each SCENAR impulse, which in turn prevents the organism from developing habituation to the signal.

Secondly, specific technical characteristics of the device such as high amplitude and at the same time, a short, non-damaging action create a signal that is accepted easily and efficiently by the body. Also, the high curve of the front of the action signal enables the stimulation of the C-fibres (0,5mkm), the thinnest structures out of all known nervous fibres. Of all the types of fibres, 80% relate to sensory fibres, for example, the number of C-fibres in the Vagus nerve is 90% and in the pelvic nerve is 50%.

Russian research data proves that the Central Nervous System is also involved in the processing of SCENAR signals, which are primarily received by the hypothalamus. Our inner regulative center takes part in the complex processes of self-regulation, where information coded as bio-signals received from the SCENAR and response is sent back.

Nowadays the majority of diseases are caused by stress and an over-active sympathetic activity. The assessment of the EEG from patients who have undergone SCENAR therapy confirms that SCENAR impulses have the unique ability to switch on the parasympathetic nervous system. Further application helps to restore the balance between these two parts of the autonomic nervous system.

NRP Model: Central Action of SCENAR Therapy

When SCENAR therapy is applied to specific reflex zones on the skin, the signals reach and activate the somatic-sensory areas of the cortex. Directly via the spinal-thalamic tract the excitation reaches the anterior parasympathetic hypothalamus and synchronises its work, which in return, co-ordinates with the cortex and sub-cortex. When activity of the anterior hypothalamus is synchronised with electrical activity of the cortex the processes of self-regulation are initiated.

In the state of synchronisation, a specific area of the cortex, which is responsible for “storing” the blueprint of “healthy body” becomes available for referencing the signals from any inner structures, including signals from the pathological focuses that have been amplified by the SCENAR.

By checking the received information about the present status against the corresponding “blueprint”, the corrective responding signals are sent to the anterior thalamus and target areas in the body in order to

regulate any existing imbalance. In order to complete the correction, the specific cells release the bioactive regulative chemical compounds.

NRP Model: Restoring Balance between the Sympathetic and the Parasympathetic systems

Clinical research, conducted by Russian scientists, proves with experimental work that SCENAR therapy is primarily targeting the anterior hypothalamus. In other words, SCENAR therapy stimulates responses from the Parasympathetic part of the Central Nervous System. Understanding the clinical implications of this phenomenon will help one to understand why SCENAR therapy is so successful.

The principle neurological control mechanism of the body is the autonomic nervous system, which is of two parts: sympathetic (fight or flight) and parasympathetic (rest and repair). When the sympathetic system is dominant, the parasympathetic is not. When the sympathetic system is predominantly active much of the time, fatigue and chronic and stress related diseases gradually begin developing.

As the primary action of the SCENAR is the activation of the parasympathetic system, we can expect the first positive signs of the shift after even the first session of SCENAR therapy. One typical response would be an increase in the quality sleep patterns. By applying the SCENAR we can gradually shift the imbalance between those two very important systems in the body.

Also, the SCENAR helps to increase the general energy level in the body by “converting” energetic processes that are feeding adaptive reactions. The concentrated energy is then freed and utilized by other normative processes throughout the body.

NRP Model: Peripheral Aspect of SCENAR Therapy

By the mid 1950's there were only three groups of Neuro-Peptides (NP) known in the scientific circles: amines; amino-acids; a peptide - the compound P (CP).

Since then, a fourth group has been identified that represents the most numerous NPs. NPs were found in the same neurons of the central and peripheral nervous systems. Some physiological functions are under the control of whole range of NPs, where each NP acts as an evolutionarily created “package of programs” for turning on or modulating a certain set of functions. NPs together with the other regulators form a functional continuity, which provides for the reconstruction of any disturbed biological function.

NRP Model: Concept of Regulative Peptides

The concept of RPs is wider because there is a whole range of RPs that is not necessarily produced only by neurons. Their life span in the liquids of the organism can vary: small peptides may last for tens of minutes, and middle/large size last for up to tens of hours. (Effective concentration of AC lasts for split seconds (10??), for Catecholamines, Serotonin, Histamine and GABA it will last from 10?? to 5sec).

Due to the high amplitude impulse, the SCENAR activates small diameter, thin peptide-containing nervous fibres at a higher degree than other methods of electrotherapy. The bioactive compounds (mainly RPs) are released in response to adequate stimuli (or the therapeutic irritations from electrical current), which have a specific effect on the surrounding local tissue as well as distant effects. For example, the effective regulation by the sensory nerve endings can be seen at the site of wound healing, in arresting inflammation, in the regulation of the gastro-intestinal mechanism preventing the ulcer formation, and in the regulation of the immune system.

The classical study of neurological secretion has looked mainly into hypothalamic- hypophysis-adrenal connections. The latest research shows that a great number of neuro-secretory cells are spread around the various parts of the nervous system and that they secrete bio-regulating peptides.

The release of the effective dosage of RPs and the consequent complexes of RPs with other blood factors creates a regulatory package, which is a full set of biological activities capable of managing practically any dysfunction.

There are numerous publications regarding the influence of RPs on the regulation of vascular tone, heart rhythm, respiratory system, on the degree of epileptic activity, on the integrative brain action and on the mechanisms of pain control, etc (ref. below).

The essential absence of contra-indications makes SCENAR therapy stand alone from other methods of electrotherapy. There is no negative effect to a normal, healthy body. The release of moderate dosages of RPs in the “normally” functioning, balanced organism will be met by an intensive response to maintain homeostasis. As a result these peptides undergo breakdown and functional balance is sustained. In the case of pathologies, the normal balanced relationships between chemical and physiological systems have been disrupted. In this case, the application of SCENAR therapy brings to the “surface” the “links” that need to be re-established in order to regain homeostasis.

NRP Model: Mechanisms for pain relief

A new dominant focus is establishing in the cortex of the brain as SCENAR impulses are applied on the damaged skin area, which in turn suppresses the pain focus. As a result of SCENAR action, the oedema around the nerve fibres becomes considerably less hence reducing pressure effects and helping to alleviate pain. There are other processes also taking place.

NRP Model: Neuro-physiological:

The SCENAR signal causes impulses in the thick and thin nerve fibres and in the brain; this prevents the passage of pain impulses. SCENAR impulses also act on A fibres which activate the substantia gelatinosa in the spinal cord and in it's excited state it depolarises the pain impulses arriving at this time. This prevents transmission of the pain impulses from the periphery to the brain, that is, it closes the gate (gate theory).

NRP Model: Neuro-chemical:

Nociceptors are pain receptors (nerve endings) and in the brain there is a nociceptive system, which is counteracted by an antagonistic system, the anti-nociceptive system. The object of SCENAR therapy is to amplify these pain controlling mechanisms.

There are three hormone systems in the anti-nociceptive system, opiate, serotonin and adrenalin, all of which influence each other. Electrical stimulation from the device acting on peripheral nerve fibres influences both nociceptive and anti-nociceptive systems. This releases opioid-like compounds which block release of compound P at the level of the substantia gelatinosa and block transmission of the pain impulses chemically.

The SCENAR acts mainly on the serotonergic mechanism rather than directly on the opiate mechanism. Oxygenation of tissues is often disturbed in pathological processes (ischaemia). The SCENAR also releases vasodilators locally, which enhances oxygen supply and eases pain. Also released are dopamine, encephalins and noradrenaline, which account for long-term analgesia.

NRP Model: Psycho-emotional

Effects on the reticular formation of the stem of the brain may give sedative and analgesic effects. It is thought that there is an area here that, when stimulated, reduces pain sensitivity. There may be cells, which are self-stimulating and have a memory for chronic pain. SCENAR treatment may suppress their memory.

EAM Model

Every part of the body, on the molecular level, so thoroughly studied by modern science, as well as the acupuncture meridians of Oriental medicine, form a continuously interconnected semiconductor electronic network. Each component of the organism even the smallest part, is immersed in and generates a constant stream of vibratory information. This information is about all of the activities taking place in the body.

Complete health is a total interconnection. Physical trauma or emotional trauma impairs the connections. When this happens, the body's defensive and repair systems become impaired and disease takes place. Scenar and other therapies restore and balance vibratory circuitry with obvious and profound benefits. The body's own defence systems are able to repair themselves.

The Information/Organization Model

Duality of the nervous system

The nervous system is a fundamental energy system in the body. Its operation is studied by measuring electrical fields generated during the transmission of nerve impulses. As electric currents always give rise to magnetic fields, the nervous system is also a source of some of the biomagnetic fields present within and around the organism. Neurophysiologists focus most of their attention on the "classical" nervous system, composed of the neurons that conduct information from place to place as electrical impulses.

This is a partial view because it neglects another energetic and informational system consisting of the Perineural connective tissue system, which constitutes more than half of the cells in the brain (R. Becker). The "Dual Nervous System" consists of the classical digital nerve network and the perineural analogue network. In contrast to the nervous system, the perineural connective tissue generates slower moving waves of direct current that flows throughout the organism, delivering messages to every part of it. The system is integrating and regulating throughout the organism.

Becker's work on the Perineural System and solid-state communication in the living matrix has many clinical implications. He has presented evidence that the Perineural System actually regulates the operation of the neurons, and not vice versa. The Perineural System is involved in number of activities; working with Scenar technologies we are most interested in the following:

1. Control of growth and regeneration
2. Control of injuries repair and wound healing
3. Nervous system regulation

X-Signal system

According to biological informational theory as it applies to acupuncture (Manaka 1995), there is a so-called "X-Signal System" that represents a "primitive" regulatory system that is different from the classical nervous and hormonal systems. The X-Signal System is primitive in the sense that it arose in evolution long before the nervous system. It is present in single-celled animals, which do not have nerves per se, but react to external stimuli in order to avoid harm. The energy fields of the body, the

Perineural System and the living matrix are some of the substances through which the X-Signal System exerts its effect on cells and tissues.

New outlook on the biology of the cell

The latest scientific research and deep study of the cell shows that the cells as the smallest part of human body have some attributes which enables them to communicate and interact with each other by exchanging information. Early electron microscopy confirmed that cells contain substantial amounts of “empty” space, where the particles are dissolved or suspended and where metabolism takes place. The more closely biologists looked at the cell, the more structures were found. A proposed model describes the cell as being filled with filaments, tubes and fibres that are collectively called cytoplasmic matrix or cytoskeleton.

The cytoskeleton pierces the cell, penetrating the nucleus, where the essential information of the DNA is stored. The cytoskeleton links with the connective tissue or extracellular matrix as a network throughout the other neighbourhood cells, connecting them with each other (Ellison & Garrod 1984.) The function of the cytoskeleton was believed to be a scaffolding of the cell but at a closer look these microscopic hexagonal lattices of fine filaments of protein form tiny hollow cylinders of indefinite length. This cellular matrix acts like a network of tracks that transports various products along cells and takes part in pulling chromosomes. The cytoskeleton also appeared to be exceptional conductors of pulses.

Coherence effect

It has been discovered that there is a high degree of coherence among the neighbouring tubules, so that vibration in one would tend to resonate in unison with its neighbours. According to a proposed theory the cytoskeleton represents the “internet” of the body: every neuron of the brain could log on at the same time and speak to every other neuron simultaneously via quantum process within. The cellular matrix helps to harmonize discordant energy and creates a global coherence of the waves in the body. Through this mechanism, the coherence becomes contagious, moving from individual cells to cell assemblies. This would provide an explanation for the instantaneous operation of the brain (at 0,00001- 0,0001 sec with the speed of transmission of information at 100 - 1000 m/sec).

Health is a state of perfect subatomic communication, and ill health is where this communication breaks down. One of the most important aspects of the waves is that they are encoded and carry information. We are ill when our waves are out of synch. H. Frohlich has shown in his own study that once energy reaches a certain threshold, molecules begin to vibrate in unison, until they reach a high level of coherence. The moment molecules reach this state of coherence, they take on certain qualities of quantum mechanics, including nonlocality. They get to the point where they can operate in tandem.

Scenar works on biofeedback loops helping to achieve the state of coherence and tune our waves into sync.