



NEUBIE

A New Paradigm in Electrical Stimulation

A White Paper by Garrett Salpeter, Founder of NeuFit

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INTRODUCTION

The NEUBIE® (“Neuro-Bio-Electric Stimulator”)

device uses a novel type of electrical stimulation to optimize neurological function for faster healing, improved mobility, recovery from chronic pain, and enhanced performance. The device is unique among electrical stimulation devices for several reasons, the most important of which is the neurophysiological effect of the waveform. Because of the unique effects of the waveform, the device can be used to create outcomes that are far more effective than what can be accomplished with traditional devices.

The NEUBIE® is combined with the NeuFit protocols to optimize neurological function. One compelling aspect of targeting the nervous system is the breadth of results that this approach can accomplish. Because the nervous system controls muscles and movement, metabolism and hormones, digestion and elimination, pain and emotions, and heart rate and blood pressure, the effects of this approach can be far-reaching and profound.

Here, we will dive into the how the NEUBIE® is used specifically to accelerate recovery from pain and injury. We'll distinguish between this technology and what is traditionally done with electrical stimulation, and go into detail on the approach that we take for finding dysfunction and correcting it. Then we'll share some examples of the work in action.

In this discussion, there is one underlying premise to keep in mind: most of our limitations are self-imposed. The body is miraculous. It is capable of tremendous feats of strength, range of motion, and performance. But because of poor habits, responses to previous traumas, and inappropriate inputs, over time we self-impose “governors” to block ourselves from displaying these qualities. The NEUBIE® is intended to help us find those governors and recalibrate them, so that the body can display all of the qualities it already possesses.

Neurophysiology

Virtually every electrical stimulation device on the market (eg. TENS, Russian Stim, Interferential, etc.) is alternating current. When turned up to a high enough level to affect change in the neuromuscular system, these devices cause the body to engage in protective co-contractions. Though there can be some benefit in the mechanical pumping of blood, lymph, and other fluids, this approach ultimately creates more problems in the neurological control of movement.

The current from traditional devices reinforces the compensatory and dysfunctional movement patterns that impede the body's healing processes, contribute to the cycle of chronic pain, and reduce mobility and movement efficiency. NEUBIE® has been engineered to have the opposite effect. It combines two waves that allow us to take advantage of the known benefits of direct current (DC), while eliminating the skin burns that historically accompanied the use of DC. An illustration of the waveforms is included in Image 1.

How do we know this? From empirical evidence. If a typical device is turned up to the same level of current as the NEUBIE® (eg. 60 mA of AC on one device and 60 mA on the NEUBIE®), the user will be locked up by the AC device, frozen by muscular

co-contraction and unable to move. In contrast, the user would be able to move through the signal of the NEUBIE®. This is a very important distinction, because it promotes the eccentric contractions that are so important for absorbing force, improving performance, protecting the joints, and reducing injury and fatigue.

There is also an important difference in the effect on the autonomic nervous system. Traditional devices actually elicit stress responses. They increase sympathetic nervous system (SNS) tone and decrease heart rate variability (HRV). In contrast, NEUBIE® technology promotes higher parasympathetic nervous system (PNS) tone and leads to greater HRV.

These distinctions allow us to make one more statement about the NEUBIE® signal. The device ends up preferentially generating sensory, afferent input, and less motor output. It is sending a sensory signal to the central nervous system (CNS), and the CNS can respond by either relaxing into that signal or fighting against it. The ability to preferentially send afferent signals is extremely important, as it lays the foundation for many of the neurological reprogramming protocols for which NEUBIE® is used.

■ = VOLTAGE ■ = TIME

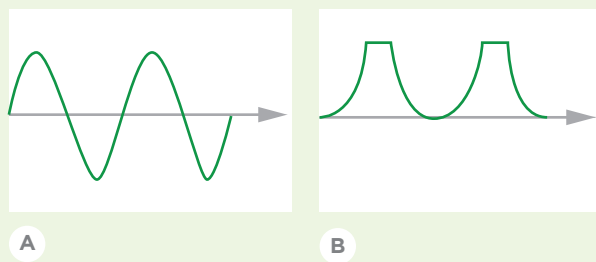


IMAGE 1

An illustration of the different types of current. Image (A) shows a traditional AC signal, approximately sinusoidal. Image (B) shows one of the two NEUBIE® waveforms, which is a pulsed DC waveform. It has an exponential rise and fall, so that it most closely matches the way charges transfer naturally across neurological membranes. This is part of how it harmonizes with the human body and is able to minimize the protective responses that usually cause the body to fight against stimulation.

How It Works - Diagnostic

These unique effects allow us to use NEUBIE® in unique ways. As part of the NeuFit protocols, the device is used diagnostically to identify areas where the body is governing or limiting range of motion, speed of movement, and muscle output. Here's how it works:

In the diagnostic scan, one electrode is stationary, while the other is scanned around on the body. The process is illustrated in Image 2. Wherever this scanning electrode is on the body, it will stimulate all of the electrically-sensitive tissue in its vicinity. It could stimulate the sensory receptors that report information on movement, position, temperature, chemical state, vibration, etc. The fastest afferent pathways are the (i) muscle spindle (MS) pathway, which reports muscle length and velocity of lengthening, and the (ii) golgi tendon organ (GTO), which reports the amount of force, or load, on a muscle and its tendon. Because these are the fastest pathways, their signal will reach the CNS first and be the first to be acted upon. These pathways lead to two different types of governors on movement, excessive tension and deficient activation. So by stimulating these pathways, we can identify where the body is governing and limiting its movement.

The First Governor: Excessive Tension

If the body is carrying excessive tension in muscles, not allowing them to eccentrically elongate as they should, that tension will be modulated via the MS pathway. The MS pathway constantly monitors muscle length. As soon as that muscle lengthens to the perceived threshold of danger, the stretch reflex kicks in to contract the muscle. This is a protective mechanism designed to prevent the muscle from straining or tearing.

It is useful, but often it is set too conservatively and leads to excessive, inappropriate muscle tension.



IMAGE 2

An Example of the diagnostic process. Here, one electrode is grounded at the base of the spine, and the other is being scanned around the upper body.

The Second Governor: Deficient Activation

If muscles are being under-activated, they will not be as available to turn on and do their jobs of protecting the body and creating movement. Activation of a muscle creates tension, and it is this tension that is monitored in the GTO. The GTO, in turn, reports to the CNS. Whenever that tension reaches its threshold of danger, the CNS inhibits that muscle to prevent it from contracting too hard and tearing itself off the bone. Of course this is important, but it is also often set way too conservatively. In this state the GTO pathway leads to the inappropriate underutilization of muscles.

So, as the scanning electrode is moved around a client's body, it will be stimulating these pathways.

The Second Governor: Deficient Activation (continued)

When stimulating an area that works well, these pathways will be activated, the signal will be evaluated by the CNS, and the CNS will send back the “All Clear!” signal. To the client, the signal will still feel pleasant.

When stimulating an area with one of these problems, or governors, the experience will be much different. The signal being sent from one of these areas will cause a more intense reaction. If it is an area with excessive tension, then the signal will trigger the same MS mechanism described above. The body responds with a strong “Contract!” signal and it feels much more intense to the client. The contraction can be intense, beyond what happens when stimulating a motor point. There is an additional quality of subjective discomfort associated with it, and typically other compensatory movements.

Likewise, if the area being stimulated is one of deficient activation, there will also be a more intense reaction. The CNS will receive a signal via the GTO, reporting that more load is on that muscle than has been in the recent past. The CNS notices that this is a much larger signal and identifies it a threat. In response to the threat, the CNS creates numerous contractions in an attempt to “lock down” the area and give the body a chance to protect itself from the threat.

This diagnostic process allows practitioners to identify both weakness and excessive tension, and to do it quickly and precisely. It has the potential to improve the speed and accuracy of diagnosis in the worlds of physical therapy, chiropractic, athletic training, and sports performance.



How It Works - Therapeutic Reprogramming

The information from the diagnostic process is then used to help re-pattern the problematic areas, as NEUBIE® stimulation is combined with NeuFit movement protocols. By stimulating those specific areas identified in the diagnostic process, the client's body learns that it can handle greater levels of stimulation on those particular pathways. It learns to better accept that signal and "lift-off" the relevant governors. After just a few minutes of this process, the client's nervous system changes and he/she often experiences immediate improvements in function, like greater range of motion and strength output, less pain, and enhanced quality of movement with a sense of ease. The improvements occur both within a session, and cumulatively over multiple sessions.

The immediate changes are different from those that usually result from training or rehabilitation. With strength training, for example, the body usually builds new contractile tissue over time. That added muscle tissue improves the ability to generate force. In a session with the NEUBIE®, clients often improve strength in a matter of a few minutes. It's an impossibly short amount of time for the body to build new muscle, so there is obviously a different mechanism at play.

In this case, the body is simply learning to activate more of the muscle that was already there, lying dormant. There was a change in the mechanism that was governing muscle output, so that more muscle was allowed to be engaged at one time. Then the client displayed greater strength.

A similar dynamic occurs with improvements in range of motion. In one session, the body does not have enough time to restructure its tissues to gain more length in those physical structures. Rather, it is learning to relax the tissues that were carrying excessive tension. Whereas those tissues had been governing the body's range of motion, they are now shifted to a different state in which they are permitting the body to move through larger ranges.

One great example of this reprogramming process can be seen in the recovery after ACL reconstruction surgery or total knee arthroplasty (joint replacement). After these surgeries, the nervous system does not understand that the knee is actually safer and more stable. Instead, it only knows that there was trauma in the knee joint. Rather than wanting to move, the nervous system wants to prevent any movement of the knee so that it does not further irritate the joint that just experienced trauma. The signal, therefore, is one of reduced activation of many knee muscles, especially the quadriceps. In this state, the thigh of the surgical leg atrophies. The average loss of thigh muscle (cross-sectional area) is about 40% by the end of the first month after total knee arthroplasty.¹

In contrast, early case studies using the NEUBIE® have shown an average of only about 10% atrophy. Because there is so much less atrophy in the early stages of the rehabilitation process, the whole process ends up progressing much faster. NEUBIE® users have recovered from both of these surgeries months ahead of the usual schedule.

Results & Sample Case Studies

The effects of NEUBIE® have been demonstrated so far with thousands of clients and in hundreds of case studies. Used in conjunction with the NeuFit protocols, it has accelerated recovery by 50-80% from a wide variety of injuries and surgeries, and has also amplified gains in fitness and performance. It has been used with athletes and non-athletes alike, and in children as young as 4 years and adults as old as 95 years.

In addition to the examples of recovery from knee surgery described above, we will cover here several exemplary case studies to demonstrate the ways NEUBIE® has been used in practice and the types of results this work has been able to achieve.

Torn Muscles

Torn muscles usually take 10-12 weeks to recover. There are several examples in which use of the NEUBIE® has cut that time down by 80%, helping clients recover in 2-3 weeks. For example, LeRoy Walker's torn tricep. LeRoy can press over 650 lbs and is one of the top-10 Raw Bench Pressers in the world. He tore his tricep in a meet, and you can see the significant bruising in Image 3(a). You can also see his tricep muscle strength in the 2nd picture. Tested via hand-held dynamometer, right after the injury his strength was only 63.2 lbs. Within the first week of NEUBIE® rehab, tricep strength had increased almost 50% to 91.7 lbs. After only 2.5 weeks of NEUBIE® rehab, he pressed 615 lbs. One more week, and he was back to up to his previous maximum.

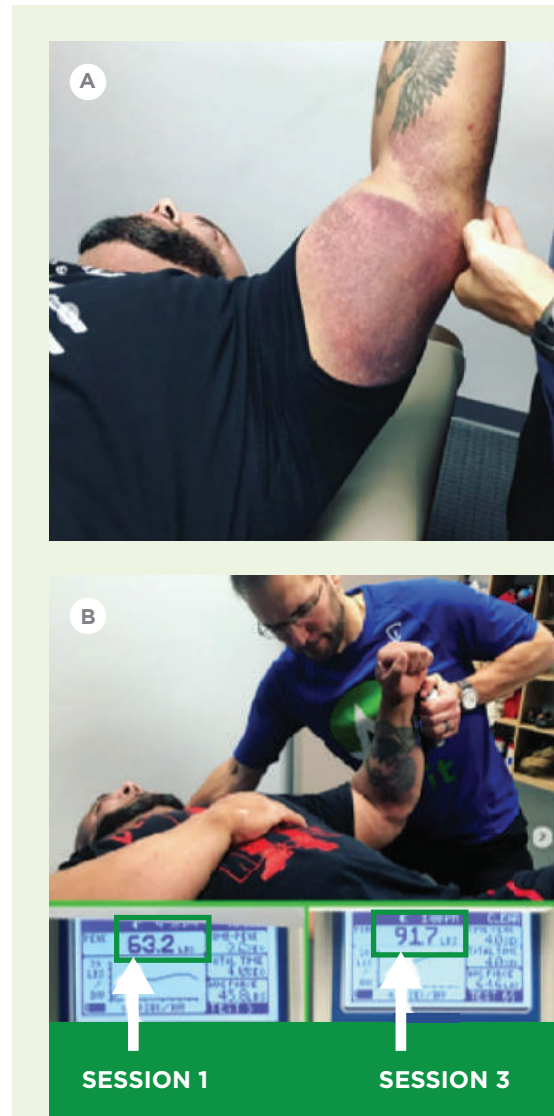


IMAGE 3

LeRoy Walker tore his tricep bench pressing in a meet. Image (A) shows the bruising that occurred in the aftermath of the tear. Image (B) shows a triceps extension muscle test, and the hand-held dynamometer force readings at the first session (63.2 lbs) and then one week later after 3 sessions (91.7 lbs). For reference, the uninjured side was 97 lbs. The injured side continued to improve and achieved that same 97 lbs level a few days later.

Tendon Injuries

Tendon injuries are often very challenging, particularly because of the limited blood flow these tissues receive. NEUBIE® can usually accelerate the recovery process by a significant amount, and sometimes help clients achieve results when nothing else is working.

Here's the example of Richard, an early 40's fitness enthusiast. He had shoulder pain for 6 months, and had exhausted all of his options for his torn supraspinatus tendon that lead to a frozen shoulder. After physical therapy, injections, and chiropractic adjustments, he was very close to undergoing surgery. As shown in Image 4(a), he had 30 degrees

or less of abduction ROM on the right shoulder. In just two sessions, that improved dramatically to the levels shown in Image 4(b). In two more, he was back to 100% and doing his full workouts again.

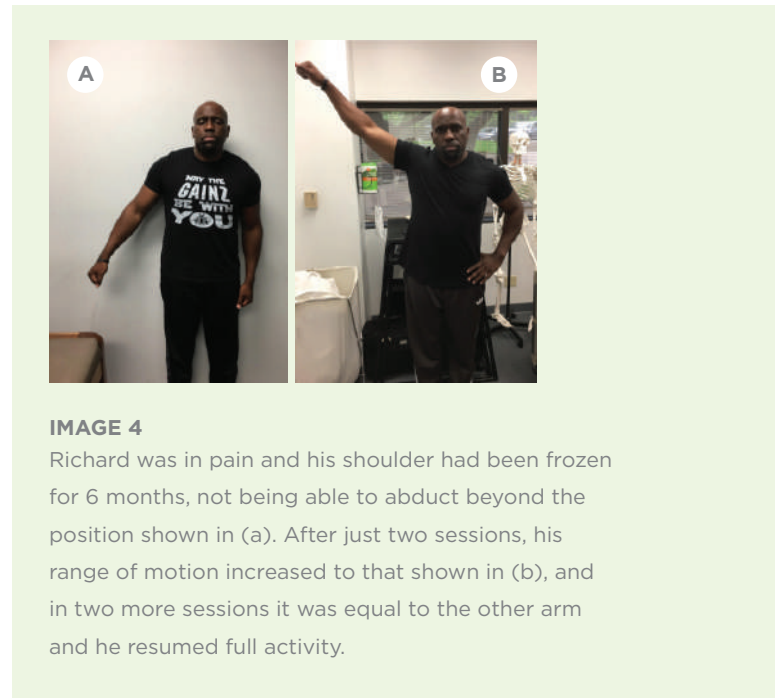


IMAGE 4

Richard was in pain and his shoulder had been frozen for 6 months, not being able to abduct beyond the position shown in (a). After just two sessions, his range of motion increased to that shown in (b), and in two more sessions it was equal to the other arm and he resumed full activity.

Chronic Pain

Chronic Pain often follows inappropriate rehabilitation from previous traumas, but it can also be idiopathic in nature. One commonality is a guarding response by the body, which is a survival and protection mechanism. This can keep pain “locked in,” and contributes to the difficulty in breaking through long-standing pain.

Image 5 shows examples of clients who had chronic pain for at least 1 year, and the ranges of motion that they were stuck with during that time. The second image in each pair illustrates the changes in range of motion after just one session with the NEUBIE®. The unique combination of the NEUBIE® current and NeuFit protocols diagnosed where the neurological dysfunctions were for these people, and then created breakthroughs in just a few minutes.

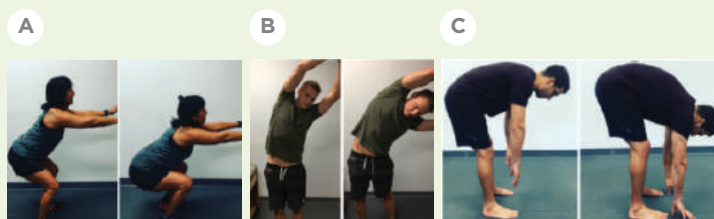


IMAGE 5

These images show the changes in pain-free range of motion experienced in one NEUBIE® session by clients who had at least one year of chronic pain. The client in (A) experienced tremendous relief from her knee pain, and the clients in (B) and (C) experienced relief from back pain.



CONCLUSIONS

The NEUBIE® technology and NeuFit protocols are a true breakthrough in the rehabilitation of injuries and chronic pain. This approach has enabled thousands of people to achieve results that they never thought were possible, and to do so in periods of time that were much shorter than anyone thought possible.

In this white paper, I hope it became clear that this truly is a new paradigm in rehabilitation. It is also an empowering one: rather than having to rely on injections and surgery, it is an opportunity to tap into the healing potential that is lying dormant within all of us.

In tens of thousands of hours of use, the NEUBIE® also has an impeccable safety record. Because of this safety record, it is a very sensible first step in the non-surgical management of numerous injuries and conditions. Even skeptics of this process will be hard-pressed to find a reason to dissuade an injured friend from trying it.

REFERENCES

- ¹ Mizner RL, Petterson SC, Stevens JE, Vandeborne K, Snyder-Mackler L., *Early quadriceps strength loss after total knee arthroplasty. The contributions of muscle atrophy and failure of voluntary muscle activation. J Bone Joint Surg Am. 2005 May; 87(5):1047-53.*

