

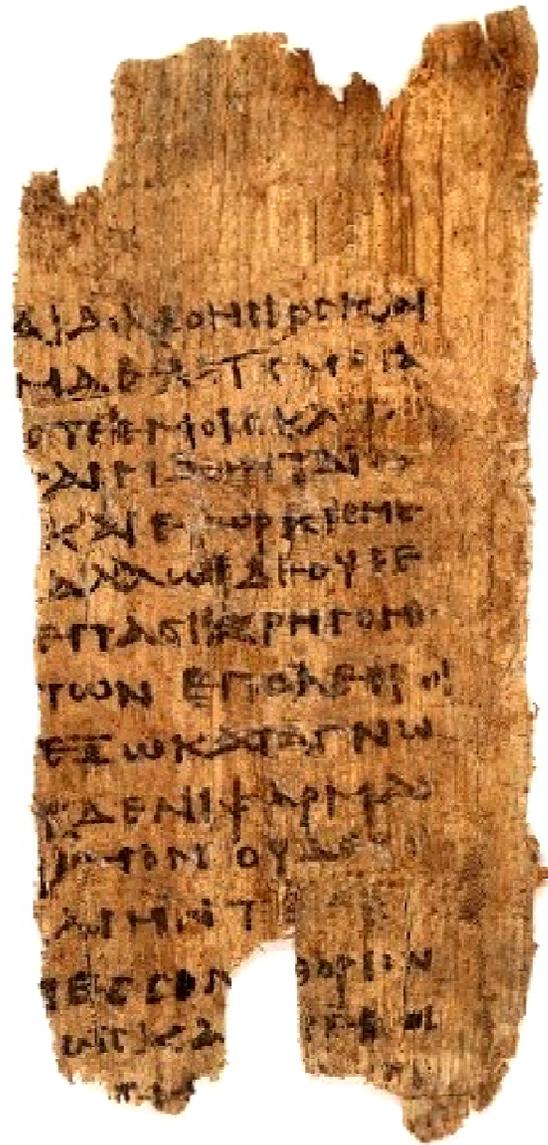
Cranial Electrotherapy Stimulation

By

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- Over 2,000 years ago the Roman physician, Scribonius Largus wrote his *Compositiones Medicae* of 46 AD recommending patients stand on a live black torpedo fish to relieve gout and other pain.
- Claudius Galen (131-201 AD) recommended using shock from electrical fish for medical therapies.
- In the 1700's, Charles Kite developed the first electric defibrillator, but Christians stopped it by declaring that reviving the dead was the work of the Devil
- In the 1730s John Wesley, the founder of the Methodist Church used electrical healing devices in all of his church clinics
- By 1900 almost all physicians in New York City used electrical devices in their offices.

Early Devices

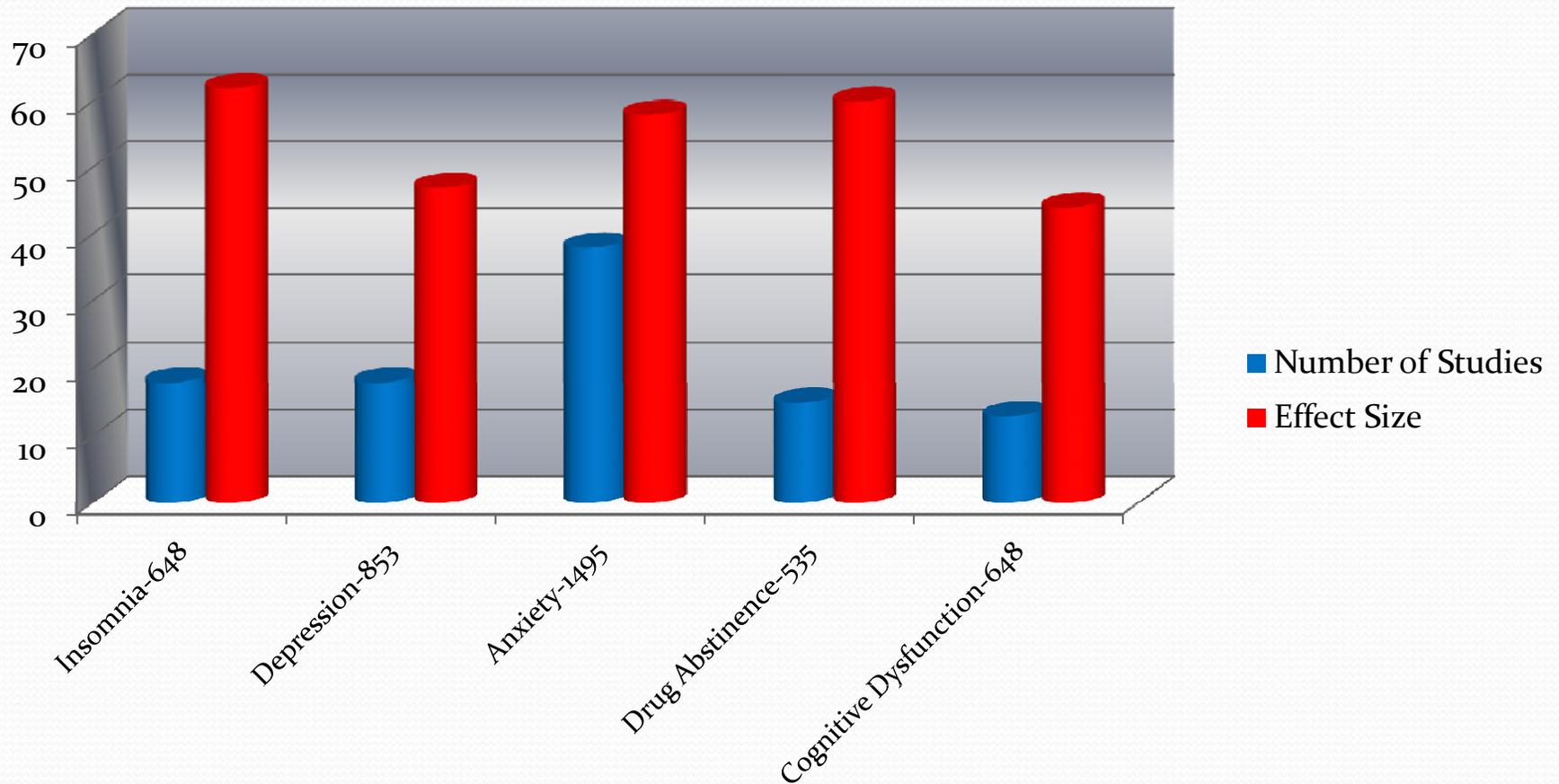


* Electro-medical apparatus, A. Gaiffe, Paris 1868

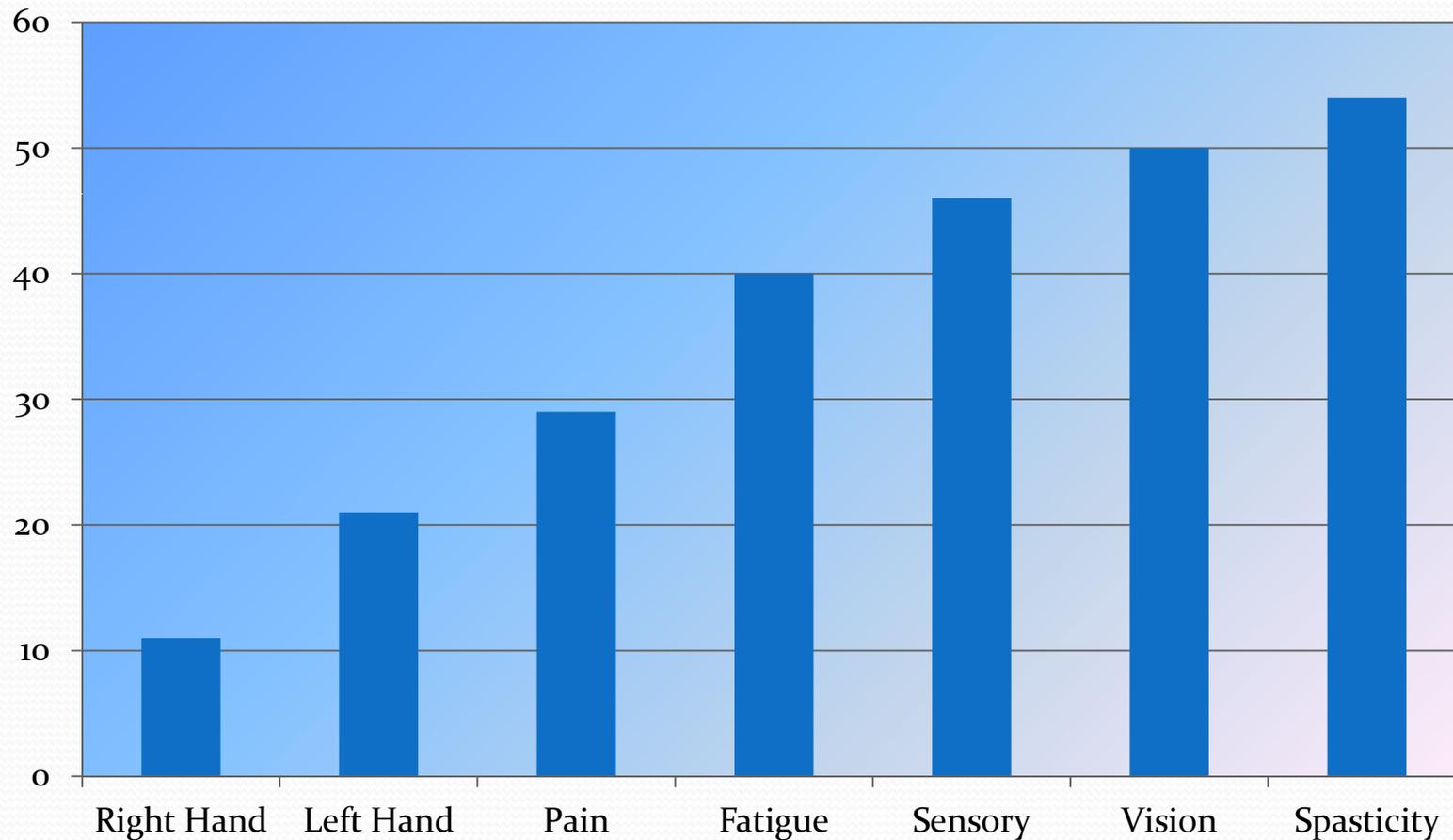
What is Cranial Electrotherapy Stimulation (CES)?

- CES is the U.S. Food and Drug Administration's term for sending small currents of electricity across the head of patients for medical treatment
- The most commonly used stimulation in the U.S. is:
 - 100 pulses per second
 - 20% duty cycle
 - Modified square wave
 - Up to 1 mAmp of current intensity
- The FDA allows CES practitioners to claim CES treatment for Insomnia, Depression and Anxiety

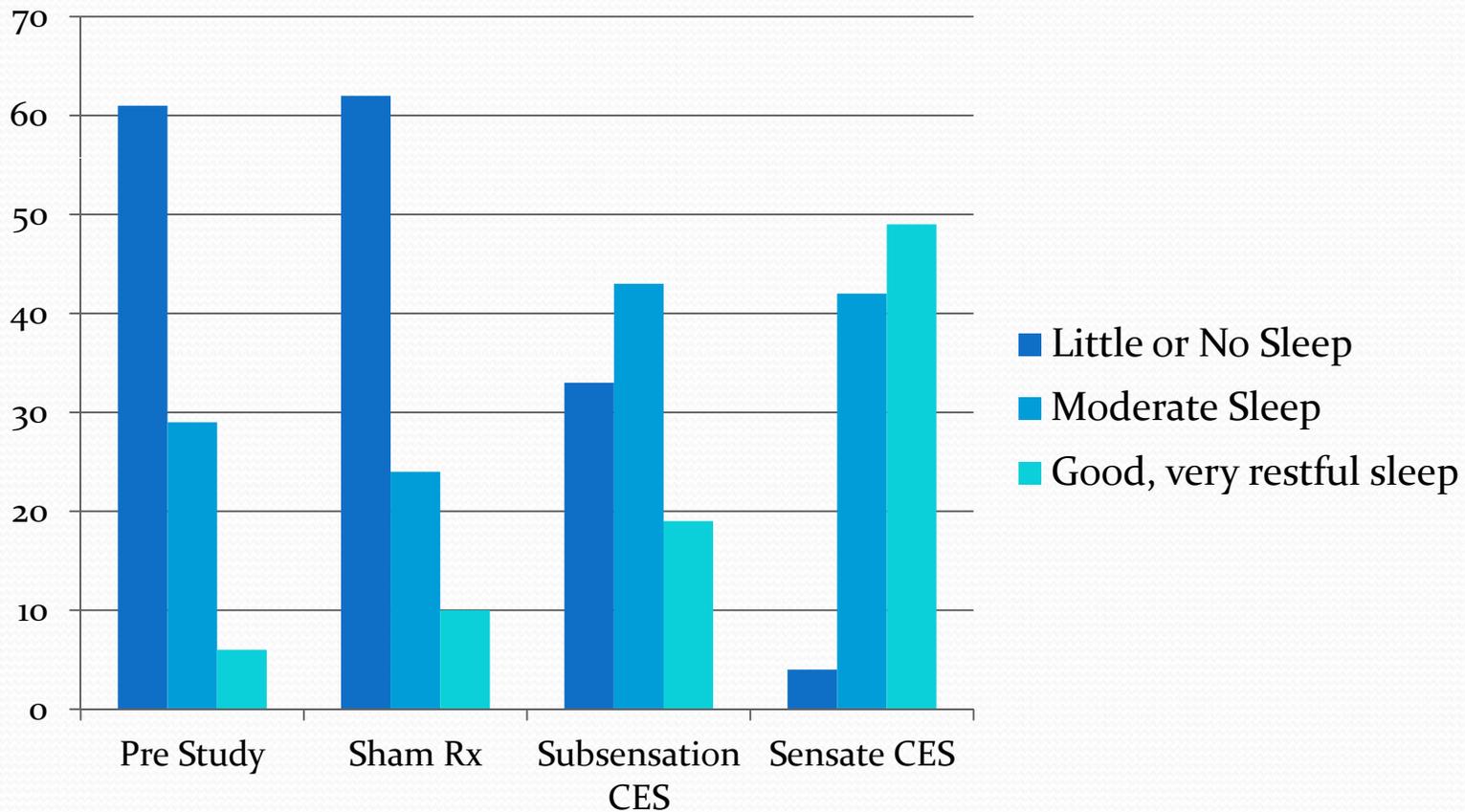
Meta-analyses of CES Studies, No. Subjects Follow Symptom



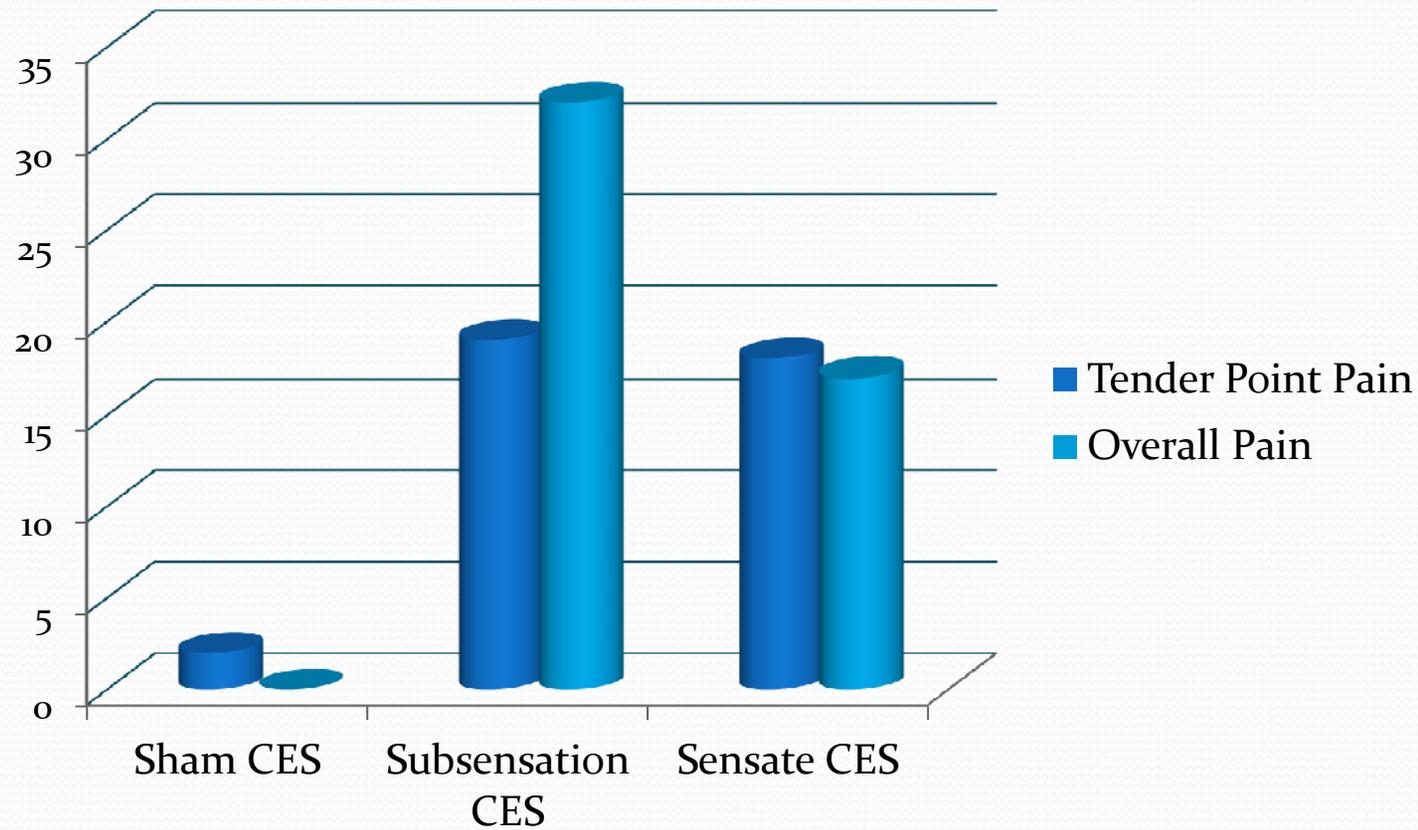
Typical CES Study, Multiple Sclerosis Patients



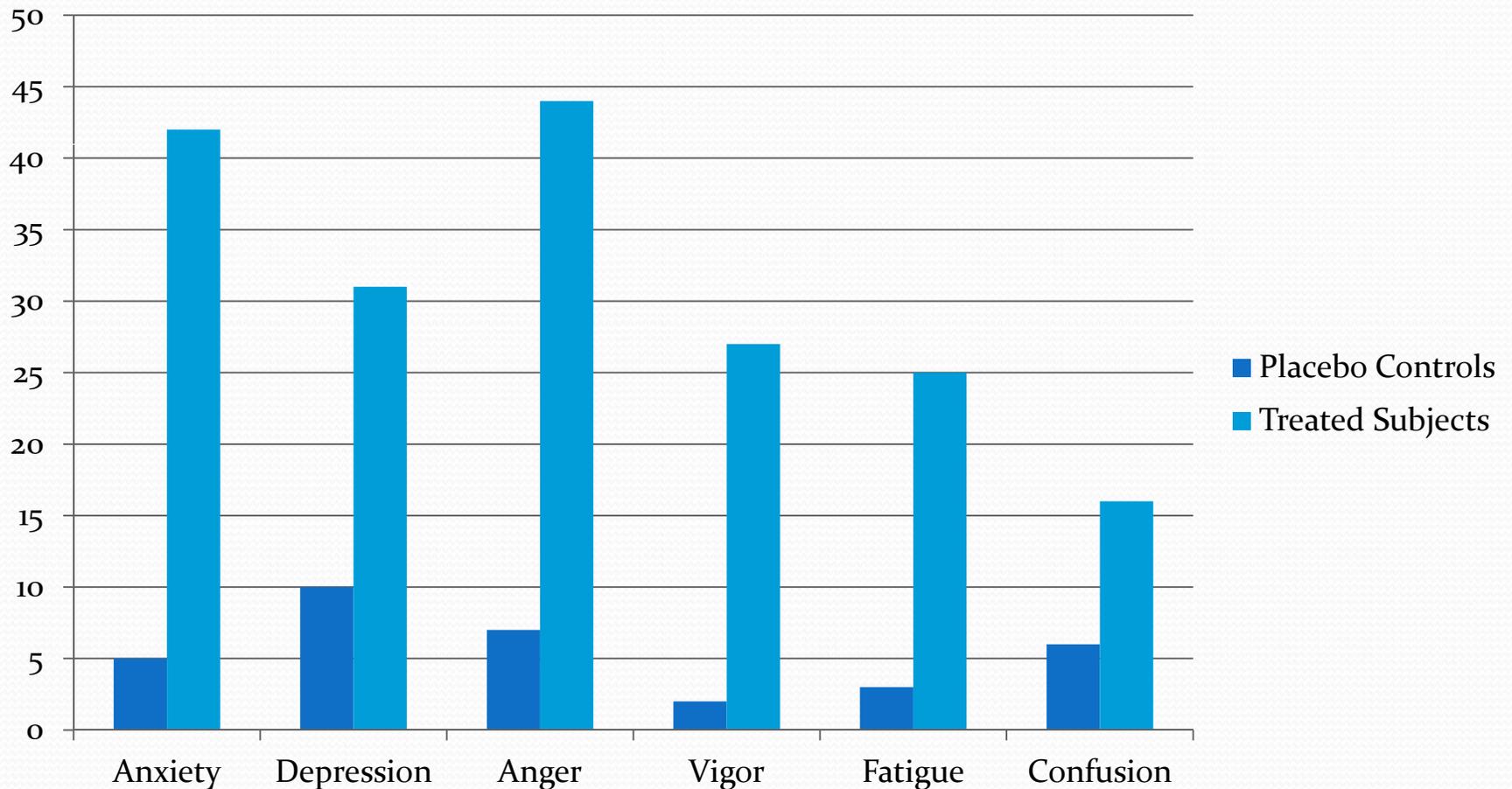
Fibromyalgia Study, Sleep Response To Treatment



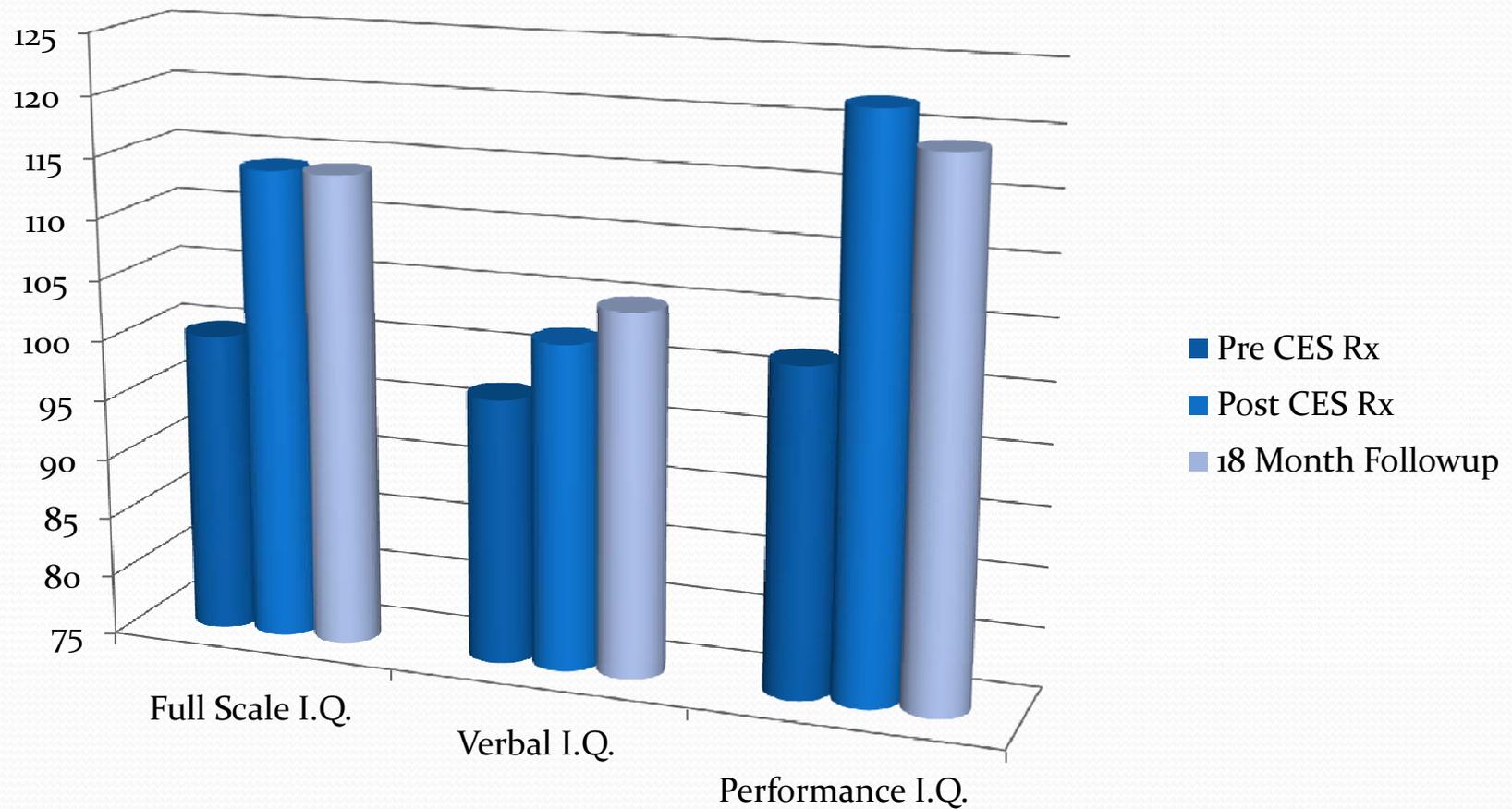
Fibromyalgia Patients, % Pain Improvement



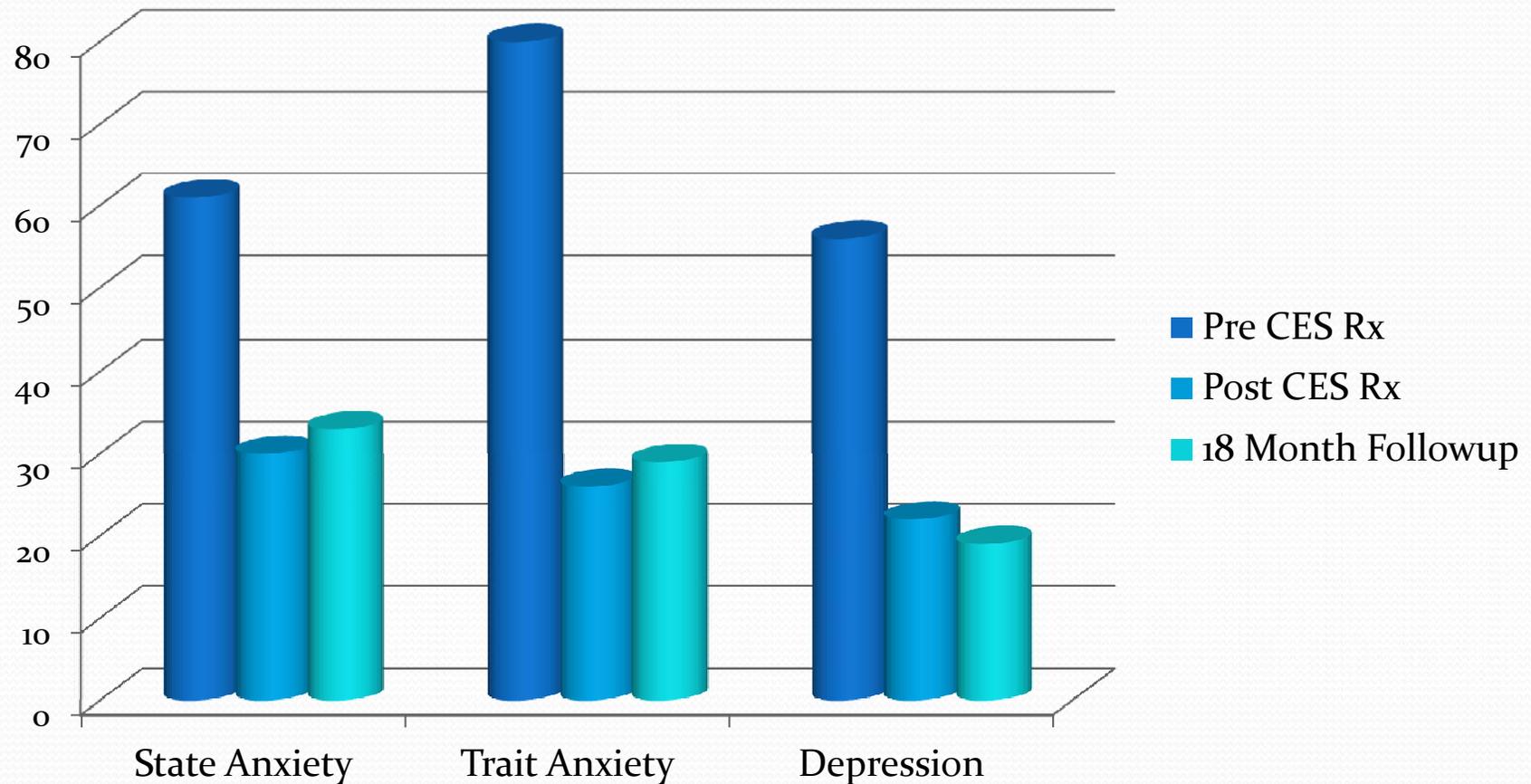
Fibromyalgia Study, % Improvement in Psychological Scores After Treatment



ADHD Study, Changes in I.Q. Scores

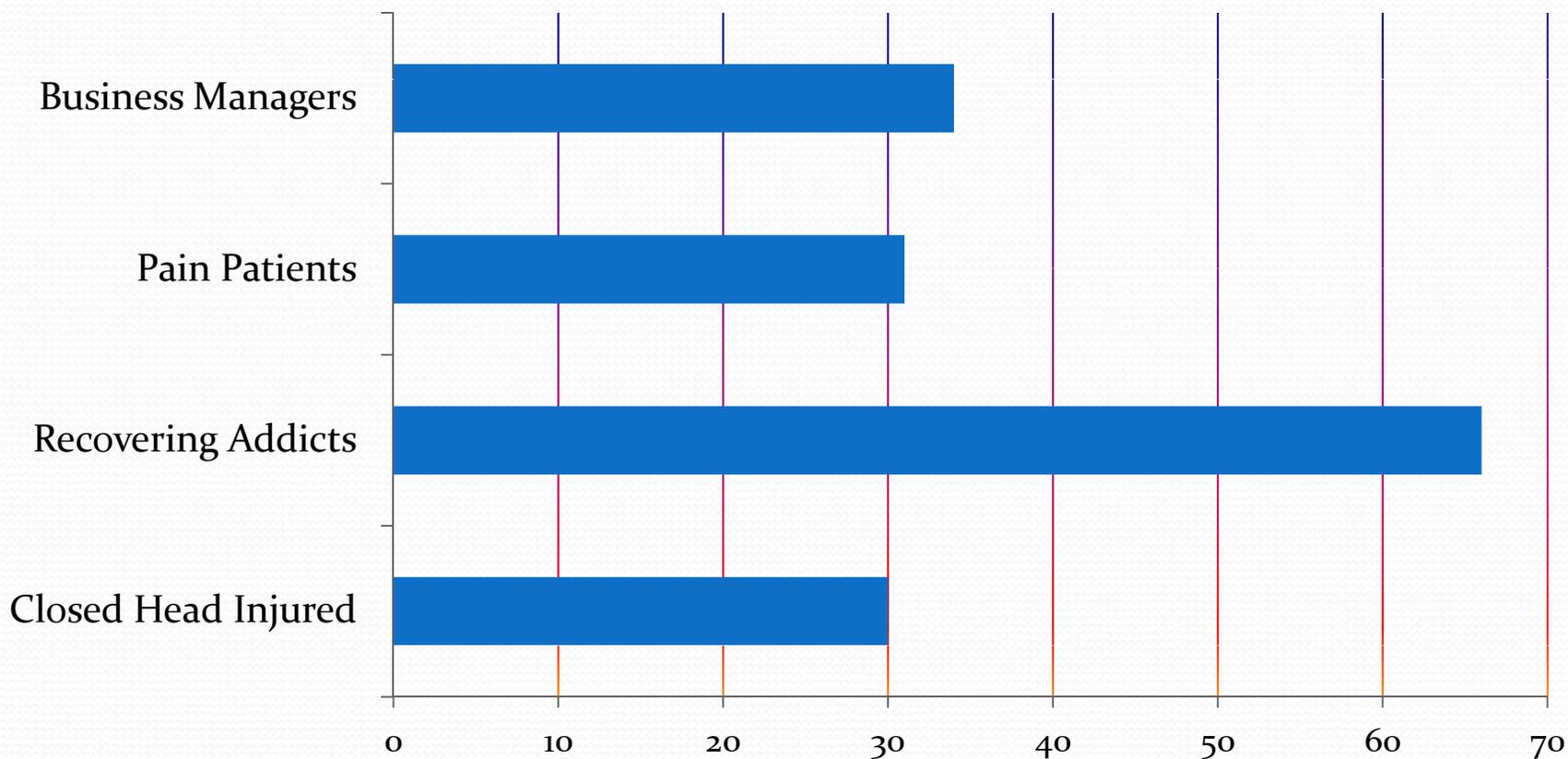


ADHD Study, Percentile Rank on Stress Factors



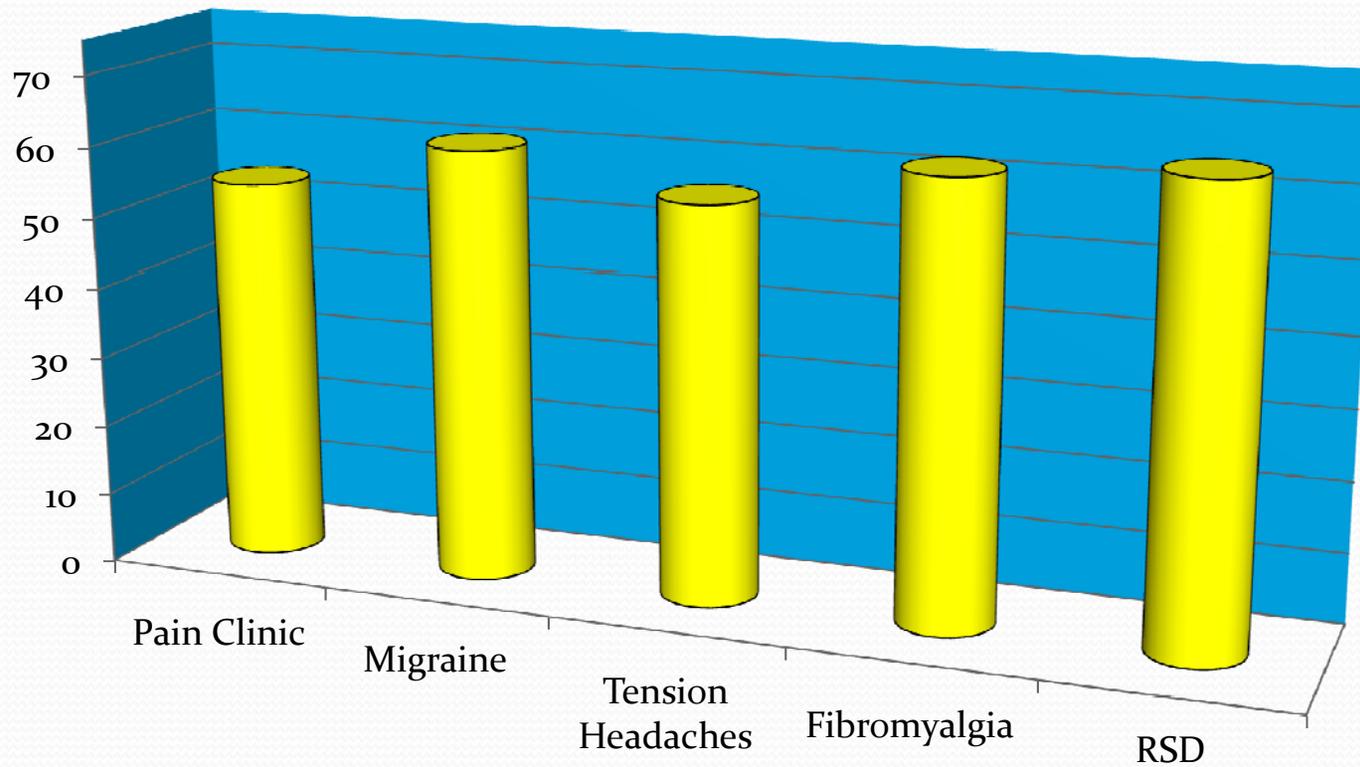
Improvement in Feelings of Well Being Following CES Treatment

Average Improvement in Feelings of Well Being

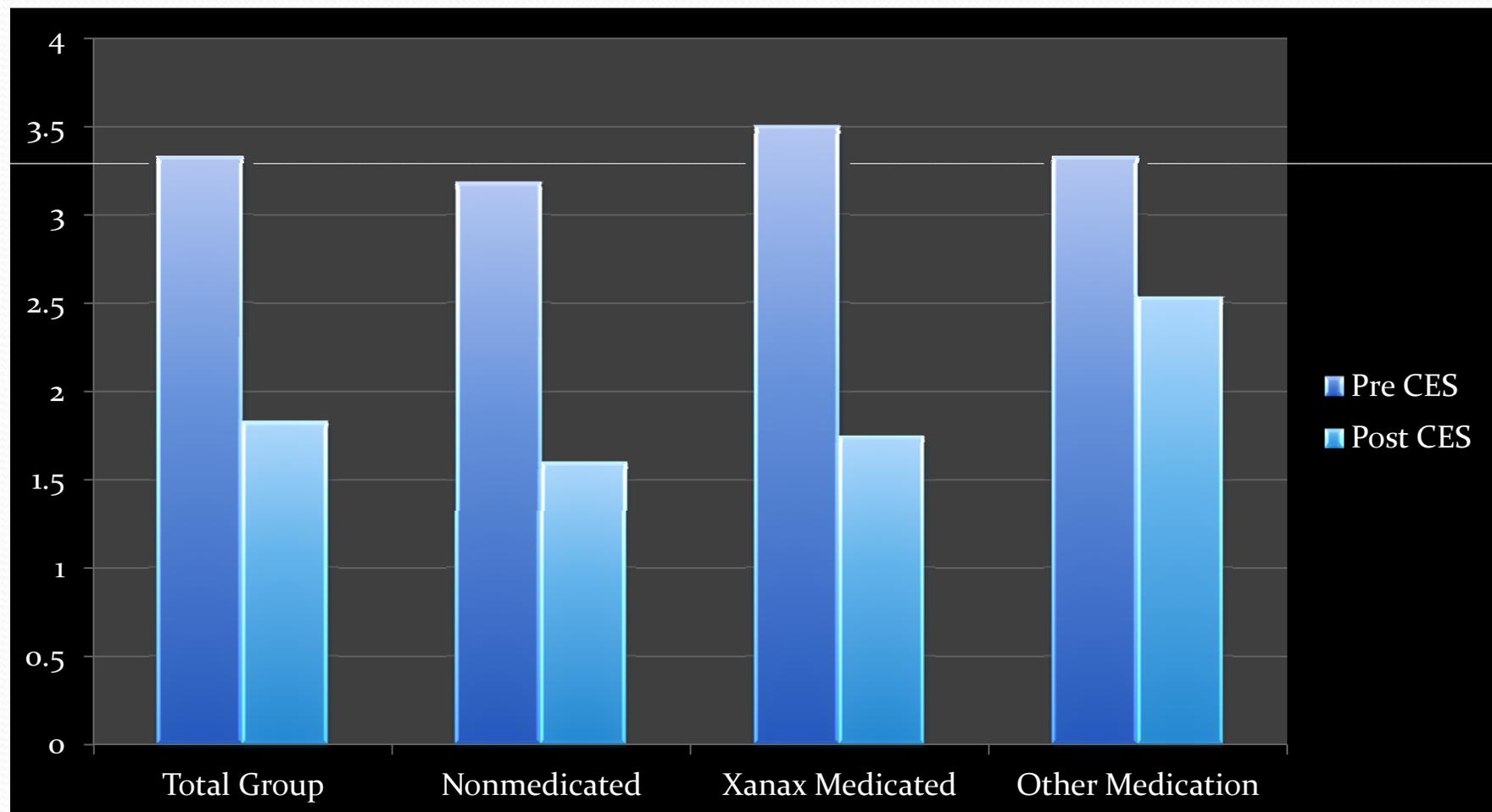


Pain Response of Patients Self Treating With CES

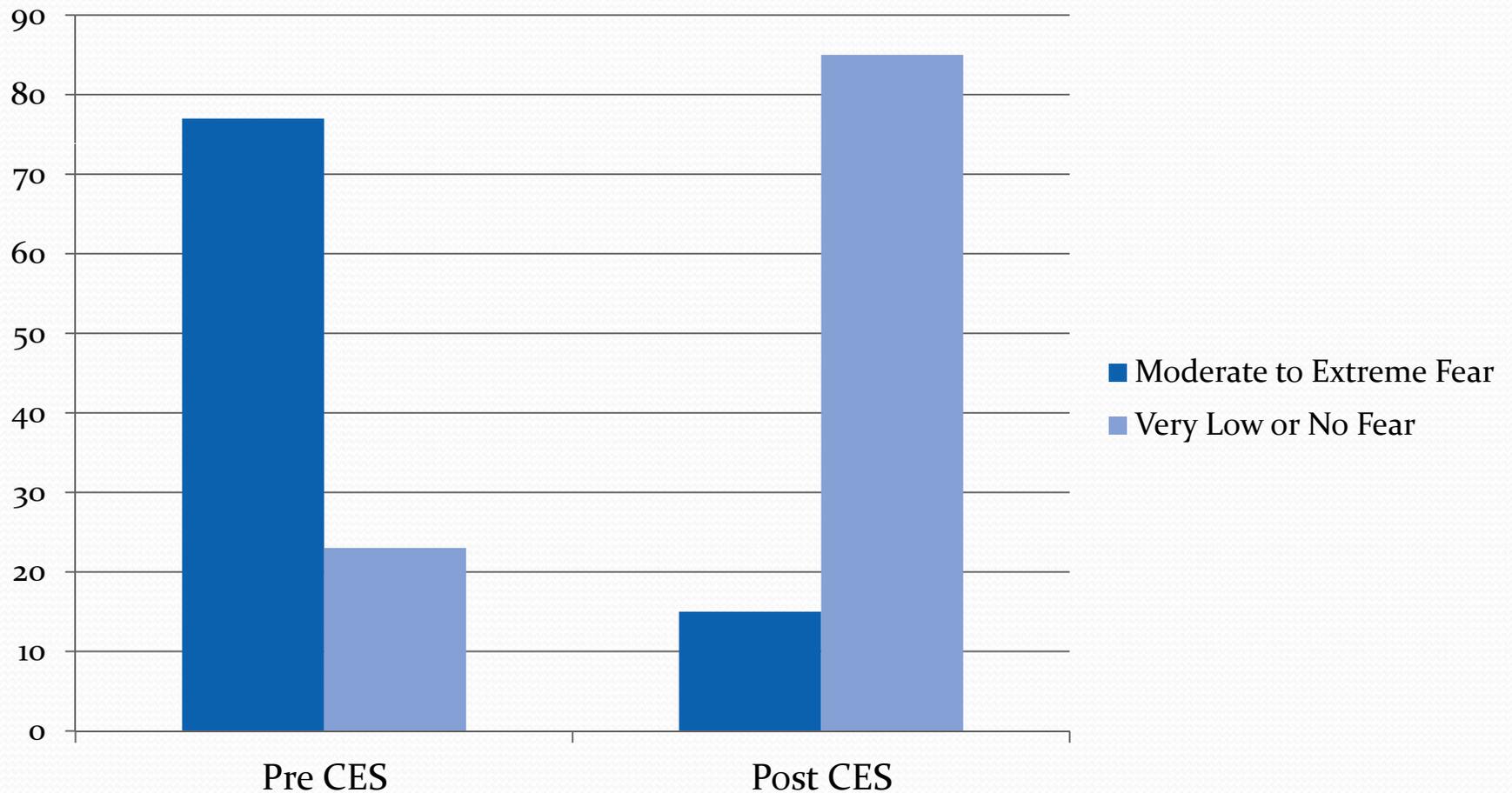
Percent Improvement After Self Treatment



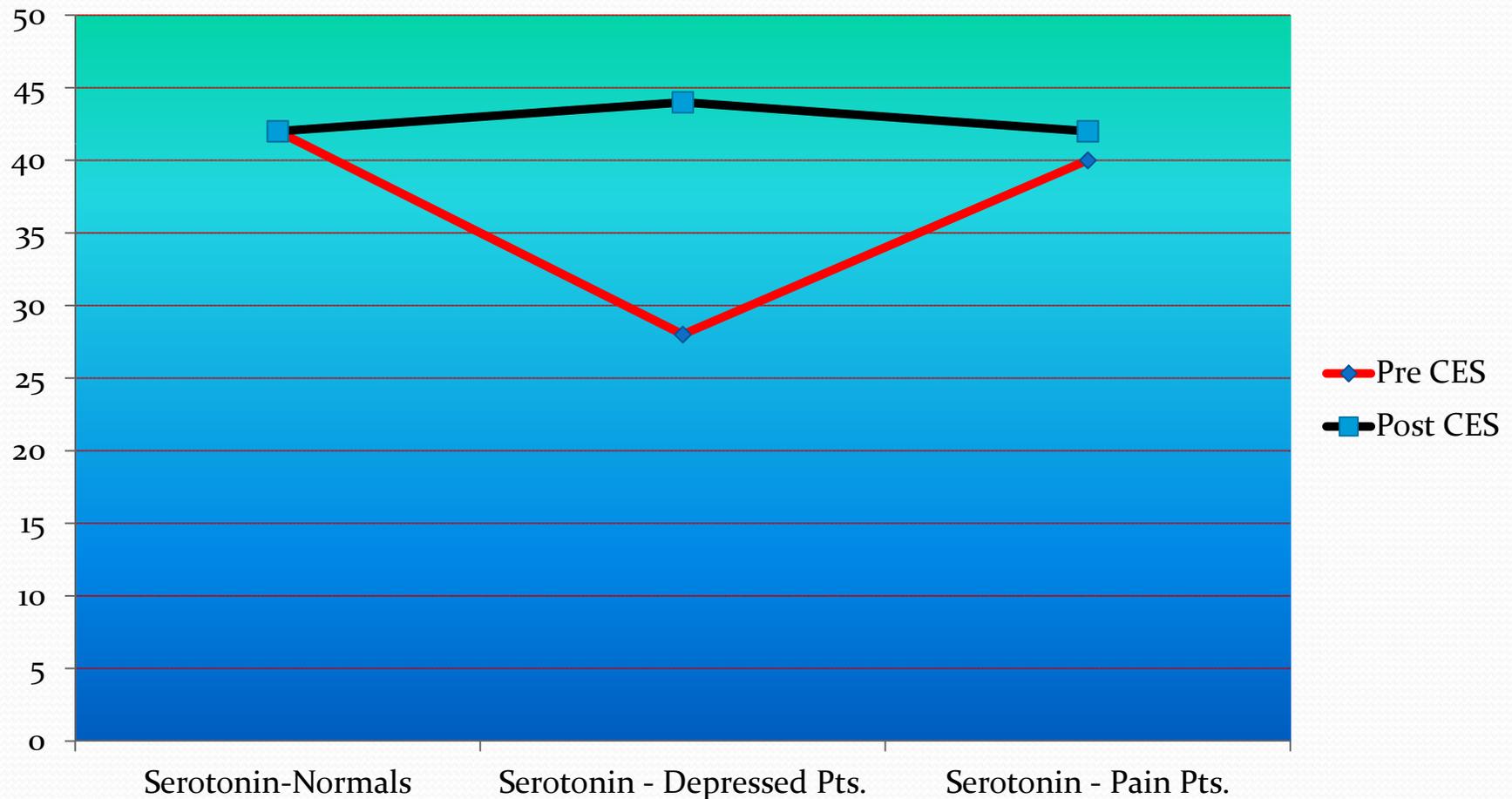
Changes in Fear Level of Phobic Patients, After 30 Minutes of CES



Gross Changes in Percent Phobia Reported Pre and Post-CES



Serotonin Level in Depressed Patients Pre and Post CES Rx



How Does CES Work?

Earlier Researchers thought that CES could not possibly enter the brain, however:

- a. University of Wisconsin (1967) showed that **CES went through every area of rabbit brain**, but canalized in the limbic system.
- b. Schroeder (1999) using EEG recordings, showed that **CES altered firing patterns throughout the brain**, significantly.
- c. Kennerly (2008) found with qEEG and Loran recordings that **CES altered firing patterns throughout the brain**, significantly.
- d. More than 20 EEG studies have shown that **CES changes brain waves** above and beyond that of sham treated patients.



1 mAmp of current applied across the head is not enough to cause a neuron to fire, and yet neurons develop a new firing pattern as CES crosses the head, what can be causing it?

Radman (2007) placed recording electrodes inside neurons, then passed CES current across the neurons. He discovered that CES, while not initially strong enough to cause the neuron to fire, as it continued to fire summated energy at the neuron until it built up sufficiently to raise the neuron's energy above the firing threshold, at which time it did fire.

He explained the clinical effects of CES by noting that 1) abnormal timing of neuron firing is the hallmark of many neurological disorders, 2) electric field-induced changes in spike timing would be important to achieving and maintaining a coherent temporal coding pattern, 3) CES changed the timing of the firing pattern, 4) **CES was associated with a synchronizing effect** during recurrent network activity when added to multiple cycles over time., **thereby normalizing the firing pattern.**



Some Theoretical Ideas of Why CES Works

1. **Balancing sympathetic/parasympathetic system** – Pavlovian

Sympathetic imbalance makes a person restless, running around constantly, seldom sleeping, and in general a nervous wreck. A parasympathetic imbalance would make a person sit around all day, listless, doing nothing but sleeping. Russians thought that CES put the sympathetic/parasympathetic system back in balance, yielding a normal person with average temperament.

2. **Neurohormonal balance** - Chronic stress theory – Pozos' Research

The concept of mainline medical science in the U.S. is that in order to be normal, one's neurotransmitters have to be in balance.

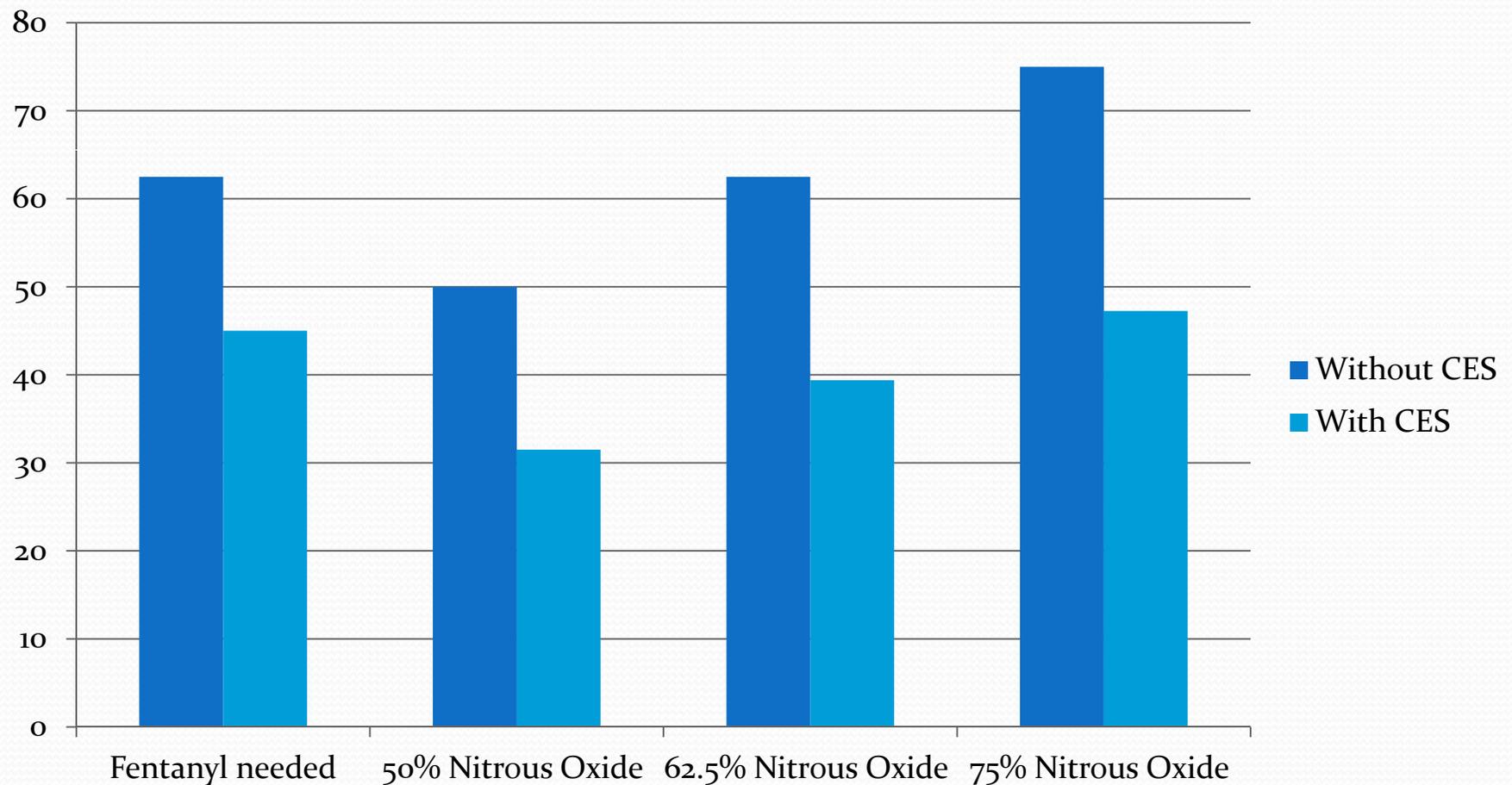
That is, serotonin, dopamine, norepinephrine, endorphins, and so forth have to be in balance with each other for the person to act and feel normally. Chronic stress knocks this system out of balance, and CES puts it back in balance.



Some Theoretical Ideas of Why CES Works, Continued

- 3. Synchronicity Theory** – Illness caused by breakdown in physiological Synchrony
Every system in the body works with a very complicated internal synchrony, much as a flock of birds or a large school of fish maneuver in synchrony when danger threatens. Each body part – liver, heart, kidneys, pancreas – has millions of separate cells, all firing in synchrony. Even though each system has a separate firing pattern, those patterns have to cooperate with the synchronous firing of other systems if the body is to succeed. When a part of the body gets out of synchrony, disease develops. It is thought that CES works on a master synchrony controller in the brain to bring the entire system back into synchrony.
- 4. CES as an Adaptogen** – an adaptogen acts on numerous major systems in the body to regulate them and bring them back toward homeostasis. It is thought that by bringing neurotransmitters back into balance, CES is basically performing as an adaptogen.

CES Potentiates Other Treatments, For Example With Anesthetics



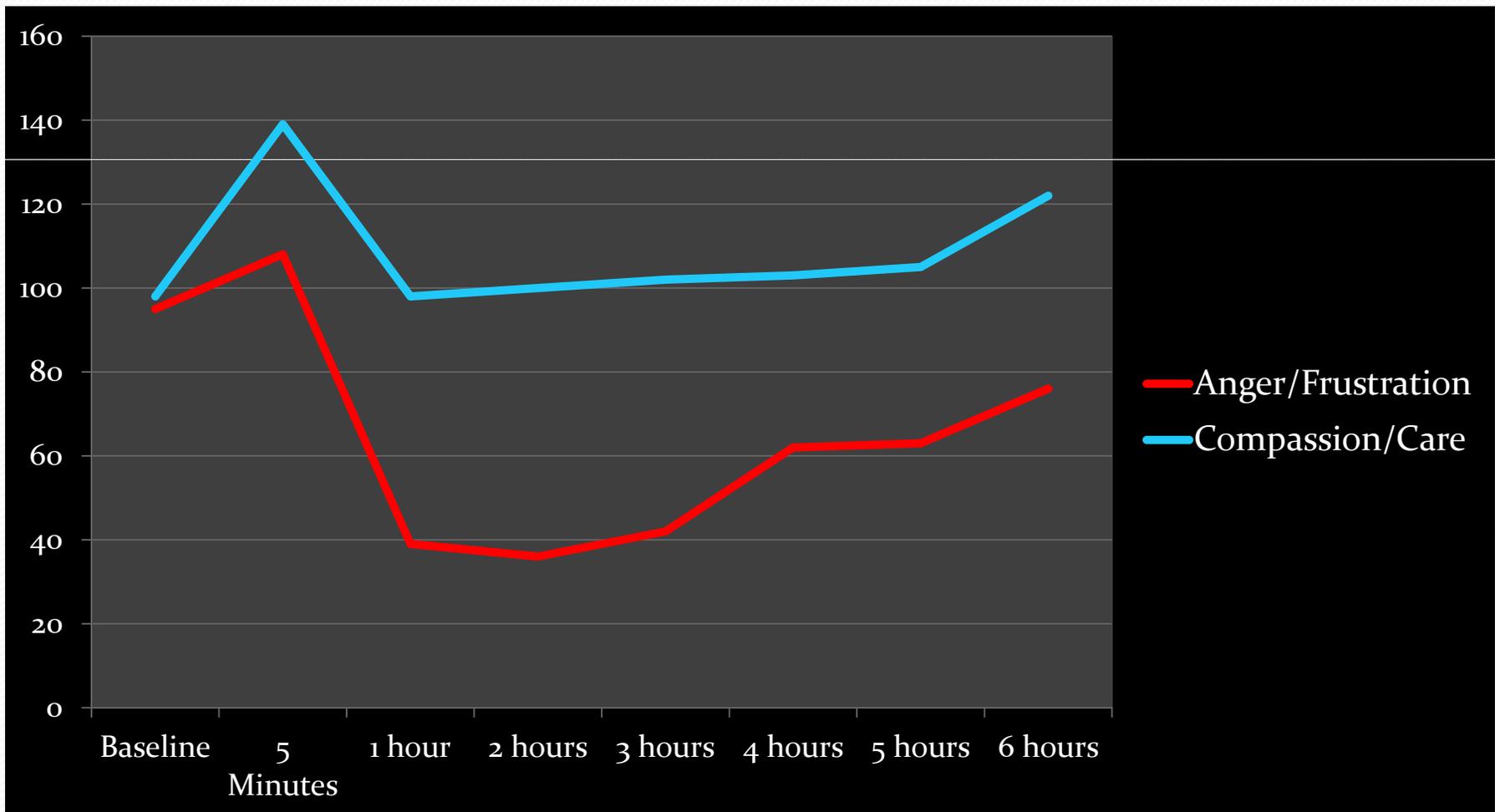


Hints for Clinicians: Potentiating Neurotransmitter Precursors

Clinical experience over many years has indicated that CES almost certainly synergizes the uptake and utilization of medications or neurotransmitter precursors when applied approximately 30 minutes after the medication or precursor has been ingested. To increase the amount of a given neurotransmitter, therefore, CES should be used along with the precursor. Some of these are:

- Tryptophan is a precursor of Serotonin, ACTH, Endorphin
- D-phenylalanine is a precursor of Dopamine
- L-tyrosine is a precursor of Dopamine, Norepinephrine, Epinephrine
- The herb Rhodiola Rosea Increases levels of all the above,
- As does the Indian herb Aswaganda

Hints for Clinicians: How Thoughts Change the Immune System



Hints for Clinicians, Continued

1. Persons have a habitual thought pattern, e.g. “the glass is half full or half empty.”
Negative vs. positive.
2. Once they get into that thought pattern, it is difficult to change because:
 - a. It is stored in the emotion centers of the brain
 - b. There more neurons firing from the emotion centers to the rational forebrain than from the forebrain to the emotion centers.
 - c. Encouraging the forebrain, intellectually, to change the thought habit in the emotion centers is difficult to impossible, therefore
3. Use CES to calm the emotion centers down and reduce their overall fire
4. Then (with cognitive practice) have the forebrain embed a new thought habit into the emotion centers

Other Clinical Synergisms

Psychotherapy – 40 alcoholic patients were given either CES or sham CES 1 hr/day for 3 weeks. The following Monday, the Alcoholics Anonymous lecturer introduced 5 new subjects during his lecture. The following Friday when tested, the CES patients recalled 4 of the 5 on average, while the sham CES subjects recalled none.

Physical therapy – 20 paraplegics/quadruplegics were given CES or sham CES 1 hr/day for 3 weeks. Though the study was blind, the physical therapists could tell with 100% accuracy who was getting CES. CES treated patients complained less, cried less, protested less, and cooperated more throughout their PT sessions.

Medications - Inpatient drug abuse patients were given sleep medications PRN throughout a CES study in which 76 patients were given CES and 75 given sham CES. The CES patients requested 64% less sleep medication throughout and following the study than did the sham treated patients.



Safety of CES

Scientific Studies – more than 150 CES studies are in the U.S. literature alone, and no significant negative side effect has ever been seen during a study or following study follow ups of up to two years later.

Patient Use – Hundreds of CES units have been and are used in hospitals and clinics, and thousands have been in use by patients in the homes for more than 38 years, and no major side effect has been noted or called in to physicians or the FDA from units similar to the CES Ultra device.

The U.S. National Research Council (1976) studied CES at FDA's request. They determined that no significant risk could be involved in putting such small amounts of current through the head, even over time.

In many research studies up to 2% of patients say they feel pain or tingling in the electrode area, while a similar percentage say it gives them a slight headache. In double blind studies it has been found that a similar number of sham treated patients as treated patients make these comments, so it can not be inferred that the signs or symptoms are coming from the electric current from CES units. Such headaches usually go away spontaneously shortly after the treatment session ends.

Notes for CES Therapists

Feelings of ecstasy. CES can give patients an initial reaction of a feeling of ecstasy which does not continue once the neurohormones are back in balance. They will want more of this but not get it.

Intense dreaming. When CES treatments initially begin catching patients up on missed REM sleep – due to anxiety or sleep meds, among other things – they will make up the REM sleep by having the most intense dreams ever. That worries some patients if the therapist does not warn them of the possibility, in which case they enjoy it immensely. As with ecstasy, it does not continue.

Too much energy. CES current adds energy to the body, and persons who are already too energized have to turn the current down very low – usually below sensation threshold. It is best to treat them before 9 AM to help their sleep at night, or the extra energy can keep them awake.

Fear of Electricity. In the U.S. many of today's patients have grandparents, or other older relatives who have had electric shock treatments. Having heard the horror stories, they will not let a therapist put a CES device on their head. The therapist should explain the difference in current levels, explain that CES might turn on a flashlight bulb at best, and let the patient hold the electrodes on two of their fingers while they, not the therapist, turn the unit on and the current up. Once they understand that is all they are going to feel when CES is on their head, they willingly put it on. Many clinicians always let the patient set the current stimulation level to his/her comfort level when giving CES treatments in a clinic setting.

Random Notes for Clinicians

Current Intensity Setting. Research has discovered that patients get the best benefit from CES treatment if the current level is set at or just below their level of comfort. Teenaged Cocaine addicts often want the current turned all the way up, and new batteries every day, while middle aged heroin addicts often don't want to feel any tingling at all, so turn it down just below their sensation level. Both get good treatment results.

How often should CES be used. Use it until the symptoms disappear. If using it with a new patient, most all symptoms begin to fade after 10 minutes to three days of treatment 1 hr/day. Most all symptoms are alleviated by the 10th to 15th day of daily treatment, 1 hr/day. Some addiction treatment clinics use it on patients 24 hours/day (when not in the shower), and some patients want to self treat for many hours at a stretch. This does not hurt. CES is not addictive, and when the symptoms subside, the patient will stop using CES on his own volition.

Are different pulse frequencies needed for different disorders? No.



For Prospective Researchers Who Want to be World Famous

Neuroregeneration. Earlier it was thought that damaged or lost neurons can never be replaced in the human brain. We now know that is not true. An fMRI or PET scan study of the hippocampus area of the brain pre/post three weeks of 1 hr/day CES in a few recovering alcoholics could well show that neuroregeneration is behind the cognitive recovery of these patients. To be on the safe side, also measure blood cortisol levels and Organic Brain Scales on an I.Q. test. This study, if successful, will guarantee overnight international acclaim for the researcher!

Inflammation. Cortisol is a stress hormone of interest to many theorists in relation to physiological and psychological stress. Two considerations are important, 1) cortisol varies normally throughout the day, so it has to be measured at the same time every day, and 2) some think that it is not the presence or absence of certain levels of cortisol that is diagnostic, but the variability of the cortisol response, so several blood draws (or salivary samples) spread over a 24 hour period might be most diagnostic, pre and post CES treatment, if measured with concurrent psychological or other stress tests to check for correlations. **Importance:** The brain's stress system generates inflammation throughout the body, and is linked to every degenerative condition studied to date. It is the body's greatest killer.



Summary of Advantages

- Drug Free
- No Significant Negative Side Effects
- Often Effective with Drug-Resistant Patients
- No contraindications for use with Pharmacotherapy, though may potentiate them, so care is necessary
- Portable & Easy-to-Use
- Pediatric to Geriatric Applications
- Less expensive than medications usually
- Not habit forming or addictive in any way