The Psychological Assessment and Treatment of Opioid Patients

John K Kreymer, Psy.D., ABPP
Licensed Psychologist
Board Certified in Clinical Health Psychology
Fellow of the American Academy of Clinical Health Psychology
Post-Doctoral Masters of Science-Clinical Psychopharmacology

Mercy Center for Pain Management
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Order of Presentation

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• Rationale for Psychological Assessment
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• Goals of Psychological Assessment
• The “Four As” With Opioid Assessment
  • Aberrant Behaviors/Risks
• Assessment Methods
• A Brief Look at Non-Pharmacological Treatment Options
  • Various Interventions
Relevant Disclosures

• Mercy Pain Management – Health Psychologist (12 Years)
Health Psychology

• Definition

• Clinical Health Psychology is the specialty that applies scientific knowledge of the inter-relationships among behavioral, emotional, cognitive, social, and biological components in health and disease to the promotion and maintenance of health; the prevention, treatment and rehabilitation of illness and disability; and the improvement of the health care system. It is dedicated to the development of knowledge regarding the interface between behavior and health, and to the delivery of high quality services based on that knowledge to individuals, families, and health care systems.
Mental Health

• Mental Health

• professional services for the [diagnosis], assessment, evaluation, treatment, and prevention of psychological, emotional, [psychophysiological], and behavioral disorders across the lifespan. These services may include procedures for understanding, predicting, and alleviating intellectual, emotional, physical, and psychological distress, social and behavioral maladjustment, and mental illness, [as well as other forms of discomfort].

• Health Psychology ➔ Illness/Physical Health

• Mental Health ➔ Mental Illness

• (Some overlap, however)
Rationale for Psychological Assessment

• To assess psychological factors affecting health, physical, and mental qualities affecting patient and provider behavior(s):
  • Patient understanding
  • Context and Complexities of decision making
  • Compliance with medical provider/regimen
  • Impact of mental health related conditions (personality disorder, depression, somatization, trauma, psychosis, etc.) on decisions/behavior
  • Obtain information that may not/can not be obtained via talking or observation in short periods of time (Actuarial Data)
  • Normative data with valid and reliability statistics
  • Candidacy for opiate and/or other potentially addictive medications or medical procedures (e.g., surgery candidate? --good research)
  • Addictive or risk potential associated with use – “Aberrant” features
  • *Generally - Best predictor of future behavior is past behavior
  • Appearances can be deceiving – look past the “obvious” or “façade” at times
Why Psychological Testing?

What does psychological assessment provide that typical interviews do not?

- Provide more objective yardstick to measure personal characteristics.
- Provide important treatment related information that may be difficult for the client to express directly in interviews. (Or obtain information the clinician did not ask or could not ask/quantify).
- Provide reliable and valid information about the client based on comparisons with research data gathered from large groups of people.
- Measure a large number of personality, cognitive or neuropsychological characteristics simultaneously.
- Offer information from a wide range of sources, including self-reports, performance tasks, and other assessment strategies.
- Provide central information needed at the start of or early in treatment.
- Guide the selection of appropriate treatment methods, particularly for clients who have not sufficiently benefited from previous treatment or whose treatment needs are complex.
- Highlight potential obstacles in treatment and suggest alternatives.
- Identify client's strengths that can be used to facilitate and speed treatment.
- Clarify the goals and focus of treatment.
- Provide a baseline to measure the progress of treatment and to evaluate the effects of treatment.
- Serve as a kind of "outside opinion" that informs both client and health care professional in their planning for and reassessment of treatment.
- Give the client information to enable more confident and active participation in treatment decisions, thereby increasing the client's sense of independence and satisfaction.
- Actuarial Data – More Accurate than Interview (see Meehl, Dawes) on the whole.
Additionally...

- Assessment is helpful for describing current functioning, confirming or refuting clinical impressions, identifying treatment needs, suggesting appropriate treatments, or aiding in [more specific] diagnosis. Pre-treatment assessment(s) is more likely to generate the greatest overall benefit for patients when (a) there are a variety of treatment approaches to choose from and there is a body of knowledge linking treatment methods to patient characteristics, (b) the client has had limited success in prior treatment, or (c) the client has complex problems calling for treatment goals to be prioritized. In essence, this is very ideal for pain and opioid assessment/treatment and surgical prediction (e.g., spine surgery).
Goals of Opioid Assessment

- Identify individuals who are at risk for developing drug or alcohol-related problems
- Identify individuals who may have developed drug or alcohol-related problems or addiction
- Identify individuals who require further medical or addiction assessment
- Diagnose addiction or other substance-related disorders
- Develop recommendations and plan for appropriate addiction treatment
- Assess the biopsychosocial needs of patients with addiction
Tolerance: A state of adaptation in which exposure to a drug induces changes that result in a diminution of one or more opioid effects over time. (Also: more drug/dose needed to get prior level of effect).

Physical Dependence: A state of adaptation manifested by a drug class-specific withdrawal syndrome that can be produced by abrupt cessation, rapid dose reduction, decreasing blood level of the drug, and/or administration of an antagonist.

Addiction: A primary, chronic, neurobiologic disease with genetic, psychosocial, and environmental factors influencing its development and manifestations. It is characterized by behaviors that include one or more of the following: impaired control over drug use, compulsive use, continued use despite harm, and craving.

Aberrant drug related behavior: A behavior outside the boundaries of the agreed-on treatment plan which is established as early as possible in the doctor-patient relationship.

Misuse: Use of a medication for nonmedical use, or for reasons other than prescribed (DSM-IV-TR). Misuse can be willful or unintentional use of a substance in a manner not consistent with legal or medical guidelines, such as altering dosing or sharing medicines, which has harmful or potentially harmful consequences. It does not refer to use for mind altering purposes.

Abuse: Misuse with consequences (DSM-IV-TR). The use of a substance to modify or control mood or state of mind in a manner that is illegal or harmful to oneself or others. Potentially harmful consequences include accidents or injuries, blackouts, legal problems, and sexual behavior that increases the risk of human immunodeficiency virus infection.

Diversion: The intentional transfer of a controlled substance from legitimate distribution and dispensing channels into illegal channels or obtaining a controlled substance by an illegal method.
The “Four As” (1)

The “Four As” (2)

• Analgesia – Is pain relief meaningful?
• Adverse Events – are side effects tolerable?
• Activities – has functioning improved with medication use?
• Aberrant Drug Related Behavior – present with medications (or would they be with medication)?

• Additionally: (Affect) - is the opioid medicating pain or emotional state?
What Are Some Aberrant Behaviors?

- Preference for short acting medications (and Asking by name)
- Running out of medications early
- Doctor shopping or fired from medical practice(s)
- Medications from multiple providers/sources
- Medications from non-sanctioned sources
- Medications “borrowed” from family/friend
- Concurrent use of prescription and other/illicit substances (e.g., methamphetamine, marijuana, heroin, ETOH, other)
- Selling prescription medication(s)
- Forging prescription (less with electronic prescribing)
- Losing or “stolen” prescriptions
- Lab work irregularities (nothing in the labs or something other than expected)
- Multiple MVAs or accidents
Aberrant Behaviors - More

• Higher (and higher) doses of medication - tolerance
• Taking medications other than as prescribed/instructed
• Associating with known risk groups (e.g., substance abusers, antisocial elements, risk takers, known drug dealer, etc.)
• Known personal substance abuse/dependence
• Reoccurring ER visits for pain/medication needs
• Dwelling on pain and medication (catastrophizing)
• Anger displays (e.g., road rage, arguments)
• Medicating for sleep, mood, or anxiety rather than for pain
Additional Risks

- Personality Disorder (e.g., impulsivity, identity concerns)
- Family history of major mental illness
- Depression, Anxiety, Somatization, Bipolar Disorder, Psychosis
- Associated Benzodiazepine Use without psychotherapy
- PTSD/Trauma (Personal History)
- Family History of Substance Abuse/Dependence
- Close Associates with Substance Issues
- Placing Self in Problematic Situations (e.g., routinely hanging out in bars and have a substance history)
- Prior Substance Use/Treatment
- Legal Problems (Arrest, Antisocial History, Substance Issues)
- Injustice/Resentment
- Decreased Stress Tolerance
- Catastrophizing Thinking (worst case, spiral down...)
- Kinesiophobia (movement/guardedness)
- Chaotic or Non-supportive living environment
Assessment Methods (1)

• Clinical Interview w/ patient
• Mental Status Examination (beyond the MMSE)
• Behavioral Observations (Does what you see match records, impressions, functioning?)
• Review of clinical medical records (EPIC, other records as available) and lab results
• Depending on jurisdiction – search of pharmacy records (no State Pharm database/PDMP in Missouri yet)
• Public Records Search (e.g., Missouri CaseNet; criminal/civil records search)
  • Assists with information for substance history, antisocial patterns
Methods (2)

• Collateral Family Interviews as possible
• Assess/Monitor and Collect Information about:
  • Family/Home Life – Quality
  • Recreation & Socialization
  • Occupational Functioning
  • Sexual Behavior
  • Self-Care Activities
  • Sleep/Appetite
  • Legal Status (Probation/Parole, DUI, Substance or Violent Offenses)
  • Stressors – Past and Present
  • Psychological History (pre and current history, treatment, etc)
  • Medical status (may or may not be available for immediate review)
  • Substance History and current use (ETOH, Nicotine, caffeine, prescriptions, illicit, herbals, etc.)
  • What other treatments have been tried – medication, non-medication, surgery, alternative, etc.
Methods (3)

- Psychometric Testing (Types) – Depends on referral question
  - Personality/Pathology (MMPI-2RF, PAI, MBMD, ZDS, others)
  - Pain (IEQ, PCS, VAS, Pain Drawing, Other rating scales)
  - Coping/Stress Tolerance (MC, PSEQ, MPI)
  - Substance Risk Assessment (e.g., SOAPP, ORT, COMM, DIRE, etc.)
  - Movement and Functional Measures (TSK, Oswestry, Roland-Morris Disability)
- We refer to Neuropsychology for TBI/cognitive testing needs (to include IQ and/or executive functioning assessment as needed)
Opioids and Co-Morbidities

...history of mood disorder, psychological problems, and psychosocial stressors increase the risk for prescription opioid misuse. A consistent association between psychiatric morbidity and prescription opioid misuse in chronic pain patients has been reported in multiple studies. Chronic pain patients with high psychiatric morbidity tend to be significantly younger, have been taking opioids longer, have significantly higher Screener and Opioid Assessment for Patients with Pain (SOAPP) and Current Opioid Misuse Measure (COMM) scores ($P < 0.001$), a greater frequency of abnormal urine toxicology screens, and significantly higher scores on the drug misuse index (DMI) ($P < 0.001$). Panic, social phobia and agoraphobia, low self-rated health status, and other substance misuse should alert clinicians to screen for abuse and dependence. Depression and anxiety disorders partially account for higher rates of abuse reported in patients taking opioid analgesics compared with those not taking prescribed opioids.
Patients in treatment for pain may fear the loss of their opioid pain medications should they disclose to a physician their concerns about their possible addiction. Providers need to approach patients who have an addiction in an honest, respectful, matter-of-fact way, just as they would approach patients with any other medical illness or problem. A provider’s responsibility is to deal appropriately with his or her own attitudes and emotional reactions to a patient. For evaluation to be effective, personal biases and opinions about drug use, individuals who have addictions, sexual behavior, lifestyle differences, and other emotionally laden issues must be set aside or dealt with openly and therapeutically.
Comments on Buprenorphrine

Patients for whom buprenorphine may be an appropriate treatment option:
• Interested in treatment for opioid addiction
• Have no contraindications to buprenorphine treatment
• Can be expected to be [reasonably] compliant with such treatment
• Understand the benefits and risks of buprenorphine treatment
• Willing to follow safety precautions for treatment
• Agree to treatment after a review of all options

Patients less likely to be candidates for buprenorphine treatment in an office-based setting:
• Dependence on high doses of benzodiazepines or other central nervous system depressants (including alcohol)
• Significant [untreated?] psychiatric comorbidity
• Active/chronic suicidal or homicidal ideation or attempts
• Multiple previous treatments for drug abuse with frequent relapses
• Poor response to previous treatment attempts with buprenorphine
• Significant medical complications

Opioid Guided Treatment Algorithm

STEP I Comprehensive initial evaluation
STEP II Establish diagnosis
♦ X-rays, MRI, CT, neurophysiologic studies
♦ Psychological evaluation
♦ Precision diagnostic interventions
STEP III Establish medical necessity (lack of progress or as supplemental therapy)
♦ Physical diagnosis
♦ Therapeutic interventional pain management
♦ Physical modalities
♦ Behavior therapy
STEP IV Assess risk-benefit ratio
♦ Treatment is beneficial
STEP V Establish treatment goals
STEP VI Obtain informed consent and agreement
STEP VII Initial dose adjustment phase (up to 8-12 weeks)
♦ Start low dose
♦ Utilize opioids, NSAIDs and adjuvants
♦ Discontinue
• Lack of analgesia, • Side effects
• Lack of functional improvement
STEP VIII Stable phase (stable – moderate doses)
♦ Monthly refills
♦ Assess for four A’s (see above)
♦ Manage side effects
STEP IX Adherence monitoring
♦ Prescription monitoring programs
♦ Random drug screens & Pill counts
STEP X Outcomes
♦ Successful – continue
• Stable doses • Analgesia, activity
• No abuse, or side effects
♦ Failed – discontinue
• Dose escalation • No analgesia
• No activity • Abuse • Side effects
• Noncompliance

Pain Physician: Opioid Special Issue
July 2012; 15:ES67-ES92
A Brief Look at Non-Pharmacological Treatment Options
Behavioral/Cognitive Behavioral Therapy

- Behavioral therapy should be part of managing chronic pain patients. It can come in small installments with words of encouragement or formalized consultations. Whenever possible, behavioral therapy should be proactive, utilized early in treatment, and not instituted after "everything" has failed.

- Bx Therapy and pharmacology can be combined in some cases for patients to achieve additional clinical improvement for pain relief. (Caveats: Opiates and Benzodiazepines alter EEG patterns/mood over the long term with potential treatment effects/artifacts).

- The focus is to identify thoughts, emotions, and behaviors that can affect onset, duration, and intensity/severity of chronic pain, along with bringing about reduction in pain/suffering while enhancing positive aspects of the person’s functioning and health. Example: Address Negative Self Talk

- Negative self-talk is an automatic private conversation that goes on inside a person's mind in response to an occurrence in the environment. Often these negative evaluations of oneself are unconscious. Under guidance from a psychologist or counselor, the individual identifies negative self-talk and changes the disparaging remarks to positive messages promoting change, reducing anticipatory distress/anxiety, and fostering a more adaptive attitude and lifestyle choices.
Non-Pharmacological Treatments c/o Mercy Pain Management

• Dietary Compliance (Food-Pain Triggers, Diabetic Complications, GERD/IBS, etc.)
• Exercise (Kinesiophobia)/Physical Therapy
• Symptom Education (Individual and Group Treatment)
• Social Support (Group Treatment – Peer Support)
• Behavioral Sleep Treatment (Hygiene, Environmental Modification, CBT)
• Stress Management and Coping Techniques
• Hypnosis/Relaxation (Jacobsonian Deep Muscle Relaxation)
• Trauma-Pain Management (EMDR)
• Cognitive-Behavioral Therapy (CBT)
• Biofeedback, Neurofeedback, and qEEG guided treatment
  • EEG, EMG, GSR, HRV, Temperature
• Meditation & Mindfulness/Autogenic Training
• emWave & Diaphragmatic Training (HRV and Vagus training)
• Alpha Stim
Stress and Coping Skills

- A fundamental aspect of chronic pain is sensitivity to changes in the internal and/or external environment. For instance, with headache sufferers this sensitivity is reflected in a heightened sense of responsibility for migraines. This often leads to *guilt and a sense of failure for their perceived inability to control their headaches*. Similar patterns may be seen with other kinds of pain patients/pain issues.

- Directing the sufferers' understanding to the biology of pain (symptom education) distances them from dwelling on uncontrollable demands. Once they understand their sensitivity, they realize that they have choices. Coping skills include cognitive restructuring, assertiveness training, and identifying goals to help with irrational thinking, cognitive distortions, and improved decision making along with use of relaxation and skills practice.
Meditation

A Wake Forest University study conducted by Fadel Zeidan in April 2011 took 15 healthy volunteers and performed MRI scans of their brains while inducing pain. In the four days that followed, a certified instructor taught the subjects mindfulness meditation (in which the patient is taught to focus on a sense/experience, often his or her breath, while accepting transient thoughts). On the fifth day, the researchers scanned the volunteers again, once while not meditating, and another time while meditating, with pain induced (heat probe) during both sessions. The study showed an approximately 40 percent reduction in pain intensity ratings during meditation when compared with non-meditation. (Many other studies document pain relief via meditation as well).

5 Immediate Meditation Benefits

• Reduced Blood Pressure and Boost(ed) Immune Functioning
• Sharpened Mental Skills (e.g., Attention, Concentration)
• Increased Serotonin levels (boost mood, reduce anxiety)
• Meditation (20 mins/day) = Improved Sleep
• More Mediation = Less Stress and Better Cardiovascular Functioning

Source: WebMD (relates to HRV training)
EEG Changes With Meditation

5 Minutes of Brain Activity – Pre-Meditation

Brain Activity after 10 Minutes of Meditation
Behavioral Sleep Strategies

- Avoid Daytime Napping (minus 30 min. “power” naps)
- Avoid Stimulants (Caffeine/Nicotine) & Alcohol close to bedtime
- *Exercise helps with sleep
- Avoid large meals before sleep – avoid spicy foods before sleep
- Natural light promotes melatonin & normal sleep-wake cycle
- Establish routine sleep/wake times
- Use bed for what it is designed for (no homework, eating, etc.) – Sleep and well, you know... avoid stressful activity right before bed
- Comfortable environment
- Work on “clock watching”
- If not asleep in 15-20 mins, don’t just stay in bed and think about how bad things are/dwell – (self-fulfilling prophecy can develop into maladaptive sleep patterns) – associate bed with sleep, not staying awake
- Sleep restriction (specific times to stay in bed/sleep) – pattern development
- Relaxation skills/deep breathing can help
EMDR/Trauma

• Eye Movement Desensitization and Reprocessing (EMDR) is a psychotherapy treatment that was originally designed to alleviate the distress associated with traumatic memories (Shapiro, 1989a, 1989b). Shapiro’s (2001) Adaptive Information Processing model posits that EMDR therapy facilitates the accessing and processing of traumatic memories and other adverse life experience to bring these to an adaptive resolution. After successful treatment with EMDR therapy, affective distress is relieved, negative beliefs are reformulated, and physiological arousal is reduced.

• EMDR therapy shows that the mind can in fact heal from psychological trauma much as the body recovers from physical trauma. When you cut your hand, your body works to close the wound. If a foreign object or repeated injury irritates the wound, it festers and causes pain. Once the block is removed, healing resumes. EMDR therapy demonstrates that a similar sequence of events occurs with mental processes.

• Thought to be connected with the biological mechanisms involved in Rapid Eye Movement (REM) sleep and internal associations arise; the client begins to process memory and disturbing feelings. In successful EMDR therapy, the meaning of painful events is transformed on an emotional level.
Cognitive-Behavioral Therapy

It works to solve current problems and change maladaptive thoughts and behaviors. CBT is "problem-focused" and "action-oriented" (therapist tries to assist the client in selecting specific strategies to help address those problems), or directive in its therapeutic approach.
Jacobsonian Deep Muscle Relaxation

- Muscle relaxation decreases or prevents muscle spasms, reduces and controls muscle tension, and helps control other physiological mechanisms (altered blood flow, changes in brain chemicals) involved in nervous system arousal and pain production. Muscle relaxation may also reduce anxiety and distress, improve sleep, and distract/reduce from the pain.

- Relaxation techniques, when used consistently, can prove effective in controlling stress, one of the causes of back pain, by helping you reach a state of mental calm, even when in the middle of a stressful situation.

“You know I can't sleep, I can't stop my brain
You know it's three weeks, I'm going insane.
You know I'd give you everything I've got for a little peace of mind.” The Beatles, I’m So Tired.
Biofeedback

• Common Types (For Pain)
  • EMG (Muscle)
  • EEG (Brainwaves)
  • GSR (Skin Conductivity)
  • HRV (Cardiac Timing/Breathing)
  • Temperature (Skin/Headache, Pain, Reynaud’s & Neuropathy)
  - Other kinds for other kinds of conditions/medical issues

**Significantly proven results (see [www.aapb.org](http://www.aapb.org))

Pain (e.g., Headache, Neuropathy, CRPS, Trigeminal Neuralgia, Fibromyalgia), Anxiety and PTSD, ADHD, Dizziness, Tinnitus, CVA/Stroke Recovery, Substance Abuse among others...
Physiologic Biofeedback

- Deep Relaxation
- Muscle Tension
- Temperature
- Heart Rate
- GSR

An example of a biofeedback display noting Heart Rate, Respiration, Muscle Tension, Temperature, and Skin Conductivity.
Temperature BioFeedback

- The average finger temperature is 85°F. As the stress response builds in the body, the finger temperature generally decreases. When the finger temperature is chronically low (below 80°F), the body is in the survival mode, usually signifying that the individual has lost the ability to relax (relax muscles).

- Biofeedback trains the nervous system to shut out excessive stimulation. Through biofeedback and relaxation, the individual steps back from daily concerns and focuses on returning the body to homeostasis through calming, relaxing music, visualization, and slow diaphragmatic breathing. As this occurs, the finger temperature rises. The goal is 96°F or as high as can be obtained over a generalized period of time. (Research notes that a sustained 3 degree (F) improvement demonstrates up to 80% improvement with migraine headache).

- Hand warming is basic to learning how to control the autonomic nervous system. Many people who experience panic attacks have cold hands much of the time. Cold hands (and feet) are indicative of the fight/flight response, which reduces blood flow to the arms and hands, legs and feet. The less warm blood from the heart that reaches your hands and feet, the cooler they will be.

When you learn to warm your hands, you take control of the sympathetic nervous system over-activity that is so much the case with panic disorder. It is easy to do and demonstrates that you are able to control the fight/flight response when you are under stress or in a trigger situation (for instance, if getting on a freeway is something that usually triggers shortness of breath and clammy hands.)
Heart Rate Variability

• During stress and negative emotions, when the heart rhythm pattern is erratic and disordered, the corresponding pattern of neural signals traveling from the heart to the brain inhibits higher cognitive functions. This limits our ability to think clearly, remember, learn, reason, and make effective decisions. (This helps explain why we may often act impulsively and unwisely when we’re under stress.) The heart’s input to the brain during stressful or negative emotions also has a profound effect on the brain’s emotional processes—actually serving to reinforce the emotional experience of stress.

• In contrast, the more ordered and stable pattern of the heart’s input to the brain during positive emotional states has the opposite effect – it facilitates cognitive function and reinforces positive feelings and emotional stability. This means that learning to generate increased heart rhythm coherence, by sustaining positive emotions, not only benefits the entire body, but also profoundly affects how we perceive, think, feel, and perform.
Scientists and physicians consider HRV to be an important indicator of health and fitness. As a marker of physiological resilience and behavioral flexibility, it reflects our ability to adapt effectively to stress and environmental demands.

Low HRV is also observed in individuals with a wide range of diseases and disorders. By reducing stress-induced wear and tear on the nervous system and facilitating the body’s natural regenerative processes.
Neurofeedback and qEEG

1 Minute Video Clip
qEEG Training - Before

TBI Patient with Headaches and Tinnitus – Nov 2015
qEEG Training - After

Same TBI Patient – 70% HA Improvement, Tinnitus 40% Improved – As of April 2016
Non-addictive Option For At-risk Patients and Others as Well
Alpha-Stim technology is a non-addictive therapy that is a treatment solution for patients who:
• Are addicted to, or at risk of, addiction to opiates
• Have drug interaction risk factors
• Have vocational restrictions on narcotic use
• Are elderly
• At risk due to compromised organ systems
• Are medication resistant
• Chronic Pain Patients (with or without narcotic risk)
• Depression/Anxiety Patients

FDA Approved, Current Class III, Pending Reclass to Class II
Other Targets for Alpha Stim

- Depression**
- Anxiety**
  - PTSD
  - Panic
  - Generalized Anxiety & Tension
- Chronic Pain**
  - Migraines
  - Fibromyalgia
  - Neuropathy
  - Back Pain
  - IBS
- (Sleep Promotion) **FDA Indicated
Alpha Stim Results

Immediate Results
In a study of severe pain patients, Alpha-Stim significantly reduced pain by an average of 71% after only 5 treatments.¹

Significantly Reduced Post-traumatic Pain
56% of patients at 3 months and 85% of patients at 6 months were somewhat or very satisfied with the Alpha-Stim device.²

Functional Status Improvement
Chronic pain patients using Alpha-Stim reported significantly improved functionality than the usual care and sham groups.³


FFT Relative Power Difference (%)

QEEG changes in 30 subjects treated with 20 minutes of CES. Blue = decrease Red = increase There is an increase in alpha activity with a simultaneous decrease in beta and delta².
Evidence from published research and ongoing studies shows that the Alpha-Stim waveform activates particular groups of nerve cells that are located at the brainstem (Figure 1). These groups of nerve cells produce the chemicals serotonin and acetylcholine which can affect the chemical activity of nerve cells that are both nearby and at more distant sites in the nervous system. These cells are situated to control the activity of afferent nerve pathways into the brain and efferent nerves that course down into the spinal cord. Alpha-Stim appears to amplify activity in some neurological systems, and deactivate activity in others. This neurological ‘fine tuning’ is called neuromodulation, and occurs either as a result of, or together with the production of a certain type of electrical activity pattern in the brain known as an alpha state which can be measured on an EEG.