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SPECIAL TOPICS

New and Promising Technologies in the Field of Addiction Recovery: Highlights of Emerging Expertise

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Holleran Steiker: Having recently attended a workshop entitled, "Emerging Technologies in Addiction Recovery" sponsored by SoberAustin.com and MR Marketing Services, I was intrigued by a variety of presentations and exhibits by clinicians representing new technologies currently being researched and utilized with addiction recovery clients. Coming in an admitted skeptic about some of the interventions that had a "new age" flavor, I must say that I was captivated and challenged by the information and research findings about the efficacy and responses, as well as the rigor of the studies conducted. The four areas presented included (a) neurotransmitter testing, remediation, and brain wellness; (b) brain SPECT imaging; (c) microcurrent therapy; and

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(d) transcranial magnetic stimulation. This discussion summarizes the various areas of innovative work and the applications of the technologies for addiction treatment.

PAM MACHEMEHL HELMLY, CN

Holleran Steiker: Can you explain neurotransmitter testing and related amino acid therapy?

Helmly: Neurotransmitter testing is relatively new in the United States, introduced here in the last 8 years, it was originated and developed in Germany some 18 years ago. Over this period of time, normative data have been established and our analyses are measured by this standard. This unique method of testing allows experts in the field to create protocols utilizing proven amino acids regimens. Neurotransmitters are the brain chemicals that communicate information throughout our brain and body. They relay signals between nerve cells or neurons. Neurotransmitters control heartbeat, breathing, and digestion. They can also affect mood, sleep, concentration, and weight, and can cause adverse symptoms when they are out of balance. Neurotransmitter levels can be depleted many ways. As a matter of fact, it is estimated that 86% of Americans have suboptimal neurotransmitter levels. Stress, poor diet, neurotoxins, genetic predisposition, drugs (prescription and recreational), alcohol, and caffeine usage can cause these levels to be out of optimal range.

There are two kinds of neurotransmitters—inhibitory and excitatory. Excitatory neurotransmitters (e.g., norepinephrine and epinephrine) are what stimulate the brain. Those that calm the brain and help create balance are called inhibitory. Inhibitory neurotransmitters (e.g., seratonin and GABA) balance mood and are easily depleted when the excitatory neurotransmitters are overactive. Dopamine can be inhibitory or excitatory depending on its levels and the reason that it is being excreted.

Based on the German technology for testing neurotransmitters in the urine, this science examines the correlation between peripheral levels of neurotransmitters and the brain. It is ultimately the ratios between neurotransmitter excretions that are most indicative of imbalance as compared to the excretions as a whole. Amino acid therapy is a term used to describe the use of supplemental amino acids along with the nutrient cofactors necessary to synthesize brain chemicals (neurotransmitters). The neurotransmitters that are produced in the brain require the same amino acid precursors and enzymes for synthesis as they do in the body. Based on this connection, urinary neurotransmitters give us a reflection of

neurotransmitter imbalances that can result in symptoms and conditions such as depressions, anxiety, attention deficit disorder/attention deficit hyperactivity disorder (ADD/ADHD), headaches, migraines, fatigue, weight issues, insomnia, memory problems, and chronic pain.

Holleran Steiker: So what are the implications for this technology for clients with chemical dependency and other substance-related issues?

Helmly: Whenever we endure significant periods of stress or trauma, we use up our neurotransmitters at a faster than normal rate. With dietary sources being the only way to make neurotransmitters, it can become difficult to recover from traumas or stresses quickly without intervention. When it comes to addictions, neurotransmitters are definitely depleted and often medications are not effective. Enough pools of neurotransmitters must be present for medications to redistribute them within the brain for a positive outcome. Interesting, it is my experience that the drug of choice is definitely indicative of which neurotransmitters are out of balance. A good example of this is that patients who choose to utilize alcohol typically have subpar inhibitory neurotransmitters or their excitatory neurotransmitters are excreting in excess. Alcohol impairs the absorption of proteins, so this particular addiction can have a very deleterious effect on brain chemistry. Most other drugs affect one or two neurotransmitters directly with a secondary effect on other neurotransmitters that are attempting to achieve balance. Combining amino acid therapy with a good diet can help with the addiction as well as speed recovery. Amino acid therapy is also complementary with medication therapy. Amino acid therapy is very safe because we encounter amino acids with all of the proteins in our diet. We have utilized amino acids in addicted babies by including them in their formulas. Amino acids were the original antidepressants if you remember.

Neurotransmitter testing can be performed while the patient is still using medications or if he or she is not in active recovery. Many physicians are beginning to use neurotransmitter testing in urine as a way to determine which medication would be optimal for a patient who is symptomatic. Testing is noninvasive and can be performed at home or in the office. With over a million tests having been performed worldwide in the last 8 years, this type of testing is gaining acceptance in the medical community.

Holleran Steiker: Where can readers go to learn more about this new mode of intervention?

Helmly: Readers are welcome to explore more information on our Web site: http://www.neurogistics.com/.

TODD CLEMENTS, MD

Holleran Steiker: I have heard of SPECT images being used to determine and study the changes in the brain functions in addicted individuals. I have read Nora Volkow's research in this area (Volkow, Fowler, & Wang, 2004), published just prior to her becoming the Director of the National Institute on Drug Abuse at the National Institutes of Health in May 2003. I know that SPECT imaging has helped the addictions field progress in its understanding of disease mechanisms, but the implications for proactive treatment are less known. Can you explain your work and its utility with addicted clients?

Clements: SPECT stands for single photon emission computed tomography. It measures the cerebral blood flow and activity patterns of the brain. It utilizes a radiopharmaceutical to create images of actual brain function by identifying blood flow patterns throughout the brain. These images assist physicians in making an accurate diagnosis and treatment plan for clients. Most of our clients find that being able to "see" the areas of their brain that are contributing to their symptoms gives them a much better understanding of their condition and increases motivation to comply with their treatment recommendations.

The study is performed by injecting a very small dose of a radioactively tagged compound (Ceretec) that is taken up by the brain. Once in the brain, the Ceretec emits ultraviolet light for the next few hours. The cameras in the SPECT scanner slowly rotate around the head and detect photons in the form of light. The most active brain cells will emit the most light and the least active ones will emit the least.

Brain SPECT scans are different than computed tomography (CT) or magnetic resonance imaging (MRI) scans. CT and MRI look at the brain's structure or anatomy. SPECT imaging assesses the brain's blood flow or functioning. In many cases the brain's structure might be normal, although function is abnormal. In the area of psychiatric care, the majority of CTs and MRIs ordered on our clients are found to be normal, yet their symptoms persist. Psychological problems often reveal abnormalities with the brain's functioning as opposed to its anatomy.

SPECT imaging is a clinically useful way to look at brain functioning. Certain mental and behavioral states can be correlated with certain SPECT patterns. Gathering this information from the SPECT studies helps clients and clinicians understand specific brain functions, which can augment effective evaluation and treatment. In 2005, Thomas Insel, MD. PhD, Director of the National Institute of Mental Health, said "Brain imaging in clinical practice is the next major advance in psychiatry." He believed that brain imaging in clinical practice would be a reality within 5 years. Indeed, today we are beginning to see his predictions come to pass.

Holleran Steiker: In what cases might a social worker or other clinician in the addictions field order a SPECT study?

Clements: The following are some of the most common reasons for a SPECT referral:

- Evaluating memory loss, suspected dementia, or other cognitive problems.
- Evaluating the effects of recent or past brain trauma (from mild to severe).
- Evaluating aggressive or violent behavior.
- Evaluating the presence of an underlying organic condition in the brain (such as brain trauma or dementia) that might be causing or contributing to emotional, behavioral, or learning disturbances.
- Evaluating treatment-resistant or atypical psychiatric conditions, including chronic relapses.
- Evaluating the specific brain patterns underlying mood disorders, anxiety disorders, and attention deficit disorders.
- Evaluating the extent of brain impairment caused by substances.
- Evaluating the physiological effects of treatment.

Although a SPECT image by itself will not give an accurate diagnosis, SPECT images help clinicians understand more about the specific brain functions. Each brain is unique and responses to treatment plans vary. Of course, diagnosing specific psychiatric conditions is a complex procedure, done through clinical history taking, personal interviews and information from families, SPECT images, and other neuropsychological tests.

Holleran Steiker: What procedure is involved when you do a SPECT scan on a client?

Clements: An evaluation typically consists of two scans that are performed at least 24 hours apart. The concentration scan is usually performed first. The client in the testing room is given a task that requires prolonged concentration. While the client is engaged in this task the imaging agent is injected into the client's arm through a small IV line. When the task is finished the client lies on a table and the SPECT camera rotates around his or her head. Clients do not have to go inside of the tube to have the scan performed. The scanning time is 20 to 30 minutes. For the resting scan the client relaxes in a quiet room and the imaging agent is given through the small IV line. This is again followed by the client lying on the SPECT scan table. Side effects are minimal in only a small percentage of our clients (e.g., a mild rash, facial redness and edema, fever, a greenish tint to urine, or a transient increase in blood pressure). The procedure is safe and comfortable.

Holleran Steiker: If readers want more information about brain imaging or your practice, where can they look?

Clements: Readers are encouraged to visit the Web site of the Clements Clinic at http://www.clementsclinic.com/. In addition, http://www.brainspace.com has more than 2,000 scientific articles and abstracts on brain imaging. New studies are continually added as they become available.

BRIAN EARTHMAN, MD

Holleran Steiker: Having looked at evaluation of neurotransmitters and amino acids, as well as SPECT images, we now turn to the use of electrical and magnetic-based treatment innovations. Dr. Earthman, can you explain the use of electrical impulses and magnetics in addictions treatment?

Earthman: Chemical dependency clients are complex because their disease is initiated in preconscious areas of the brain such as the ventral tegmental area (VTA) and nucleus accumbens (NAcc). Because these preconscious areas are the starting point of the disease, chemically dependent individuals lose volitional control over their chemical use. They no longer have the ability to make rational decisions about when and how much to use. Chemical dependency is a devastating psychiatric illness in and of itself, but up to 70% of clients with a chemical dependency problem also have a diagnosable psychiatric disorder. In addition to that anxiety, depression, and insomnia are almost ubiquitous in the early stages of sobriety. As many of your readers know, if someone's depression or anxiety is not addressed, he or she is more likely to relapse into chemical use.

The mind and body are electrochemical systems. Although our health care industry heavily favors a chemical approach to affect change, decades of studies have shown that applying small amounts of electrical stimulation "microcurrents" (<1,000 microamperes) can produce exceptional results and provide relief and healing. About 500 microamperes of current can increase cellular amino acid transport and ATP [adenosine triphosphate] production. We see increases in serotonin and endorphins along with decreases in norepinephrine and cortisol. A qEEG that measures brain wave activity shows a decrease in delta waves and an increase in alpha waves when this current is applied. These waves correlate to a client's feeling relaxed and alert. Dr. Todd Clements, who described his work earlier in this dialogue, has seen objective positive changes in brain functioning after Alpha-Stim treatment with his SPECT imaging.

The current field of electrical and magnetic therapies can be a little confusing. It is important to understand that there are many forms of electrical or magnetic-based therapy and different applications for them. The

classic electrical therapy that most people think of is electroconvulsive therapy (ECT). ECT is a large amount of current delivered to the brain over a short period to induce a seizure. This is done under anesthesia with muscle blockers and most clients need 8 to 10 treatments over a month, then return to medication therapy with maintenance ECT treatments continued every few weeks or months. There is also trans-cutaneous electrical nerve stimulation (TENS), which is a medium amount of current used to block the pain signals going to the brain. Its effects usually last during or up to an hour after treatment. Psychiatrists including Dr. Marilyn Vache in Austin (see http://www.dr-vache.yourmd.com/) are using the new repetitive transcranial magnetic stimulation (rTMS) for treating medication-resistant depression. rTMS is done in the physician's office daily for a month by a large machine that generates a focused magnetic field. Cranial electrical stimulation devices (CES) are designed to be taken home for use by the individual outside of clinical settings.

Holleran Steiker: Can you explain the procedures you utilize in your practice?

Earthman: In my practice, I utilize a variety of interventions, but one of the most innovative and promising is Alpha-Stim, which can be used as a stand-alone treatment or as an adjunct to psychopharmacological medications. It can be used as often as necessary to control pain—without any significant side effects. It can also be used daily to calm anxiety and relieve depression or insomnia. In chemical dependency I have found Alpha-Stim to be helpful in a variety of ways. It is a great nonmedication treatment for depression, anxiety, or insomnia. It will decrease the withdrawal symptoms experienced during the detoxification phase. It can help with accelerating the return of normal cognitive function. It is a great relapse prevention tool that can be used on a PRN [*pro re nata*, a Latin medical term used to mean "as the situation arises" or "take as needed"] basis to decrease cravings. In addition, Alpha-Stim has also been invaluable for the treatment of chronic pain issues in the prescription opiate dependence population.

CES treatment is very simple. The current is applied by clips that attach on the ear lobes. Used just 20 to 40 minutes every day, every other day, or on an as-needed basis, Alpha-Stim can help induce a pleasant, relaxed feeling of well-being. In my experience, Alpha-Stim is well tolerated and very safe, having no significant side effects in more than 4,500 clients involved in research studies. In contrast, drugs and medications used in the treatment of mood disorders have been proven to have a wide range of undesirable side effects and some can result in chemical dependency. Unlike many medications, an Alpha-Stim treatment leaves the mind relaxed and alert. My experience is that anxiety and insomnia generally resolve in 1 to 2 weeks and depression in 2 to 3 weeks of daily treatment at home.

Holleran Steiker: Where would you recommend readers turn for more information on the science of this innovative intervention?

Earthman: Much research is being conducted on the efficacy of this treatment. The studies are rigorous and most use double-blind placebo controlled studies for comparison. For an overview of the research in this area, see the article by Kirsch and Gilula (2007) in *Practical Pain Management.*

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