

# FINDING HAPPINESS AND ACTIVATING DOPAMINE THE NEUREKA! NEUROFEEDBACK WAY: CAN WE RETURN TO NEVERLAND?

By Jonathan Cowan, Ph.D. and Kenneth Blum, Ph.D.

Happiness and other positive feelings are the rewards we feel when dopamine acts appropriately in the “normal” brain. These feelings are actually rewards for paying attention and learning something new—part of nature’s plan for insuring our survival. For many people dependent on drugs and even addictive behaviors, this proper brain activity is “Neverland”, something they have not ever experienced, or at least in a long time. Wouldn’t it be wonderful if their brains could be trained to shift the “set point” of their happiness system upwards!

Following the discovery of the first association between the dopamine D2 receptor gene polymorphism and severe alcoholism, there has been an explosion of research reports in psychiatric and behavioral addiction literature and neurogenetics. Since 1996, our (Blum’s) laboratory has coined the umbrella term “Reward Deficiency Syndrome” (RDS) [now a recognized disorder SAGE Encyclopedia of Abnormal Psychology 2017] to explain the common neurochemical and genetic mechanisms involved with both substance and non-substance, addictive behaviors.

Our ongoing proposal is that the real phenotype is RDS, not any specific drug of abuse or addictive behavior, and impairments in the brain’s reward processing system, either genetically or environmentally (epigenetically) induces its influence on both substance and non-substance, addictive behaviors. Understanding shared common mechanisms will ultimately lead to better diagnosis, treatment and prevention of relapse. While at this juncture, we cannot as yet state that we have “hatched the behavioral addiction egg”; we are just beginning to ask the correct questions and through an intense global effort will hopefully find a way of “redeeming joy” and permitting *homo sapiens* to live a life, free of addiction and pain.

Along these lines we are proposing a Reward Deficiency Solution System (RDSS) that includes: Genetic Addiction Risk Score (GARS); Comprehensive Analysis of Reported Drugs (CARD); and a glutaminergic-dopaminergic optimization complex (Kb220Z). We are now hereby adding Neureka! Neurofeedback, to this comprehensive approach. It is potentially a missing piece in the puzzle to prevent relapse and help balance brain dopamine function.

We’ll review some of the studies that show the effects of raising Neureka! Then, we’ll summarize some lines of evidence which indicate that Neureka! may act by raising dopamine activity.

## Training Happiness With Neurofeedback

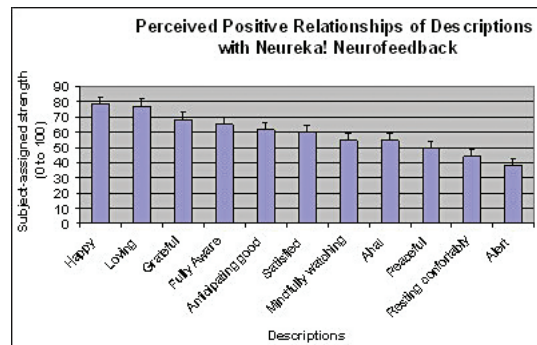
The brain produces brainwaves for everything it does. Research shows when we feel good feelings, such as happiness and love, the brain produces brainwaves around 40 cycles per second. These can be measured by the Peak BrainHappiness Trainer Pro and processed to create Neureka!

A special protocol in the Trainer reads the raw brainwave information from the sensors on the person’s head and shows the level of Neureka! on a PC screen. New studies show a person can learn to increase the amount of the Neureka! produced by the brain. The more Neureka! they produce, the more good feelings, like happy, loving and grateful, they feel. There are also improvements in memory and attention from this training.

## Study 1: What Does Neureka! Feel Like?

In this study, researchers asked the subjects to raise their level of Neureka! using neurofeedback with the Peak BrainHappiness Trainer for 15 minutes. Then, the researcher asked the subjects to describe what it felt like, in their own words, when they were able to see that the level of their brainwave output had changed.

All of the subjects used very positive words to describe what it felt like to be at higher Neureka! Levels. There were some fascinating descriptions, all but one very positive. They used words such as: love, compassion and joy.



In the next part of the study, a researcher read words aloud to the subjects and they asked the subjects to create the feeling or idea inside themselves and watch the screen on the Peak BrainHappiness Trainer. Then, they rated how the measured levels of Neureka! they saw on the screen compared to the intensity of what they felt. They reported remarkably strong relationships to happiness, love, gratitude, satisfaction, awareness and other experiences.

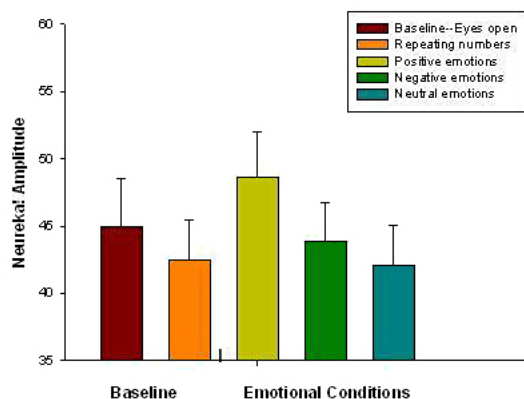
## Study 2: Create the Feelings

In this study, researchers read words related to positive emotions to subjects who were asked to feel that way for just 6 seconds. The researchers used the Peak BrainHappiness Trainer neurofeedback system to measure and record the levels of the Neureka! for the subjects as they felt these emotions. With all of the positive words, the test subjects showed a significant increase above the baseline levels in their Neureka! output. The highest increases in Neureka! values were for the words “happy” and “joy”.

The brain produced more Neureka! when the subject felt positive emotions.

## Study 3: Positive vs. Negative Feelings

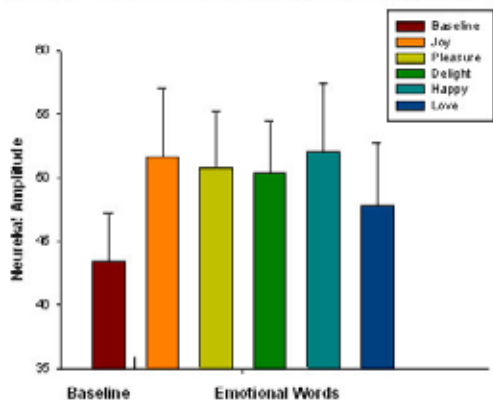
MEANS AND STANDARD ERRORS OF NEUREKA! DURING EMOTIONAL CONDITIONS (N=9)



In this study, subjects created internal states related to the positive, negative or neutral words read to them. The Neureka! associated with positive emotions was significantly higher than the Neureka! during negative or neutral emotions.

In one of the test cycles, the researchers said “unhappy” after testing “happy”. That pair showed the greatest difference in Neureka! output levels from the subjects.

MEANS AND STANDARD ERRORS OF NEUREKA! DURING EMOTIONAL WORDS (N=15)



This chart shows how the levels of Neureka! relate to several positive feelings.

#### Study 4: Enhancing Happiness, Thinking, and Memory

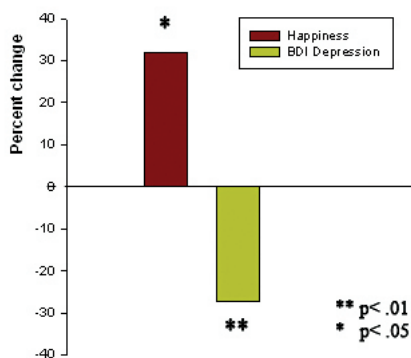
The 4<sup>th</sup> study we are reporting showed that people who used Neureka! neurofeedback training with the Peak BrainHappiness Trainer had positive results in 3 main areas. In just 5 hours of training--25 minutes for each session--the subjects showed positive changes. They reported being happier, having better brain function, and feeling less depressed.

Dr. Estate Sokhadze and Robert Daniels carried out this study, which was published in Adolescent Psychiatry. Half of the subjects were referred from Court for involvement with drugs as a diversion. In the first part, the subjects watched DVD's with beautiful scenes from the BBC series- Planet Earth, during their training sessions. When they raised their Neureka! values, the size of the DVD picture on the PC screen grew at the same time. The researchers asked the subjects to make the picture grow as much as possible. All of the subjects learned to raise their Neureka! values.

#### Enhancing Happiness

The study used a question to rate happiness, which was used in an earlier study done in Australia, called HILDA [Household Income and Labour Dynamics in Australia survey]. In that study, they asked the subjects to rate how happy they were from 1 to 6 - (6) all of the time, (5) most of the time, (4) a good bit of the time, (3) some of the time, (2) a little of the time, and (1) none of the time.

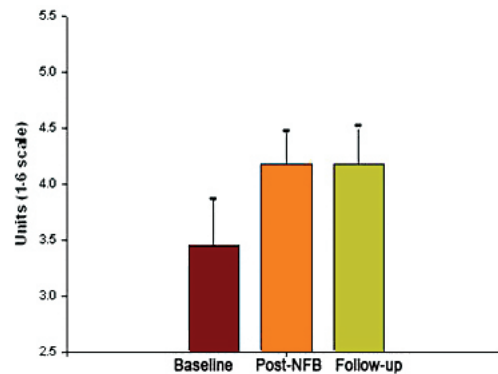
Happiness self-report and BDI depression scores after 12 sessions of Neureka! neurofeedback



In this study, there was an overall increase in happiness of about 33%. The subjects in the lower happiness ranges rated their happiness 50% higher as a group after Neureka! training with the Peak BrainHappiness Trainer.

Their enhanced happiness lasted at least four months!

Subjective Happiness Rating at Pre- Post-Neurofeedback and Follow-up (Mean with Standard Errors, Whole Sample, N=11)



#### Feeling Less Depressed

The study included another test called the Beck Depression Inventory, a very well-known and accepted measure of depression. The subjects improved their scores by an average of 35%, showing that they felt better. This effect did not persist until the four month follow up. This is not about the serious condition called clinical depression, which has to be diagnosed by a professional, which was not done here.

#### Better Brain Function

When the subjects had finished all the training sessions, the researchers rechecked them with a short computerized test called the MicroCog. The MicroCog was developed at Harvard to look for difficulties in thinking and general brain function. The results seem to show the subjects improved in two main areas: General Cognitive Functioning and Memory. This indicates a very selective improvement in brain function, particularly centered around memory accuracy.

Another set of tests showed major improvements in attention after they were trained.

#### Improvements in Happiness Lead to Better Health and Success

There are over 150 studies which show that current happiness leads to better health in the future. The Australian study on happiness, HILDA, showed this relationship between happiness and health in nearly 10,000 people. In 2001, they asked the subjects to rate how happy they were. Three years later, in 2004, the researchers asked the same subjects to rate their health, with the question: "In general, would you say your health is excellent, very good, good, fair, or poor?" The people who rated themselves in the upper ranges of happiness in 2001 were much healthier in 2004. Those happier ones had more than 50% odds to be in better overall health in 2004 than the others who had reported they were less happy in 2001.

The results of this study may also indicate that Neureka! training with the Peak BrainHappiness Trainer can improve long-term health. We used the same question about happiness that they did in the HILDA study, and they showed major improvements, which persisted for four months. Health and happiness seem to be connected. For example, there are studies connecting heart disease and immune system function to the level of happiness. This could mean that people who become happier may also become healthier.

There are also a number of studies which indicate that happiness leads to future success.

#### The Neverland of Happiness due to Proper Dopamine Function

Overall, this study showed that people can learn to raise their Neureka! level using neurofeedback with the Peak BrainHappiness Trainer. When they do, they report they are happier, and tests show their brains work better and they feel less depressed. They also

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# POWERFUL CLUB DRUG “KETAMINE” AKA SPECIAL K, PROVIDES RAPID RELIEF FOR TREATMENT RESISTANT DEPRESSION AND SUICIDALITY

By Mark S. Gold, MD

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physicians are also Board Certified in Anesthesiology and have administered ketamine to countless patients. Many addiction medicine doctors and addiction psychiatrists have also worked in pain medicine. For licensed medical professionals the APA guidelines are a good reference if Ketamine is being considered. Certainly more studies are needed and professionals will require new skills with specific training in Psychiatry, Addiction Medicine, TRD, TMS and Ketamine therapy, especially when treating patients with co-occurring depression and addictive disease.

## Final Thoughts

It is not surprising that a drug of abuse, like Ketamine, can play an important role in medicine—not unlike opioids, that are both FDA approved medications—and also drugs of abuse. Similarly, coca leaves (cocaine) are consumed like we drink coffee, by those who live in the Andes Mountain regions of South America, while pure cocaine hydrochloride is still used by ENT doctors as a local anesthetic during nasal surgery.

So, is Ketamine a panacea for depression? Unlikely, or maybe it's just too early to know for sure. At present, the IV delivery system for Ketamine therapy is neither convenient, simple, or without risk. Although the remarkable and fast acting effects of Ketamine is short lived, the fact that it works at all and exerts its effect via the NMDA system is a potential game-changer. Further, this research may shed some light on why a disproportionately high percent of motivated and treatment adherent recovering people struggle with debilitating depression long-after they have stopped using intoxicants. Although they remain sober, many struggle with sleep problems, anhedonia, boredom, and mood swings, all of which are well documented risk factors for relapse. Our research and work with impaired health professionals have found that 12-Step programs, Caduceus Fellowship, continuous drug and alcohol testing, ongoing professional and peer support have produced unprecedented success, e.g., Over 80% of MD's in these programs:

- Have never tested positive for drugs or alcohol during 5 years of monitoring.
- Nearly all returned to work in their chosen field without restrictions.
- Nearly all report having a high quality of life.

We know and accept that many of our addicted patients experience co-occurring depression. Accordingly, recovery counseling, tailored psychotherapy modalities, and, when needed, antidepressant therapy can help. If not, TMS, ECT and now, perhaps Ketamine may provide relief and prevent relapse, overdose, loss of hope, and even suicide.

In summary, addictive drugs change the brain. These changes

include depression and may persist for months and even years into recovery. Yet we continue seeking to improve because the cost of failure for TRD and addictive disease is simply too high. So we will keep an eye open, and an open mind regarding Ketamine and the research that will certainly follow.

References Provided Upon Request

*Mark S. Gold, MD, Chairman of the RiverMend Health Scientific Advisory Boards, is an award-winning expert on the effects of opiates, cocaine, food and addiction on the brain. His work over the past 40 years has led to new treatments for addiction and obesity which are still in widespread use today. He has authored over 1000 medical articles, chapters, abstracts, journals, and twelve professional books on a wide variety of psychiatric research subjects, including psychiatric comorbidity, detox and addiction treatment practice guidelines.*

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appeared to raise their long-term “set-point” of happiness, as they stayed at the same level of happiness for 4 months. Could this help addicts return to Neverland?

There are other reasons to suggest the idea that this happiness increase is due to balanced dopamine function. The location where the Trainer measures from is right over the largest concentration of dopaminergic neurons in the cortex, an extension of the midbrain dopamine system we call the “Prefrontal Pleasure Center”. Dopamine is well-known to enhance memory and attention as the training study showed. Putting it altogether, the Neureka! rhythm and the dopamine system are part of the brain's system for processing new learning, and rewarding us for making the effort to explore and discover by creating positive feelings.

Continued investigation of this novel strategy may lead to a better-targeted approach in the long-term, enhancing dopamine regulation by balancing the glutaminergic-dopaminergic pathways. This may potentially change the landscape of treating all addictions, helping many people to return to “Neverland”.

*Jonathan Cowan, Ph.D., studied with the discoverer of brainwave biofeedback while doing his Ph.D. dissertation at the Univ. of California, San Francisco, and then was one of the first researchers to publish about the joyless moods of narcotic addicts, while on the staff at the National Institute on Drug Abuse Addiction Research Center. Over the next 40 years he has combined these interests by designing and marketing neurofeedback systems that use unique methods to train Focus, Alertness, Neureka!, and the Mood Elevator—the Peak Achievement Trainer and the Peak BrainHappiness Trainer Pro.*

*Kenneth Blum, B.Sc. (Pharmacy), M.Sc., Ph.D. & DHL; received his Ph.D. in Neuropharmacology from New York Medical College and graduated from Columbia University and New Jersey College of Medicine. He also received a doctor of humane letters from Saint Martin's University Lacey, WA. He has published more than 550 abstracts; peer-reviewed articles and 14-books.*

## WORKPLACE LEADERS AND DEPRESSION

By Dr. Mel Whitehurst

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- Instead of asking the worker to change, ask them to do something different. You can never completely change things by fighting the existing reality. To change something, build a new model or a new way of doing things can energize the depressed person.
- When problems are identified and solutions constructed, the worker should make a verbal commitment to comply.

References Provided Upon Request

*Dr. Mel Whitehurst is a semi-retired psychologist. He has been a practicing psychologist for over forty years, most of which was in independent private practice.*