

“Food for Thought: The Role of Nutrients in Reducing Aggression, Violence and Criminal Behavior”

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Almost nightly, we are besieged by news stories of violent acts, as well as television and movie depictions of violence. We see the devastating effect of violence on individuals, victims and perpetrators alike, their families and entire communities. What is more dismaying than the acts themselves is how frequently the perpetrators are youth, often with little remorse for their actions. Puzzled, we are left to ask some very difficult questions: Why are violent perpetrators ever younger? What motivates someone to commit a violent crime? What can we do to reverse the rise in violence, especially in our youth, who represent the future?

The root causes of delinquency, maladaptive and anti-social behavior, crime and violence have been debated for decades. The medical world has long believed that behavior disorders (ranging from mild temper tantrums to assaultive rages) result from life experiences, such as lack of love, bad parenting, child abuse, broken homes, and poverty. However, over the past decade, scientific research has shown that imbalances in neurotransmitters, their precursors and other biochemicals and nutrients can significantly contribute to severe behavior disorders and violence. Even more compelling is the growing number of studies demonstrating that behavior can be enhanced through nutrient supplementation and dietary changes.

The Biochemistry of Violence and Criminal Behavior

The brain is a chemical factory that constantly produces neurotransmitters throughout our lives. The raw materials are amino acids, vitamins, minerals, and other nutrients. The step-by-step processes by which the body produces the major neurotransmitters have been known for years.

Sufficient nutrients to produce neurotransmitters can usually be obtained from a well-balanced diet involving the major food groups. However, many persons have poor diet, absorption or metabolic disorders that result in severe nutrient imbalances that adversely affect brain functioning.

It would be a simple matter if all nutrient imbalances were deficiencies, since a multiple vitamin/mineral supplement would then have efficacy. Unfortunately, many imbalances involve overloads of certain nutrients, or inability to get rid of toxins, and multiple vitamin/mineral supplements can actually make individuals with these imbalances worse.

The connection between behavior and various nutrients has been very well established. For example, deficiencies in thiamine, vitamin B-6 or folic acid can cause impulsivity, irritability and aggressiveness. In addition, boys with lower serum omega-3 fatty acids have more behavior problems and more temper tantrums, sleep problems, and learning difficulties than those boys with higher levels of serum omega-3 fatty acids.

There is an equally well-established body of knowledge identifying the connection between behavior and trace minerals. Lead, mercury, iodine, cobalt, iron, copper, manganese, and zinc have all been

found to influence brain development and function. Zinc deficiency can affect emotionality, response to stress, impact on planning skills, attention, and inhibition. Dr. William Walsh of the Health Research Institute in Warrenville, Illinois found that, in a group of 153 males between the ages 3 and 20 years old, those with a history of assaultiveness had a 1.40 copper/zinc blood ratio, significantly higher than the 1.02 copper/zinc ratio of those males without a history of assaultiveness. Most notably among the trace minerals, exposure to lead may account, at least partially, for up to 37% of arrested delinquents, according to Dr. Bruce Lanphear of Children's Hospital Medical Center in Cincinnati. However, it may also be one of the most preventable causes of criminal behavior (see side bar).

Biochemical Profiles of Violence and Criminal Behavior

As far back as the 1970s, Dr. Walsh and other scientists at the Argonne National Laboratory initiated research on the biochemistry of violent behavior of convicted criminals at Statesville Penitentiary in Illinois. They noticed that there were many cases of convicted criminals unsuccessfully trying various avenues to obtain help and treatment for their violent behavior, which often started at a very early age. Dr. Walsh and his colleagues studied scientific literature and talked with professionals, but at that time most effort in the fields of mental health or criminology and reform was yielding few promising conclusions.

The first definitive results came with a sibling experiment, which tested 24 pairs of brothers living in the same households. In each sibling pair, one brother had a violent history and the other was an "all-American" boy with excellent behavior. The results showed two distinctive trace-metal patterns in the violent youths, which were not present in their normal brothers. Further studies replicated these results. The conclusion was clear: Most violent children and adults exhibited trace-metal imbalances

seldom found in persons with normal behavior. Subsequent research with more than 800 criminals and ex-convicts confirmed these findings. Since that time, the Health Research Institute and Pfeiffer Treatment Center (HRI-Pfeiffer), a non-profit organization founded by Dr. Walsh, has tested over 10,000 children and adults with behavior problems, with similar results.

Of the two patterns, those with Type A biochemistry are characterized by episodic outbursts, but show remorse for their behavior after an outburst. Their body chemistry reveals: high copper, low zinc, high copper/sodium ratio, high blood lead, and abnormal blood histamine (being too high or low compared to normal levels). Many school children that have Type A biochemistry may have mild, moderate, or severe versions of this chemical imbalance.

On the other hand, those with Type B biochemistry are characterized by frequent assaultive behavior and show little or no remorse for their behavior. Their body chemistry reveals: high blood histamine, high urine kryptopyrroles, low blood spermine, low zinc, low copper/sodium ratio, and high lead.

Most individuals with a Type B profile exhibit behavior disorders by age 2, and are often described as oppositional, defiant, pathological liars, remorseless, and cruel. Children that torture animals would most likely have this pattern if tested. The incidence of the Type B imbalance appears to be less than 0.5% in the general population, but between 20-75% in maximum-security prisons in Illinois, California, and Ohio.

At the far end of the biochemical spectrum, HRI-Pfeiffer's forensic studies on almost 30 mass murderers, serial killers and death row inmates have shown these individuals to have extreme examples of these imbalances. Patrick Sherrill who killed 17 co-workers in an Oklahoma post office was found to have a severe Type A imbalance. Notable examples of individuals with severe Type B

imbalance include James Huberty (McDonalds massacre), serial killer Henry Lee Lucas, and Charles Manson. Subjects tested include Charles Manson, James Oliver Huberty (convicted in the California McDonald's massacre) and Patrick Sherrill (responsible for the Oklahoma Post Office slayings).

Balancing the Imbalances

Fortunately, a great deal of research has demonstrated that the imbalances underlying these biochemical profiles may be corrected through ensuring an healthy and regular supply of essential nutrients such as amino acids, minerals, vitamins, and other nutrients. These biochemicals provide the building blocks to replace very low levels of nutrients, or to assist the body in eliminating toxins or nutrient build-ups that may interfere with the synthesis or function of neurotransmitters.

Some of the more recent studies that have examined the impact of nutrient supplementation and nutrition on behavior follow:

- In a double blind study conducted by Dr. Stephen Schoenthaler of California State University, school-age children on a low dose multi-vitamin and mineral tablet rated at approximately 50% USDA taken for 4 months resulted in a greater decrease in anti-social behaviors and delinquency in comparison to a placebo. Dr. Schoenthaler also references numerous studies in juvenile corrections centers that have reported violence and anti-social behavior being reduced by approximately 50% when nutrient-rich dietary programs balancing fats, sugars, starches, and proteins are implemented.
- In an outcome study conducted by Dr. William Walsh, 207 consecutive patients with a history

of behavior problems were given a customized vitamin-mineral supplement designed specifically for each patient's unique nutritional needs. There was significant improvement in symptoms typically associated with behavior problems and delinquency, such as verbal tantrums, destructive behavior or assaultive behavior for 85% to 90% of compliant patients. In previous research, Dr. Walsh noted four prior studies that demonstrated lowering the copper/zinc ratio through nutrient supplementation in assaultive patients had a substantial impact on behavior.

- In a study recently published in the British Journal of Psychiatry, Dr. Bernard Gesch held a randomly assigned, double blind, placebo trial with 231 adult male prisoners. Half of the participants received a multi-vitamin, mineral and essential fatty acid supplement, while the other half received a placebo. Compared to the control group, there was a 35.1% reduction of antisocial behavior with the intervention group. Overall, there were 26.3% fewer antisocial behaviors in the intervention group in comparison to the control group.

Three-Tiered Approach to Nutrient-Based Intervention for Reducing Violence and Aggression

Applying this knowledge in the corrections environment is not as daunting as one might think.

Basically, an effective nutrient-based intervention could consist of three tiers:

1. **Modify Diets** - In her book Food & Behavior, Barbara Stitt, Ph.D, who was a probation officer for twelve years, has very specific recommendations on developing a diet for correctional institutions that can provide all the essential nutrients needed to function

optimally, and avoid the excesses that can compromise healthy functioning. Below is a summary of her most important points:

- a. Use whole, fresh foods that have not had nutrients removed through processing.
 - b. As much as possible, ensure that most carbohydrates are complex (starches), and that they are eaten along with fiber. Fiber moderates the breakdown of carbohydrates, so that the resulting glucose (a form of sugar) is not released too quickly into the system, causing the “sugar high” that can contribute to impulsive and inappropriate behavior. This means, of course, that simple sugars, which are in sweets and many “low-fat” foods, should be kept to a minimum.
 - c. Provide protein primarily through whole grains, legumes, lean meats and vegetable sources (recall from above that diets high in fat are associated with behavior problems).
 - d. Keep fat to no more than 20% of caloric intake. Of the fat that is consumed, try to make most of it omega-3 fats (the “good” fat associated with “good” behavior), and avoid omega-6 fats (the “bad” fat that is in many fast foods and processed foods, as well as most meats).
2. **Provide multi-vitamin supplements** – As the research suggests, a multi-vitamin containing the nutrients most important to good brain functioning could benefit all offenders. This supplement would include at the very least: B-complex vitamins, Vitamins C, E and A, and, among the trace minerals, zinc, calcium, magnesium and iron.
 3. **For those with continued inappropriate behavior, perform biochemical testing and provide individualized supplementation to correct any imbalances found** – While the majority of offenders may respond well to the first two tiers, there are those for whom

“normal” levels of nutrients will not suffice. After a trial of modified diet and supplementation, non-responders would go through a regimen of testing to determine where their metabolism is unbalanced, and provide the right nutrients in the appropriate quantities to balance the biochemistry.

As with most governmental and non-profit agencies, implementation of new programs must be sensitive to the availability of financial resources. In keeping with that concern, it is important to note that the costs of these components is minimal, especially when they can result in shorter probation periods, shorter prison sentences or less recidivism. In Dr. Stitt’s experience as a probation officer, 80% of her cases that were placed on a nutrient-based intervention went on to lead healthy and productive lives, which clearly resulted in less of a financial burden on society. Dr. Stitt also points out that using whole, fresh foods can reap immediate savings, because it can actually be less expensive than purchasing processed food and sugar. Finally, although the cost of nutritional supplements are an added expense, they typically would amount to no more than \$5.00 per month, which would be more than made up for in the costs savings from fewer drugs and hospital stays. A similar case can be made for any testing that may need to be done to identify biochemical imbalances, and any subsequent formulation of individualized nutrient programs.

Conclusion

National prison records suggest that in many cases criminals cannot be returned to society without a high probability of repeating criminal activity. In an effort to control violence, our nation has adopted stringent conviction laws, yet even this may not have the expected impact. An article in the Washington Post, September 11, 1996, reported, “Gang members may not settle down during their

long sentences, and will become more violent not less as time goes by.” Our nation is still searching for more effective systems or interventions for violence-prone juvenile delinquents and adults. The challenge is to develop treatments that will contribute not only to reducing violent behavior of offenders in the correctional system, but reducing such behavior in our communities and, ultimately, deterring future delinquency and crimes.

Clearly, the research suggests that there is a strong correlation between biochemistry, nutrition and behavior. The research also demonstrates that antisocial behavior can be reduced or eliminated through a variety of nutrient-based interventions. The applications of this research are significant and hold promise for providing institutions, communities and individuals with effective, low-cost strategies to supplement what is already working in the effort to address violence and implement constructive change within the correctional system and society at large.

SIDE BAR

Silent Menace – The Insidious Effects of Lead Exposure

The potential effects of exposure to lead in children are well known; lower IQ scores, learning disabilities, hyperactivity, aggressive or disruptive behavior and difficulty maintaining attention, as well as kidney and liver problems. The cost to society, however, is much more far reaching. Children with high lead levels are more likely to drop out of school and exhibit criminal behavior. These problems can continue into adulthood, creating an on-going burden to society in terms of reduced earning potential, and increased costs for public assistance, corrections and law enforcement.

High lead levels are seen most frequently in inner city children, the same group that are most at risk of delinquency and criminal behavior. A study by Dr. Shoshan Melman of the Hahnemann School of Medicine found that, of 817 pre-school and toddler-aged children seen for routine checkup in an inner city clinic, 70% had excess blood levels of lead. Dr. J. F. Wiley of the St. Christopher's Hospital for Children in Philadelphia, PA found that 71% children seen in one inner city emergency room and 50% of children seen in a second emergency room exhibited high lead levels.

Clearly, there is much work that needs to be done to reduce at-risk children's exposure to lead in all of its forms: in building materials, in the air, in drinking water, in soil and in foods. Although, for many years, there has been a significant level of effort to reduce the amount of lead used in gasoline, paint, food packaging and industry, the use of lead in manufacturing actually increased 77% between 1990 and 1997. It is also impossible to avoid lead in the diet, since there is virtually no food that is free of lead. Lead can even be passed on by mothers; Dr. Brian Gulson of Macquarie University in Sydney, Australia discovered that lead stored in the bones of mothers and transferred through breast milk accounted for 36% to 80% of the lead in their infant's bodies during the first two to three months after birth. Exposure during this critical time of development can have permanent consequences well into adulthood.

Currently, the Centers for Disease Control (CDC) have established the toxic level of lead at 10 mcg/dL. However, the CDC only recommends monitoring for levels from 10-14 mcg/dL, and only family education and environmental assessment for levels between 15-19 mcg/dL. Even for levels between 20 -45 mcg/dL medical intervention is typically not recommended. This approach does nothing to prevent chronic or lower-level exposure to lead, which is more common and has been

shown to lead to the cognitive and behavioral problems described above in levels as low as 2.5 mcg/dL. This is $\frac{1}{4}$ of the toxic level established by the CDC.

Even if chelation, the medical intervention of choice, is used, it still only removes lead from soft tissues. With longer-term or chronic lead exposure, most of the lead has been absorbed by the bones. When lead is removed from the soft tissues, it leaches out of the bones back into the soft tissues for months or years afterwards, continuing the damage to the developing child. In fact, several studies done by Dr. Bruce Lanphear of Children's Hospital Medical Center in Cincinnati and Dr. Herbert Needleman of the University of Pittsburgh have found significantly higher levels of bone lead levels in older delinquents than in an age-matched non-delinquent group from the same community.

Fortunately, there appear to be relatively low-cost ways to help children with lead levels below 45 mcg/dL avoid these life-long effects of chronic lead exposure, the adverse consequences of which society continues to pay through the school-age years and into adulthood. These solutions are based on generally accepted medical knowledge regarding the relationship between lead and various nutrients.

For example, it recognized that iron deficiency and calcium deficiency increase lead absorption, as does poor nutrition in general. In fact, improving nutrition is one of the recommendations given to parents of children with lead levels above 14 mcg/dL. Some other nutrients that have been associated with reducing lead absorption or enhancing lead excretion are: vitamins A, C, and E, taurine, zinc and selenium. It is important to note that each individual metabolizes nutrients and toxins differently, so the amounts of nutrients required can vary from child to child.

Therefore, it would seem that a cost-effective way to reduce the insidious and life-long effects of lower-level or chronic lead exposure is to provide nutritional supplements to children that are specifically developed to reduce lead absorption, increase lead excretion, and generally promote cognitive development. For children that have more serious behavior disorders, supplement regimens that are individually tailored to their unique metabolisms might result in the greatest improvements.

Applied to the corrections setting, an effective and low-cost intervention would be to test juveniles for high blood lead levels, and make nutritional supplements available to those whose blood lead level exceeds 2.5 mcg/dL. In addition, menus in juvenile facilities can be modified where necessary to include adequate amounts of the relevant nutrients.

Providing such nutritional intervention to juveniles who have high blood lead levels can be an effective way to minimize the detrimental effects, contributing to more consistent and appropriate behavior and better academic performance, which can ultimately lead to a more productive life as an adult.

Mr. Constantine Bitsas – biographical summary

Mr. Bitsas is Executive Director of the Health Research Institute and Pfeiffer Treatment Center, a non-profit medical facility specializing in research and treatment of biochemical and nutrient-based imbalances involved in behavior dysfunctions (including criminal behavior), as well as cognitive, affective or developmental disorders. In this capacity, Mr. Bitsas has developed collaborative relationships with schools and institutions in the inner city to develop nutrient-based programs for reducing antisocial or unproductive behavior. He came to HRI-Pfeiffer in May of 1999 with sixteen years of experience in administration of not-for-profit human services agencies, including several years with the Institute of Mental Health in Washington, D.C. Prior to moving into administration, he worked as a crisis counselor and therapist for Mental Health Services West in Portland, Oregon.

Constantine earned his B.S. degree in psychology from Portland State University and Reed College in 1982 and his MBA from George Washington University in 1987.