Commentary

Toxic causes of mental illness are overlooked

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1. Introduction

For patients presenting with myriad forms of psychiatric illness including bipolar disease, depression, personality disorders, obsessive-compulsive affliction, and various psychotic maladies, the unfolding medical approach usually follows a consistent algorithm: clinical assessment, perhaps some laboratory investigations, followed by drug treatment with or without psychotherapy and social support. Although psychosocial triggers are often identified, many believe that the underlying etiology of most psychiatric infirmity is a 'chemical imbalance' ultimately resulting from genetic predestination; the best available therapeutic intervention is thus believed to lie with psychopharmacologic measures designed to modify the pathological biochemistry resulting from aberrant DNA. Increasing evidence, however, has begun to suggest that commonly overlooked determinants may account for the anguished psyche in some 'mentally ill' individuals (Dumont, 1989; Eicher and Avery, 2005).

The worldwide prevalence of mental health affliction accounts for staggering rates of suffering and disability. While mental illness was previously thought to result from disordered lives, troubled emotions and psychological problems, neuropsychiatric disease is increasingly recognized to be the consequence of disordered brain biochemistry, perhaps precipitated or aggravated by adverse life events. Recent research in biological psychiatry, however, has explored the question: 'What causes disordered brain chemistry?' Although various hypotheses have been explored (Middleton et al., 2007; Panksepp, 2006), increasing attention has focused on the field of neurotoxicology (Eicher and Avery, 2005).

The ever-expanding industrial and technological world has witnessed the unprecedented release of a swelling repertoire of potentially toxic chemicals which have the capability to inflict brain compromise. Although the ability of xenobiotics to induce clinical illness is well established, the expanding public health problem of widespread toxicant exposure in the general population is a relatively new phenomenon that has spawned escalating concern. The emerging area of clinical care involving the assessment and management of accrued toxic substances such as heavy metals, pesticides, plasticizers and other endocrine disrupting or neurotoxic compounds has not been fully appreciated by the medical community and has yet to be incorporated into the clinical practice of many consultants or primary care practitioners.

All great truths begin as blasphemies. (George Bernard Shaw)
2. Case history

As well as dizziness, migrating joint pain and chronic fatigue, this 38-year-old disabled peace officer presented with a 4-year history of severe depression, inordinate anger, insomnia, and intrusive thoughts regarding self-mutilation. After seeking help from a psychologist, a family physician, a neurologist and three psychiatrists, the patient was distressed with the lack of improvement despite interventions including numerous antidepresants, antipsychotics, lithium and ECT. With no apparent response to therapy, the patient was plagued by ongoing suicidal ideation as his prognosis was considered poor. Subsequent exposure assessment, however, revealed high levels of mercury. In keeping with recommended interventions (Lindh et al., 2002; Wojcik et al., 2006) several mercury-containing dental amalgams (the greatest source of mercury body burden in the non-occupationally exposed population, according to the WHO (Bigham et al., 2002)) were removed followed by interventions to detoxify accumulated tissue mercury. His condition progressively improved and after 24 months, all joint symptoms, neurological complaints and psychiatric problems had resolved.

3. Discussion

In the lay and medical press, evidence linking brain malfunction to adverse exposure has received considerable attention. Various infectious agents have been correlated with mental health afflictions. Research for example, suggests that psychotic illness in some patients may represent the sequelae of a prenatal or perinatal exposure to maternal herpes simplex virus (Buka et al., 2001). Much attention has also been given to the evolving story of streptococcal infections—a debilitating constellation of symptoms earning them the dubious designation: mad hatters. Exposure to another toxic metal, mercury, has also been correlated with brain dysfunction. "Mad Hatter Syndrome" was a phrase coined to describe the various symptoms including irritability, anxiety, depression and various personality changes that arose in individuals occupationally exposed to mercury (Fraser-Moodie, 2003). In the production of felt hats, an industry that traces back to the mid-17th century in France, a mercury compound was applied to animal fur—a process which involved the licking of brushes doused with this toxic heavy metal. The laborers frequently manifested a constellation of psychiatric symptoms earning them the dubious designation: mad hatters. More recently, the front page of the Wall Street Journal unveiled a story about the travails of a young student afflicted with neurologic dysfunction—after the case baffled various physicians, parent prompting followed by laboratory testing confirmed mercury intoxication (Waldman, 2005).

As well as commonly known neurotoxins including lead and mercury, recent medical literature discusses common environmental exposures such as certain pesticides (Beseler and Stallones, 2003; Stallones and Beseler, 2002), industrial solvents (Ng et al., 1992) and mold byproducts (Genuis, 2007) which may affect neuroendocrine function resulting in depression, memory problems, sleep disturbance, concentration impairment, and various other difficulties. Furthermore, various industrial chemicals have potential to seriously disrupt neurological development (Grandjean and Landrigan, 2006) while lifelong sexual behavior may be influenced by exposure to toxic chemicals at critical phases of development (Dorner et al., 2001; Rapp, 2004). Is toxinant exposure a common event in the 21st century?

Rather than isolated occurrences, recent Canadian and American population studies demonstrate routine toxicant bioaccumulation in adults and children (Centers for Disease Control and Prevention, 2005; Neumann et al., 2006) and cord-blood research suggests widespread in-utero contamination from vertical transmission (Environmental Working Group, 2005). Furthermore, contact with toxics occurring many years prior may continue to alter thinking and behavior as some chemicals including lead remain stockpiled within tissues (Nevin, 2007), even in the absence of ongoing exposure. The troubling trend of widespread xenobiotic bioaccumulation has ignited increased exploration of the pathogenetic mechanisms of toxicant-induced clinical illness.

Crudely stated, the human organism is a collection of chemicals perpetually occupied in purposeful biochemical reactions. Accordingly, coordinated brain activity is reliant upon an intricate and precise network of interacting infinitesimal biochemical compounds including neurotransmitters, nutrients, and hormones. Various toxic chemical substances – whether consumed in tainted foodstuffs, inhaled, applied to skin, vertically transmitted or introduced into the body by surgery, dental work, or injection – have the potential to disturb the finely tuned network responsible for healthy brain function. Thinking is just as physiological as digestion, and emotions are just as biological as pain. While sick stomachs may regurgitate or sick lungs may induce cough, the language of a disordered brain includes impaired thinking, intellectual compromise, failed memory and altered moods (Feldman, 1999)—manifestations frequently indicative of compromised physiology rather than compromised psychology. In the face of chemical or other toxic insult to the brain, common
psychiatric interventions including psychotherapy and psychopharmacology may assist in coping but do not address etiology nor restore optimal mental health.

Adverse exposure is only one potential determinant of psychiatric disorder; a comprehensive approach to mental illness includes assessment of physical, emotional, social and spiritual factors. Adverse exposure assessment, however, remains largely ignored or rejected for two reasons. First, demonstrating cause and effect between exposure and illness is difficult as slow bioaccumulation of chronic low-level exposures often leads to vague and insidious symptoms in the early stages. As individual response to specific toxins involves a kaleidoscope of factors including genetic vulnerability, psychological status, individual physiology, and a varying multiplicity of exposures, outcomes are frequently nonspecific and the clinical index of suspicion often remains low. Second, there has been insufficient attention to environmental health and human exposure assessment in medical education; physicians are generally not equipped to assess and manage chemical exposures.

4. Conclusion

As state-of-the-art medicine is a work in progress, prevailing assumptions about medical dogma need to be continuously challenged, including the common notion that mental illness is generally the result of genetic predestination. Recent study suggests that rather than genonomic fatalism, illness is the result of the complex interaction between the fixed genome and the modifiable environment of the individual (Genuis, 2008b; Office of Genomics and Disease Prevention, 2000). In combination with vulnerable DNA, the etiology or trigger for many diagnoses originates in practices and conditions injurious to the human organism. Although manifest symptoms may apparently be emotional or behavioral in their presentation, the underlying cause of some mental health afflictions is patho-physiological rather than patho-psychological. Mood and emotion are biological processes dependent on complex biochemical functioning—disordered mood and emotion often result from disordered biochemistry, a potential consequence of toxicant exposure. In an era marked by ubiquitous synthetic chemicals and an unprecedented proclivity to toxicant exposures, it is important that health practitioners comprehensively consider and explore toxicological factors when encountering patients with mental health complaints (Genuis, 2008c).

5. Conflict of interest

None declared.

References