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An explanation of multiple chemical sensitivity

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An Explanation of Multiple Chemical Sensitivity

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Abstract

Through a review of literature, this paper will provide an explanation of multiple chemical sensitivity. Multiple chemical sensitivity (MCS) is characterized by a low-level exposure to environmental chemicals resulting in multiorgan symptoms reported by the patient. The diagnosis of MCS is difficult to come about because MCS is unknown to many medical professionals or is not recognized as an illness by others. Also, there exists no single diagnostic test to confirm multiple chemical sensitivity. The etiology of MCS is unknown and often can cause great debate between being a physiological disorder or a psychological disorder or a combination of both. The treatment of multiple chemical sensitivity includes avoidance therapy, diet therapy, neutralization therapy, and sometimes psychotherapy. The type of treatment depends on the characteristics of the patient. The goal of treatment is to control symptoms not rid the illness. MCS is such a poorly defined and unknown illness there is a need for much further research.

Multiple Chemical Sensitivity

Introduction

Imagine developing a rash, headache, being dizzy, and becoming short of breath all due to an exposure to common household cleaners. The development of these symptoms due to a chemical exposure is known as multiple chemical sensitivity (MCS). MCS is an illness prevalent in 0.2-4% of the general population in the United States with 70-80% being women (Sparks, 2000). An interesting fact regarding MCS is it only occurs in certain societies and countries, specifically Western industrialized countries (Bornschein, 2001). MCS is an illness simply unknown in Eastern European countries.

In the 1940's, an allergist by the name of Theron G. Randolph stated allergies caused fatigue, irritability, behavior problems, depression, confusion, and nervous tension. In the early 1950's, Randolph suggested common environmental chemical exposure could produce a wide variety of symptoms. Randolph felt humans had an inability to adapt to these chemical exposures resulting in a new form of sensitivity (Barrett, 1997). From this theory evolved the theory of what is now called multiple chemical sensitivity. Magill (1998) believes multiple chemical sensitivity is a syndrome characterized by patient's beliefs that the symptoms are caused by exposure to low-levels of environmental chemicals.

Multiple chemical sensitivity has become a controversial issue. Many mainstream medical professional organizations, such as the American Medical Association, reject multiple chemical sensitivity as an established organic disease (Magill, 1998). According to the American Medical Association (1992), "no evidence based on well-controlled clinical trials is available that supports a cause-and-effect relationship between exposure to very low levels of

substances and the myriad symptoms reported by clinical ecologists to result from such exposure" (pp. 3466). The American Medical Association continues to say that "until such accurate, reproducible, and well-controlled studies are available, the American Medical Association Council on Scientific Affairs believes that multiple chemical sensitivity should not be considered a recognized clinical syndrome" (pp. 3467).

Definition

Several different phrases have been used to identify the phenomenon of multiple chemical sensitivity. These phrases are chemical AIDS, chemical hypersensitivity syndrome, ecologic illness, environmental hypersensitivity disorder, total allergy syndrome, 20th century disease, Gulf War Syndrome, and idiopathic environmental intolerance (Labarge, 2000). All of these phrases can be used interchangeably, but idiopathic environmental intolerance and multiple chemical sensitivity are the two most commonly used phrases. Through this paper multiple chemical sensitivity or MCS will be the two terms used.

Multiple chemical sensitivity is a term used to describe a phenomenon in which people experience many troubling problems exacerbated by environmental exposure. These problems are polysymptomatic, including somatic, cognitive, and affective symptoms affecting the entire body system. MCS is characterized by a low level exposure to environmental chemicals, such as perfumes and air fresheners, typically not harmful to the general population (Labarge, 2000). Several definitions have been proposed, but Cullen (1987) offers a widely used definition. Cullen's definition includes seven elements. First, the syndrome is acquired after a documentable environmental exposure causing objective health effects. Second, the effects must involve more than one organ system. Third, the symptoms appear or disappear in response to a predictable, known stimuli. Fourth, symptoms appear after exposure to chemicals of different

structures and toxicity. Fifth, symptoms occur after a witnessed exposure, therefore being verifiable. Sixth, the level of exposure must be far below levels known to cause harm. Finally, there must not exist a test able to explain the symptomatology. Cullen's definition describes an illness without pinpointing specific symptoms or the disease process.

Although Cullen's definition is the most widely used and accepted definition, a few others do exist. The American College of Physicians (1989) state that in each issue of the journal *Clinical Ecology* ecologic illness is defined as a "polysymptomatic, multisystem chronic disorder manifested by adverse reactions to environmental excitants" (pp. 168). These excitants are present in the air, water, drugs, and the surrounding environment. Bartha et al (1999) describes multiple chemical sensitivity as a chronic condition having reproducible symptoms affecting multiple organs with repeated low- level chemical exposure. These symptoms appear with exposure to different unrelated chemical substances and improve or resolve when the irritant is removed. Nethercott et al's (1992) definition is very similar to Bartha et al. Nethercott defines MCS as a chronic condition with reproducible symptoms as a result of low- level chemical exposure, which improve or resolve when the chemical is removed. Finally, the Association of Environmental and Occupational Clinics defines MCS as a change in health status identified by the patient with symptoms triggered by multiple chemicals lasting at least 6 months. Kruetzer (2000) states these symptoms are defined by the patient and occur in more than three organ systems and patients with other medical conditions, such as asthma, should be excluded.

The above definitions have several points in common. They each describe multiple chemical sensitivity as reproducible symptoms as a result of low-level chemical exposure, which improve or resolve once the chemical is removed. Other elements included in the definitions

include multiple organ system involvement, patient reported symptoms, exclusion of patients with preexisting medical conditions, and responses to other chemically unrelated substances. These definitions are based solely on patient and clinician subjective findings. Objective findings and laboratory findings tend to be nonexistent. According to Kreutzer (2000), multiple chemical sensitivity has become quite a controversial illness in the medical field.

Symptoms and Patient Characteristics

The symptoms MCS patients experience are nonspecific affecting multiple organ systems. These symptoms make daily living quite difficult. A study by Labarge and McCaffrey (2000) identified over 151 symptoms associated with multiple chemical sensitivity. Patients report having no symptoms to a previous exposure to a chemical, which at lower levels exhibit symptoms. Levy (1997) states these symptoms tend to be recurrent and disappear after the stimulus is removed.

Symptoms generally affect the central nervous system, respiratory system, and gastrointestinal system. Central nervous system symptoms include headache, fatigue, difficulty concentrating, dizziness, odor hypersensitivity, irritability, anxiety, and depression. Respiratory symptoms including rhinitis, hoarseness, dry cough, pressure when breathing, and reports of asthma associated with airway irritants such as odor producing products (Levy, 1997). According to Barrett (1997), nausea and diarrhea are the two most commonly reported gastrointestinal system symptoms. Other symptoms affecting different systems include dry, red, irritated skin, urinary frequency, muscular stiffness, and muscle pain.

Most patients diagnosed with MCS are middle-aged, well-educated females. According to Labarge (1997), the expensiveness of treatment and increased amount of knowledge on environmental toxins and their effects may help explain why patients tend to be from higher

socioeconomic status and be well-educated. It is thought women notice and react to symptoms differently than men do. Pennebaker (1994) believes women try to find causes for symptoms, therefore are more likely to blame environmental exposures to their symptoms. Miller (1992) states women are exposed to domestic chemicals more often then men in poorly ventilated homes thereby increasing their risk of developing multiple chemical sensitivity.

Patients who believe they have MCS firmly state their symptoms are a result from chemical exposure. Sometimes they begin to alter their behavior to avoid being diagnosed with another illness such as depression or anxiety. Other patients begin to withdraw from daily activities, family, and social activities to try to minimize the risk of chemical exposure (Magill, 1998). Rosenberg (1990) described the personality of an individual affected by MCS as obsessive/paranoid. These individuals seek medical attention for explanation of physical symptoms and describe their history in complete detail. Rosenberg (1990) continues on describing these individuals as histrionic/somatizing, which is a person who presents their history in a more global and impressionistic manner.

Diagnostic Evaluation

Many patients tend to self diagnose themselves with multiple chemical sensitivity. They are quite knowledgeable on the topic after having done extensive research in the area of MCS. These patients know exactly which irritants produce symptoms and when the exposure occurred. Some patients, after self diagnosis, attempt to seek a physician for a formal diagnosis. Many times they do not receive the diagnosis they want, which can lead to personal trouble. These patients begin to feel like no one will listen to them, they get depressed, and some even become suicidal.

When a patient presents with a suspected case of MCS, it is essential to take a thorough history and physical. The history should include a detailed exposure history including place of exposure, initial and subsequent exposures causing symptoms, specific chemicals or irritants the patient was exposed, protective measures, other workers exposed and their symptoms, and non-occupational exposures causing symptoms (Magill, 1998). According to Magill, patients may be asked to keep a symptom diary including information on daily exposures, specific chemicals, and the symptoms that occurred. Current and past medical illnesses, results of previous work-ups and treatments, and review of medical records also need to be included in the history. Magill concludes if the exposure happened in the workplace, the Material Safety Data Sheets need to obtained. Sparks (2000) included the importance of a physical examination to rule out any other illnesses, such as somatoform disorders or anxiety disorders.

The consultation should be by an occupational and environmental specialist. These clinicians have the training and experience to assess patients with chemical exposures. It can be very difficult for a primary physician to assess these patients without any formal training with chemical exposures. The consultation should include a psychiatric evaluation. It can be quite difficult to convince a patient they need a psychiatric evaluation. According to Sparks (2000), these patients do not want to accept the idea that a psychological factor could be exacerbating their symptoms. Other medical specialties should also be used to rule out other diseases.

According to Sparks (2000), there have been no specific diagnostic tests established to diagnose multiple chemical sensitivity. Diagnostic tests are used to rule out other illnesses. A pulmonary function test may be ordered for a patient complaining of respiratory tract symptoms to rule out reactive airway disease. Biological monitoring may be used in cases where the chemical irritant has a known correlation with measurable blood or urine levels and health

effects as with lead. The results of any test only explains those symptoms associated with the test, it does not explain the multiorgan symptoms. Test results need not be over interpreted either. When variations in test results occur, it becomes challenging to distinguish what are abnormal variations or what are normal variations for that person.

The test considered most important by clinical ecologists is known as provocation-neutralization. Barrett (1997) identifies provocation-neutralization as when diluted chemicals are injected into the body via sublingually or subdermally until a reaction or reoccurrence of symptoms occurs. Once a reaction has occurred, subsequent injections will be administered at a lower dose until "neutralization" or disappearance of the symptoms occurs. Levy (1997) states once symptoms appear, the test is considered positive, but medical professionals consider this to be pure chance.

Etiological Theories

The etiology of multiple chemical sensitivity is unknown and causes great debate. According to Labarge and McCaffrey (2000), the debate is whether MCS is a result solely from chemical exposures or if it is a misdiagnosis of other psychological or physical illnesses. Those who view physiological factors as the primary reason for the development of MCS believe symptoms are exacerbated by psychological factors. Whereas, those who view psychological factors as the primary cause for the development of MCS believe symptoms are caused by perceived or actual chemical exposure.

The etiological theories proposed to explain multiple chemical sensitivity include both physiological and psychological theories. Each of these have sub-categories that will be described in detail below.

Psychological Theories

Conditioned response

This theory evolved from Pavlovian classical conditioning where "a neutral stimulus is paired with a stimulus that reflexively elicits a particular response. The pairing of the two stimuli leads to the formation of a learned association between them" (Giardino, 2000, pp. 519). According to Giardino (2000), the neutral stimulus is the conditioned stimulus (CS) and the other stimulus is the unconditioned stimulus (UCS). Giardino continues to explain the response from the unconditioned stimulus is the unconditioned response (UCR) and the response to the conditioned stimulus, after being associated with the unconditioned stimulus, is known as the conditioned response (CR). Giardino concludes there exist contextual cues, which are additional sensory inputs that occur at the same time as the initial unconditioned stimulus. These cues may act as conditioned stimulus eliciting a response during a later event.

This type of conditioning known as interoceptive conditioning may have close ties with multiple chemical sensitivity (Giardino, 2000). According to Labarge (2000), when applying this theory to MCS, the initial chemical exposure would be the unconditioned stimulus with the physical reaction being the unconditioned response. Anything associated with the chemical exposure, such as odor, would be considered the conditioned stimulus. The conditioned stimulus would be capable of producing a conditioned response, such as symptoms of multiple chemical sensitivity.

Besides classical conditioning, sensitization and generalization are two another forms of a conditioned behavior. According to Giardino (2000), sensitization is increased sensitivity to stimulus after an initial exposure usually to a noxious substance. The purpose of sensitization is thought to avoid or minimize reactions to a stimulus when re-exposure occurs. Giardino

describes generalization as "the ability of a non-CS stimuli to regularly elicit a CR, even though they have never been paired with the UCS" (pp. 521). The more similar the stimulus is to the original conditioned stimulus, the more likely a conditioned response would occur. Giardino believes as more time passes, stimuli less similar to the original conditioned stimuli, begin to develop qualities to produce a conditioned response.

It is unclear to what extent conditioning theories apply to patients with multiple chemical sensitivity, but there are several characteristics of MCS consistent with a portion of these theories. First, odorless chemicals are rarely associated with the production of symptoms in MCS. According to Giardino (2000), there is the potential for chemicals to possess value as unconditioned stimulus, and for a particular sensory property, such as odor, to serve as a conditioned stimulus producing symptoms experienced during prior exposures. Second, patients with MCS show signs of avoidance and increased sensitivity to a chemical irritant similar to other psychological disorders. Avoiding the chemical irritant may increase a person's sensitivity to the feared chemical.

Psychiatric disorders

Four specific psychiatric illnesses have been associated with multiple chemical sensitivity. Somatoform disorder, depression, post-traumatic stress disorder, and panic disorder are the most commonly associated psychiatric illnesses with MCS. According to Brautbar (1992), "psychiatric evaluations have shown that the syndrome may be a new variant of somatoform disorder" (pp. viii). Features of somatoform disorder include a history of physical complaints usually consisting of more than one organ system that cannot be fully explained by the medical professionals (Labarge, 2000). These features are almost identical to multiple chemical sensitivity.

According to Varcarolis (1998), depression is characterized by symptoms often interfering with a person's social or occupational life. These symptoms include and are not limited to fatigue, decreased concentration, difficulty sleeping, depressed mood, or changes in motor activity. Schottenfeld (1987) suggests MCS is an atypical form of depression where cognitive and somatic symptoms predominate rather than a depressed mood. According to Brautbar (1992), some medications used to treat chronic depression have also improved symptoms of MCS.

Others feel that multiple chemical sensitivity is a variant of post-traumatic stress disorder. According to Varcarolis (1998), PTSD is characterized by repeated re-experiencing of a traumatic event through flashbacks, dreams, or recollections. People suffering from PTSD avoid talking about the event and avoid activities, people, or places that would bring back memories of the event. These people often have feelings of numbness, emptiness, or detached from others. They have difficulty sleeping, difficulty concentrating, and are very irritable and anger easily. Schottenfeld (1986) suggests people suffering from MCS may actually be suffering from PTSD where symptoms become present after perception of a chemical. Schottenfeld (1986) describes a form of post-traumatic stress disorder where there is occupational or environmental exposure resulting in emotional, cognitive, and behavioral symptoms. Symptoms then reappear when there is a re-exposure to the chemical or there are reminders of the event.

According to Varcarolis (1998), panic disorder is characterized by panic attacks, which are a sudden onset of extreme apprehension, a sense of impending doom, or fear. Dager (1987) describes multiple chemical sensitivity as a form of panic disorder in which the person is experiencing panic attacks exacerbated by exposure to a chemical irritant. The symptoms of panic disorder: chest tightness, shortness of breath, palpitations, paresthesias, mental confusion,

and light-headedness, are quite similar to the symptoms of multiple chemical sensitivity. Labarge (2000) states although these four psychiatric illnesses have similarities with multiple chemical sensitivity, there is not one specific illness that can account for all bouts of MCS due to the different qualities and symptoms each person suffering from MCS possess.

Black (1999) found that persons diagnosed with multiple chemical sensitivity had a higher likelihood of first-degree relatives to be diagnosed with a mental disorder. Depression, alcoholism, panic disorder, and antisocial personality were the most frequently reported. Black (2000) believes this association between family history of mental illness and the diagnosis of multiple chemical sensitivity is unclear, but could reflect the substantial psychiatric comorbidity found in patients with MCS.

Cognitive influences

Although not directly related to the development of MCS, cognitive influences related to the perception of illness following a chemical exposure have been investigated. According to Williams and Lees-Haley (1993), four cognitive influences, attentional focus, category accessibility, disease prototypes, and selective monitoring, have been reviewed regarding the development of an illness. Williams and Lees-Haley believe heightened self-focused attention on internal (bodily) versus external (environmental) stimuli can result in increased symptom reporting. Williams and Lees-Haley describe category accessibility as the knowledge of health related perceptions in one's mind and the readiness to which these perceptions are used to explain symptoms. If a chemical exposure triggers these health related perceptions, symptoms may be falsified due to the perceptions. Disease prototypes are an individual's definition of a disease including a set of symptoms indicative of that particular disease. According to Williams and Lees-Haley, selective monitoring takes into account a person's interpretation of bodily

sensations following an exposure to a chemical agent. Following the exposure, individuals will be extremely aware of any adverse reaction or supposed reaction due to believed bodily sensations. Williams and Lees-Haley state that "research on selective monitoring has shown that providing individuals with information regarding what sensations or symptoms they can expect to experience can evoke a biased search for sensations" (pp. 501).

In addition to these four ideas, the influence of the media, the beliefs of other people, and the involvement with legal proceedings can influence illness perception. The media often reports on how chemicals can affect a person's health. Meryll Streep claimed that allowing children to eat apples that had been sprayed with pesticides was causing significant harm (Labarge, 2000). Media influences, especially by famous people, can sway a person's way of thinking causing them to develop perceptual biases. The influence of others, such as doctors or peers, can have a negative effect. Sparks (2000) describes MCS as a belief system promoted by clinical ecologists. Referring people to a network of similar minded clinicians, journal articles, hotlines, and support groups reinforce this belief system. This belief promotes the patient as a victim where the symptoms are not indicative of severe illness or psychological diseases. Finally, the influence of being involved in legal cases may alter the individual's illness behaviors.

Physiological Theories

Immunological dysfunction

Allergy is an acquired or induced sensitivity to an allergen or antigen. The allergen or antigen may inhibit the immune system, known as immunosuppression, or may enhance the immune system, known as hypersensitivity. When the immune system reacts to an allergen, there may be changes in the immunoglubulins, especially IgE (Labarge, 2000).

Labarge states when comparing multiple chemical sensitivity to allergy, it is important to note that there is an inconsistent finding of IgE involvement with MCS, therefore MCS should be characterized as immune dysregulation. According to Levin and Byers (1992), MCS is best characterized as an aggravated disorder of the neuro/endocrine/immune systems. Through a variety of mechanisms, cell damage, cell death, or malignancy may occur which could result in immune dysfunction.

Meggs (1992) and Bascom (1992) have similar propositions related to immune dysfunction and MCS. They suggest odorous chemical irritants excite and irritate the olfactory nerves and nerve fibers in the airway producing inflammation and initiating an immune response. Meggs believes the immune response produces mediators having the ability to affect the central nervous system producing symptoms similar to those seen with multiple chemical sensitivity.

Limbic/olfactory theory

There may be an important interaction between the olfactory nerve, the brain limbic system, and the hypothalamus when looking at the effects of chemicals on multisystems (Graveling, 1998). Neural sensitization can occur by both kindling and non-kindling effects. Kindling is when low-level chemical exposure initially has no effect, but eventually will elicit susceptibility to a reaction (Graveling, 1998). Graveling describes non-kindling as a time dependent sensitization where the degree of a reaction is due to the repeated exposure to a chemical.

Brautbar (1992) suggests "low-level concentrations of chemicals can cause changes in brain activity and result in behavioral and physiological reactions" (pp.xi). This is especially true for patients with pre-existing brain dysregulation due to depression, where a chemical exposure would cause further changes in the dysregulation.

Bell (1992) suggests chemicals enter the central nervous system through the olfactory system, which lacks a blood brain barrier. The chemicals can then migrate from the nose to the olfactory bulb and then to other areas of the brain. This would serve as an initial common pathway for the spread of sensitization throughout the entire body. Bell also suggests that the limbic system is a common ground for interaction between the immune, endocrine, and nervous systems along with the central nervous system's tie to all organs of the body. This may explain the variety of multisystem symptoms.

Treatments

The goal of treatment is not to rid the illness, but to control the symptoms. Patients need to learn coping skills to deal with their illness so their daily living is improved. Treatment needs to be individualized, nonjudgmental and supportive. Therapies must be based on the idea the patient's symptoms are real and distressing (Sparks, 2000).

According to Levy (1997), treatment needs to include both restrictive diets and desensitization over a prolonged period. Levy believes medical treatment is not well tolerated if no other specific illnesses are found. Using psychopharmacological drugs without psychotherapy is also not useful. Sparks (2000) also feels symptom desensitization is a vital part of treatment. In addition, Sparks also includes pharmacologic treatments, an increase in social and physical activity, and treatment for other coexisting medical illnesses.

Sparks (2000) states symptom desensitization is a principle of "gradually increasing exposure in an organized program allowing for accommodation and increasing tolerance" (pp. 607). The patient should be encouraged to have a sense of control over environmental stressors. In order to do this, individuals need to be able to reduce stress in their life by a variety of methods including massages, physical therapy, meditation, or regular exercise. Sparks states

odors and exposure to irritating chemicals needs to be reduced and controlled as much as possible even if levels are already below governmental standards. Pharmacologic and psychotherapy may be beneficial treatments if used together. The use of psychotherapy is a difficult challenge due to the fact that individuals with MCS tend to deny the idea that psychological factors may play a role in their symptoms. Sparks concludes that complete avoidance of chemical irritants is not indicated because it is contraindicated and impossible to accomplish.

On the other hand, Reid (1999) feels the main part of treatment is avoidance of the chemical irritants, which has led to the development of "safe-rooms" and even "ecology houses" (pp. 618). These are residential areas free of plastics and other synthetic materials with filtering systems to cleanse the incoming air. Avoidance therapy can be difficult and costly. Individuals with MCS may quit their job or relocate as an attempt to rid environmental chemicals from their lives.

Reid (1999) also includes the use of provoction-neutralization as part of treatment. Provocation-neutralization, as stated before, is a process of injecting diluted chemicals into the body via sublingually or intradermally until symptoms appear. According to Levy (1997), after symptoms appear, a subsequent injection is given at a lower dose until symptoms disappear, which is considered neutralization. This is one approach to treatment, but Reid (1999) also feels treatment should include a thorough assessment of the patient, treatment of any psychiatric disorder, and guidance to promote optimal life functioning rather than withdrawing into a disabling lifestyle.

The American Medical Association (1989) feels treatment should consist of a combination of chemical exposure avoidance, special diets, and neutralization therapy. The

American Medical Association's view on avoidance therapy is similar to that of Reid. Individuals should avoid irritating chemicals, which have led to the establishment of isolated communities. Diet therapy is a cycle of eating foods that cause sensitivity once every 4 or 5 days. Individuals need to eat "natural" foods in order to avoid pesticides and artificial additives. According to the American Medical Association (1989), neutralization therapy is an extension of provocation-neutralization testing. This therapy allows for the patient to administer mixtures or sets of chemicals at the neutralizing level. Neutralization therapy is used to relieve symptoms or to prevent anticipated symptoms. The AMA says the patient may alter the dose, determine the frequency of administration, discontinue the treatment during symptom free periods, and can resume treatment when there is a reoccurrence of symptoms.

According to Black (1993) it is necessary to first determine whether or not the individual with a diagnosis of MCS has a nonpsychiatric medical disorder that may be causing the symptoms. If that is the case the medical disorder needs to be treated properly. If the symptoms are not related to a medical disorder, psychological treatment is often recommended. Labarge (2000) believes how the condition of the individual is best characterized, affects the type of psychiatric approach, which may include a cognitive and behavioral approach. The cognitive and behavioral techniques include cognitive restructuring, exposure and response prevention, or relaxation and stress reduction. Labarge concludes that antidepressants or anti-anxiety medications may also be included in the treatment regime.

Staudenmayer (2000) states patients who are diagnosed with somatization disorder rather than multiple chemical sensitivity are quite resistant to psychological treatment because they do not consider their symptoms to be psychological. Treatment needs to focus on establishing short-term goals rather than focusing on specific symptoms, decreasing negative behaviors that

maintain symptoms or perceptions, such as avoidance of exposure, and increase positive behaviors that help reduce stress and promote well-being, such as returning to work. Finally, Labarge (2000) states the patient's beliefs or thoughts are examined and alternative interpretations of the cognitions are developed in hopes that the patient will be able to challenge their cognitions.

Staudenmayer (2000), believes that somatizing patients have a poor prognosis due to a strong belief in physical and not psychological symptoms. In addition, MCS patients who are continuously treated by clinical ecologists are poor candidates for psychotherapy.

Conclusion

Multiple chemical sensitivity is defined as a disorder evidenced by multiorgan symptoms following a known chemical exposure. These symptoms often resemble known psychological disorders, such as depression, anxiety, or somatoform disorder, which makes it difficult to make a diagnosis of MCS difficult. Many mainstream medical associations, such as the American Medical Association, do not consider MCS to be an organic disorder, therefore making multiple chemical sensitivity a quite controversial issue.

There are many etiological theories established that try to explain what the phenomenon of multiple chemical sensitivity. There is not enough evidence to confirm or reject any specific theory. Although the role of psychological factors has been repeatedly demonstrated, a straightforward psychological cause is unlikely. Future research is needed focusing on the patient's health beliefs and how they affect the development of symptoms due to environmental toxins.

There are a variety of proposed treatments for multiple chemical sensitivity. Many clinicians advise the client to avoid chemicals or other irritants that cause symptoms. Avoidance

therapy becomes quite difficult and costly. Psychotherapy is another popular form of treatment, especially for those patients who resemble known psychiatric disorders. The last popular form of treatment is neutralization, which is a stem of the provocation-neutralization test.

MCS remains an ill-defined and poorly understood disorder. Future research and knowledge on multiple chemical sensitivity is imperative to help define, classify, and treat this disorder. Until then, medical professionals need to be aware that there exists a disorder whereby symptoms may be caused by exposure to low-levels of environmental chemicals.

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