Multiple Chemical Sensitivity and Idiopathic Environmental Intolerance (Part One)

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Abstract

Multiple chemical sensitivity/idiopathic environmental intolerance (MCS/IEI) is a commonly used diagnostic term for a group of symptoms. These symptoms have been described and commented on for more than 15 years in the USA. Recently, it has also been observed in Japan. The main features of this syndrome are multiple symptoms involving in multiple organ systems that are precipitated by a variety of chemical substances with relapses and exacerbation under certain conditions when exposed to very low levels which do not affect the population at large. There are no laboratory markers or specific investigative findings. Although traditional medical organizations have not agreed on a definition for this syndrome due to the lack of obvious evidence to demonstrate the existence of these symptoms, it is being increasingly recognized. It constitutes an increasing percentage of the caseload at occupational/environmental medical clinics.

Part one of this review article discusses pathophysiological theories, substances which cause symptoms, prevalence in the general and specific populations, past history and family history, and clinical symptoms of MCS/IEI patients.

Key words: multiple chemical sensitivity, idiopathic environmental intolerance, chemical intolerance, pathophysiological theories, clinical symptoms

Introduction

Multiple Chemical Sensitivity (MCS) refers to the condition in which people report negative symptoms in response to exposure to common chemicals, and attribute their sensitivities to prior exposure to the same or often structurally unrelated chemicals. The onset of MCS is often attributed to prior repeated chemical exposure in the home and/or workplace, and once initiated, symptoms are triggered by extremely low levels of many chemicals or types of food. Symptoms reportedly differ in focus and intensity depending upon the type or duration of exposure, but share the characteristics of disabling and limiting the person's access to areas where such exposure might occur.

At a World Health Organization-sponsored conference in 1996 (1), conferees urged that research continue concerning MCS while conceding that its validity has not been established. They proposed the term "idiopathic environmental intolerance (IEI)", because many people with MCS were suggested to develop symp-

toms in response to environmental agents, such as electromagnetic waves, other than chemicals. For this reason, we will henceforth refer to this disorder as MCS/IEI.

The first case involving a patient with multiple, disabling chemical intolerance was described nearly half a century ago (2). First described in 1952, the syndrome has engendered over 20 names, including environmental illness, total allergy syndrome, 20th century disease, and chemical AIDS (3). Originally called "the petrochemical problem," this condition has been the subject of several sponsored meetings and professional conferences over the past 10 years (4). Chemical intolerance or chemical sensitivity poses major scientific and policy challenges for physicians, toxicologists, ecologists, employers, building owners, chemical producers, and government officials. Investigators in more than a dozen countries have reported cases arising in diverse demographic groups following exposure to indoor air contaminants, chemical spills, industrial chemicals, and pesticides (4).

Despite the work and dedicated investigations of many researchers, there is no widely accepted definition of MCS/IEI because there is very little agreement on what the symptoms represent. These aspects of MCS/IEI have led some observers as well as scientific policy committees to reject MCS/IEI as an organic disease (5). Although MCS/IEI is not generally accepted by mainstream medicine (6, 7), and the Scientific Council of the American Medical Association (8) urged that it not be recognized, a growing body of literature (9–11) has documented many people

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Abbreviation: IEI, Idiopathic environmental intolerance; MCS, Multiple chemical sensitivity; PGW, Persian Gulf War; TDS, Time-dependent sensitization.

in the United States and elsewhere who have developed a set of symptoms that they and some physicians attribute to chemical exposure. In the present paper, we discuss pathophysiological theories, substances which cause symptoms, prevalence in the general and specific populations, past history and family history, and clinical symptoms of MCS/IEI patients.

The differences between chemical intolerance (sensitivity) and MCS/IEI

Since there are many diagnostic names related to chemical intolerance and chemical sensitivity other than MCS/IEI, symptoms of MCS/IEI should be differentiated from chemical intolerance and chemical sensitivity. As for the differences between MCS/IEI and chemical sensitivity, Davidoff and Keyl (12) observed that certain members of the general population have reported mild sensitivity to chemicals. However, these people with mild sensitivity differ from the MCS/IEI groups with respect to the number and types of symptoms reported, the duration and frequency of response, and associated features. Kutsogiannis and Davidoff (13) also observed that MCS/IEI syndrome was significantly different from manifestations of chemical sensitivity in a sensitive clinical control. Furthermore, in contrast to sensitive controls, MCS/IEI patients reported more illnesses from more common types of environmental chemical exposure, more changed tolerances, longer recovery time after illness-inducing exposure, more odor related symptoms (including odor intolerance), longer time of illness related to chemical exposure, and more symptoms, especially of the following types: neurobehavioral (e.g., confusion); systemic (e.g., overwhelming fatigue); gastrointestinal (e.g., blurring); and upper respiratory symptoms (e.g., stuffy nose).

Bell et al. also focused on chemical intolerance to evaluate MCS/IEI, because they suggested that chemical intolerance is one of the most specific symptoms of MCS/IEI rather than fibromyalgia or chronic fatigue syndrome. In an effort to isolate effects from disability, litigation, and expectation/attribution, Bell et al. (14–19) initiated a series of studies focused on chemical intolerance in high-functioning older and young adults from the community who were not clinically ill. Findings in these preclinical chemical intolerant individuals, who constituted 15–30% of the general population samples, included life histories of medical problems that overlapped with those of MCS/IEI patients (10, 17, 19), increased trait shyness (14, 15, 17), objectively lower total sleep times (20), evaluation of plasma beta-endorphins (21), alterations in spectral electroencephalographic patterns during chemical exposure (22) and reduced reaction times on divided-attention tasks (23).

Pathophysiological theories of MCS/IEI

There are few peer-reviewed studies that has demonstrated sufficiently strong objective correlates of reported symptoms, nor are there any studies demonstrating a new mechanism for symptom causation from chemical exposure despite some creative speculation about exposure routes in the body, sensitive tissue, and amplification processes (17, 24–29). As a result, causal hypotheses for MCS/IEI range widely between physiological and psychological mechanisms (30–34), psychosocial (35–44), belief systems (45), and enzyme, immune abnormality (46–48).

For simplification, these mechanisms may be grouped into six categories: (a) toxicologic, (b) psychophysiologic, (c) psychi-

atric, (d) belief systems, (e) and immune abnormality.

Toxicologic theories, or time-dependent sensitization (TDS)

Some studies suggested that theories of toxicity or organ damage attributable to immunologic or other dysfunctions remain unsupported (49, 50). In the neural-sensitization model, the following have been proposed: (1) in chemical intolerant individuals, olfactory-limbic pathways induce abnormalities in a wide range of affective, cognitive, and somatic processes via their regulatory role in the CNS (hypothalamus, amygdala, and limbic system), endocrine, and autonomic functions (33); and (2) the individual difference variable leading to amplified reactivity to low levels of chemicals is the neuropharmacological process of time-dependent sensitization (TDS) (16, 18, 51, 52). TDS is the progressive increase in a given measure with the passage of time between the initial and subsequent exposure (29, 53). Diverse pharmacological and nonpharmacological (psychological or physical stress) stimuli can initiate and elicit TDS responses, which can occur in behavioral, neurochemical, immune, and/or autonomic measures at the level of cells, organs, and/or organisms (29). Sensitizable and nonsensitizable individuals may not differ from one another at baseline or during an initial exposure, but they will differ after repeated, intermittent re-exposure (54). Exogenous stimuli must have sufficiently novel, stressful, or foreign characteristics to be capable of inducing TDS (29). However, endogenous stimuli detected in local tissue may also induce TDS in the central nervous system pathway that processes afferent information (e.g., irritable bowel syndrome (55), a diagnosis commonly reported by chemical intolerant individuals and MCS/IEI patients (10)). Notably, the results of animal studies show that the female gender (56), hyperreactivity to novel substances (54), certain genetic vulnerabilities (53, 57), and/or ingestion of increased amounts of sucrose (58) are individual differences that predict heightened susceptibility to TDS. As for the olfactory system, there is evidence that sensitivity via the olfactory system is related to hypothalamic-pituitary-adrenal axis functioning, with a change of sensitivity occurring in patients with Cushing's syndrome or with Addison's disease by means of changing the concentration of the serum corticosteroid level (59, 60).

Otherwise, findings of neurotoxic patterns on cerebral metabolism after chemical exposure (61) lead credence to the organic origin of the neurocognitive complaints of poor memory and concentration frequently reported by MCS/IEI patients.

With regard to another pathologic explanation, Meggs (62) has posited neurogenic inflammation as a hypothesis to explain ways in which inflammation leads to further irritation upon chronic low-level exposure of volatile organic compounds, contributing to chronic rhinitis. Further, in line with neurogenic inflammation, neurogenic "switching" has been suggested as the mechanism by which the sites of inflammation are rerouted via the central nervous system to various end-organs in an attempt to explain the polysymptomatic complaints in various organ systems reported by persons with chemical intolerance.

Psychophysiologic and psychiatric theories

Some studies have proposed and have begun to demonstrate that a behaviorally conditioned response to odor could explain some MCS/IEI cases (40, 63, 64). Such severe chemical exposure may act as an unconditioned response, producing one trial learning of a conditioned psychologic response. For example, exposure to

glutaraldehyde, a known irritant, is accompanied by an odor that could act as the conditioned stimulus, which then becomes associated with the irritative symptoms of glutaraldehyde, the unconditioned stimulus. Thereafter, the odor (or perhaps other similar odors), paired with lower exposure concentrations, could produce similar symptoms at a level of exposure below the threshold for causing mucosal irritation.

Many physical and emotional stressors produce hyperventilation, as do a variety of pulmonary, renal, cardiovascular, and other diseases states. Symptoms of hyperventilation can induce some common symptoms of MCS/IEI such as headache, dyspnea, palpitation, tremor, panic, pain, and even seizure activity (65). There are currently no data on the association of hyperventilation with MCS/IEI symptoms, but patients diagnosed as MCS/IEI may include patients with psychiatric diseases. Some intriguing case reports have associated organic solvents with panic attacks (39–41). The substantial importance of panic attacks in some cases of otherwise unexplainable symptoms was reviewed by Smoller et al. (66). For cases in which one or more chemical odor triggers either typical or limited panic attacks, the designation of “odor-triggered panic attacks or panic disorder” has been proposed (67).

Belief systems

In some individuals, MCS/IEI is characterized by a belief system (49); this is consistent with the increasing concern of the public regarding environmental pollution and health effects of exposure to man-made chemicals (68, 69). The mechanism by which a set of beliefs might lead to symptoms is not clear, but it is easy to understand how beliefs could affect attribution if symptoms were already present. Standenmayer and Selner (45) suggested that misattribution and suggestion can occur especially from clinical ecologists, who have developed an “irrational belief system” and who “indoctrinate” their patients.

Immune abnormality

The term MCS/IEI is most often applied to an acquired non-IgE-mediated reaction in one or more of the organ systems to normally nontoxic chemical stimuli (47, 48). Although immune disorders have been invoked, there are no convincing scientific studies that document any specific immune abnormalities in patients with MCS/IEI (38, 50). National Institutes of Health Technology Assessment Workshop Panel (70) suggested that MCS/IEI patients did not have any abnormality regarding auto-immune body, T lymphocyte, B lymphocyte, CD-4 subset, CD-8 subset or IL-2, although there was a slight difference of IL-1 between MCS/IEI patients and normal groups.

Substances which cause symptoms of MCS/IEI

The Environmental Health Center-Dallas, Dallas, Texas estimated the percentage of suspected triggers of MCS/IEI in 200 chemically sensitive patients in studies conducted in as shown in Fig. 1 (71). The most frequently reported trigger was a newly constructed home or a new job site where occupants or workers were extensively exposed to construction materials such as paint, solvents, carpet, etc. Their use in new homes and renovation accounted for 30% of the triggers of MCS/IEI cited by the 200 patients at the Environmental Health Center-Dallas (Fig. 1). Other types of chemical exposure (e.g., pesticides) accounted for another 24%. A number of MCS/IEI patients also have reported multiple

Fig. 1 Suspected triggers of MCS/IEI in 200 chemically sensitive patients in studies conducted at the Environmental Health Center—Dallas, Dallas, Texas.

adverse food reactions and acquired intolerance to various types of medicine and alcohol (72). Randolph and Moss (73) observed that patients who were “chemically susceptible” often reported intolerance for sweets or alcohol beverages, e.g., feeling ill after drinking a single glass of wine or a can of beer, and also for many unrelated chemicals, various foods, or *Candida albicans* (48, 74, 75).

As for hyperreactivity to multiple unrelated chemicals, Kanerva and Estlander (76) reported that a woman who had dermatitis which might have been caused by epoxy resin exposure underwent several types of second patch tests. Epoxy resin was the only substance that elicited an allergic patch test reaction. After 10–20 days, the patient developed 3 further patch test reactions. They suggested that the delayed-type hypersensitivity was caused by “double active sensitization” which is both double active sensitization and simultaneous active sensitization to multiple unrelated chemicals during the retesting. As mentioned above, MCS/IEI patients have lately become sensitive to many unrelated substances.

The patterns of exposure causing symptoms of MCS/IEI

As reported previously (38, 77, 78), patients have been exposed to a wide range of chemicals in a variety of settings usually through personal, domestic or occupational use and in some instances through accidental exposure. Many patients date the onset of symptoms to a specific event, but 38% report a gradual onset without specific initiating exposure (50).

As for the concentration and the number of chemicals exposed to MCS/IEI patients, the complex mixtures of volatile organic compounds at very low levels tolerated by the majority of building occupants may pose problems for persons who have reported pre-existing chemical sensitivities. Total volatile organic compound measurements may not correlate with symptoms in these individuals (79). There is also evidence that low levels of mixtures of genotoxic chemicals (including benzene) may actually be more damaging than higher levels because they do not trigger an appropriate induction of detoxification enzymes (80). In addition, there is evidence that the synergistic effect of multiple low levels of potentially toxic xenobiotics may be clinically relevant, as appears to be the case in chemically exposed Persian Gulf War (PGW) veterans (81). One animal model for PGW neurological problems suggests that synergistic interactions of multiple agents may be more capable of generating nervous system damage and/or dysfunction than a single agent (81).

Prevalence in the general population, specific population, gender, and age

General population

In previous studies reported by some authors (82), telephone surveys of randomly selected adults in various US states (e.g., California, New Mexico) indicated that 16% of those polled reported feeling that they were unusually sensitive to everyday chemicals. Bell et al. (14) found that 66% of college students reported illness from at least one of five listed chemicals (pesticides, auto exhaust, paint, new carpets, and perfume), and 15% from at least four of the chemicals, and also up to 30% of the general population report milder forms of chemical intolerance, without disability (83). Meggs et al. (11) found, in a random household sample of 1,027 people polled in North Carolina, that 33% reported chemical sensitivity, with the major incitants being perfume, pesticides, cigarette smoke, and fresh paint. Severe symptoms associated with MCS/IEI were reported in 4–6% of the general population (11, 51, 84).

Specific population

In specific populations, prevalence rates have also been high. Epidemiological findings suggest that a substantial proportion of various populations report chronic odor intolerance: i.e. the majority of workers exposed to solvents (85, 86), and approximately 30% of office workers (19). Following overexposure to gasoline in a previous study (87), 33.3% of workers in an underground tunneling project reported either developing such sensitivities or experiencing the intensification of pre-existing sensitivities, with 26.7% of these workers fitting criteria for MCS/IEI syndrome, as characterized by the 1999 consensus definition (88). MCS/IEI syndrome was also found in 63% of 19 workers referred for examination at a University of California, San Francisco, clinic following pesticide application for the control of cockroach infestation in a workplace setting (27). In occupational clinics, rates of MCS/IEI syndrome in ill clinic populations have generally been high. MCS/IEI syndrome was reported by 13% of 160 solvent-exposed workers who were admitted consecutively for clinical services (89) and by 19% of 111 patients in California diagnosed by physicians as having occupational disease attributable to organophosphates (90).

Several prevalence estimates of MCS/IEI syndrome have emerged in studies of PGW veterans, depending on the populations investigated and the methodology used (91–97). Findings from the largest random study, which was based on the response to questionnaires completed by 11,216 veterans, showed a 3-fold increase in reported chemical sensitivity, among deployed personnel (15%:5%) (95). The rates of MCS/IEI have been extremely high among ill veterans. Among a small random sample of Veterans Administration Hospital out-patients who complained of illness, MCS/IEI was reported by 86% of deployed veterans, compared with 30% of the nondeployed veterans (91). Overall, more cases of MCS/IEI syndrome have been found in deployed than in nondeployed individuals; Gulf War veterans have experienced more cases of MCS/IEI syndrome than have control populations.

In the PGW cohort, risk factors of MCS/IEI include age over 25 years, female gender, receiving a physician's diagnosis of MCS/IEI, professional psychiatric treatment, prior psychotropic medication usage, current psychiatric illness (depression, post-traumatic stress disorder, generalized anxiety, panic disorder), deployment to

the Persian Gulf, and reporting a low level of preparedness for deployment (96).

Gender

With regard to gender difference, Bell et al. (14) stated that females outnumber males as environmental illness patients by a ratio of 2:1. Clinical samples studied by some authors (98–102) were also predominantly women. In their large representative household population study, Meggs et al. (11) found that 39% of women and 24% of men reported chemical sensitivity. With conducted logistic regression models, female gender was associated with individual self-reports of sensitivity to chemicals (82). As in an early study (72) of 112 persons who attributed the onset of MCS/IEI to exposure of either pesticides or indoor air contaminants, approximately 80% of the MCS/IEI respondents were women. Ashford and Miller (103) reported that 70–80 percent of individuals who were not part of an exposed cohort (e.g., industrial workers) were female; 50 percent were 30–50 years old and usually white, middle to upper middle class, and professionals.

Age

In general, 30–50 years old was suggested as the predominant age for MCS/IEI (103, 104). However, Woolf (105) reported a case of a preschool child who was 4 years old and who had suffered from an allergy to milk and poor weight gain as an infant, and then later developed asthma, allergic symptoms, sinusitis, headaches, fatigue, and rashes precipitated by an expanding variety of chemicals, foods, and allergen.

Several prevalence surveys of MCS/IEI-like symptoms have been conducted among samples of the general population (11, 12) and college students (14, 15). However, no information accompanied these surveys with which to assess the sensitivity or specificity of the questionnaires used against definitional criteria for MCS/IEI. Consequently, assessments of prevalence are limited by the lack of a standard case definition as well as validated objective measures of MCS/IEI.

Past history and family history of MCS/IEI patients

The family dynamics of persons diagnosed with MCS/IEI have not been systematically studied, so it is difficult to speculate on how family history may have influenced the development of MCS/IEI symptoms in the subjects of previous studies (106). A study by Staudenmayer et al. (107) found a higher prevalence of physical and sexual abuse among a cohort of women who reported chemically related illness than in a control group of subjects with chronic medical or psychological disorders. Some other studies have also observed increased prevalence of childhood abuse histories in MCS/IEI patients (108) and higher ratings of overall early life stress in nonpatients with chemical intolerance (10). The authors hypothesized that the etiology of the complaints in their chemically sensitive patients may somehow be related to their childhood trauma. Of course, childhood trauma in general correlates with disturbed family dynamics and family psychiatric illness. A positive family history for psychiatric diagnoses and treatment may be common in patients of MCS/IEI (106). They reported that nearly 30% of the relatives of subjects with MCS/IEI were reported to have MCS/IEI themselves (Table 1). Comorbidities such as posttraumatic stress syndrome or childhood physical or sexual abuse may also have roles as underlying determinants of vulnera-

Table 1 Psychiatric variables in first-degree relatives of subjects with MCS/IEI

	Number of relatives (%)	
Alcoholism	21	(20.2)
Depression	18	(17.3)
Drug use disorder	5	(4.8)
Schizophrenia	1	(1.0)
Antisocial personality	8	(7.7)
Generalized anxiety	3	(2.9)
Obsessive-compulsive disorder	3	(2.9)
Suicide attempts	6	(5.8)
Suicide completed	1	(1.0)
Somatic treatment	6	(5.8)
Hospitalized psychiatrically	6	(5.8)
Received counselling	8	(7.7)
Social incapacity due to mental illness	3	(2.9)
MCS/IEI	10	(28.8)

bility in the later development of MCS/IEI as adults (44).

Clinical symptoms

Symptoms reported may affect any organ system including respiratory, digestive, cardiovascular, neurological, and musculoskeletal, and often include headaches, fatigue, joint pain, dizziness, depression, tension, increased or decreased heart rate, confusion, or muscle spasms (72, 109, 110). Joffres et al. (110) observed the symptoms which were most common among the MCS/IEI patients who were cared for at the Nova Scotia Environmental Sensitivities Research Center (Table 2). Ranking of these symptoms did not vary greatly by gender. Ranking of “trouble finding right words” was higher in women (8th) than in men (24th) and “stuffy or full sinuses” was ranked higher in men (6th) than in women (21st).

In the study of 112 MCS/IEI patients (48), the four most frequently reported symptoms were “tired or lethargic,” “fatigue over 6 months,” “memory difficulties,” and “difficulty concentrating”. Miller and Prihoda (112) observed that the reports of new caffeine, alcohol, medication, food, or other intolerances by patients may signal exposure-related illness.

The process by which MCS/IEI patients become disabled

Chemically intolerant patients often are not only troubled by their symptoms, but also by limitations imposed by their condition on their activities, including their activity at work, attending school, socializing, traveling, living in conventional homes, wearing usual clothing, and eating a normal diet.

Patients massively avoid people and places that might result in chemical exposure, and alienate family and friends, change jobs (including part-time work and disability), with concomitant reductions in income (42, 113), have difficulty receiving symptomatic relief from medical professionals, and difficulty attaining insurance and disability benefits and social services (109).

Access to both people and places is diminished for several reasons. First, physicians who specialize in MCS/IEI often recommend chemical avoidance (74, 114, 115). Patients comply with medical advice to improve their physical health and reduce sources of illness reactions. However, this results in separation from previous sources of support and stability, and consequently in reduced roles and activities. Second, many people are confined to small geographic areas due to chemical exposure in automobiles or airplanes, thus, family contact and support are diminished. Third, even within a geographic area, people with MCS/IEI report losing public access due to the chemicals present in public buildings. Therefore, community service, public outings, shopping, and other public contacts diminish. The need to avoid fragrances in personal interactions, as others may take offense at the request to refrain from wearing scented products, results in less contact.

The attitudes of others also serve to place further distance between people with MCS/IEI and potential sources of support. Since MCS/IEI is still a largely unrecognized and often refuted chronic condition, many of the patients with MCS/IEI reported that they simply were not believed by laypersons or physicians, or that their requests for accommodations were perceived as unnecessary or as inconvenient demands. The views of health professionals, in particular, and when people with MCS/IEI sometimes receive psychiatric labels for what they have perceived to be physical problems (116), the attribution of the disease as “all in your head” isolates the patients from spouses, family, friends, and especially doctors (117). Therefore, the lack of validation by others may be a significant obstacle to perceived social support for this

Table 2 Prevalence of the top 15 symptoms reported ranked by gender among individuals with MCS/IEI

Symptoms	Both		Male		Female	
	%	Rank	%	Rank	%	Rank
Difficulty concentrating	95	1	90	1	96	2
Fatigue, very tired, without energy	95	2	87	3	97	1
Tiredness not relieved by rest or sleep	92	3	84	5	94	3
Sneezing/runny or congested nose without a cold	91	4	90	2	92	5
Forgetfulness/poor memory	90	5	80	9	93	4
Irritability	90	6	85	4	91	6
Headache	88	7	79	10	90	7
Itchy eye(s)	88	8	81	8	90	9
Trouble finding the right words	86	9	70	24	90	8
Need to clear throat	85	10	83	7	86	12
Difficulty making decisions	84	11	73	16	87	11
Stuffy or full sinuses	83	12	84	6	82	21
Muscle pain or ache not related to overexercise	83	13	79	11	94	17
Stiffness in muscles or joints	83	14	75	13	84	15
Feeling light-headed	82	15	71	18	85	13

population.

Many patients restrict their activities and reconstruct their habitats so that they can avoid the environmental agents that cause symptoms, essentially living in a relatively chemical-free environment. Some patients use barrier clothing such as special masks, gloves, coveralls, and even self-contained breathing apparatus in an attempt to avoid chemical triggers. This isolates the patients from others socially and in extreme cases can lead to unemployment (96).

MCS/IEI advocated and law

To support MCS/IEI patients, MCS/IEI advocates postulate that low levels of exposure to any chemical present in the ambient environment which can induce a state of chemical sensitivity leaving the patient disabled should be recognized medically (109, 118). Following these activities, the US Department of Housing and Urban Development has provided housing assistance to people with reported chemical sensitivities. MCS/IEI sufferers in USA have sought their inclusion under the Americans with Disabilities Act (5, 119).

The American College of Occupational and Environmental Medicine (7) declared that polemic and social activism of groups representing the spectrum of opinion about MCS/IEI must not constrain opportunities for open scientific debate, compassionate treatment, fair adjudication of social benefits, and rational policy making (120, 121).

Summary

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Since the publication of earlier position statements by the American College of Occupational and Environmental Medicine (7), the diagnosis, treatment and etiologic assessment of MCS/IEI has remained a troublesome medical and social concern for individuals, physicians, government, and other organizations. No consistent physical findings or laboratory abnormalities have yet been found to differentiate MCS/IEI patients from the remainder of the population. A number of MCS/IEI patients also have reported multiple adverse reactions to not only chemicals and food, but also alcohol and microwaves. The pathological or psychological mechanisms that may contribute to the development and maintenance of this disorder have still not been definitively elucidated. As for the prevalence of MCS/IEI, severe symptoms associated with MCS/IEI were reported in 4–6% of the general population, and it is predominantly middle-aged females. There was a higher prevalence of physical and sexual abuse among a cohort of women who reported chemically related illness than in a control group of subjects with chronic medical or psychological disorders. A causal connection between environmental chemicals, food, and/or drugs and the patients' symptoms continues to be speculative and cannot be based on the results of currently published scientific studies.

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