

Multiple chemical sensitivity—is the environment really to blame?

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The American Academy of Allergy, Asthma and Immunology¹ has reaffirmed its doubts about the scientific status of what is known as multiple chemical sensitivity (MCS). Yet despite a long line of such authoritative rejections^{2–4} MCS continues to gain in popularity, political support and media attention. The emergence of MCS followed reports of a multitude of symptoms triggered by exposure to substances in the environment^{5–9}. These substances include synthetic fabrics, food additives, paints and pesticides. Other labels for multiple chemical sensitivity are listed in Box 1.

The characteristic feature of multiple chemical sensitivity is that the reported symptoms are unaccompanied by physical signs or biomedical test abnormalities¹⁰. Nevertheless the symptoms (Box 2) are usually attributed to immunological or neurological dysfunction caused by environmental toxins.

The status of this illness is viewed with scepticism by many physicians^{11,12} but a report commissioned by the UK Health and Safety Executive¹³ is less dismissive. Although the authors note the paucity of objective evidence, they comment that ‘the available evidence seems most strongly to support a physical mechanism involving sensitization of part of the midbrain known as the limbic system.’ In addition, an increasing number of doctors known as clinical ecologists or environmental physicians have based their practice on MCS, particularly in the USA. Indeed, the controversy has reached the political arena with interested parties attempting to stifle research findings inconsistent with their aims¹⁴. Research in chemical sensitivity has focused on the development of immunological or neurophysiological theories offering a pathophysiological basis for the syndrome or on a quest for psychological morbidity amongst these patients. What was missing until lately was a perspective taking account of the historical and cultural context of the condition. This deficiency was remedied by Shorter, who in an elegant review¹⁵ traced the development of clinical ecology in the USA. The principal advocate was a Chicago-based allergist, Randolph, who diagnosed MCS in his wife and in several colleagues. He

Box 1 Other labels for multiple chemical sensitivity

<i>Environmental illness</i>
<i>Ecologic illness</i>
<i>20th century disease</i>
<i>Total allergy syndrome</i>
<i>Chemical AIDS</i>
<i>Cerebral allergy</i>
<i>Systemic candidiasis</i>

Box 2 Symptoms of multiple chemical sensitivity

<i>Fatigue</i>	<i>Rhinitis</i>
<i>Malaise</i>	<i>Insomnia</i>
<i>Headache</i>	<i>Dyspnoea</i>
<i>Lack of concentration</i>	<i>Depression</i>
<i>Memory loss</i>	<i>Anxiety</i>

prescribed avoidance of numerous substances as well as a range of other treatments. Randolph and his many followers attracted considerable criticism, particularly from the American College of Allergists, and in 1966 they formed themselves into the independent Society for Clinical Ecology, since renamed the American Academy of Environmental Medicine. Clinical ecology was initially confined to North America but today, propelled by media interest and the enthusiastic acceptance of a population seeking alternatives to orthodox medicine, it is spreading further afield.

MULTIPLE CHEMICAL SENSITIVITY AND OTHER ILLNESSES

MCS encompasses a heterogeneous population with the common feature that patients attribute their symptoms to substances in the environment. The symptoms of MCS, like those of illnesses such as fibromyalgia, chronic fatigue syndrome and sick-building syndrome¹⁶, are non-specific and commonly found in the general community. For most individuals they are of short duration and although troublesome they do not lead to consultation¹⁷. A small proportion of patients, however, complain of persistent multiple symptoms which cause disability and are associated

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with psychological morbidity. These symptoms often remain medically unexplained, lacking objective physical findings. In contrast to other disorders, particularly chronic fatigue syndrome^{18,19}, MCS has been little studied in terms of patients' health beliefs and illness attributions, but the limited work so far suggests that this aspect of the disorder may be important in both its development and its management^{20,21}. Environmental issues, as reflected in newspaper headlines and other media, are at present causing widespread anxiety and exposure to chemicals in domestic or occupational settings is not the only focus of attention. Radiation from visual display units and power lines²², dental amalgam fillings²³, and silicone breast implants have also been accused of damaging health; clearly, MCS should not be viewed in isolation.

EPIDEMIOLOGY

The lack of a widely accepted definition remains problematic. Cullen¹⁰ proposed the following definition of MCS:

- Initial symptoms acquired in relation to identifiable environmental exposure
- Symptoms involving more than one organ system
- Symptoms recurring and abating in response to predictable stimuli
- Symptoms elicited by low level exposures to chemicals of diverse structural classes
- Symptoms unexplained by any standard test of organ system function.

Prevalences as high as 4–6% have been reported in the general population¹⁶ but the inconsistent use of terminology does not allow confidence in the validity of these figures. A preponderance of women with the disorder (70–80%) and above-average levels of education may reflect the recruitment of study populations from specialist (e.g. allergy) clinics. These clinic attenders are unlikely to be a representative sample of the general population¹⁶. Two questionnaire surveys of Gulf War veterans reveal a striking contrast in the self-reported prevalence of chemical sensitivity—5% in US veterans²⁴, 0.8% in UK veterans²⁵, suggesting that awareness of MCS in the UK lags behind that in the USA. Cullen's requirement of identifiable exposure¹⁰ is often neglected in published work. So, how well does the historical and geographical occurrence of MCS fit in with chemical exposure? Synthetic chemicals have been present in the environment for at least a hundred years yet the attribution of these symptoms to low-level chemical exposure is much more recent. In the published work⁸ MCS sufferers are predominantly

white-collar workers, who we might expect to have lower rates of exposure to solvents, pesticides and so on than the blue-collar workforce. Also, descriptions of MCS have been largely confined to developed countries with relatively strict environmental controls. In comparison, in the developing world and the former Eastern bloc chemical production has occurred with little regulation.

THEORIES OF CAUSATION

The search for the origins of MCS has divided researchers, with a split between adherents to a 'physiological' explanation and those who invoke psychological factors. Amongst the clinical ecology community the initial focus was upon specific allergies to foodstuffs and other substances¹². As methods of immunological testing became more sophisticated so did explanations for cause, although the primary hypothesis remains one of immune dysregulation precipitated by exposure to chemicals: the immune system is believed to have a fixed, limited capacity ('total body burden') to cope with a given quantity of antigen⁶. Publications supporting these theories have been criticized for methodological shortcomings and the lack of demonstrable consistent abnormalities^{3,12,26}. Furthermore, investigators who have used conventional testing methods have repeatedly failed to demonstrate immunological deficiency in these patients. More recently a neurological model of MCS has been described which involves sensitization of the 'olfactory-hypothalamic-limbic' network by odorant chemicals²⁷. Again, persuasive experimental data in support of this hypothesis is lacking. Bell and colleagues have produced much of this work but most of their studies have involved patients with cacosmia (a general sensitivity to odours) rather than MCS specifically²⁸.

Several studies have focused on the presence of psychological morbidity in patients with MCS, and they too have been criticized for poor design—for example, selection of patients referred to psychiatric clinics, or the use of inadequate controls^{5,7,9,26,29}. Simon *et al.*²⁶ tried to avoid these shortcomings by looking at patients attending a community allergy clinic and using patients with musculoskeletal injuries as controls. They demonstrated a greater prevalence of psychiatric disorder in MCS patients (higher scores for depression and anxiety) as well as a higher prevalence of medically unexplained symptoms. Immunological and neuropsychological investigations revealed no differences between cases and controls. Clearly the higher psychological morbidity associated with multiple chemical sensitivity does not establish cause and it is noteworthy that a substantial proportion of MCS patients show no significant psychological distress. However, patients with MCS are more likely than controls to have had medically unexplained

physical symptoms before the onset of their current illness; thus, illness beliefs and attributions may have a role in the development of their symptoms. As well as affective disorders, somatoform disorders feature prominently amongst psychiatric diagnoses in MCS patients^{9,26,30}. Many patients meet the diagnostic criteria for panic disorder and in small case-series various behavioural treatments have proved effective^{31,32}.

Investigators who highlighted the association of depression and anxiety disorders with MCS came under angry attack, including calls for this sort of research to be stopped¹⁴—an illustration of the continuing stigmatization of psychological disorders as well as the persistence of mind–body dualism. Mayou *et al.*³³ have emphasized the limitations of current classification systems, and propose that a multidimensional system taking account of the patient's illness beliefs, behaviour, physiological disturbance and mental state would be more helpful.

MANAGEMENT

The mainstay of treatment provided by clinical ecologists is the avoidance of offending chemicals. This has led to the development of 'safe-rooms' and even 'ecology houses'—residential units that are free of plastics and other synthetic materials, with filtering systems to cleanse incoming air. Provocation-neutralization is a method of assessment and treatment advocated by clinical ecologists³. This entails progressively higher doses of a supposed environmental trigger (sublingually or intradermally) until the patient complains of symptoms. Then a 'neutralizing' dose is identified at which symptoms are eliminated, and the patient is advised that the treatment may have to be repeated. Although there are many anecdotal reports on these treatments, controlled studies are notably lacking^{3,12}. Nor are they without hazards: first, they can result in extreme social and nutritional deprivation; secondly, there is the missed opportunity for effective treatment. In the absence of evidence-based specific treatments for MCS, a pragmatic approach³⁴ would involve a broad assessment of the patient with appropriate investigation, treatment of any psychiatric disorder and guidance that promotes physical and social functioning rather than withdrawal into a life of worsening disability. Clinicians must acknowledge the reality of patients' complaints if a constructive relationship is to be maintained; and patients will often willingly discuss the emotional factors in their illness if they feel their symptoms are being taken seriously. The extent to which medically unexplained symptoms should be investigated requires careful thought since a continued pursuit of unproductive tests will reinforce the patient's belief that organic disease is present. The emphasis upon recognizing psychiatric illness is justified by the prevalence of anxiety

and depression in the MCS population, its effect on functioning and the availability of treatment. Treatment may range from basic advice on stress management and relaxation training to psychotropic drugs for those with more severe symptoms. Cognitive behavioural therapy has proved effective in chronic fatigue syndrome and there are some indications of efficacy in MCS^{21,32}. This treatment involves focusing upon illness beliefs and avoidant behaviour, with graded exposure to the suspected triggers. Controlled trials are now necessary.

CONCLUSIONS

MCS remains an ill-defined and poorly understood syndrome. Existing evidence does not favour an immunological or neurological basis and knowledge gained in other medically unexplained syndromes such as chronic fatigue syndrome should prove of value. The role of psychological factors has been repeatedly demonstrated although, in this heterogeneous group of patients, a straightforward psychological cause is unlikely³⁵. More work is needed on the role of patients' health beliefs and their attribution of symptoms to the environment. Another object for consideration is the role of medical professionals in both initiating and perpetuating this disorder¹¹. This particularly applies to modes of treatment. An essential part of the doctor's role, according to Hippocrates, is to 'follow that system or regimen which, according to my ability and judgment, I consider for the benefit of my patients, and abstain from whatever is deleterious and mischievous'. A recommendation to withdraw from twentieth century life can have disastrous consequences in a vulnerable patient.

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