

Case Definitions for Multiple Chemical Sensitivity¹

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A wide array of names has been applied to the syndromes suffered by patients with heightened reactivity to chemicals (Table 1). Each name has specific implications regarding the underlying cause, mechanism, or manifestations of the disease, and they overlap. A major hindrance in achieving scientific respectability has been the difficulty in agreeing upon a definition for this condition (or conditions). It should be realized that no single case definition, even if agreed upon in one context—e.g., for diagnosis purposes—will suffice for use in other contexts. It is important to distinguish case definitions for use in diagnosis, epidemiological studies, research on the nature of the condition, regulatory standard-setting, compensation awards, and situations requiring alternative employment or housing. The social and political consequences of the use of a particular definition in a specific context requires the case definition to be carefully constructed.

Cullen (1987b) has emphasized the importance of establishing a uniform case definition before meaningful epidemiologic studies can be undertaken, but cautions, "However constructed, the goal of descriptive studies must be refinement of the diagnostic criteria, in particular the very tentative boundaries with other diagnostic entities such as allergic, anxiety, panic and post-traumatic stress disorders, and physiologic sequelae of central nervous system (CNS) intoxication or injury, especially by organic solvents." He acknowledges possible overlap among these entities and offers the following case definition: Multiple chemical sensitivities (MCS) is an acquired disorder characterized by current symptoms, referable to multiple organ systems, occurring in response to demonstrable exposure to many chemically unrelated compounds at doses far below those established in the general population to cause harmful effects. No single widely accepted test of physiologic function can be shown to correlate with symptoms. (Cullen 1987a)

This case definition, intended for epidemiological use, is intentionally narrow. Cullen

¹ Excerpted in part from N.A. Ashford and C.S. Miller, *Chemical Exposures: Low Levels and High Stakes*, Van Nostrand Reinhold, New York 1991.

TABLE 1

Cause	Mechanism	Effect
Environmentally induced illness	Immunologic illness Immunotoxicity	Multiple chemical sensitivities (MCS)
Chemically induced (or acquired) hypersusceptibility	Immune dysfunction	Multiple chemical sensitivity syndrome
Chemically acquired immune deficiency syndrome (chemical AIDS)	Immune dysregulation	Chemical hypersensitivity syndrome
The petro-chemical problem	Conditioned odor response	Universal allergy
	Fear/anxiety	20th-century illness
	Mass psychogenic illness	Total allergy syndrome
	Various psychiatric disorders	Environmental allergy or illness
		Cerebral allergy
	Environmental maladaptation syndrome	
	Food and chemical sensitivity	

This case definition, intended for epidemiological use, is intentionally narrow. Cullen excludes persons who react to substances no one else is aware of on the basis that such individuals may be delusional and excludes persons who have bronchospasm, vasospasm, seizures, or "any other reversible lesion" that can be identified and specifically treated. Clinical ecologists, however, would argue that persons with bronchospasm, vasospasm, seizures, and other illnesses excluded by Cullen may well have the chemical sensitivity problem. Each issue of the clinical ecologists' journal, *Clinical Ecology*, contains the following definition:

Ecologic illness is a chronic multi-system disorder, usually polysymptomatic, caused by adverse reactions to environmental incitants, modified by individual susceptibility and specific adaptation. The incitants are present in air, water, food, drugs and our habitat.

Although the patients the clinical ecologists and Cullen see are demographically divergent, the definitions of their illnesses are remarkably alike. Both describe the chemically sensitive patient in similar terms. [See Miner and Ashford, "Allergy and Multiple Chemical Sensitivity (MCS) Distinguished" in this report for a discussion of sensitive populations.]

However, what is sorely needed is an objective test that can be applied in each individual case to determine, incontrovertibly, whether a particular person has multiple chemical sensitivities.

Given the multitude of environmental exposures (both chemical and food) that allegedly can result in a seemingly endless array of physical and mental syndromes and the frequent absence of findings on routine physical examination, the practitioner who sees these patients with their divergent and unfamiliar litany of complaints is at great disadvantage in trying to diagnose the condition.

To circumvent this problem, we propose the following operational definition of multiple chemical sensitivity for diagnostic purposes, a definition that is based upon environmental testing:

The patient with multiple chemical sensitivities can be discovered by removal from the suspected offending agents and by rechallenge, after an appropriate interval, under strictly controlled environmental conditions. Causality is inferred by the clearing of symptoms with removal from the offending environment and recurrence of symptoms with specific challenge.

Challenges conducted for research purposes should be performed in a double-blind, placebo-controlled manner.

This operational definition is essential to resolving, once and for all, the debate about whether an individual's symptoms are or are not environmentally induced. An environmental unit is necessary for scientific validation of the concept of chemical sensitivity. Because of the expense and time required by patients and physicians alike, we are not arguing that the unit be used for all patients. Such stringent measures are not necessary for most patients. For severe cases, however, no alternative is available at present, and only from firsthand observation of hospitalized patients can physicians have the opportunity to understand this illness better. In time, as more clinical data on these patients accumulate, physicians may be able to diagnose this disorder on the basis of the patient's history and a few key laboratory tests. For now, reliance must be placed on rigorous study in an environmental unit. Ultimately a phenomenological definition may emerge that allows physicians to diagnose, at least tentatively, chemical sensitivity based on a history of a specific sensitizing event (such as a pesticide exposure) followed by evidence of chemical and food sensitivities, multisystem effects, improvement after avoidance of exposure, and similar experiences of persons with like histories.

Criteria for the selection of cases *for research purposes* are:

- Sensitivity to chemicals, i.e., symptoms or signs related to chemical exposures at levels tolerated by the population at large that is distinct from such well recognized hypersensitivity phenomena as IgE-mediated immediate hypersensitivity reactions, contact dermatitis, and hypersensitivity pneumonitis.
- Sensitivity, expressed as symptoms and signs, in one or more organ systems.
- Symptoms and signs that wax and wane with exposures. It is not necessary to identify a chemical exposure associated with the onset of the condition. Preexistent or concurrent conditions, e.g. asthma, arthritis, somatization disorder or depression, should not exclude patients from consideration.

The selection of subjects for research protocols should depend on the specific hypotheses to be tested. Identifiable populations should include but not be restricted to:

- Symptom or sign based: Patients with reactivity to environmental chemicals, either through self-reporting or meeting case selection criteria.
- Disease based: Patients with specific disease that are suspected to be caused by or exacerbated by chemical exposures.
- Exposure based: Groups characterized by a common exposure, such as workers at a specific factory, occupants of a particular building, or residents of a contaminated community.
- Population based: Groups such as school children or a random community sample.

Appropriate comparison groups should be chosen in each case.

Whatever case definitions emerge for diagnostic or research purposes, decisions concerning "safe levels" of chemical exposure for regulatory standard-setting, criteria of eligibility for disability awards under workers' compensation or social security, and criteria of eligibility for alternative employment or housing ultimately need to be based on suitable definitions. These definitions should be expected to differ in exactness and stringency, and may be in flux until more research results are obtained.

REFERENCES

- Cullen, M., "The Worker with Multiple Chemical Sensitivities: An Overview." In: Cullen, M. (ed.) Workers with Multiple Chemical Sensitivities, Occupational Medicine: State of the Art Reviews (1987a), Hanley and Belfus, Philadelphia, 2(4):655-662.
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