

Research on Multiple Chemical Sensitivity (MCS)

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This document lists citations for peer-reviewed journal articles that support a physiological basis for MCS.

Abdel-Rahman A., Shetty A.K., Abou-Donia M.B. 2002. Disruption of the blood-brain barrier and neuronal cell death in cingulate cortex, dentate gyrus, thalamus, and hypothalamus in a rat model of Gulf-War syndrome. *Neurobiology of Disease* 10(3): 306-26.

Abel-Rahman A., Abou-Donia S., El-Masry E., Shetty A., Abou-Donia M. 2004. Stress and combined exposure to low doses of pyridostigmine bromide, DEET, and permethrin produce neurochemical and neuropathological alteration in cerebral cortex, hippocampus, and cerebellum. *Journal of Toxicology and Environmental Health Part A* 67(2): 163-92.

Abdel-Rahman A., Dechkovskaia A.M., Goldstein L.B., Bullman S.H., Khan W., El-Masry E.M., Abou-Donia M.B. 2004. Neurological deficits induced by malathion, DEET, and permethrin, alone or in combination in adult rats. *Journal of Toxicology and Environmental Health Part A* 67(4): 331-56.

Abou-Donia M.B. 2003. Organophosphorus ester-induced chronic neurotoxicity. *Archives of Environmental Health* 58(8): 484-97.

Abou-Donia M.B., Wilmarth K.R., Abdel-Rahman A.A., Jensen K.F., Oehme F.W., Kurt T.L. 1996. Increased neurotoxicity following concurrent exposure to pyridostigmine bromide, DEET, and chlorpyrifos. *Fundamentals of Applied Toxicology* 34(2): 201-22.

Abou-Donia M.B., Dechkovskaia A.M., Goldstein L.B., Shah D.U., Bullman S.L., Khan W.A. July 2002. Uranyl acetate-induced sensorimotor deficit and increased nitric oxide generation in the central nervous system in rats. *Pharmacology, Biochemistry, and Behavior* 72(4): 881-90.

Abou-Donia M.B., Dechkovskaia A.M., Goldstein B., Abdel-Rahman A., Bullman S.L., Khan W.A. 2004. Co-exposure to pyridostigmine bromide, DEET, and/or permethrin causes sensorimotor deficit and alterations in brain acetylcholinesterase activity. *Pharmacology, Biochemistry, and Behavior* 77(2): 253-62.

Abu-Qare A.W., Abou-Donia M.B. 2001. Combined exposure to sarin pyridostigmine bromide increased levels of rat urinary 3-nitrotyrosine and 8-hydroxy-2'-deoxyguanosine, biomarkers of oxidative stress. *Toxicology Letters* 123(1): 51-58.

Abu-Qare A.W., Abou-Donia M.B. 2001. Biomarkers of apoptosis: release of cytochrome c, activation of caspase-3, induction of 8-hydroxy-2'-deoxyguanosine, increased 3-nitrotyrosine, and alteration of p53 gene. *Journal of Toxicology and Environmental Health Part B, Critical Reviews* 4(3): 313-32.

Abu-Qare A.W., Abou-Donia M.B. 2008. In vitro metabolism and interactions of pyridostigmine bromide, N,N-diethyl-m-toluamide, and permethrin in human plasma and liver microsomal enzymes. *Xenobiotica* 38(3): 294-313.

Anderson R.C., Anderson J.H. 1999. Sensory irritation and multiple chemical sensitivity. *Toxicology and Industrial Health* 15(3-4): 339-45.

Ashford N.A. 1999. Low-level chemical sensitivity: implications for research and social policy. *Toxicology and Industrial Health* 15(3-4): 421-47.

Baldwin C.M. and Bell I.R. 1998. Increased cardiopulmonary disease risk in a community-based sample with chemical odor intolerance: implications for women's health and health-care utilization. *Archives of Environmental Health* 1998 53(5): 347-53.

Baldwin C.M., Bell I.R., O'Rourke M.K. 1999. Odor sensitivity and respiratory complaint profiles in a community-based sample with asthma, hay fever, and chemical odor intolerance. *Toxicology and Industrial Health* 15(3-4): 403-9.

Bascom R., Meggs W.J., Framptom M., Hudnell K., Kilburn K., Kobal G., Medinsky M., Rea W. 1997. Neurogenic inflammation: with additional discussion of central and perceptual integration of nonneurogenic inflammation. *Environmental Health Perspective* 105 (Suppl. 2): 531-37.

Bell I.R., Miller C.S., and Schwartz G.E. 1992. An olfactory-limbic model of multiple chemical sensitivity syndrome: possible relationships to kindling and affective spectrum disorders. *Biological Psychiatry* 32(3): 218-42.

Bell I.R., Warg-Damiani L., Baldwin C.M., Walsh M.E., Schwartz G.E. 1998. Self-reported chemical sensitivity and wartime chemical exposures in Gulf War veterans with and without decreased global health ratings. *Military Medicine* 163(11): 725-32.

Bell I.R., Schwartz G.E., Peterson J.M. and Amend D. 1993. Self-reported illness from chemical odors in young adults without clinical syndromes or occupational exposures. *Archives of Environmental Health*. 48(1): 6-13.

Bell I.R., Schwartz G.E., Baldwin C.M., Hardin E.E. 1996. Neural sensitization and physiological markers in multiple chemical sensitivity. *Regulatory Toxicology and Pharmacology* 24(1), pt. 2: S39-S47.

- Bell I.R., Baldwin C.M., Schwartz G.E.R. 2001. Sensitization studies in chemically intolerant individuals: implications for individual difference research. *Annals of the New York Academy of Sciences* 933:38-47.
- Brandt-Rauf P.W., Andrews L.R., Schwarz-Miller J. 1991. Sick-hospital syndrome. *Journal of Occupational Medicine* 33(6): 737-39.
- Bronstein A.C. 1995. Multiple chemical sensitivities—new paradigm needed. *Journal of Toxicology: Clinical Toxicology* 33(2): 93-94.
- Brooks S.M., Weiss M.A., Bernstein I.L. 1985. Reactive airways dysfunction syndrome. Case reports of persistent airways hyperreactivity following high-level irritant exposures. *Journal of Occupational Medicine* 27(7): 473-76.
- Brown-DeGagne A.M., McGlone J. 1999. Multiple chemical sensitivity: a test of the olfactory- limbic model. *Journal of Occupational and Environmental Medicine* 41(5): 366-77.
- Buchwald D., Garrity D. 1994. Comparison of patients with chronic fatigue syndrome, fibromyalgia, and multiple chemical sensitivities. *Archives of Internal Medicine* 154(18): 2049-53.
- Caress S.M., Steinemann A.C. 2003. A review of a two-phase population study of multiple chemical sensitivities. *Environmental Health Perspectives* 111(12): 1490-97.
- Caress S.M., Steinemann A.C. 2004. Prevalence of multiple chemical sensitivities: A population-based study in the southeastern United States. *American Journal of Public Health* 94(5): 746-47.
- Caress S.M., Steinemann A.C. 2009. Prevalence of fragrance sensitivity in the American population. *Journal of Environmental Health* 71(7): 46-50.
- Caress S.M., Steinemann A.C. 2009. Asthma and chemical hypersensitivity: prevalence, etiology, and age of onset. *Toxicology and Industrial Health* 25(1): 71-78.
- Caress S.M., Steinemann A.C. 2004. A national population study of the prevalence of multiple chemical sensitivity. *Archives of Environmental Health* 59(6): 300-305.
- Caress S.M., Steinemann A.C. 2005. National prevalence of asthma and chemical hypersensitivity: an examination of potential overlap. *Journal of Occupational and Environmental Medicine* 47(5): 518-22.
- Caress S.M., Steinemann A.C., Waddick C. 2002. Symptomatology and etiology of multiple chemical sensitivities in the southeastern United States. *Archives of Environmental Health* 57(5): 429-36.
- Davidoff A.L., Keyl P.M., Meggs W.J. 1998. Development of multiple chemical sensitivities in laborers after acute gasoline fume exposure in an underground tunneling operation. *Archives of Environmental Health* 53(3):183-89.

DeRosa C.T., Hicks H.E., Ashizawa A.E., Pohl H.R., Mumtaz M.M. 2006. A regional approach to assess the impact of living in a chemical world. *Annals of the New York Academy of Sciences* 1076:829-38.

Donnay A.H. 1999. On the recognition of multiple chemical sensitivity in medical literature and government policy. *International Journal of Toxicology* 18(6): 383-92.

Elberling J., Linneberg A., Dirksen A., Johansen J.D., Frølund L., Madsen F., et al. 2005. Mucosal symptoms elicited by fragrance products in a population-based sample in relation to atopy and bronchial hyper-reactivity. *Clinical and Experimental Allergy* 35(1): 75-81.

Farrow A., Taylor H., Northstone K., Golding J. 2003. Symptoms of mothers and infants related to total volatile organic compounds in household products. *Archives of Environmental Health* 58(10): 633-41.

Fernandez M., Bell I.R., Schwartz G.E. 1999. EEG sensitization during chemical exposure in women with and without chemical sensitivity of unknown etiology. *Toxicology and Industrial Health* 15(3-4): 305-12.

Gibson P.R., Elms A.N., Ruding L.A. 2003. Perceived treatment efficacy for conventional and alternative therapies reported by persons with multiple chemical sensitivity. *Environmental Health Perspectives* 111(12): 1498-1504.

Gilbert M.E. 1995. Repeated exposure to lindane leads to behavioral sensitivities and facilitates electrical kindling. *Neurotoxicology and Teratology* 17(2): 131-41.

Greene G.J., Kipen H.M. 2002. The vomeronasal organ and chemical sensitivity: a hypothesis. *Environmental Health Perspectives* 110 (Suppl 4): 655-61.

Haley R.W., Billecke S., La Du B.N. 1999. Association of low PON1 type Q (type A) arylesterase activity with neurologic symptoms complexes in Gulf War veterans. *Toxicology and Applied Pharmacology* 157(3): 227-33.

Heuser G., Mena I., Alamos F. 1994. NeuroSPECT findings in patients exposed to neurotoxic chemicals. *Toxicology and Industrial Health* 10: 561-71.

Jammes Y., DelPierre S., DeVolgo M.J., Humbert-Tena C., Burnet, H. 1998. Long-term exposure of adults to outdoor air pollution is associated with increased airway obstruction and higher prevalence of bronchial hyperresponsiveness. *Archives of Environmental Health* 53(6): 372-77.

Johansson A., Löwhagen O., Millqvist E., Bende M. 2002. Capsaicin inhalation test for identification of sensory hyperreactivity. *Respiratory Medicine* 96(9): 731-35.

Joffres M.R., Sampalli T., Fox R.A. 2005. Physiologic and symptomatic responses to low-level substances in individuals with and without chemical sensitivities; a randomized controlled blinded pilot booth study. *Environmental Health Perspectives* 113(9): 1178-83.

- Kelly K.J., Prezant D.J. 2005. Bronchial hyperreactivity and other inhalation lung injuries in rescue/recovery workers after the world trade center collapse. *Critical Care Medicine* 33 (Suppl 1): S102-S106.
- Kilburn K.H. 2003. Effects of hydrogen sulfide in neurobehavioral function. *Southern Medical Journal* 90(10): 997-1106.
- Kilburn K.H. 1999. Measuring the effects of chemicals in the brain. *Archives of Environmental Health* 54(3): 150.
- Koch F., Hughes J.M. 1998. Perioperative care of environmentally sensitive patients. *AORN Journal* 68(3): 375-82.
- Lax M.B., Henneberger P.K. 1995. Patients with multiple chemical sensitivities in an occupational health clinic: presentation and follow-up. *Archives of Environmental Health* 50(6): 425-31.
- Lieberman A.D., Craven M.R. 1998. Reactive Intestinal Dysfunction Syndrome (RIDS) caused by chemical exposures. *Archives of Environmental Health* 53(5): 354-58.
- LoVecchio F., Fulton S.E. 2001. Ventricular fibrillation following inhalation of Glade Air Freshener. *European Journal of Emergency Medicine* 8(2): 153-54.
- Mackness B., Durrington P.N., Mackness M.I. 2000. Low paraoxonase in Persian Gulf War Veterans self-reporting Gulf War Syndrome. *Biochemical and Biophysical Research Communications* 276(2): 729-33.
- MacPhail R.C. 2001. Episodic exposures to chemicals: What relevance to chemical intolerance? *Annals of the New York Academy of Sciences* 933:103-11.
- McKeown-Eyssen G., Baines C., Cole D.E.C., Riley N., Tyndale R.F., Marshall L, Jazmaji V. 2004. Case-control study of genotypes in multiple chemical sensitivity: CYP2D6, NAT1, NAT2, PON1, PON2 and MTHFR. *International Journal of Epidemiology* 33(5): 971-78.
- McKeown-Eyssen G.E., Baines C.J., Marshall L.M., Jazmaji V., Sokoloff E.R. 2001. Multiple chemical sensitivity: Discriminant validity of case definitions. *Archives of Environmental Health* 56(5): 406-12.
- Meggs W.J., Cleveland C.H. Jr. 1993. Rhinolaryngoscopic examination of patients with the multiple chemical sensitivity syndrome. *Archives of Environmental Health* 48(1): 14-18.
- Meggs W.J., Dunn K.A., Bloch R.M., Goodman P.E., Davidoff A.L. 1996. Prevalence and nature of allergy and chemical sensitivity in a general population. *Archives of Environmental Health* 51(4): 275-82.

- Meggs W.J. 1993. Neurogenic inflammation and sensitivity to environmental chemicals. *Environmental Health Perspectives* 101(3): 234-38.
- Meggs W.J. 1995. Neurogenic switching: a hypothesis for a mechanism for shifting the site of inflammation in allergy and chemical sensitivity. *Environmental Health Perspectives* 103: 54-56.
- Meggs W.J. 1999. Mechanisms of allergy and chemical sensitivity. *Toxicology and Industrial Health* 15(3): 331-38.
- Meggs W.J. 1997. Hypothesis for induction and propagation of chemical sensitivity based on biopsych studies. *Environmental Health Perspectives* 105 (Suppl 2): 473-78.
- Meggs W.J. 1994. RADS and RUDS—the toxic induction of asthma and rhinitis. *Clinical Toxicology* 32(5): 487-501.
- Meggs W.J. 1995. Multiple chemical sensitivities—chemical sensitivity as a symptom of airway inflammation. *Journal of Toxicology. Clinical Toxicology* 33(2): 107-10.
- Miller C.S., Gammage R.B., Jankovic J.T. 1999. Exacerbation of chemical sensitivity: a case study. *Toxicology and Industrial Health* 15(3-4): 398-402.
- Miller C., Ashford N., Doty R., Lamielle M. Otto D., Rahill A., Wallace L. 1997. Empirical approaches for the investigation of toxicant-induced loss of tolerance. *Environmental Health Perspectives* 102 (Suppl 2): 515-19.
- Miller C.S. and Mitzel H.C. 1995. Chemical sensitivity attributed to pesticide exposure versus remodeling. *Archives of Environmental Health* 50(2): 119-29.
- Miller C.S. and Prihoda T.J. 1999. The Environmental Exposure and Sensitivity Inventory (EESI): a standardized approach for measuring chemical intolerances for research and clinical applications. *Toxicology and Industrial Health* 15(3/4): 370-85.
- Miller C.S. 2001. The compelling anomaly of chemical intolerance. *Annals of the New York Academy of Sciences* 933:1-23.
- Miller C.S., Prihoda T.J. 1999. A controlled comparison of symptoms and chemical intolerances reported by Gulf War veterans, implant recipients, and persons with multiple chemical sensitivity. *Toxicology and Industrial Health* 15(3/4): 386-97.
- Miller C.S. 1999. Are we on the threshold of a new theory of disease? Toxicant-induced loss of tolerance and its relationship to addiction and abidction. *Toxicology and Industrial Health* 15(3/4): 284-94.
- Miller C.S. 1992. Possible models for multiple chemical sensitivity: conceptual issues and the role of the limbic system. *Toxicology and Industrial Health* 8(4): 181-90.

- Miller C.S. 1996. Chemical sensitivity: symptom, syndrome or mechanism for disease? *Toxicology* 111(1-3): 69-86.
- Miller C.S. 1997. Toxicant-induced loss of tolerance—an emerging theory of disease? *Environmental Health Perspectives* 105 (Suppl 2): 445-53.
- Miller C.S. 2001. Toxicant-induced loss of tolerance. *Addiction* 96(1): 115-39.
- Millqvist E., Bengtsson U., Lowhagen O. 1999. Provocations with perfume in the eyes induce airway symptom in patients with sensory hyperreactivity. *Allergy* 54(5): 495-99.
- Millqvist E. 2005. Changes in levels of nerve growth factor in nasal secretions after capsaicin inhalation in patients with airway symptoms from scents and chemicals. *Environmental Health Perspectives* 113(7): 849-52.
- Österberg K., Ørbæk P., Karlson B., Åkesson B., Bergendorf U. 2003. Annoyance and performance during the experimental chemical challenge of subjects with multiple chemical sensitivity. *Scandinavian Journal of Work, Environment and Health* 29(1): 40-50.
- Overstreet D.H., Djuric V. 2001. A genetic rat model of cholinergic hypersensitivity: implications for chemical intolerance, chronic fatigue, and asthma. *Annals of the New York Academy of Sciences* 933:92-102.
- Pall M.L. 2002. NMDA sensitization and stimulation by peroxynitrite, nitric oxide, and organic solvents as the mechanism of chemical sensitivity in MCS. *The FASEB Journal* 16(11): 1407-17.
- Pall M.L. 2003. Elevated nitric oxide/peroxynitrite theory of multiple chemical sensitivity: central role of N-methyl-D-aspartate receptors in the sensitivity mechanism. *Environmental Health Perspectives* 111(12): 1461-64.
- Pall M.L., Anderson J.H. 2004. The vanilloid receptor as a putative target of diverse chemicals in multiple chemical sensitivity. *Archives of Environmental Health* 59(7): 363-75.
- Pall M.L. 2007. Nitric oxide synthase partial uncoupling as a key switching mechanism for the NO/ONOO-cycle. *Medical Hypotheses* 69(4): 821-25.
- Pall M.L. 2001. Common etiology of posttraumatic stress disorder, fibromyalgia, chronic fatigue syndrome and multiple chemical sensitivity via elevated nitric oxide/peroxynitrite. *Medical Hypotheses* 57(2): 139-45.
- Pall M.L., Satterlee J.D. 2001. Elevated nitric oxide/peroxynitrite mechanism for the common etiology of multiple chemical sensitivity, chronic fatigue syndrome, and posttraumatic stress disorder. *Annals of the New York Academy of Sciences* 933:323-29.

Parkinson D.K., Bromet S., Cohen L.O., Dunn M.A., Dew C. 1990. Health effects of long-term solvent exposure among women in blue-collar occupations. *American Journal of Industrial Medicine* 17(6): 661-75.

Perhall K.E. 2003. Contact and chemical sensitivities in the hospital environment. *Otolaryngologic Clinics of North America* 36(5): 1021-34.

Rea W.J., Ross G.H. 1989. Food and chemicals as environmental incitants. *The Nurse Practitioner* 14(9): 17.

Rea W.J., Pan Y., Johnson A.R. 1991. Clearing of toxic volatile hydrocarbons from humans. *Boletín de la Asociación Médica de Puerto Rico* 83(7): 321-24.

Rea W.J., Ross G.H., Johnson A.R., Smiley R.E., Sprague D.E., Fenyves E.J., Samadi N. 1991. Confirmation of chemical sensitivity by means of double-blind inhalant challenge of toxic volatile chemicals. *Boletín de la Asociación Médica de Puerto Rico* 83(9): 389-93.

Rogers W.R., Miller C.S., Bunegin L. 1999. A rat model of neurobehavioral sensitization to toluene. *Toxicology and Industrial Health* 15(3-4): 356-69.

Ross G.H., Rea W.J., Johnson A.R., Hickey D.C., Simon T.R. 1999. Neurotoxicity in single photon emission computed tomography brain scans of patients reporting chemical sensitivities. *Toxicology and Industrial Health* 15(3-4): 415-20.

Ross G.H. 1997. Clinical characteristics of chemical sensitivity: an illustrative case history of asthma and MCS. *Environmental Health Perspectives* 105 (Suppl 2) 437-41.

Rossi J. 3rd. 1996. Sensitization induced by kindling and kindling-related phenomena as a model for multiple chemical sensitivity. *Toxicology* 111(1-3): 87-100.

Rowat S.C. 1998. Integrated defense system overlaps as a disease model: with examples for multiple chemical sensitivity. *Environmental Health Perspectives* 106 (Suppl 1): 85-109.

Schnakenberg E., Fabig K.-R., Stannula M., Stroble N., Lustig M., Fabig N., Schloot W. 2007. A cross-sectional study of self-reported chemical-related sensitivity is associated with gene variants of drug-metabolizing enzymes. *Environmental Health* 6:6-16.

Sykes R. 2006. Somatoform disorders in DSM-IV: mental or physical disorders? *Journal of Psychosomatic Research* 60(4): 341-44.

Ternesten-Hasseus E., Bende M., Millqvist E. 2002. CME: Increased capsaicin cough sensitivity in patients with multiple chemical sensitivity. *Journal of Occupational and Environmental Medicine* 44(11): 1012-17.

Thrasher J.D., Broughton A., Madison R. 1990. Immune activation and autoantibodies in humans with long-term inhalation exposure to formaldehyde. *Archives of Environmental Health* 45(4): 217-23.

Yu I.T., Lee N.L., Zhang X.H., Chen W.Q., Lam Y.T., Wong T.W. 2004. Occupational exposure to mixtures of organic solvents increases the risk of neurological symptoms among printing workers in Hong Kong. *Journal of Occupational and Environmental Medicine* 46(4): 323-30.

Zibrowski L.M., Robertson J.M. 2006. Olfactory sensitivity in medical laboratory workers occupationally exposed to organic solvent mixtures. *Occupational Medicine* 56(1): 51-54.

Ziem G. 1999. Profile of patients with chemical injury and sensitivity, part II. *International Journal of Toxicology* 18(6):401-9.

Ziem G., McTamney J. 1997. Profile of patients with chemical injury and sensitivity. *Environmental Health Perspectives* 105(Suppl 2): 417-36.

Appendix: Related Articles

Anderson R.C. and Anderson J.H. 1997. Toxic effects of air freshener emissions. *Archives of Environmental Health* 52(6): 433-41.

Anderson R.C. and Anderson J.H. 1998. Acute toxic effects of fragrance products. *Archives of Environmental Health* 53(2): 138-46.

Anderson R.C. and Anderson J.H. 2000. Respiratory toxicity of fabric softener emissions. *Journal of Toxicology and Environmental Health Part A* 60(2): 121-36.

Anderson R.C. and Anderson J.H. 1999. Acute respiratory effects of diaper emissions. *Archives of Environmental Health* 54(5): 353-58.

Anderson R. and Anderson J. 2003. Acute toxicity of marking pen emissions. *Journal of Toxicity and Environmental Health Part A* 66(9): 829-45.

Anderson R.C., Anderson J.H. 2000. Respiratory toxicity of mattress emissions in mice. *Archives of Environmental Health* 55(1): 38-43.

Anderson R.C. and Anderson J.H. 1999. Respiratory toxicity in mice exposed to mattress covers. *Archives of Environmental Health* 54(3): 202-9.

Bridges B. 2002. Fragrance: emerging health and environmental concerns. *Flavour and Fragrance Journal* 17(5): 361-71.

Brown A.E. 1999. Developing a pesticide policy for individuals with multiple chemical sensitivity: considerations for institutions. *Toxicology and Industrial Health* 15(3/4): 432-37.

Cooper S.D., Raymer J.H., Pellizzari E.D., Thomas K.W. 1995. The identification of polar organic compounds found in consumer products and their toxicological properties. *Journal of Exposure Analysis and Environmental Epidemiology* 5(1): 57-75.

Destailats H., Lunden M.M., Singer B.C., Coleman B.K., Hodgson A.T., Weschler C.J., Nazaroff W.W. 2006. Indoor secondary pollutants from household product emissions in the presence of ozone: a bench-scale chamber study. *Environmental Science and Technology* 40(14): 4421-28.

Duty S.M., Ackerman R.M., Calafat A.M., Hauser R. 2005. Personal care product use predicts urinary concentrations of some phthalate monoesters. *Environmental Health Perspectives* 113(11): 1530-35.

Muir T. and Zegarac M. 2001. Societal costs of exposure to toxic substances: economic and health costs of four case studies that are candidates for environmental causation. *Environmental Health Perspectives* 109 (Suppl 6): 885-903.

Steinemann A.C. 2009. Fragranced consumer products and undisclosed ingredients. *Environmental Impact Assessment Review* 29(1): 32-38.

Steinemann A. 2004. Human exposure, health hazards, and environmental regulations. *Environmental Impact Assessment Review* 24(7/8): 695-710.

Weschler C.J. 2009. Changes in indoor pollutants since the 1950s. *Atmospheric Environment* 43(1): 153-69.

Ziem G. 2005. Pesticide spraying and health effects. *Environmental Health Perspectives* 113(3): A150. (Letter to the editor)

Ziem G. 1999. Understanding patients with multiple chemical sensitivity. *American Family Physician* 59(8): 2101. (Letter to the editor)