EHAC · ASEC
Environmental Health Association of Canada
Association pour la Santé Environnementale du Canada

ASEQ EHAQ
Association pour la santé environnementale du Québec
Environmental Health Association of Québec

Summary

The MCS story: The science and resistance to change

John Molot, MD
Environmental Medicine. Adjunct Professor, Faculty of Medicine, University of Ottawa.

Dr. John Molot's presentation, delivered during the first day of the Resilience MCS Conference, offered a deeply informed and scientifically grounded exploration of Multiple Chemical Sensitivity (MCS), challenging long-held misconceptions and institutional resistance. Drawing on over two decades of clinical practice and scientific research, Dr. Molot framed MCS as a legitimate, biologically based health condition rooted in the body's physiological response to repeated exposure to environmental chemicals.

He explained that MCS is primarily a disorder involving receptor sensitivity, particularly through TRPV1 and TRPA1 channels. These receptors are proteins in our body which are responsible for detecting chemical threats in the environment. They are found in the respiratory, nervous, and immune systems, and become abnormally sensitized in individuals with MCS, leading to heightened responses to even low-level exposures. MCS may not be related to the olfactory system; instead, it involves the trigeminal and vagus nerve pathways, responsible for pain sensitivity, and involuntary bodily functions such as digestion, heart rate, and the immune system. A heightened sensitivity means that many individuals react to chemicals without actually detecting an odour. This distinction is critical to understanding the condition as physiological rather than psychological.

Dr. Molot highlighted a number of objective findings that validate MCS as a real condition. Nineteen studies have shown that MCS patients demonstrate hypersensitivity to capsaicin and acrolein, compounds commonly used in clinical tests to assess TRPV1 activity. In addition to receptor sensitization, functional brain imaging studies consistently reveal abnormal activity in brain areas related to emotional and sensory processing, including the amygdala, hippocampus, and prefrontal cortex, in response to chemicals. These findings suggest that MCS involves altered central nervous system processing, likely resulting from repeated exposures and consequent neural sensitization.

He also noted emerging research into genetic predispositions, particularly in detoxification pathways and TRP receptor genes. Genetic differences in detoxification may explain why some individuals cannot efficiently remove chemicals from their internal body systems, leading to heightened exposure, and greater sensitization. Although this work remains in early stages, it points to the likelihood that some individuals are genetically more vulnerable to environmental stressors. Combined with nutritional deficiencies or excessive exposure to indoor pollutants, these vulnerabilities can lead to chronic oxidative stress, a key mechanism identified as underpinning MCS. Oxidative stress is an inflammatory state which occurs due to ionic imbalance in the cells, and could lead to cell death.

Throughout his talk, Dr. Molot emphasized the pervasiveness of indoor air pollutants. With most people spending 90 percent of their time indoors, they are constantly exposed to volatile organic compounds (VOCs) emitted from building materials, furniture, cleaning products, and personal care items. These chemicals cross the blood-brain barrier within minutes and disrupt cellular processes, particularly in individuals whose detoxification systems are impaired or overwhelmed.

One of the most impactful elements of the presentation was Dr. Molot's critique of the medical establishment's long-standing dismissal of MCS. He invoked the Semmelweis Reflex, the tendency of institutions to reject new scientific ideas that conflict with prevailing norms. He drew historical parallels to the early rejection of germ theory. He noted that many pioneers of environmental medicine—such as Dr. Theron Randolph and Dr. Mark Cullen—faced ridicule for their work on chemical sensitivity. Despite growing scientific evidence, leading medical associations in the 1990s issued position statements declaring MCS unproven, often relying on outdated or biased information, which continues to be cited today.

Dr. Molot concluded by urging the medical and research communities to recognize the growing body of evidence and reframe MCS not as a fringe or psychosomatic condition, but as a legitimate disorder with measurable physiological and neurological markers. He called for a paradigm shift rooted in rigorous scientific testing, openness to new ideas, and the courage to question outdated institutional views. For Dr. Molot, the future of MCS research and treatment looks past denial, and is based on a genuine effort to understand and respond to the realities of environmental illness.

Citations

Claeson AS, et al. Levels of oxylipins, endocannabinoids and related lipids in plasma before and after low-level exposure to acrolein in healthy individuals and individuals with chemical intolerance. Prostaglandins Leukot Essent Fatty Acids. 2017 Jun;121:60-67.

Claeson AS, Andersson L. Symptoms from masked acrolein exposure suggest altered trigeminal reactivity in chemical intolerance. NeuroToxicology. 2017 May;60:92–8.

Cui X, et al. The correlation between mental health and multiple chemical sensitivity: a survey study in Japanese workers. Environ Health Prev Med. 2015 Mar;20(2):123-9.

Cullen MR. The worker with multiple chemical sensitivities: an overview. Occup Med. 1987 Oct-Dec;2(4):655-61.

Dahlstrom MF. Using narratives and storytelling to communicate science with nonexpert audiences. Proc Natl Acad Sci U S A. 2014 Sep 16;111 Suppl 4(Suppl 4):13614-20.

EPA. US Environmental Protection Agency. Indoor Air Quality. 2017. Available from: https://www.epa.gov/report-environment/indoor-air-quality

Froghi S. New Insights on the Role of TRP Channels in Calcium Signalling and Immunomodulation: Review of Pathways and Implications for Clinical Practice. Clin Rev Allergy Immunol. 2021 Apr;60(2):271-292.

Gibson et al. Perceived treatment efficacy for conventional and alternative therapies reported by persons with multiple chemical sensitivity. Environ Health Perspect. 2003 Sep;111(12):1498-504.

Goldberg RF, Vandenberg LN. The science of spin: targeted strategies to manufacture doubt with detrimental effects on environmental and public health. Environ Health. 2021 Mar 26;20(1):33.

Gupta VK, et al. Semmelweis Reflex: An Age-Old Prejudice. World Neurosurg. 2020 Apr;136:e119–25

McKeown-Eyssen GE, et al. Multiple chemical sensitivity: discriminant validity of case definitions. Arch Environ Health. 2001 Oct;56(5):406–12.

Mahtani KR. Beware evidence “spin”: an important source of bias in the reporting of clinical research. The BMJ. 2016. Available from: https://blogs.bmj.com/bmj/2016/06/21/kamal-r-mahtani-beware-evidence-spin-an-important-source-of-bias-in-the-reporting-of-clinical-research/

Molot J, et al. Multiple Chemical Sensitivity: It’s time to catch up to the science. Neurosci Biobehav Rev. 2023 Aug;151:105227

Molot J, et al. Neurological susceptibility to environmental exposures: pathophysiological mechanisms in neurodegeneration and multiple chemical sensitivity. Rev Environ Health. 2021 Sep 16.

Okamoto N, et al. Effect of single-nucleotide polymorphisms in TRPV1 on burning pain and capsaicin sensitivity in Japanese adults. Mol Pain. 2018 Jan-Dec;14:1744806918804439.

Palmquist E, Claeson AS. Odor perception and symptoms during acrolein exposure in individuals with and without building-related symptoms. Sci Rep. 2022 May 17;12(1):8171

Perales RB, et al. Does improving indoor air quality lessen symptoms associated with chemical intolerance? Prim Health Care Res Dev. 2022 Jan 12;23:e3.

Randolph TG. Sensitivity to petroleum including its derivatives and antecedents. J Lab Clin Med. 1952;40:931.

Ray PD, et al. Reactive oxygen species (ROS) homeostasis and redox regulation in cellular signaling. Cell Signal. 2012 May;24(5):981-90.

Rossi S, Pitidis A. Multiple Chemical Sensitivity: Review of the State of the Art in Epidemiology, Diagnosis, and Future Perspectives. Journal of Occupational and Environmental Medicine. 2018 Feb;60(2):138–46.

Schütz M, et al. Consequences of a human TRPA1 genetic variant on the perception of nociceptive and olfactory stimuli. PLoS One. 2014 Apr 21;9(4):e95592.

Weller K, et al. TRPV1, TRPA1, and CB1 in the isolated vagus nerve--axonal chemosensitivity and control of neuropeptide release. Neuropeptides. 2011 Dec;45(6):391-400.

Wilson RA. Cosmic Trigger: The Final Secret of The Illuminati 1. And/Or Press. 1977

Zheng J. Molecular mechanism of TRP channels. Compr Physiol. 2013 Jan;3(1):221-42.

Zucco GM, Doty RL. Multiple Chemical Sensitivity. Brain Sci. 2021 Dec 29;12(1):46.