



UNDERSTANDING MULTIPLE CHEMICAL SENSITIVITY (MCS)



ASEQ-
EHAQ



WHAT IS MULTIPLE CHEMICAL SENSITIVITY (MCS)

Multiple Chemical Sensitivity (MCS)

MCS is an acquired chronic condition in which individuals experience adverse reactions to low-level, common chemical exposures previously tolerated and tolerated by others (Steinemann, 2018).

Common Triggers

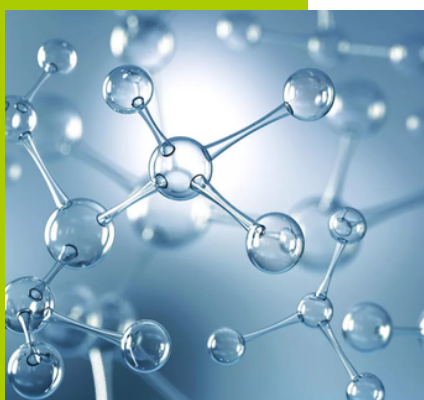
Include volatile organic compounds (VOCs) such as limonene, geraniol, eugenol, linalool, citral, cinnamal, citronellol, lylal and others (Salonen et al., 2024) found in perfumes, colognes, fragrances, scented and other products such as cleaning agents, personal and laundry products, air fresheners, pesticides, smoke, and building materials (Miller & Ashford, 2000; Jinn et al., 2007; Caress & Steinemann, 2009; Masri et al., 2021)

SENSITIZATION AND RECEPTORS



Sensitization Process

People with MCS often become sensitized to chemicals due to an unusual high dose repeated or prolonged exposure to chemicals. The process of sensitization means that their bodies react more intensely to even low levels of certain chemicals (Davidoff & Keyl, 1996; Hempel et al., 2023).



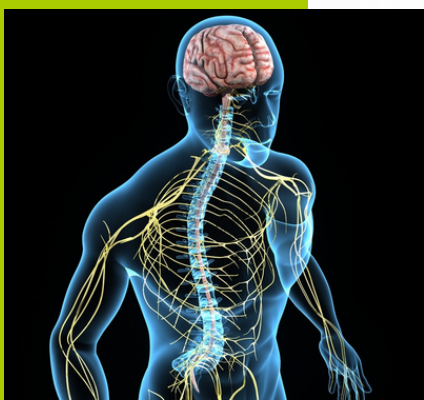
Sensing chemicals

Multiple studies of MCS have repeatedly found a heightened sensitivity in chemical-sensing receptors in individuals with MCS, suggesting they can detect chemicals at lower levels than the unaffected population (Meggs, 1993; Bell et al., 1996; De Luca et al., 2021).



Receptor sensitization

Means that these receptors can detect chemicals at lower levels and/or respond more strongly with a range of physical symptoms (Doty et al., 1988).



Receptor location

Found in both the central nervous system (brain) and peripheral nerves, especially in the respiratory system (Meggs et al., 1996).



Receptor sensitization effects:

Sensitization can lead to a range of physical symptoms in response to exposures to low levels of chemicals that most other people may not even notice

Symptoms of MCS

- **Respiratory:** Wheezing, shortness of breath, coughing, congestion
 - **Neurological:** Headaches, dizziness, difficulty concentrating, brain fog, fatigue.
 - **Skin and Eyes:** Rashes, itching, watery or burning eyes.
 - **Digestive Issues:** Nausea, stomach discomfort (Gibson et al., 2003).
-

Who is Affected?

- **Prevalence:** Over 1.13 million Canadians have a diagnosis (1 in 34 Canadians), 72% of which are women and 50% are over the age of 55 (Statistics Canada, 2020; CCHS).
- **Vulnerable Groups:** Those with asthma (Zock et al., 2006, Wang et al. 2019), contact dermatitis (Nardelli et al., 2009; Polanska et al., 2010), autism (Marco et al., 2011; Steinemann, 2019; Xu et al., 2020), migraines, allergies, autoimmune disorders, and other chronic illnesses may be more susceptible (Kreutzer et al., 1999).



WHY IS MCS IMPORTANT?

- **Health Impact:** MCS can severely impact quality of life, and lead to social isolation, job loss, and housing challenges (Gibson et al., 2003; Steinemann, 2018; Molot et al., 2023).
- **Accessibility Issue:** Scented environments and toxic exposures in public spaces, workplaces, and health-care settings make access difficult for individuals with MCS, prohibiting their access to the most fundamental needs (Caress & Steinemann, 2004).

SOLUTIONS AND ACCOMMODATIONS

- **Scent-Free Policies:** Implement fragrance-free policies in workplaces, schools, and health-care facilities to improve accessibility (Miller, 2000; Flegel and Martin, 2015; Brilmyer and Apolloni, 2017; Steinemann, 2019).
- **Education and Awareness:** Increase awareness of MCS and the impact of sensitization to foster supportive environments and initiate policy change (Gibson et al., 2003; Imai et al., 2008; Gibson, 2016; Seguel et al., 2016; Briones-Vozmediano & Espinar-Ruiz, 2021; Paterson et al., 2021).
- **Least-Toxic Products:** Use fragrance-free, non-toxic cleaning and personal care products with certified Eco Logos (Steinemann, 2017).



DID YOU KNOW?

MCS is recognized as a disability protected under the Human Rights Act (CHRC, 2007), the Canadian Human Rights Commission guides federally regulated employers and service providers on accommodation measures. Human Rights Commissions across Canada favour removal of barriers for inclusion of disability.

TAKE ACTION

- Support fragrance-free policies.
- Encourage use of low-toxicity products.
- Raise awareness about MCS and sensitization in your community (Smith et al., 2024).

REFERENCES

- Bell, I. R., Miller, C. S., & 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), 218-242.
- Brilmyer, G., & Apolloni, a. (2017, May). Creating accessible campuses through ... creating accessible campuses through fragrance-free policies. https://escholarship.org/content/qt32z6p6cj/qt32z6p6cj_nosplash_969449e80fd5808cf4bae3ae5713adff.pdf?T=opoqz0
- Briones-Vozmediano, E., & Espinar-Ruiz, E. (2019). How do women suffering from multiple chemical sensitivity experience the medical encounter? A qualitative study in Spain. *Disability and Rehabilitation*, 43(8), 1110–1120. <https://doi.org/10.1080/09638288.2019.1650297>
- Caress, S. M., & Steinemann, A. C. (2004). A review of a two-phase population study of multiple chemical sensitivities. *Environmental Health Perspectives*, 112(5), 576-579.
- Canadian Human Rights Commission. (2024). Environmental sensitivities and scent-free policies. Retrieved from <https://www.chrc-ccdp.gc.ca/en/resources/publications/environmental-sensitivities-and-scent-free-policies>.
- Davidoff, A. L., & Keyl, P. M. (1996). Symptoms and risk factors associated with idiopathic environmental intolerance. *Occupational Medicine*, 46(1), 51-59.
- De Luca, C., et al. (2021). The role of sensory and olfactory pathways in multiple chemical sensitivity. *Reviews on Environmental Health*, 36(1), 85-94.
- Doty, R. L., Deems, D. A., Frye, R. E., Pelberg, R., & Shaman, P. (1988). Olfactory sensitivity, nasal resistance, and autonomic function in patients with multiple chemical sensitivities. *Archives of Environmental Health*, 43(6), 395-401.
- Flegel, K., & Martin, J. G. (2015). Artificial scents have no place in our hospitals. *Canadian Medical Association Journal*, 187(16), 1187–1187. <https://doi.org/10.1503/cmaj.151097>
- Gibson, P. R., Elms, A. N. M., & 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.
-

REFERENCES

- Gibson, P. R., Lockaby, S., & Bryant, J. (2016). Experiences of persons with multiple chemical sensitivity with mental health providers. *Journal of Multidisciplinary Healthcare*, 163. <https://doi.org/10.2147/jmdh.s100688>
- Hempel, S., et al. (2023). Multiple chemical sensitivity scoping review protocol: overview of research and MCS construct. *BMJ Open*, 13(9), e072098.
- Imai, N., Imai, Y., & Kido, Y. (2008). Psychosocial factors that aggravate the symptoms of Sick House syndrome in Japan. *Nursing & Health Sciences*, 10(2), 101–109. <https://doi.org/10.1111/j.1442-2018.2008.00389.x>
- Jinno, H., Tanaka-Kagawa, T., Obama, T., Miyagawa, M., Yoshikawa, J., Komatsu, K., & Tokunaga, H. (2007). Kokuritsu Iyakuhin Shokuhin Eisei Kenkyujo hokoku = Bulletin of National Institute of Health Sciences, (125), 72–78.
- Kreutzer, R., Neutra, R. R., & Lashuay, N. (1999). Prevalence of people reporting sensitivities to chemicals in a population-based survey. *American Journal of Epidemiology*, 150(1), 1-12.
- MARCO, E. J., HINKLEY, L. B. N., HILL, S. S., & NAGARAJAN, S. S. (2011). Sensory processing in autism: A review of neurophysiologic findings. *Pediatric Research*, 69(5 Part 2). <https://doi.org/10.1203/pdr.0b013e3182130c54>
- Masri, S., et al. (2021). Toxicant-induced loss of tolerance for chemicals, foods, and drugs: assessing patterns of exposure behind a global phenomenon. *Environmental Sciences Europe*, 33, Article 65.
- Meggs, W. J. (1993). Neurogenic inflammation and sensitivity to environmental chemicals. *Environmental Health Perspectives*, 101(3), 234-238.
- Miller, C. S., & Ashford, N. A. (2000). Understanding multiple chemical sensitivity: an overview. *Toxicology and Industrial Health*, 6(2), 9-19.
- Molot, J., Sears, M., & Anisman, H. (2023). Multiple Chemical Sensitivity: It's Time to Catch Up to the Science. *SSRN Electronic Journal*.
- Nardelli, A., Thijs, L., Janssen, K., & Goossens, A. (2009). Rosa centifolia in a 'non-scented' moisturizing body lotion as a cause of allergic contact dermatitis. *Contact Dermatitis*, 61(5), 306–309. <https://doi.org/10.1111/j.1600-0536.2009.01639.x>
-

REFERENCES

- Paterson, C. A., Sharpe, R. A., Taylor, T., & Morrissey, K. (2021). Indoor PM2.5, vocs and asthma outcomes: A systematic review in adults and their home environments. *Environmental Research*, 202, 111631. <https://doi.org/10.1016/j.envres.2021.111631>
- Polańska, A., Silny, W., Czarnecka-Operacz, M., & Jenerowicz, D. (2010). Case report Allergic and toxic reaction caused by fragrances – a case report. *Advances in Dermatology and Allergology/Postępy Dermatologii i Alergologii*, 27(6).
- Salonen, H., Salthammer, T., Castagnoli, E., Täubel, M., & Morawska, L. (2024). Cleaning products: Their chemistry, effects on indoor air quality, and implications for human health. *Environment International*, 190, 108836. <https://doi.org/10.1016/j.envint.2024.108836>
- Seguel, J. M., Merrill, R., Seguel, D., & Campagna, A. C. (2016). Indoor Air Quality. *American Journal of Lifestyle Medicine*, 11(4), 284–295. <https://doi.org/10.1177/1559827616653343>
- Smith, C., Drinkwater, A., Modlich, M., Van der Horst, D., & Doherty, R. (2024). IAQ and Environmental Health Literacy: Lived experiences of vulnerable people. *Buildings & Cities*, 5(1). <https://doi.org/10.5334/bc.418>
- Statistics Canada. (2020). Canadian Community Health Survey (CCHS) 2019-2020.
- Steinemann, A. (2018). Fragranced consumer products: Effects on autistic adults in the United States, Australia, and United Kingdom. *Air Quality, Atmosphere & Health*, 11(10), 1137–1142. <https://doi.org/10.1007/s11869-018-0625-x>
- Steinemann, A. (2019). International prevalence of chemical sensitivity, co-prevalences with asthma and autism, and effects from fragranced consumer products. *Air Quality, Atmosphere & Health*, 12(5), 519–527. <https://doi.org/10.1007/s11869-019-00672-1>
- Wang, M., Tan, G., Eljaszewicz, A., Meng, Y., Wawrzyniak, P., Acharya, S., Altunbulakli, C., Westermann, P., Dreher, A., Yan, L., Wang, C., Akdis, M., Zhang, L., Nadeau, K. C., & Akdis, C. A. (2019). Laundry detergents and detergent residue after rinsing directly disrupt tight junction barrier integrity in human bronchial epithelial cells. *Journal of Allergy and Clinical Immunology*, 143(5), 1892–1903. <https://doi.org/10.1016/j.jaci.2018.11.016>
-

REFERENCES

Xu, M., Minagawa, Y., Kumazaki, H., Okada, K., & Naoi, N. (2020). Prefrontal responses to odors in individuals with autism spectrum disorders: Functional NIRS measurement combined with a fragrance Pulse Ejection System. *Frontiers in Human Neuroscience*, 14. <https://doi.org/10.3389/fnhum.2020.523456>

Zock, J.-P., Plana, E., Jarvis, D., Antó, J. M., Kromhout, H., Kennedy, S. M., Künzli, N., Villani, S., Olivieri, M., Torén, K., Radon, K., Sunyer, J., Dahlman-Hoglund, A., Norbäck, D., & Kogevinas, M. (2007). The use of household cleaning sprays and adult asthma. *American Journal of Respiratory and Critical Care Medicine*, 176(8), 735–741. <https://doi.org/10.1164/rccm.200612-1793oc>