

HDQ Neutral Health Impacts

HDQ Neutral is a quaternary ammonium disinfectant.

Short-Term Exposure to HDQ Neutral via inhalation can result in **nasal discomfort, cough and damage to the respiratory tract.**

Long-Term Exposure to QACs like those found in HDQ Neutral has been associated with **asthma** in healthcare workers, and the following reproductive and developmental effects in animals:

- **Infertility**
- **Low sperm count & motility**
- **Difficulty giving birth**
- **Low birth weight**
- **Late-term fetal deaths**
- **Neural tube defects (NTDs)**

Health Effects of Exposure to HDQ Neutral

HDQ Neutral is categorized as a quaternary ammonium disinfectant based on its active ingredients didecyldimethylammonium chloride (DDAC), and alkyl C-12-16 dimethylbenzyl ammonium chloride (ADBAC), both of which are quaternary ammonium compounds (QACs).¹ As a class, QACs are highly effective antimicrobial agents.² Because of this, QACs have been widely used in the hospital industry, and have now become relatively widespread, permeating household cleaning products and even personal care products.³

Acute (short-term exposure) health risks: According to the HDQ Neutral's Safety Data Sheet, acute exposure to HDQ Neutral is associated with adverse health effects. Inhalation can result in nasal discomfort, coughing, and damage to the mucosal membrane of the respiratory tract. Skin contact with the chemical can result in redness and blistering, and ingestion can result in burns to the digestive tract, pain, nausea, vomiting, and diarrhea.⁴ Controlled laboratory studies of mice suggest that short-term inhalation exposure to ADBAC may have deleterious impacts on airways and lungs, including severe inflammation, irritation, and altered breathing patterns.^{5,6} In addition, studies indicate that at environmentally-relevant doses, short-term ADBAC exposure can induced damage to the DNA of animal and human cells, suggesting that exposure at low concentrations may be genotoxic.⁷

Chronic (long-term exposure) health risks: Public health studies examining QAC exposure in healthcare workers identified associations between long-term QAC exposure in the workplace and asthma.⁸

¹ HDQ Neutral Chemical SDS. <https://www.spartanchemical.com/sds/downloads/AGHS/EN/1202.pdf>

² Melin et al, 2016. Quaternary ammonium disinfectants cause subfertility in mice by targeting both male and female reproductive processes. *Reproductive Toxicology*, 59: 159-166. Available at: <https://reader.elsevier.com/reader/sd/pii/S0890623815300319?token=855DC2205C84233FA5382E682FD0DEAFD077A886A40845112914B4ED6728982D59DEBE524C77C467582DD51913A5FAC4>.

³ Melin et al, 2014. Exposure to common quaternary ammonium disinfectants decreases fertility in mice. *Reproductive Toxicology*, 50:163-170. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4260154/>.

⁴ SDS *supra* note 1.

⁵ Larsen et al, 2012. Airway effects of inhaled quaternary ammonium compounds in mice. *Basic Clinical Pharmacol Toxicol*. 110(6): 537-543. Available at: <https://pubmed.ncbi.nlm.nih.gov/22188809/>

⁶ Swiercz, et al. 2008. Pulmonary irritation after inhalation exposure to benzalkonium chloride in rats. *Int J Occup Med Environ Health*, 21(2):157-163. Available at: <https://pubmed.ncbi.nlm.nih.gov/18715840/>

⁷ Ferk et al, 2007. Benzalkonium chloride (BAC) and dimethyldioctadecyl-ammonium bromide (DDAB), two common quaternary ammonium compounds, cause genotoxic effects in mammalian and plant cells at environmentally relevant concentrations. *Mutagenesis*, 22(6): 363-370.. Available at: <https://academic.oup.com/mutage/article/22/6/363/1132811>

⁸ Gonzalez et al, 2014. Asthma among workers in healthcare settings: role of disinfection with quaternary ammonium compounds. *Clin Exp Allergy*, 44(3): 393-406. Available at: <https://pubmed.ncbi.nlm.nih.gov/24128009/>; Paris et al,

In addition, laboratory studies of animals have found links between chronic exposure to QACs and both serious impacts on the reproductive system and serious birth defects.⁹ Studies show that ingestion of the same QAC mixture found in HDQ Neutral over many weeks by male and female mice resulted in altered reproductive cycles in females, difficulty conceiving, fewer pregnancies, difficulty in giving birth, and lower birthweights.¹⁰ In male mice, ambient exposure to the mixture through the air over several weeks resulted in decreased sperm count and sperm motility.¹¹ A study has also found a link between exposure to this mixture during pregnancy and an increased prevalence of neural tube defects (NTDs),¹² including incomplete closure of the face and spinal malformations, in exposed rodent pups.¹³ Moreover, the incidence of NTDs persisted in subsequent pregnancies after exposure was discontinued, suggesting that reproductive harm from exposure to the mixture can have lasting effects. Rodent exposure to the mixture during pregnancy additionally increased the number of late-gestational fetal deaths.¹⁴

Conclusion: The health risks associated with both short- and long-term QAC exposure, as described in the SDS for HDQ Neutral, the public health studies of workers, and the laboratory studies of rodents, raise concerns about the reports of heavy use of HDQ Neutral at the Immigration and Customs Enforcement (ICE) detention facility in Adelanto, CA. On average, individuals detained at ICE facilities remain in custody for 55 days, and those detained at Adelanto have reported that HDQ Neutral is sprayed within the facility every 15-30 minutes.¹⁵ In order to protect the health of detained individuals and children, it is essential that all ICE facilities, including Adelanto, review whether their use of disinfectants is lawful based on the label and safe based on SDS warnings, taking into account that many residents are of reproductive age, or are children. At a minimum, all unlawful and unsafe use must stop.

2012. Work-related asthma in France: recent trends for the period 2001-2009. *Occup Environ Med*, 69(6): 391-397.

Available at: <https://pubmed.ncbi.nlm.nih.gov/22383588/>

⁹ Much of the information on the health effects of QACs come from laboratory animals, as data from toxicological studies in animals are highly relevant for predicting a chemical's toxicity in humans.

¹⁰ Melin et al, 2016 *supra* note 2; Melin et al, 2014 *supra* note 3.

¹¹ Melin et al, 2016 *supra* note 2.

¹² Neural tube defects are birth defects pertaining to organs of the central nervous system, namely the spine and spinal cord.

¹³ Hrubec, et al. 2018. Ambient and Dosed Exposure to Quaternary Ammonium Disinfectants Causes Neural Tube Defects in Rodents. *Birth Defects Research*, 109(14):1166-1178. Available at:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5905424/>

¹⁴ *Id.*

¹⁵ <https://www.americanimmigrationcouncil.org/research/immigration-detention-united-states-agency#:~:text=As%20of%20December%209%2C%202019%2C%20individuals%20were%20held%20in%20ICE,immigration%20case%20took%2046%20days.>