

Research on the Safety of D₅

About D₅

Decamethylcyclopentasiloxane (D₅) is used as an ingredient in personal care products, including roll-on deodorants and antiperspirants, shampoos and hair conditioners, bath and soap products, and moisturizers and body lotions. It is an odorless, colorless non-oily siloxane fluid that acts as a “carrier” allowing products to spread smoothly and easily, providing a silky, luxurious feel during application. D₅ evaporates quickly, leaving a dry feeling after the personal care product is applied.

Key Research Findings and Relevance

D₅ is among the most extensively studied materials used in consumer and industrial applications. Decades of in-depth research on D₅ indicate it is safe when used as intended in consumer and industrial applications.

Over 50 studies have been conducted and almost all of these studies showed no effects. However, there were two findings observed in studies with laboratory rats that required further investigation. These two findings, increased liver weight and an increasing trend for uterine tumors, were shown to be effects that are specific to rats and that have no relevance to human health.

The increase in liver weight mentioned above was seen after repeated exposure to high concentrations of D₅. This response in rats, which does not affect the animal’s health, is well-documented and widely recognized. It is related to an increase of liver enzymes that metabolize and eliminate a material from the body. The increased liver weight reverses even while the D₅ exposure continues. The finding is not adverse, but is considered a natural adaptive change in rats, and does not represent a hazard to humans.

In a two-year, combined chronic/carcinogenicity study, rats were exposed by inhalation up to the highest possible vapor concentrations of D₅. There were no findings in male rats. Data showed a statistically significant trend for a certain type of tumor (uterine endometrial adenocarcinoma) in female rats exposed at the highest level—a level much higher than the low levels that consumers or workers might encounter. Based on the finding in female rats, silicone manufacturers conducted extensive follow-up research to determine the cause of the finding. Results of this research indicate that the finding seen in the two-year study occurred through a biological pathway that is specific to the rat and is not relevant to humans. D₅, which acts on the pituitary gland like dopamine, stimulated a change in balance between two hormones in the rat, estrogen and progesterone. This change is a biological response unique to rats. The same affect does not occur in humans following exposure to dopamine agonists such as D₅. Scientific studies have shown that although exposure to chemicals and drugs mimicking dopamine might result in uterine tumors in female rats, they would not do so in humans. Therefore, this observed effect does not indicate a potential health hazard to humans. This conclusion is supported by an expert panel of independent scientists who have reviewed the research results and have come to the same conclusion.

Silicone Manufacturers' Commitment

D₅ manufacturers are committed to worker and consumer safety. One concrete expression of this commitment is the \$30 million voluntary Siloxane Research Program (SRP) that aims to enhance current knowledge about the safety of siloxanes in consumer and industrial applications. As a part of this program, study methods and results are reviewed by a panel of independent scientific experts, and study results are published in peer-reviewed scientific publications. This initiative represents the largest voluntary health and safety program ever conducted on siloxanes.

Silicone manufacturers continue to communicate the results of this research initiative to regulatory agencies, employees, and customers. Based on the extensive data available for D₅, silicone manufacturers continue to support the safe use of D₅ when used as intended.



SEHSC is a not-for-profit trade association comprised of North American silicone chemical producers and importers. For more than 50 years, SEHSC has promoted the safe use of silicones through product stewardship and environmental, health, and safety research. The organization also is involved in legislative and regulatory issues relating to silicone materials.