

# Americans Exposed to Fertility-Lowering Chemicals in Cheerios, Quaker Oats

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## STORY AT-A-GLANCE

- › A pilot study by the Environmental Working Group reveals 80% of Americans tested positive for chlormequat chloride, a pesticide and growth regulator
- › 92% of oat-based foods, including popular brands like Quaker Oats and Cheerios, also contained the chemical
- › The U.S. Environmental Protection Agency has proposed expanding chlormequat use to staple grains to increase yields, despite potential health risks
- › Animal studies show chlormequat is linked to reproductive and developmental problems, raising concerns for human health
- › EWG opposes the EPA's plan, urging further investigation, and recommends buying organic oat products to avoid exposure

In a pilot study<sup>1,2,3</sup> conducted by the Environmental Working Group and published in the February 15, 2024, issue of the Journal of Exposure Science & Environmental Epidemiology, findings revealed that 80% of Americans tested positive for chlormequat chloride, an agricultural chemical used as a pesticide and plant growth regulator.<sup>4</sup>

Moreover, the chemical was detected in 92% of oat-based foods examined, including popular brands such as Quaker Oats and Cheerios. As reported by the EWG:<sup>5</sup>

*“The groundbreaking analysis of chlormequat in the bodies of people in the U.S. rings alarm bells, because the chemical is linked to reproductive and developmental problems in animal studies, suggesting the potential for similar harm to humans.”*

## **EPA Considers Expanding Chlormequat Use in Crops**

In the U.S., chlormequat chloride is currently only registered for use as a plant growth regulator (PGR) in ornamentals, but the Environmental Protection Agency recently proposed to expand the registration to barley, oat, triticale (a hybrid cereal grain derived from the crossbreeding of wheat and rye) and wheat as well, to give farmers another tool to increase yields.<sup>6</sup> As explained by the EPA, chlormequat:<sup>7</sup>

*“... works to control plant size by blocking the hormones that stimulate growth prior to bloom. In small grains like wheat, barley, oats, and triticale, lodging (the bending over or breakage of small grain stems) is a major production issue.*

*Lodging can severely limit grain yield and harvestability and have detrimental effects on grain quality. As a PGR, chlormequat chloride application decreases the height of the grain plant stem, resulting in reduced lodging and potentially increased grain yield.”*

Doing so could come at a cost to consumers' health, however. While the EPA claims “There are no dietary, residential, or aggregate ... risks of concern,”<sup>8</sup> the EWG<sup>9</sup> cites evidence showing otherwise.

## **Chlormequat's Toxic Effects Evident in Animal Studies**

According to the EWG, historical and recently published animal studies have demonstrated:<sup>10</sup>

Reproductive declines in pigs raised on chlormequat-treated grains; female pigs had

disrupted estrus cycling and difficulty mating

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Decreased fertilization capacity of sperm in male mice

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Reduced sperm motility in male rats

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Delayed onset of puberty, decreased weights of male reproductive organs and decreased testosterone levels in male rats

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Dysregulated fetal growth of the head and bones

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Dysregulated metabolism

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Chlormequat has also been shown to affect the endocrine systems of animals, although the exact mechanism is still unclear. Previous studies suggest chlormequat does not act like most other endocrine disrupting chemicals. For example, it does not use estrogen or androgen receptors and does not alter aromatase activity.

Instead, researchers have suggested it may affect the endocrine system by altering steroid biosynthesis and causing endoplasmic reticulum stress.<sup>11</sup> As noted by EWG,<sup>12</sup> “Although these studies focus only on the chemical’s potential effects on animals, they raise questions about whether it could also harm humans.”

## **Chlormequat Exposure Is on the Rise**

As current testing indicates, individuals are already encountering chlormequat through food, primarily in imported grains. The EPA's decision to authorize the importation of grains treated with chlormequat in 2018<sup>13</sup> has contributed to this exposure.

**“These findings and chlormequat toxicity data raise concerns about current exposure levels, and warrant more expansive toxicity testing, food monitoring, and**

## epidemiological studies to assess health effects of chlormequat exposures in humans.” ~ EWG

Expanding its application as a plant growth regulator in the U.S. to encompass staple grains would evidently heighten exposure levels, potentially leading to significant adverse effects. As reported in the featured study:<sup>14</sup>

*“Chlormequat chloride is a plant growth regulator whose use on grain crops is on the rise in North America. Toxicological studies suggest that exposure to chlormequat can reduce fertility and harm the developing fetus at doses lower than those used by regulatory agencies to set allowable daily intake levels.*

*Here we report the presence of chlormequat in urine samples collected from people in the U.S., with detection frequencies of 69%, 74%, and 90% for samples collected in 2017, 2018–2022, and 2023, respectively.*

*Chlormequat was detected at low concentrations in samples from 2017 through 2022, with a significant increase in concentrations for samples from 2023. We also observed high detection frequencies of chlormequat in oat-based foods.*

*These findings and chlormequat toxicity data raise concerns about current exposure levels, and warrant more expansive toxicity testing, food monitoring, and epidemiological studies to assess health effects of chlormequat exposures in humans.”*

### **Continual Exposure Indicated by Data**

The researchers also highlight that in urine samples collected from individuals in the U.K. and Sweden, chlormequat was identified in nearly 100% of participants, with frequencies and concentrations notably surpassing those of metabolites from other pesticides such as chlorpyrifos, pyrethroids, thiabendazole, and mancozeb. This suggests that individuals are probably ingesting higher quantities of chlormequat compared to the aforementioned pesticides.

The chemical has also been identified in serum and milk in animal studies. And, while human sampling to ascertain the presence of chlormequat in human serum and breast milk has not been conducted, the authors emphasize that "chemicals associated with reproductive harm in serum and milk have important implications for exposures during pregnancy and to infants."

Chlormequat has a half-life in the body of about two to three hours, with a significant portion of administered doses being expelled within a span of 24 hours. So, the detection of the chemical in 80% of urine samples indicates ongoing exposure throughout the day for the majority of individuals.

In terms of quantity, the concentrations ranged from 0.27 micrograms to 52.8 mcg of chlormequat per gram of creatinine in the 2023 samples, with a median of 1.4 mcg.

## **High Levels Also Found in Food Samples**

The researchers also sent out 25 conventional and eight organic oat-based food samples for testing, along with nine conventional wheat-based food samples. All food samples were purchased in grocery stores in the Washington, DC metro area between June and August 2022, and February and May 2023.

All but two of the 25 nonorganic oat-based products had detectable levels of chlormequat. The maximum detected level reached 291 mcg per kilogram, signifying a significant presence of chlormequat in oats, as noted by the authors. One organic oat product also contained a low amount (17 mcg), as did two wheat-based breads, which contained 3.5 mcg and 12.6 mcg respectively. As noted in the featured study:<sup>15</sup>

*"It remains to be determined whether chlormequat levels in U.S. urine and food samples may rise in the coming years. In the U.S., chlormequat is currently only allowed in imported oat and wheat products, but domestic agricultural uses on non-organic crops are currently under review by the U.S. EPA.*

*It is possible that if such domestic uses were approved, combined with widespread adoption of agricultural practices that utilize chlormequat abroad*

*and domestically, chlormequat levels would likely continue to increase in oats, wheat, and other grain foods, leading to higher levels of exposure for the U.S. general population.*

*Current chlormequat concentrations in urine from this study and others suggest that individual sample donors were exposed to chlormequat at levels several orders of magnitude below the reference dose (RfD) published by the U.S. EPA (0.05 mg/kg bw/day) and the acceptable daily intake (ADI) value published by the European Food Safety Authority (0.04 mg/kg bw/day).*

*However, we note that published toxicological studies on chlormequat suggest reevaluation of these safety thresholds may be warranted. For instance, animals exposed to doses lower than the current RfD and ADI, of 0.024 and 0.0023 mg/kg bw/day in mice and pigs respectively, exhibited reduced fertility.*

*In another toxicological study, exposure during pregnancy at a dose equivalent to the No Observed Adverse Effect Level (NOAEL) of 5 mg/kg that was used to derive the U.S. EPA reference dose, caused altered fetal growth as well as metabolism and body composition in neonatal mice.*

*Additionally, the regulatory thresholds do not consider the adverse effects of mixtures of chemicals that may impact the reproductive system, which have been shown to cause additive or synergistic effects at doses lower than for individual chemical exposures, raising concerns about the potential health effects associated with current exposure levels, especially for individuals on the higher end of exposure in general populations of Europe and the U.S.”*

## **EWG Opposes Plan to Expand Use of Chlormequat**

In light of its discoveries, the EWG strongly opposes the EPA's proposal to permit the application of chlormequat on domestically grown oats, barley, wheat and triticale.

Alexis M. Temkin, the principal author of the EWG study, expressed concern about the widespread presence of chlormequat in both food and urine samples, stating that it

"raises alarm bells." Temkin advocates for additional investigation into the matter and urges the U.S. Food and Drug Administration to incorporate chlormequat into its yearly pesticide monitoring of grains.

*"The Environmental Protection Agency needs to fully consider the potential risks to children's health from chlormequat exposure and reconsider their recent decisions to allow chlormequat to be present in children's foods,"* Temkin told Newsweek.<sup>16</sup>

Other organizations have also voiced opposition, including the Public Interest Research Group (PIRG),<sup>17</sup> which collected more than 10,000 signatures calling on the agency to reject the proposal. In a comment to the EPA's proposal last year, PIRG wrote:<sup>18</sup>

*"Research shows that chlormequat chloride disrupts fetal growth and harms the reproductive system. We shouldn't allow its use on food crops unless and until it's proven completely safe – especially since we know we can farm without it ...*

*All this chemical is used for is to make the stems of small grains a little bit stronger, so fewer of them bend or break. A slightly bigger harvest isn't worth the risk to our health."*

## **Oatmeal Has a Metabolic Poison: Linoleic Acid (LA)**

Like most grains, except for white rice, they contain linoleic acid (LA). Although it's a small amount, about 1g per cup of oatmeal, it can accumulate over time. Ideally, you should aim to keep your LA intake below 2g per day, but certainly under 5 grams daily.

It's important to monitor your total LA consumption from all foods and decide which ones to eat to maintain your LA levels within this range. While oatmeal is nutritionally richer than white rice, the latter contains no LA. Oatmeal does offer some minerals, though the amounts can vary based on its cultivation, they are still relatively minor.

## **Opt for Organic Oat Products**

In an interview with the New York Post,<sup>19</sup> Olga Naidenko, vice president of science investigations at the EWG, advised consumers to opt for organic oat products, as they are cultivated without the application of harmful pesticides like chlormequat and glyphosate.

To help you find the cleanest food, consider downloading the EWG's [Healthy Living app](#). This resource furnishes evaluations for over 120,000 food and personal care items. Simply scan the product with your cellphone to get its rating.

## Sources and References

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- <sup>1, 9, 14</sup> [Journal of Exposure Science & Environmental Epidemiology February 15, 2024 DOI: 10.1038/s41370-024-00643-4](#)
- <sup>2, 5, 12</sup> [EWG February 15, 2024](#)
- <sup>3</sup> [ZeroHedge February 16, 2024](#)
- <sup>4, 6, 7, 8</sup> [EPA.gov April 26, 2023](#)
- <sup>10, 11, 13</sup> [Journal of Exposure Science & Environmental Epidemiology February 15, 2024 DOI: 10.1038/s41370-024-00643-4, Introduction](#)
- <sup>15</sup> [Journal of Exposure Science & Environmental Epidemiology February 15, 2024 DOI: 10.1038/s41370-024-00643-4, Discussion](#)
- <sup>16</sup> [Newsweek February 15, 2024](#)
- <sup>17, 18</sup> [PIRG May 26, 2023](#)
- <sup>19</sup> [New York Post February 15, 2024](#)