

Opiates in Our Food Supply?

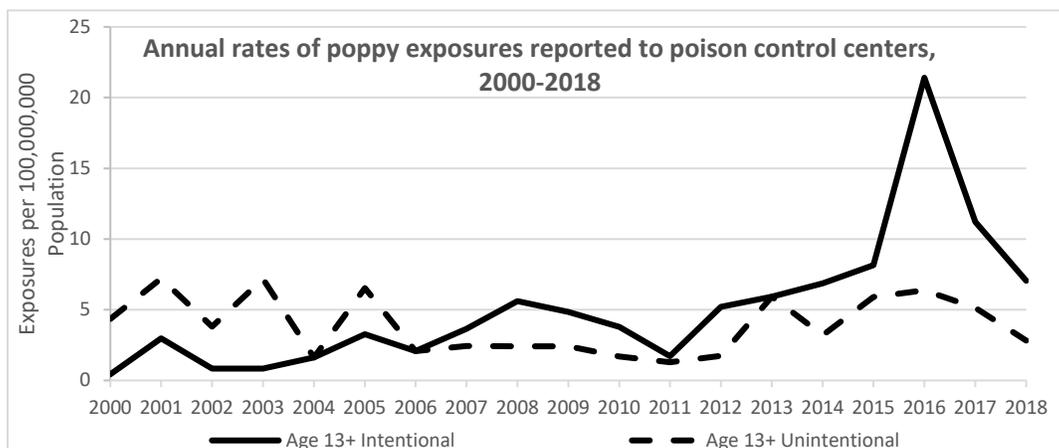
Addressing Preventable Harm from Contaminated Poppy Seeds

Poppy seeds and heroin originate from the same plant— *Papaver somniferum*, or the opium poppy. The seeds themselves naturally contain negligible amounts of opiate alkaloids, but other parts of the poppy plant produce substantial amounts of opiates including morphine, codeine, and thebaine.¹ The seeds can become contaminated with opiates from the plant’s sap and dust during harvest. Therefore, thorough washing and processing are needed to reduce the opiate content of the seeds to safe levels.

Papaver somniferum may not be legally grown in the U.S., but we import seeds from countries like Turkey and the Netherlands.² When producers in these countries fail to follow important processing steps to reduce opiate contamination, poppy seeds pose risks to consumers. Exposure to contaminated poppy seeds in food can result in unintentional intoxication³ and false positive drug tests.⁴ People may also use the opiates in contaminated poppy seeds for the purpose of intoxication, or to provide claimed health benefits including the treatment of pain, anxiety, and opioid withdrawal.⁵ When large amounts of poppy seeds are mixed with water and consumed as a tea, opiate contamination can cause overdose and death.⁶ To address the harms posed by contaminated poppy seeds, the Center for Science in the Public Interest is urging federal authorities to take action by setting and enforcing maximum limits for opiate content, and removing contaminated seeds from the market.

Adverse events from contaminated poppy may be on the rise.

A recent study by CSPI and the Connecticut Poison Control Center found that U.S. poison control centers received 392 calls regarding poppy exposure in people age 13+ between 2000 and 2018, and rates of “intentional exposures” increased during that period.⁷ Intentional exposure is a category of adverse events that includes use of a substance for intoxication, therapeutic purposes, or self-harm.



Risks from contaminated poppy are severely heightened when consumers brew “poppy seed tea.”

Seventy-seven of these 392 exposures involved poppy in liquid form, suggesting the use of “poppy seed tea.” This home-brewed concoction is made by combining large amounts of poppy seeds with water, and online recipes direct users to add acidic ingredients that help extract opiates from the seeds. But opiate contamination levels can vary widely between batches of seeds, putting users at risk of accidental overdose.

Contaminated poppy seeds have caused dozens of overdoses and deaths in the U.S.

At least 20 non-fatal overdoses and 19 deaths from poppy in the U.S.—most involving consumption of poppy seed tea—have been reported in the medical literature and government publications, and most have occurred since 2016.⁸ These are likely underestimates, as additional deaths involving poppy have been reported in the popular media, and adverse event data is typically incomplete.⁹

Poppy seeds with unsafe levels of opiates continue to be sold.

Despite the documented harm caused by contaminated poppy seeds, these products remain on the market. A 2018 study analyzed the opiate content of 22 poppy products purchased online and found up to 2,788 mg morphine per kg seeds after extraction, with a median of 97.3 mg/kg morphine.¹⁰ For reference, a dose of 20 to 50 morphine mg equivalents per day increases the risk of overdose and death.¹¹



In some cases, the failure to decontaminate appears to be intentional. Some manufacturers and retailers market poppy products as “raw” or “unwashed” to signal higher concentrations of opiates than properly processed seeds. Consumers seeking out contaminated seeds leave online product reviews using coded language to describe opiate levels, such as a rating system (“9/10”) or descriptors like “high quality.”

Federal authorities must take action to prevent further harm from contaminated poppy seeds.

The harms caused by contaminated poppy seeds are largely preventable. Cleaning processes recommended by the European Commission have proved effective at reducing morphine contamination from 50 to 220 mg/kg down to 4 mg/kg or less.¹² The European Union is currently in the process of establishing a legal threshold for opiate contamination in poppy seeds, and the United States must follow suit.¹³

The sale of opiate-contaminated poppy products is already illegal under the Controlled Substances Act, which lists “poppy straw” (defined as all parts of the poppy plant except its seeds) as a Schedule II controlled substance. But action is needed to enforce this law, and to provide manufacturers and retailers the guidance they need to ensure the poppy products they sell are safe.

CSPI is calling on the Food and Drug Administration to coordinate with the Drug Enforcement Agency and Customs and Border Protection to:

1. Establish a maximum permissible threshold of opiate contamination for poppy seeds sold in the United States and describe good manufacturing practices to reduce opiate contamination in poppy seeds.
2. Issue import requirements to ensure that imported seeds do not exceed the maximum threshold of opiate contamination.

For more information, please contact the Center for Science in the Public Interest at policy@cspinet.org.

¹ Powers D, Erickson S, Swortwood MJ. Quantification of morphine, codeine, and thebaine in home-brewed poppy seed tea by LC MS/MS. *J Forensic Sci.* 2018;63(4):1229–1235.

² Engber D. *If you can't grow poppies... Where do poppy seeds come from?* Slate. May 24, 2005. <https://slate.com/news-and-politics/2005/05/where-do-poppy-seeds-come-from.html>

³ Sproll C, Perz RC, Lachenmeier DW. Optimized LC/MS/MS analysis of morphine and codeine in poppy seed and evaluation of their fate during food processing as a basis for risk analysis. *J Agric Food Chem.* 2006;54:5292-5298.

⁴ Concheiro M, et al. Morphine and Codeine in Oral Fluid after Controlled Poppy Seed Administration. *Drug Test Anal.* 2015;7(7):586–591.

⁵ Haber I, Pergolizzi J, LeQuang J. Poppy seed tea: a short review and case study. *Pain Ther.* 2019;8(1):151–155

⁶ Greenthal E, Lurie P, Doyon S. Opioid exposure associated with poppy consumption reported to poison control centers and the U.S. Food and Drug Administration. *Clinical Toxicology.* 2021;...

⁷ *Id.*

⁸ Overdoses include 18 from Greenthal et al. (2021) and two from Spyres MB, et al. Two cases of severe opiate toxicity after ingestion of poppy seed tea. *Toxicol Commun.* 2018;2(1):102-104.; deaths are all referenced in Greenthal et al. (2021)

⁹ Other deaths from poppy seed tea (and poppy pod tea). 2020. <http://www.poppyseedtea.com/Other%20Deaths%20Page.html>.

¹⁰ Powers (2018)

¹¹ U.S. Centers for Disease Control and Prevention. Calculating total daily dose of opioids for safer dosage.

https://www.cdc.gov/drugoverdose/pdf/calculating_total_daily_dose-a.pdf

¹² Commission Recommendation of 10 September 2014 on good practices to prevent and to reduce the presence of opium alkaloids in poppy seeds and poppy seed products. Official Journal of the European Union. 2014/662/EU:96–100.

¹³ European Commission. Standing Committee on Plants, Animals, Food and Feed- Section *Novel Food and Toxicological Safety in the Food Chain.* September 2020. https://ec.europa.eu/food/sites/food/files/safety/docs/reg-com_toxic_20200921_sum.pdf

Poppy seed image: <https://pxhere.com/en/photo/1521603> (labeled for reuse under Google's Create Commons)