



June 3, 2019

Vice Admiral Jerome M. Adams, U.S. Surgeon General
Office of the Surgeon General
U.S. Department of Health and Human Services
200 Independence Avenue SW
Humphrey Building, Suite 701H
Washington, DC 20201

Dear Dr. Adams:

The Center for Science in the Public Interest (CSPI), a consumer group with more than 45 years of experience advocating for a healthier food system, writes to request that you issue an advisory to urge Americans to avoid the purchase and consumption of contaminated poppy seeds (“unwashed” poppy seeds) and poppy seed pods.

These dangerous products can contain high levels of morphine, codeine, thebaine, and other opiate alkaloids. They pose grave health risks, particularly when the opiates are concentrated by brewing large amounts into a “tea.”

Patients with opioid use disorder have been known to use these products as substitutes for other opioids.¹ Others reported that they began using the products believing they were relatively harmless natural herbal remedies, not fully realizing the potential for dependence and abuse. For too long, these products have been overlooked as a limited, but important component of the ongoing opioid epidemic.

Contaminated poppy seeds and poppy seed pods pose a serious, immediate, and increasing hazard to consumers. As we describe below, these contaminated products have been associated with at least 13 fatalities reported in the United States since 2010, yet the products remain widely available for sale online, including through the popular online shopping platforms Amazon.com and Ebay.com.

The opium poppy, *Papaver somniferum*, naturally produces opiate alkaloids, including morphine, codeine, and thebaine, which are concentrated in the seed pod and milky sap of the plant. The opiates found in the *Papaver somniferum* plant are highly addictive, leading the Drug Enforcement Administration (DEA) of the U.S. Department of Justice (DOJ) to list “poppy straw,” which is defined as parts of the poppy plant other than the seeds, as a controlled substance under Schedule II of the Controlled Substances Act (CSA).^{2,3} As a result of this listing, and under the provisions of several international agreements, *Papaver somniferum* cannot be legally cultivated in the United States, and therefore raw materials must be imported to produce opioids for pharmaceutical use as well as poppy seeds sold as foods.⁴ While the sale of imported poppy seeds for food is legal, the knowing or intentional distribution of poppy seeds that have been contaminated with poppy straw is a violation of the CSA.⁵

Poppy seeds may become contaminated with poppy straw and sap in the fields or during harvest, necessitating washing and processing to remove the alkaloids.^{6,7} The European Commission has developed guidance on good practices to prevent and reduce the presence of opium alkaloids in poppy seeds and poppy seed products.⁸ These practices begin with selecting seeds from varieties cultivated for food use, which are bred to contain a low level of opium alkaloids. Appropriate processing can be highly effective; the combination of washing and drying can reduce morphine concentrations in highly contaminated batches of raw poppy seeds (original concentrations vary from 50 to 220 mg morphine/kg) down to concentrations below 4 mg morphine/kg without loss of quality and organoleptic properties.⁹ The United Kingdom has issued guidance setting a target level of 10 mg morphine/kg for the presence in poppy seeds placed on the market destined for the final consumer.¹⁰

The risk presented by contaminated poppy seeds and poppy seed pods is heightened by the fact that consumers may increase the opioid content of these products by brewing the seeds or pods into an herbal tea, often in combination with an acid such as lemon juice. This practice, thought to provide health benefits (and presumably also used by some to induce intoxication or stave off opioid withdrawal), often relies on substantial quantities of seeds for a standard recipe. For example, the website Mercola.com recommends a “Healthy Poppy Seed Tea Recipe” of 200 g (0.44 lbs) poppy seeds in 400 ml water,¹¹ and the website Chewworld.com offers instructions to brew 300 g of poppy seeds in 400 ml of water, advising consumers: “[t]o prevent overdose, Health And Nutrition Tips suggests ingesting not more than 3 pounds of poppy seeds.”¹²

Brewing contaminated seeds via these common methods may create substantial risks. One research team at Sam Houston State University recently analyzed samples of poppy seeds purchased online and found that morphine concentrations in some samples were high enough to yield 2788 mg of morphine from 1 kilogram (2.2 lbs) of seeds, in addition to codeine and thebaine.¹³ Assuming a batch of seeds with up to 2788 mg/kg of morphine,¹⁴ brewing 0.44 lbs of seeds per the Mercola recipe instructions could produce up to 557 mg morphine, and 3 lbs of seeds (the maximum suggested by Chewworld.com) could yield up to 3801 mg of morphine. These amounts are well above the dose of 50 morphine mg equivalents per day demonstrated to increase the risk of overdose among patients prescribed morphine for pain treatment.¹⁵ These amounts would be dissolved in a certain volume of water, perhaps 1-2 L (see Appendix 1), so the dose to the user would depend upon how much of the liquid was consumed.¹⁶

As noted above, contaminated poppy seeds and seed pods can readily be purchased online where they may be labeled and marketed as foods or dietary supplements, or sold for crafting¹⁷ or gardening. Typically, the fact that the seeds may be contaminated with opiates is not clearly indicated in the labeling or advertising materials, and users seeking contaminated seeds instead utilize coded language in product reviews, sometimes offered on third-party blogs, to signal which seeds are most likely to contain high concentrations of opiates. The contaminated seeds thus remain widely available, including through the online shopping platform Amazon.com, despite the fact that the retailer has been informed multiple times of the risks of these products, including on April 25, 2018, by Senator Tom Cotton,¹⁸ on July 13, 2018, by Arkansas Attorney General Leslie Rutledge,¹⁹ and most recently on February 27, 2019, in a letter sent by the family of a victim who died from poppy seeds purchased on the platform.²⁰

Predictably, poppy seed tea consumption has resulted in numerous cases of overdose, dependence, and death, and these cases appear to be more common over time. CSPI has identified 5 cases of non-fatal overdose, 7 cases of opioid dependence, and 13 confirmed deaths associated with the use of poppy seeds or seed pods from the medical literature, a 2010 DOJ Drug Alert, and case reports in the FDA Center for Food Safety and Applied Nutrition Adverse Event Reporting System (CAERS) database²¹ (see Appendix I).

All but four of these 25 cases involved men (84%) and the median age was 26 years (range: 6 weeks-82 years; age was unavailable for six cases). Typically, the product was administered as a tea, usually made from about 1-2 pounds of poppy seeds, but occasionally from the poppy pod. Eighteen of the cases took place in the United States, including all 13 deaths. Five case reports, all in the United States, noted that the product was purchased over the internet. In all but one case from the medical literature, the major opioids in poppy plants, morphine and codeine, were identified either in the product itself or in the blood or urine of the patient. These are likely significant underestimates, and CSPI is continuing to identify and confirm additional cases from other sources. Based on our review, the problem appears to be worsening in recent years.

In addition to these cases, we identified a survey conducted in 2000-2001 of 24 patients at an opioid rehabilitation center in New Zealand, 46 percent of whom reported having tried poppy seed tea. Five of these patients reported that the product was their main source of opioids.²² A survey of patients enrolled in the Cambridge Drug Dependency Unit in the United Kingdom identified 43 patients who acknowledged drinking poppy tea, a regional practice that apparently dates to the 19th Century.²³

Additional cases of overdose, dependence, and death were reported in lay media reports from other countries, including two in England,^{24,25} one in Canada,²⁶ and two in Tasmania.^{27,28} The family members of one poppy seed tea overdose victim created a website, www.poppyseedtea.com, which collects reports of 17 deaths attributed to poppy tea, both in the United States and internationally, gathered from media reports and direct email communications from the families of other victims.²⁹ Many of these may be duplicates of those reported in other sources and so are not included in our total of 13 deaths. The same website also includes numerous emails from consumers describing dependence and withdrawal symptoms, as well as additional non-lethal overdose cases. Some users describe how they began using the product believing it was a relatively harmless natural herbal remedy, not fully realizing the potential for dependence and abuse.

As Surgeon General, you can help elevate this issue and prevent further loss of life by issuing an advisory urging Americans to avoid the purchase and consumption of contaminated poppy seeds (“unwashed” poppy seeds) and poppy seed pods. You can also conduct consumer education and outreach on this issue through your office’s social media platforms.

We look forward to further communication with you on this important matter.

Sincerely,

Peter Lurie, M.D., M.P.H.
President
Center for Science in the Public Interest

Laura MacCleery
Policy Director
Center for Science in the Public Interest

Sarah Sorscher
Deputy Director of Regulatory Affairs
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Appendix 1: Cases of overdose, dependence, and death associated with the use of poppy seeds or seed pods from the medical literature, CAERS case reports, and DOJ Drug Alert

■ Overdose ■ Dependence ■ Death

Reference	Age (y)	Sex	Case Location (state or country)	Method of Administration, Duration	Estimated Dose*	Opioids Detected in Blood/Urine	Other Drugs Mentioned	Outcome	Where Purchased
CAERS, 2019 ^{xxx}	46	Male	GA	Tea				Death	Internet
CAERS, 2019 ^{xxxi}	44	Female	UT	Tea				Death	Internet
Haber, 2019 ^{xxxii}	42	Male	Authors from IN, FL	Tea		Urine: morphine 0.001 mg/L		Entered detoxification	Internet
Poponea, 2018 ^{xxxiii}	22	Male	Authors from MI	Tea	Poppy seed pods	Blood (8 days after ingestion): morphine (0.049 mg/L), codeine (0.15 mg/L)		Admitted to ICU; Anoxic brain injury; Death	“Offline”
Spyres, 2018 ^{xxxiv}	33	Male	Authors from CA, IN	Tea for four months	2 lbs/2 L water Morphine (1.09 mg/mL), codeine (62.1 µg/mL), thebaine (not quantified)	Urine: opiates, benzodiazepines	Alprazolam, Escitalopram, Buspirone	Overdose reversed with naloxone; later admitted to ICU; continued using the product and developed apparent addiction	Internet (Amazon.com)

Reference	Age (y)	Sex	Case Location (state or country)	Method of Administration, Duration	Estimated Dose*	Opioids Detected in Blood/Urine	Other Drugs Mentioned	Outcome	Where Purchased
Spyres, 2018 ^{xxxv}	17	Male	Authors from CA, IN	Tea	1.5 lbs with water	Urine: morphine, codeine, benzodiazepines	Etizolam	Overdose reversed with naloxone	Internet
Powers, 2017 ^{xxxvi} , CAERS, 2016 ^{xxxvii}	24	Male	AR	Tea	Dissolved in 33 fl oz bottle of water (5 lb bag found)	Blood: morphine (0.25 mg/L), codeine (0.012 mg/L), thebaine (trace)		Death	
Powers, 2017 ^{xxxviii}	21	Male	Authors from TX, AR	Tea	Water: Poppy seed “double wash”	Blood: morphine (>0.80 mg/L), codeine (0.26 mg/L)	Adderall	Death; Pulmonary edema; Early acute pneumonia	Grocery store
Kwiecien-Obara, 2016 ^{xxxix}	24	Male	Poland	“Brew”	5 kg	Opiates (presumably in blood): >2 mg/L	Dextromethorphan	Overdose with quadriplegia	
CAERS, 2016 ^{xl}	24	Male	FL	Poppy seed sports drink mixture		Blood: codeine, morphine, hydromorphone	Laudanosine, Alprazolam, Lamotrigine, Delta-9 Carboxy THC, Mitragynine, Norfluoxetine, Detro/Levo Methorphan	Death	
CAERS, 2016 ^{xli}	30	Male	US	Tea				Opioid addiction; twice required opioid treatment	Internet + grocery stores

Reference	Age (y)	Sex	Case Location (state or country)	Method of Administration, Duration	Estimated Dose*	Opioids Detected in Blood/Urine	Other Drugs Mentioned	Outcome	Where Purchased
Pearson, 2015 ^{xlii}		Male	Authors from MN	Tea	Made from 1-2 lbs daily	Urine: morphine (37.6 mg/L), codeine (2.56 mg/L), hydromorphone (1.43 mg/L)	Hydromorphone	Withdrawal symptoms	
CAERS, 2015 ^{xliii}	20	Male	US	Poppy Seed Wash				Death; Coma; Pulmonary edema	Internet (poppyseedwash.com)
Bailey, 2010 ^{xliv}	42	Male	Authors from WV	Tea	Poppy seed pods	Blood: morphine (0.12 mg/L), codeine (0.085 mg/L), thebaine (0.072 mg/L), phenazepam (0.29 mg/L) Urine: hydrocodone; codeine; thebaine	Phenazepam	Death; Pulmonary and cerebral edema	
DOJ Drug Alert, 2010 ^{xlv}	5 adults	All Male	CO, TX, WA	Tea					

Reference	Age (y)	Sex	Case Location (state or country)	Method of Administration, Duration	Estimated Dose*	Opioids Detected in Blood/Urine	Other Drugs Mentioned	Outcome	Where Purchased
Nanjayya, 2009 ^{xlvi}	82	Female	India	Afeem (opium) candies, then poppy seeds, then poppy pod solution over a total of 55 years	Poppy pods in 1-2 L of water per day Solution positive for opioids			Withdrawal symptoms; required opioid detoxification	Homeopathic shops
Hahn, 2008 ^{xlvii} (also described in Smith ^{xlviii} & EFSA ^{xliv})	6 weeks		Authors from MD	Poppy seed milk mixture	75 cc of 200 g in 500 cc milk In seeds: morphine (.1%), codeine (.003%)	Blood: morphine (0.004 mg/L) Urine: morphine		Accidental poisoning; admitted to ICU	
Lloyd-Jones, 2006 ^l	43	Female	Australia	Tea for 10 years	5-6 kg/ week	Urine: opiates		Entered detoxification 3 times	
Lloyd-Jones, 2006 ^{li}	26	Male	Australia	Tea for 3 years	1-3 kg/day	Urine: morphine, codeine, oxazepam, temazepam, desmethyldiazepam	Heroin, Benzodiazepines, Alcohol	Entered drug treatment 2 times	Grocery store

Reference	Age (y)	Sex	Case Location (state or country)	Method of Administration, Duration	Estimated Dose*	Opioids Detected in Blood/Urine	Other Drugs Mentioned	Outcome	Where Purchased
King, 1997 ^{lii}	26	Male	Australia	Tea	Up to 2 L made from 4 kg; Morphine (0.14 mg/mL)	Blood: morphine (3 mg/L)		Seizure; entered detoxification	
Unnithan, 1993 ^{liii}	37	Male	UK	Tea for 20 years	Poppy heads – 14 heads/day	Urine: morphine, benzodiazepines	Benzodiazepines, alcohol	Entered detoxification	Florist

¹ As evidenced by case reports and claims made by manufacturers, e.g. <https://www.healthline.com/health-news/fda-warns-poppy-seed-wash-can-be-dangerous-drug>

² 21 U.S.C. §§ 802(17) & 812(c); 21 C.F.R. § 1308.12(b).

³ See Appendix. Letter to Senator Cotton from the U.S. Department of Justice, Office of Legislative Affairs. November 2, 2018.

⁴ *Ibid.*

⁵ *Ibid.*

⁶ European Food Safety Authority. Opium alkaloids in poppy seeds: assessment updated. May 16, 2018. www.efsa.europa.eu/en/press/news/180516.

⁷ Sharma A, Sharma P, Singh N. Reduction of morphine in poppy seeds through food enhancing nutritional quality of food products. *JFAV*. 2015;5(2):9-13.

⁸ European Commission. 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 (2014/662/EU). Brussels, BE: 2014. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014H0662&from=EN>.

⁹ *Ibid.*

¹⁰ United Kingdom Food Standards Agency. *Plant toxins*. UK FSA; January 19, 2018. www.food.gov.uk/business-guidance/plant-toxins.

¹¹ Mercola. *Is Poppy Seed Tea Safe to Drink?* Mercola; n.d. <https://articles.mercola.com/teas/poppy-seed-tea.aspx>.

¹² Chew the World. <https://chewtheworld.com/poppy-seed-tea-recipe/>.

¹³ 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*. 2017;63(4):1229-1235.

¹⁴ *Ibid.*

¹⁵ U.S. Centers for Disease Control and Prevention. Calculating total daily dose of opioids for safer dosage. CDC; n.d.

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

¹⁶ For example, if Chewworld.com's 3 lbs of the 2788 mg/kg seeds were dissolved in 2 L of water, and a user drank 100 ml, less than half a cup, they would consume 190 mg of morphine.

¹⁷ Some websites sell poppy seeds are intended for use in soapmaking, and seed pods may be marketed for decorative purposes.

¹⁸ News Release. *Cotton warns of opioid overdoses from unwashed poppy seeds*. April 25, 2018. <https://www.cotton.senate.gov/?p=speech&id=933>.

¹⁹ News Release. *Rutledge asks retailers to remove unwashed poppy seeds from shelves*. July 13, 2018. <https://arkansasag.gov/media-center/news-releases/rutledge-asks-retailers-to-remove-unwashed-poppy-seeds-from-shelves/>.

²⁰ See Appendix. Letter from Steve and Betty Hacala to the Amazon Board of Directors. February 27, 2019.

²¹ CSPI searched for CAERS reports using the term “poppy” and going back to 2004. Based on the ages and event dates reported, it appears that at least two deaths and the case of hospitalization with drug dependence are not duplicates of the medical literature or DOJ Drug Alert cases, nor the additional cases reported to CSPI by families of the

deceased.

²² Braye K, Harwood T, Inder R, Beasley R, Robinson G. Poppy seed tea and opiate abuse in New Zealand. *Drug Alcohol Rev.* 2007;26(2):215–9.

²³ London M, O'Regan T, Aust P, Stockford A. Poppy tea drinking in East Anglia. *Br J Addict.* 1990;85:1345-7.

²⁴ Mother warns of poppy tea 'risks' after son's overdose. *BBC.* December 8, 2009. http://news.bbc.co.uk/2/hi/uk_news/wales/8402748.stm

²⁵ Salkeld, L. DJ died after drinking a PINT of deadly 'poppy tea' he made using a recipe he found online. *Daily Mail.* December 31, 2013.

<https://www.dailymail.co.uk/news/article-2531688/DJ-died-drinking-PINT-deadly-poppy-tea-using-recipe-online.html>

²⁶ N.S. family warns of poppy seed tea dangers. *CBC News.* June 4, 2012. <https://www.cbc.ca/news/canada/nova-scotia/n-s-family-warns-of-poppy-seed-tea-dangers-1.1208439>

²⁷ McMillen, A. Tasmania's opium poppy growers face trouble ahead. *The Australian.* March 7, 2015. <https://www.theaustralian.com.au/weekend-australian-magazine/tasmanias-opium-poppy-growers-face-trouble-ahead/news-story/a66ff44dc39704bc7d68c65f151e789f>

²⁸ Teen overdoses after drinking poppy head tea. *ABC News Australia.* September 19, 2013. <https://www.abc.net.au/news/2013-09-19/teen-overdoses-after-drinking-poppy-head-tea/4967422>

²⁹ PoppySeedTea.com. Other Deaths from Poppy Seed Tea. <http://poppyseedtea.com/Other%20Deaths%20Page.html>.

* Poppy seeds unless otherwise noted

^{xxx} Report #156983/2019-36347; additional information from personal communication with family of the deceased

^{xxxii} Report #2019-28036; additional information from personal communication with family of the deceased

^{xxxiii} Haber I, Pergolizzi J, LeQuang JA. Poppy seed tea: a short review and case study. *Pain Ther.* 2019; <https://doi.org/10.1007/s40122-019-0113-5>.

^{xxxiii} Poponea N, Kashian MT, Vollstaedt J. Opium poppy seed tea: a lesser known but deadly cocktail. *Am J Resp Crit Care Med.* 2018;197:A6895. Poster presentation at American Thoracic Society International Conference, 2018.

^{xxxiv} Spyres MB, van Wijk XMR, Lapoint J, Levine M. Two cases of severe opiate toxicity after ingestion of poppy seed tea. *Toxicology Communications.* 2018;102-4.

^{xxxv} Spyres MB, van Wijk XMR, Lapoint J, Levine M. Two cases of severe opiate toxicity after ingestion of poppy seed tea. *Toxicology Communications.* 2018;102-4.

^{xxxvi} 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* 2017; doi:10.1111/1556-4029.13664.

^{xxxvii} Report # 2018-CFS-006553

^{xxxviii} 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* 2017; doi:10.1111/1556-4029.13664.

^{xxxix} Kwicień-Obara E, Szponar J, Krajewska A, Witkowska A, Radoniewicz A, Szponar M. [Morphine (obtained from poppy seeds) and dextrometorfan poisoning—a case report]. *Przegl Lek.* 2016;73(8):596-8. [abstract only]

^{xl} Report # 2018-CFS-006187

^{xli} Report # 206560

^{xlii} Pearson ACS, Eldrige JS, Hooten WM. Interpreting urine drug screen results in the context of poppy seed use. *Mayo Clin Proc.* 2015;90:1734-40.

^{xliii} Report # 185987

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