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. 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). 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. 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.
Poppy seeds may become contaminated with poppy straw and sap in the fields or during harvest, necessitating washing and processing to remove the alkaloids. 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. 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. 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.

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, 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.”

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. Assuming a batch of seeds with up to 2788 mg/kg of morphine, 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. 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.

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 crafting 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, on July 13, 2018, by Arkansas Attorney General Leslie Rutledge, 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.
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) database (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. 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.

Additional cases of overdose, dependence, and death were reported in lay media reports from other countries, including two in England, one in Canada, and two in Tasmania. 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. 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
Center for Science in the Public Interest
## 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

<table>
<thead>
<tr>
<th>Reference</th>
<th>Age (y)</th>
<th>Sex</th>
<th>Case Location (state or country)</th>
<th>Method of Administration, Duration</th>
<th>Estimated Dose*</th>
<th>Opioids Detected in Blood/Urine</th>
<th>Other Drugs Mentioned</th>
<th>Outcome</th>
<th>Where Purchased</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAERS, 2019xxx</td>
<td>46</td>
<td>Male</td>
<td>GA</td>
<td>Tea</td>
<td></td>
<td></td>
<td></td>
<td>Death</td>
<td>Internet</td>
</tr>
<tr>
<td>CAERS, 2019xxxi</td>
<td>44</td>
<td>Female</td>
<td>UT</td>
<td>Tea</td>
<td></td>
<td></td>
<td></td>
<td>Death</td>
<td>Internet</td>
</tr>
<tr>
<td>Haber, 2019xxxii</td>
<td>42</td>
<td>Male</td>
<td>Authors from IN, FL</td>
<td>Tea</td>
<td></td>
<td>Urine: morphine 0.001 mg/L</td>
<td>Entered detoxification</td>
<td>Internet</td>
<td></td>
</tr>
<tr>
<td>Poponea, 2018xxxiii</td>
<td>22</td>
<td>Male</td>
<td>Authors from MI</td>
<td>Tea</td>
<td></td>
<td>Blood (8 days after ingestion): morphine (0.049 mg/L), codeine (0.15 mg/L)</td>
<td>Admitted to ICU; Anoxic brain injury; Death</td>
<td></td>
<td>“Offline”</td>
</tr>
<tr>
<td>Spyres, 2018xxxiv</td>
<td>33</td>
<td>Male</td>
<td>Authors from CA, IN</td>
<td>Tea for four months 2 lbs/2 L water Morphine (1.09 mg/mL), codeine (62.1 µg/mL), thebaine (not quantified)</td>
<td></td>
<td>Urine: opiates, benzodiazepines</td>
<td>Alprazolam, Escitalopram, Buspirone</td>
<td>Overdose reversed with naloxone; later admitted to ICU; continued using the product and developed apparent addiction</td>
<td>Internet (Amazon.com)</td>
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<td>Reference</td>
<td>Age (y)</td>
<td>Sex</td>
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<td>Method of Administration, Duration</td>
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<td>Other Drugs Mentioned</td>
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<tr>
<td>Spyres, 2018&lt;sup&gt;xxxv&lt;/sup&gt;</td>
<td>17</td>
<td>Male</td>
<td>Authors from CA, IN</td>
<td>Tea</td>
<td>1.5 lbs with water</td>
<td>Urine: morphine, codeine, benzodiazepines</td>
<td>Etizolam</td>
<td>Overdose reversed with naloxone</td>
<td>Internet</td>
</tr>
<tr>
<td>Powers, 2017&lt;sup&gt;xxxvi&lt;/sup&gt;, CAERS, 2016&lt;sup&gt;xxxvii&lt;/sup&gt;</td>
<td>24</td>
<td>Male</td>
<td>AR</td>
<td>Tea</td>
<td>Dissolved in 33 fl oz bottle of water (5 lb bag found)</td>
<td>Blood: morphine (0.25 mg/L), codeine (0.012 mg/L), thebaine (trace)</td>
<td>Adderall</td>
<td>Death</td>
<td></td>
</tr>
<tr>
<td>Powers, 2017&lt;sup&gt;xxxviii&lt;/sup&gt;</td>
<td>21</td>
<td>Male</td>
<td>Authors from TX, AR</td>
<td>Tea</td>
<td>Water: Poppy seed “double wash”</td>
<td>Blood: morphine (&gt;0.80 mg/L), codeine (0.26 mg/L)</td>
<td>Adderall</td>
<td>Death; Pulmonary edema; Early acute pneumonia</td>
<td>Grocery store</td>
</tr>
<tr>
<td>Kwiecien-Obara, 2016&lt;sup&gt;xxxix&lt;/sup&gt;</td>
<td>24</td>
<td>Male</td>
<td>Poland</td>
<td>“Brew”</td>
<td>5 kg</td>
<td>Opiates (presumably in blood): &gt;2 mg/L</td>
<td>Dextromethorphan</td>
<td>Overdose with quadriplegia</td>
<td></td>
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<tr>
<td>CAERS, 2016&lt;sup&gt;xl&lt;/sup&gt;</td>
<td>24</td>
<td>Male</td>
<td>FL</td>
<td>Poppy seed sports drink mixture</td>
<td>Blood: codeine, morphine, hydromorphone</td>
<td>Laudanosine, Alprazolam, Lamotrigine, Delta-9 Carboxy THC, Mitragynine, Norfluoxetine, Detro/Levo Methorphan</td>
<td>Death</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAERS, 2016&lt;sup&gt;xxii&lt;/sup&gt;</td>
<td>30</td>
<td>Male</td>
<td>US</td>
<td>Tea</td>
<td></td>
<td></td>
<td>Opioid addiction; twice required opioid treatment</td>
<td>Internet + grocery stores</td>
<td></td>
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<tr>
<td>Reference</td>
<td>Age (y)</td>
<td>Sex</td>
<td>Case Location (state or country)</td>
<td>Method of Administration, Duration</td>
<td>Estimated Dose*</td>
<td>Opioids Detected in Blood/Urine</td>
<td>Other Drugs Mentioned</td>
<td>Outcome</td>
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<tr>
<td>Pearson, 2015&lt;sup&gt;iii&lt;/sup&gt;</td>
<td>Male</td>
<td></td>
<td>Authors from MN</td>
<td>Tea</td>
<td>Made from 1-2 lbs daily</td>
<td>Urine: morphine (37.6 mg/L), codeine (2.56 mg/L), hydromorphone (1.43 mg/L)</td>
<td>Hydromorphone</td>
<td>Withdrawal symptoms</td>
<td></td>
</tr>
<tr>
<td>CAERS, 2015&lt;sup&gt;iii&lt;/sup&gt;</td>
<td>20</td>
<td>Male</td>
<td>US</td>
<td>Poppy Seed Wash</td>
<td></td>
<td></td>
<td></td>
<td>Death; Coma; Pulmonary edema</td>
<td>Internet (poppyseedwash.com)</td>
</tr>
<tr>
<td>Bailey, 2010&lt;sup&gt;iv&lt;/sup&gt;</td>
<td>42</td>
<td>Male</td>
<td>Authors from WV</td>
<td>Tea</td>
<td>Poppy seed pods</td>
<td>Blood: morphine (0.12 mg/L), codeine (0.085 mg/L), thebaine (0.072 mg/L), phenazepam (0.29 mg/L)</td>
<td>Phenazepam</td>
<td>Death; Pulmonary and cerebral edema</td>
<td></td>
</tr>
<tr>
<td>DOJ Drug Alert, 2010&lt;sup&gt;iv&lt;/sup&gt;</td>
<td>5 adults</td>
<td>Male</td>
<td>CO, TX, WA</td>
<td>Tea</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Reference</td>
<td>Age (y)</td>
<td>Sex</td>
<td>Location (state or country)</td>
<td>Case Method of Administration, Duration</td>
<td>Estimated Dose*</td>
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<tr>
<td>Nanjayya, 2009xlvi</td>
<td>82</td>
<td>Female</td>
<td>India</td>
<td>Afeem (opium) candies, then poppy seeds, then poppy pod solution over a total of 55 years</td>
<td>Poppy pods in 1-2 L of water per day Solution positive for opioids</td>
<td>Blood: morphine (0.004 mg/L) Urine: morphine</td>
<td>Withdrael symptoms; required opioid detoxification</td>
<td>Homeopathic shops</td>
<td></td>
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<tr>
<td>Hahn, 2008xlvii (also described in Smithxlviii &amp; EFSAxlxi)</td>
<td>6 weeks</td>
<td>Authors from MD</td>
<td>Poppy seed milk mixture</td>
<td>75 cc of 200 g in 500 cc milk In seeds: morphine (.1%), codeine (.003%)</td>
<td>Blood: morphine (0.004 mg/L) Urine: morphine</td>
<td>Accidental poisoning; admitted to ICU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lloyd-Jones, 2006l</td>
<td>43</td>
<td>Female</td>
<td>Australia</td>
<td>Tea for 10 years</td>
<td>Urine: opiates</td>
<td>Entered drug treatment 3 times</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lloyd-Jones, 2006li</td>
<td>26</td>
<td>Male</td>
<td>Australia</td>
<td>Tea for 3 years</td>
<td>Urine: morphine, codeine, oxazepam, temazepam, desmethyldiazepam</td>
<td>Heroin, Benzodiazepines, Alcohol</td>
<td>Entered drug treatment 2 times</td>
<td>Grocery store</td>
<td></td>
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<tr>
<td>Reference</td>
<td>Age (y)</td>
<td>Sex</td>
<td>Case Location (state or country)</td>
<td>Method of Administration, Duration</td>
<td>Estimated Dose*</td>
<td>Opioids Detected in Blood/Urine</td>
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<tr>
<td>King, 1997lii</td>
<td>26</td>
<td>Male</td>
<td>Australia</td>
<td>Tea</td>
<td>Up to 2 L made from 4 kg; Morphine (0.14 mg/mL)</td>
<td>Blood: morphine (3 mg/L)</td>
<td></td>
<td>Seizure; entered detoxification</td>
<td></td>
</tr>
<tr>
<td>Unnithan, 1993liii</td>
<td>37</td>
<td>Male</td>
<td>UK</td>
<td>Tea for 20 years</td>
<td>Poppy heads – 14 heads/day</td>
<td>Urine: morphine, benzodiazepines</td>
<td>Benzodiazepines, alcohol</td>
<td>Entered detoxification</td>
<td>Florist</td>
</tr>
</tbody>
</table>

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](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).
4 Ibid.
5 Ibid.
9 Ibid.
14 Ibid.
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.
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.


* Poppy seeds unless otherwise noted

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

xxxi Report #2019-28036; additional information from personal communication with family of the deceased


xxxvii Report # 2018-CFS-006553


xl Report # 2018-CFS-006187

xli Report # 206560


xliii Report # 185987


