



White Paper

Challenging the Poppy Seed Defense

The “poppy seed defense,” or the claim that ingesting poppy seeds is the reason for a failed drug test, has long been used to challenge opiate drug test results. To date, there is limited published research regarding the impact of poppy seed consumption on opiate drug test results in controlled studies – especially in alternative testing matrices such as oral fluid. We know poppy seeds contain opiates, specifically morphine and codeine. Ultimately, what employers want to understand is: Can eating poppy seeds produce a positive drug test for a job applicant or employee? “As SAMHSA looks to add oral fluid testing to the Mandatory Guidelines for Federal Workplace Drug Testing Programs, it will be important to understand the potential impact of poppy seed consumption on these drug tests,” said Dr. Barry Sample, Director of Science and Technology, Quest Diagnostics.

In the article *Concentrations of Morphine and Codeine in Paired Oral Fluid and Urine Specimens Following Ingestion of a Poppy Seed Roll and Raw Poppy Seeds* published in the October 2015 issue of the *Journal of Analytical Toxicology*, scientists from Quest Diagnostics Employer Solutions compared the impact of the consumption of raw poppy seeds and a poppy-containing food product on urine and oral fluid drug tests. For individuals performing safety-sensitive duties, as well as other workers subject to routine drug testing for opiates, it is important to distinguish between normal dietary poppy seed consumption and non-prescribed (i.e., illicit) opiate or heroin use.

Concentrations of morphine and codeine present in urine and oral fluid test results after raw and cooked poppy seed ingestion.

The authors determined morphine and codeine concentrations using laboratory-based urine and oral fluid drug screening and confirmation methodologies after study participants ate a Ukrainian-style poppy seed roll and raw poppy seeds. By ingesting a prepared poppy seed food product and approximately the same amount of raw poppy seeds and then measuring drug concentrations over a series of intervals ranging from 15 minutes to 20 hours, the study showed a distinction between the concentrations and duration of time that morphine and codeine were detected in both urine and oral fluid drug tests, depending on the source of poppy seeds ingested (i.e. prepared or raw).

The experiment was designed to examine two different ways of ingesting poppy seeds using two different drug testing technologies – laboratory-based urine and oral fluid drug tests – at specified intervals after initial ingestion. Urine testing is one of the most common drug testing methods and is an accurate, reliable way to detect drug use



Morphine and codeine are naturally occurring in the poppy plant. The opiate content of poppy seeds varies greatly and is dependent on the seed origin and method of processing. Poppy seeds are commonly used in cuisines around the world such as pastries, breads, pastas and garnishes. The seeds may be used whole or ground and are sometimes pressed to make poppy seed oil. The processing of the poppy seeds during food preparation (e.g., washing, soaking, grinding and baking) has been shown to cause a decrease in drug concentration.

that typically occurred within the past 72 hours. Oral fluid testing is also effective at detecting recent drug use and is normally able to detect the presence of drugs for a period of 24 to 48 hours after use.

All study participants were healthy adults who tested negative for opiates and illicit drugs prior to the start of the experiment. On day one, participants consumed a traditional Ukrainian-style roll prepared with approximately 15 grams of poppy seeds, per serving. For the second portion of the study, which occurred at least two days later, the same participants were given 15 grams of raw poppy seeds to consume. For each part, participants were instructed to consume the roll or seeds within 15 minutes and were permitted to drink up to 6 ounces of water in the first 2 hours.

Urine Drug Test Results

In addition to the cutoff of 2,000 ng/mL for opiates widely used in urine workplace drug testing, the study also examined a second (historical) cutoff of 300 ng/mL in an effort to illustrate the potential impact of the two different cutoffs on reporting a positive test after poppy seed ingestion. Specifically, the Substance Abuse and Mental Health Services Administration (SAMHSA) raised the federally mandated cutoff concentration for morphine and codeine from 300 to 2,000 ng/mL, in part to reduce the number of positives reported due to poppy seed consumption in urine drug testing in November, 1998.

A total of 120 urine specimens were collected for baseline testing and post-ingestion analysis. After eating a poppy seed roll, 95.8 percent of specimens contained detectable levels of morphine and 6.2 percent codeine. In comparison, all specimens contained detectable levels of morphine and 47.9 percent codeine after consuming raw poppy seeds. Seventy-five percent of the specimens collected two, four, six and 20 hours after eating a poppy seed roll tested positive for morphine at the lower cutoff and none were positive at the higher cutoff. After eating the raw seeds, depending on the time after collection and the cutoff, up to 100 percent of specimens were positive for morphine.

Oral Fluid Drug Test Results

A total of 246 oral fluid specimens were collected. Morphine was detected in oral fluid up to two hours after raw poppy seed ingestion and only a half hour after consumption of a poppy seed-containing roll. The data suggest that oral fluid drug testing may be less susceptible to the “poppy seed defense” after casual dietary poppy seed consumption because of its narrower window of drug detection.

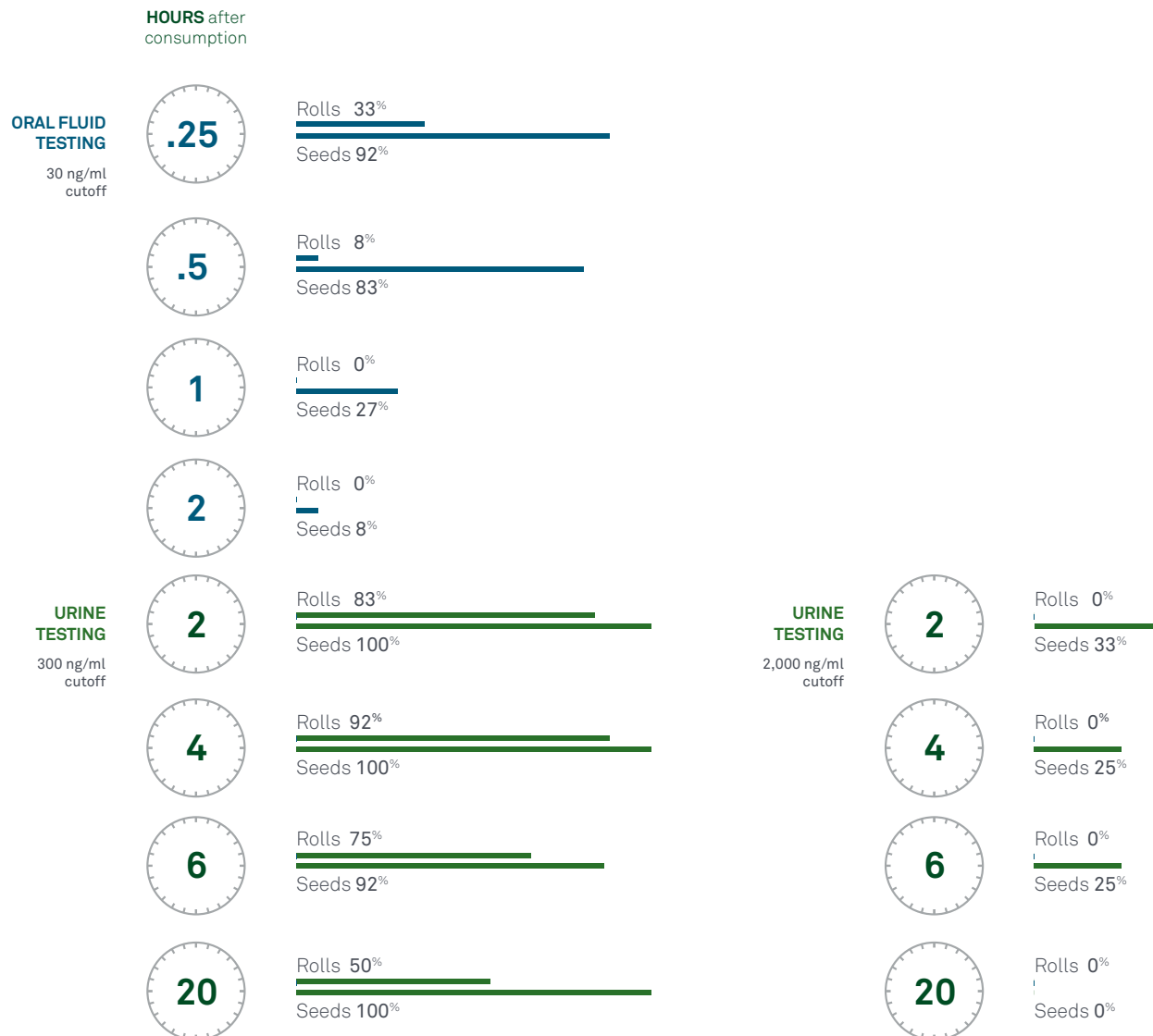
“The research tells us that it is possible to test positive on a drug test for morphine – even less so for codeine – after eating poppy seed-containing products. A unique characteristic of this study is that it compared the consumption of approximately the same amount of poppy seeds in both a prepared food item and as raw seeds and included the collection of both urine and oral fluid specimens. Not surprisingly, most of the positive test findings and the longest detection window resulted from the ingestion of the large quantity of raw poppy seeds in a very short period of time prior to specimen collection. In fact, many of the study participants found consuming such a large amount of raw seeds to be extremely unpalatable. The results from this study suggest that there is less of a ‘poppy seed defense’ from a donor who completes an oral fluid drug test after casual dietary poppy seed consumption rather than a urine test due to the shorter detection window of oral fluid,” said Dr. Kimberly Samano, Postdoctoral Fellow, Quest Diagnostics.

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– Dr. Kimberly Samano

Percentage of Morphine-Positive Urine and Oral Fluid Drug Tests with Raw Seeds and Poppy Seed Roll

In 1998, the Substance Abuse and Mental Health Services Administration (SAMSHA) raised the federally mandated cutoff concentration for morphine from 300 to 2,000 ng/mL to minimize the number of positive opiate tests resulting from poppy seed consumption, specifically the incidental exposure from food products. This chart illustrates the difference in urine testing using 300 and 2000 ng/mL cutoffs, both of which are currently used in workplace drug testing. Using a 2,000 ng/mL cutoff, morphine positivity was not observed in urine from rolls and raw seeds produced detectable morphine levels in urine during the first 6 hours after consumption. With oral fluid testing, morphine positivity from rolls falls below a 30 ng/mL cutoff after 30 minutes and morphine positivity from raw seeds after one hour.



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