

TECHNICAL NOTE

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Poppy Seed Ingestion: The Oregon Perspective

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ABSTRACT: Numerous articles have been published regarding the positive morphine and codeine urinalysis results from the ingestion of poppy seeds. Oregon's perspective towards ingestion of controlled substances focuses around driving under impaired conditions. To determine the influence of the residual opium on poppy seeds to impairment, seven volunteers each ingested 25 grams of poppy seeds baked into bundt cakes. Urine samples were screened by EMIT using 300 ng/ml cutoff levels. All of the urine specimens were found to be opiate positive shortly after consuming the cake; however, after administering a series of standardized drug recognition evaluation tests, no subjects were found to exhibit symptoms of opiate impairment.

KEYWORDS: toxicology, opiates, poppy seeds, drug recognition evaluation

Oregon, as many states, has its problems with drug- and alcohol-impaired drivers. Our Driving Under the Influence of Intoxicants (DUII) laws clearly describe that it is unlawful to operate a motor vehicle while under the influence of alcohol drugs or both. A study sponsored by the Oregon Traffic Safety Commission² showed that of 145 drivers arrested for driving under the influence, 42% were found positive for controlled substances. The most common drug found was marijuana.

Recent articles [1–8] indicate that ingestion of poppy seeds can lead to levels of morphine and codeine high enough to cause an incorrect interpretation of a subject's urine. This issue becomes critically important when trying to evaluate the level of impairment of a person operating a motor vehicle.

The National Highway Traffic Safety Administration (NHTSA) along with the Los Angeles Police Department instituted a Drug Recognition Evaluation (DRE) program in 1986. As of October 1990, police agencies in 13 states have enacted this program [9].

The DRE examiner observes and records five categories of reactions that demonstrate signs of drug use: 1) Vital signs (pulse, temperature and blood pressure); 2) Psychophysical response (coordination of mind and body); 3) Signs of administration of drugs (injection sites, etc.); 4) Eye response (horizontal/vertical gaze nystagmus, eye conveyance, pupil size under varying light intensities); and 5) Physical and behavioral characteristics (muscle rigidity, or flaccidity, hyperactivity, etc.).

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²Hayes, C. E., "O.S.P./O.T.S.C. DUII-Drug Study," presented to the Oregon State Police, sponsored by the Oregon Traffic Safety Commission, May 1991.

In some studies [9] the DRE officer was able to correctly identify the drug of impairment more than 90% of the time. (Some other studies indicated a rate slightly under 90%).

The primary intent of our experiment was not only to determine that the ingestion of poppy seeds produce positive morphine/codeine levels, but to determine whether a trained drug recognition evaluator could observe any significant symptoms of impairment.

The DRE results were critical to the success of the experiment. These individuals, in essence, acted as our medical-review officers.

Selavka [8] indicated the need for these people when he stated "This only underscores the importance of the medical review officer in fashioning the correct administrative or judicial response to a positive opiate laboratory response."

The advantage of drug recognition evaluators is that whether they are in the private sector or in law enforcement, they can perform the evaluation at the time of the alleged impairment with highly accurate results. Even though no correlation can be drawn between drug urine levels and impairment, this information should assist officers in evaluating impaired drivers when poppy-seed questions arise.

Materials and Methods

Poppy seeds were purchased from three local stores. The origin of one source was indicated to have been the San Francisco area of California. The remaining two sources were unknown. Three poppy seed cakes were baked at 350°F for 45 min and divided so that each volunteer would consume 25 g of one brand of seeds. Testing began at 10:00AM with the seven subjects consuming the prescribed amount of cake within 1 h. The subjects were DRE tested and baseline urine samples taken before starting. Specimen collections continued up to 12 h while drug recognition evaluations were performed 2 to 6 h post-ingestion.

Seven volunteers (6 men, 1 woman) ages 41 to 50 years and body weights from 66.7 to 113.2 kg were tested prior to the experiment to insure drug-free specimens. No volunteers had a history of drug use.

The evaluators tested each subject in the areas previously described, including tests typically conducted during a normal field sobriety test (heel-to-toe walk, finger-to-nose, etc.).

Analytical Methods

Analyses of the urine samples were performed on Syva's ETS analyzer, in accordance to the manufacturer's package insert, using as a low cutoff value 300 ng/mL for the opiate assay (Syva Company, Palo Alto, CA). Quality control specimens were purchased from Bio-Rad (Anaheim, CA).

The urine specimens were prepared for GC-MS confirmation using Varian's procedure of acid hydrolysis and subsequent extraction through their solid phase extraction tubes [10]. Confirmation was performed on a Hewlett-Packard GC-MS 5890/5970 using a 12.0 m HP-1 crossed-linked methyl silicone column. The GC was programmed from 200 to 270°C. The MS was set in SCAN mode.

Results and Discussion

One subject (RAK) could only consume half of the prescribed amount, indicating that he was not feeling well. A second subject (KOH) also indicated similar effects; however, this subject consumed the remaining 12.5 g of seeds raw. The remaining five subjects consumed the cake with the general response of being extremely full, as one would feel after a heavy meal.

Two to 6 h postingestion subjects gave morphine values ranging from 307 ng/mL to 8940 ng/mL with a mean of 1935 ng/mL.

Each volunteer was subjected to standardized tests (Table 1) to determine impairment. Characteristics of opiate impairment are listed in Table 2.

Based upon pre and postingestion data (Table 3), evaluators observed *no* significant changes in pupil size, body temperature, blood pressure, pulse rate, inner clock, nystagmus, or typical field sobriety tests.

TABLE 1—*Drug influence evaluation checklist.*

Arresting officer(s) stop the suspect, conduct a DUI alcohol investigation complete with S.F.S.T., and determine that the suspect might be under the influence of a drug other than alcohol or in combination with alcohol. Arresting officers administer a breath test to the suspect at a Department facility. If the observed degree of intoxication is higher than the breath test results should indicate, and there is any other evidence of the possibility of drug intoxication, the officers shall call for a DRE.

1. Cursory examination to determine evidence of drug impairment. If arrestee possibly under the influence of a drug, continue. If not, advise officers of disposition of arrestee.
2. Drug Influence Evaluation:
 - Pulse rate—taken three different times during the evaluation.
 - Nystagmus and nonconvergence.
 - Rhombberg test (modified position of attention and internal clock).
 - Walk and turn test.
 - One leg stand test.
 - Finger to nose test.
 - Blood pressure test/temperature/second pulse.
 - Pupillary size and reaction test (darkroom exam).
 - Examination for signs of drug ingestion.
 - Third pulse.
3. DRE forms opinion of intoxication and cause.

TABLE 2—*Drug category symptomatology chart.*

Major Indicators	Narcotic Analgesics
Horizontal nystagmus	Not present
Vertical nystagmus	Not present
Lack of convergence	Not present
Pupil size	Usually constricted
Reaction to light	Little or no visible reaction
Pulse rate	Usually below normal
Blood pressure	Usually below normal
Body temperature	Usually below normal
General indicators	Droopy eyelids; drowsiness; depressed reflexes; low, raspy voice; dry mouth; facial itching, euphoria; fresh puncture marks
Duration of effects	<i>NOTE:</i> Hippus may be evident during withdrawals. Tolerant users exhibit relatively little psychomotor impairment
Methods of administration	3–6 hours
Overdose signs	Oral; smoked Shallow, slow breathing; clammy skin; convulsions; coma; possible death

Normal Ranges:		
Blood pressure	Pulse	Pupil diameters
$\frac{120-140}{70 \quad 90}$	60–90	3.0–6.5

This data indicates that individuals who consume large amounts of poppy seeds do not show symptoms of opiate impairment, even though they may have positive urine results.

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