



A93 Identification and Determination of Opiates in Poppy Tea Preparations

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The goal of this presentation is to present the forensic community with a survey conducted on various sources of Opium Poppy and *Papaver somniferum*. This presentation will also discuss the alkaloid profiles as well as the levels detected.

This presentation will impact the forensic science community by discussing a survey of *P. somniferum* obtained from various sources conducted on both intact poppy pods and the separated seeds. The alkaloid profiles obtained using GC-MS and the calculated levels acquired using HPLC-UV will be compared and presented.

The Opium Poppy, *Papaver somniferum*, is widely grown as an attractive flower throughout Europe, South America, Asia, and parts of the United States. Although it is prized as an ornamental plant in the garden and its seeds are used in the production of foods and oils, for many, *P. somniferum*'s value lies in the opium. Opium refers to the dried latex that is collected from the plant by scoring the immature seed pods. It contains numerous opiate alkaloids including morphine, codeine, thebaine, papaverine, and noscapine. Morphine is the most prevalent alkaloid in opium comprising anywhere up to 20% of the total mass. Codeine is the second most common alkaloid making up 0.3% to 3% of the total.¹ Thebaine, although not used therapeutically, can be converted industrially into a variety of compounds including oxycodone and oxymorphone. It is the most poisonous opium alkaloid and often causes nausea and vomiting when ingested. All three of these compounds are Schedule II controlled substances as defined by the DEA.

Although the latex is the greatest source of opiate alkaloids, these compounds can be found in other parts of the plant as well. Poppy tea is a popular drink made from various portions of the dried poppy flower and induces a long lasting intoxication. The seeds and dried seed capsules are generally indicated for use in making the tea and due to the widespread availability of dried poppy pods on the internet, in floral markets, at craft stores, etc, this can be problematic. Over the last two years, multiple deaths attributed to acute morphine and/or codeine intoxication have been reported, with poppy tea being noted as the likely source of the opiates.² The FDA's Forensic Chemistry Center first received dried poppy pods in May of 2009 after the death of a 20-year-old male college student. Several pods were received and analysis was conducted on the entire fruit

(the dried pod capsule with seeds) as well as the seeds alone. Both samples were prepared by grinding portions with either a food processor or by hand using a mortar and pestle. The ground parts were then steeped in boiling water for 30 minutes, as per the tea recipe received with the pods. The extract was then filtered and analyzed using GC-MS analysis and HPLC-UV analysis. The early results showed a trace amount of morphine in the seed extracts. However, extracts examined from the entire pod demonstrated the presence of morphine, codeine, and thebaine. Subsequent quantitation by HPLC-UV confirmed an average of 18.5 mg per pod of morphine, 3.7 mg per pod of codeine, and 0.4 mg per pod of

thebaine. Preparing the tea as described in the recipe yielded 92 mg, 18.5 mg, and 2.0 mg of morphine, codeine, and thebaine respectively per cup of tea. With the minimum lethal dose of morphine reported at 200 mg and cases of 60 mg causing sudden death in hypersensitive individuals, the levels detected are alarming.³

A survey of *P. somniferum* obtained from various sources will be conducted on both intact poppy pods and the separated seeds. The alkaloid profiles obtained using GC-MS and the calculated levels acquired using HPLC-UV will be compared and presented.

References:

1. http://www.sciencedaily.com/articles/o/opium_poppy.htm
2. Bunch, Joey, "Boulder death could be second from poppy tea," The Denver Post, 7/21/2009.
3. Macchiarelli, L., Arbarello, P., Cave Bondi, G., Di Luca, N.M., Feola, T., *Medicina Legale (compendio)* II edition, Minerva Medica Publications, Italy, Turin 2002.

Poppy Tea, Morphine, Opiates