



K40 Postmortem Blood Concentrations Following the Oral Ingestion of Transdermal Fentanyl Patches (Duragesic®)

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The objective of this presentation is to describe the oral administration of transdermal fentanyl patches (Duragesic®) with resultant blood concentrations in seven deaths in the province of Ontario, Canada.

This presentation will impact the forensic community and/or humanity by alerting the forensic community to an unusual opioid abuse practice: the ingestion of fentanyl patches. Detailed case reports of seven deaths will assist forensic toxicologists in the interpretation of postmortem blood fentanyl concentrations that may arise following this route of administration.

Introduction: Fentanyl is a synthetic narcotic analgesic that is available in the form of a transdermal patch for the management of chronic pain. Transdermal patches contain 2.5-10 mg fentanyl and provide a dose of 25-100 µg/hr for 72 hours. Therapeutic serum concentrations following transdermal application have been reported up to 5 ng/mL. Since the introduction of the transdermal system to treat chronic pain, the patches are increasingly being found in the opioid-abusing population. There have been numerous reports of abuse of the transdermal delivery systems through the application of multiple patches or by intravenous injection of the patch contents. In addition, there are a limited number of reports where abuse of these transdermal patches was achieved via ingestion or inhalation.

Methods: Fentanyl-related deaths following the oral ingestion of transdermal patches were retrospectively identified from the files of the Toxicology Section of the Centre of Forensic Sciences, which provides the sole toxicology testing for coroner's investigations in the province of Ontario (approx. population 12 million). Inclusion criteria were: time period between 2002 and 2004 and the detection of fentanyl in postmortem blood. Further information pertaining to the circumstances of death, autopsy findings, and cause and manner of death was obtained from the Office of the Chief Coroner of Ontario. The route of fentanyl administration was classified as oral based on both observations of individuals chewing fentanyl patches prior to death or the finding of fentanyl patches in the oral cavity or pharynx during autopsy. Fentanyl was extracted from blood samples by liquid/liquid extraction and quantitation was performed using gas chromatography-mass spectrometry in the electron ionization mode.

Results & Discussion: A total of 119 fentanyl-related deaths were identified for the period of 2002 to 2004, of which there were seven cases where the route of administration was classified as oral. The seven decedents comprised three females and four males with ages ranging from 32 to 51 years. Postmortem blood fentanyl concentrations were determined in all cases and ranged from 7 to 97 ng/mL with a mean blood concentration of 28 ng/mL. There were two cases in which death was attributed solely to fentanyl overdose. The first was a 42-year-old male found dead in bed with numerous small pieces of a transdermal patch in the oral cavity and a heart blood fentanyl concentration of 22 ng/mL. The second case was that of a 20-year-old woman who had shared and ingested the contents of a 10 mg fentanyl patch the night before her death. Postmortem fentanyl was measured in a femoral blood sample at a concentration of 13 ng/mL. The blood fentanyl concentrations in these two cases are higher than those observed following therapeutic administration of transdermal patches and are comparable to concentrations in cases of fentanyl overdose following excessive transdermal application.

In three other cases, fentanyl was present in combination with ethanol and death was considered to have been the result of combined ethanol/fentanyl toxicity. The concentrations of fentanyl were 7, 8 and 28 ng/mL with corresponding blood alcohol concentrations of 209, 171 and 160 mg/100mL, respectively. The final two cases that will be presented comprise a case of mixed drug toxicity in which the fentanyl concentration was 97 ng/mL and a case in which administration was via both the transdermal and oral route of administration. In the latter case, a fentanyl concentration of 19 ng/mL was detected and the medical cause of death was due to a combination of fentanyl toxicity and a perforated duodenal ulcer.

Although oral ingestion accounted for less than 6% of the total number of fentanyl-related deaths in Ontario between 2002 and 2004, the seven deaths associated with this practice illustrate that toxic blood concentrations can occur following this route of administration. Detailed case reports of these cases will expand on this unusual means of Duragesic® abuse and illustrate the range of blood fentanyl concentrations that may be expected.

Fentanyl, Postmortem, Oral Abuse