

Letter to the Editor—Comparison of Fentanyl Extraction from Two Different Transdermal Patches

Sir:

According to a federal government report, prescription drug abuse is the second leading category of illegal drug use, following marijuana. The traditional response to drug abuse has been law enforcement; however, the pharmaceutical industry has introduced novel delivery systems that inhibit abuse without interfering with the efficacy or safety of the drug. Fentanyl is potent opioid drug (80–100 times more potent than morphine) used in the management of moderate-to-severe chronic pain. The study described involves a series of fentanyl extraction/recovery experiments to determine the relative ease of obtaining fentanyl in an abusable form from the Duragesic[®] reservoir patch and a prototypical matrix patch. The Duragesic[®] transdermal system contains fentanyl base in alcohol gelled with hydroxyethyl cellulose. The matrix patch is a drug-in-adhesive formulation of fentanyl base dissolved in the polyacrylate adhesive.

The experiments were designed to evaluate fentanyl recovery using readily available solvents in a manner consistent with drug abuser capability. The Duragesic[®] and matrix patches were prepared for extraction by removing the protective layer and placing them in the selected solvent. The prepared patches were subjected to the following extraction techniques: (1) “Percolated”: prepared

patch and 750 mL of the solvent were percolated for 3 hours in a stainless-steel electric coffee percolator; (2) “Soaked”: prepared patch left undisturbed in 500 mL of the extraction solvent at room temperature; and (3) “Soaking at elevated temperature”: prepared patch soaked in 750 mL of solvent at boiling point. Extraction efficiency was evaluated by liquid chromatography/tandem mass spectrometry (LC-MS/MS) at various time points.

Experiments involving minimal time and effort yielded significant amounts of fentanyl from the matrix patch system. Methanol was the most efficient solvent, achieving 95% of the theoretical yield in only 5 min. Soaking for 30 min at room temperature in isopropyl alcohol or Bacardi 151 rum, yielded 73% and 90%, respectively, and at 3 h yielded 89% and 93%, respectively. Yields for the Duragesic[®] patch did not exceed 10% at any time point. More complex processes such as percolating in vinegar for 3 h or boiling in ethyl alcohol were required to get significant yields from Duragesic[®] patches.

Overall, under the conditions tested, fentanyl is more easily and more rapidly extracted from the matrix patch than from the Duragesic[®] reservoir patch.

Robert P. Bianchi, B.S.
5502 Chestermill Court
Fairfax, VA 22030