Heat and Transdermal Fentanyl

Transdermal fentanyl (Duragesic, and others) offers a convenient delivery system for patients with chronic pain but it has some drawbacks. One is that exposing the patch to heat, either from an external source, increased exertion or possibly high fever, could increase release of the drug, which might lead to an overdose and fatal respiratory depression. A recent article in the NY Times about this problem may have aroused the concerns of some patients using the patches.

First approved for marketing by the FDA in 1991, transdermal fentanyl provides continuous delivery of the drug for about 3 days. After application of the patch, a depot of fentanyl forms in the upper layers of the skin. Serum concentrations of the drug increase gradually, reaching a peak (Cmax) in 24-72 hours. According to a pharmacokinetic model mentioned in the labeling, an increase in body temperature to 40°C (104°F) could increase fentanyl serum concentrations by 33%. Local application of heat near or on a fentanyl transdermal patch also increases systemic absorption; in one study, heating the patch during the first 4 hours after application increased maximum serum concentrations nearly three-fold. Unintentional increases in systemic fentanyl absorption caused by a heating pad, a warming blanket used during surgery and strenuous exertion have led to respiratory depression in 3 patients. No reports of clinical overdosage caused by fever have been published.

Serious adverse events may require removal of the patch and administration of an opioid antagonist such as naloxone (Narcan, and others). Monitoring for hypoventilation or cognitive impairment for at least 24 hours is recommended after removing the patch because fentanyl concentrations decrease slowly (50% decrease in about 17 hours) due to continued systemic absorption from the intracutaneous reservoir.
