Study of different toxicological methods for analysis and detection of two non-opioid drugs and follow-up their stability in postmortem specimens

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Fentanyl and pentazocine are opioid agonists that relive pain with fewer adverse effects and more potent analgesic effect than morphine, and because of its strong sedative properties, it has become an analogue of illicit drugs such as heroin. The present study was designed to 1) reveal which of the different toxicological analytical methods is more suitable for the identification of fentanyl and pentazocine, 2) estimate the postmortem drug concentrations of fentanyl and pentazocine in some tissues of rats injected intramuscularly and intraperitoneally respectively with two different doses of the drug and define the time at which the drug disappear in such putrefied tissues.The results obtained can be summarized as follow:1) Color tests revealed that some chemical reagents are suitable for the identification of both drugs (e.g. Marquis reagent and cobalt thiocyanate), while other reagents such as Forrest reagent and cobalt nitrate / ammonia are specific for fentanyl and ferric chloride is specific for pentazocine.2) Different coloring reagents were sprayed on the chromatoplates of TLC and the results revealed that iodoplatinate reagent and PDA reagent may be considered specific for the identification and hence differentiation of both studied drugs.3) The chromatographic behavior of the drug on silica gel (GF254) is considered important for its identification. There were different calculated Rf values with different eluents.4) The UV spectrum of fentanyl and pentazocine showed absorption band at λ max 250 nm, 277 nm respectively for both studied drugs.5) GC/Ms chromatograms of demonstrated that base ion fragments occurring a m/z 245 for fentanyl and 289 for pentazocine.6) Infrared spectroscopy analysis of fentanyl and pentazocine demonstrated its characteristic function groups of both studied drugs.7) The characteristic mass spectrum of the drug was identified andthe mass fragments of both studied drugs were defined.8) The quantitative estimations of the drugs in different organs of rats byGC/MS were successfully carried out. Calibration curve was plottedusing different concentrations from fentanyl and pentazocine against the area under peaks, and consequently the concentrations of drug residue in different tissues and blood were obtained.9) The distribution of fentanyl and pentazocine in different organs of rats, as well as their abundance per gram tissue was illustrated.10) Fentanyl was not detected in the brain, spleen, liver, blood and

liver samples after 3rd week of sacrifice when rats administrated low dose of fentanyl (0.1 mg/ kg body weight). Therefore, it’s difficult to depend upon these tissues for drug poisoning detection.11) On the other hand, pentazocine was not detected in the brain tissue after the 3rd week and the 4th week in case of the spleen tissue after sacrifice of rats administrated low dose of pentazocine (17.5 mg/kg body weight). So, brain tissue cannot be considered as organ of choice for drug poisoning detection.12) At the low dose of fentanyl, muscle tissue (heart and femoral) and hair fentanyl was detected until the 5th week of sacrifice.13) On the other hand, pentazocine was detected in hair and muscle tissue (heart and femoral) until the 6th week of sacrifice when rats administered either low or high dose of the drug. So, muscle tissue and hair are the samples of choice for pentazocine poisoning detection.14) At the high dose of fentanyl (0.2 mg/kg body weight) was detected in spleen, liver, blood and brain tissue until the 5th week of sacrifice. In addition, fentanyl was detected in hair and muscle tissue (femoral and heart) until the 6th week of sacrifice.15) It is worthy notice that in case of fentanyl and pentazocine hair and muscle tissue (heart and femoral) samples can be used as evidence of intoxication and for estimation of fentanyl and pentazocine concentration present at the time of death.16) In most studied tissues, a direct relationship was observed between the administrated dose of fentanyl and at the time at which the drugs disappeared after death.17) It is worthy notice that whatever the fentanyl administration dose is, the highest concentration (after 5 hours of treatment) is in the spleen and the lowest one is in the hair.18) A direct relationship was recorded between the administered dose of pentazocine and the time at which the drug disappeared in spleen, liver, kidney, blood and brain samples. Again, it seems that whatever the administered dose of pentazocine is, the highest concentration (after 4 hours of treatment) is in the heart muscle and the lowest one is in the hair.