

Determination of opioid analgesics in hair samples of patients under palliative care

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AIMS: Aim of this study was the development of a liquid-chromatographic tandem mass-spectrometric method (LC/MS-MS) for the determination of opioid concentrations in hair. The applicability of the method was shown by analysis of hair samples of patients under palliative care.

METHODS: The procedure utilizes a simple methanolic extraction without further time-consuming sample clean-up. The evaporated hair extract can directly be used for further analysis. Chromatographic separation on a Phenomenex C12 MAX-RP column followed by electrospray mass spectrometry in multiple reaction monitoring mode was used for selective and sensitive detection. The LC/MS-MS procedure was applied and validated for the simultaneous determination of the opioids: tilidine (TI), buprenorphine (BU), codeine (COD), oxycodone (OC), fentanyl (FE), hydromorphone (HM), morphine (MOR), oxymorphone (OXMO), methadone (MET), piritramide (PI), tramadol (TRA) and the metabolites: bisnortilidine (BNTI), nortilidine (NTI), norfentanyl (NFE) and normorphine (NOMO).

RESULTS: The method was shown to be sensitive with limits of detection between 0.8 and 17.4 pg/mg hair matrix. Precision ranged between 3.1 and 14.9 % by the use of an internal standard technique. The coefficients of correlation of the calibration curves ranged between 0.993-0.999. The applicability of the whole procedure was shown by analysis of authentic hair samples from patients receiving opioids for the treatment of cancer pain.

CONCLUSIONS: Compared to conventional GC/MS methods, the sensitivity could be significantly enhanced. LC/MS-MS in hair analysis has the degree of sensitivity and reproducibility demanded in clinical and forensic toxicology. Hair analysis was demonstrated to be a complementary and useful tool in monitoring drug-taking behaviour of patients consuming opioid analgesics for treatment of pain. For example it was shown that consumption of TRA and MET was dramatically underreported in a collective of patients under palliative care.

KEYWORDS: *Hair, Opioids, LC/MS analysis, Palliative care*

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