MONITORING OF IMATINIB IN FINGERPRINTS BY LC-MS/MS: METHOD DEVELOPMENT AND VALIDATION

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INTRODUCTION: Imatinib (IM) is the first tyrosine kinase inhibitor (TKI) approved for the treatment of chronic myeloid leukemia (CML). Evaluating treatment adherence is crucial, as a satisfactory response is associated with adherence rates above 95%. The use of fingerprint analysis to assess therapeutic adherence has been proposed in the literature as a non-invasive collection strategy with high stability. OBJECTIVE: To develop and validate an innovative and non-invasive methodology for monitoring IM concentrations in fingerprints using UPLC-MS/MS. MATERIALS AND METHODS: To develop and validate an innovative and non-invasive methodology for monitoring IM concentrations in fingerprints using UPLC-MS/MS. The samples were concentrated at 60°C for 45 minutes. After evaporation, the extract was resuspended in 100 µL of methanol. The analysis was conducted on a UPLC-MS/MS Xevo® TQD-micro system with electrospray ionization in positive mode. A C18 column (10 × 2.1 mm, 1.7 µm) was used at 40°C with gradient elution of water containing 0.1% formic acid (A) and acetonitrile containing 0.1% formic acid (B), ranging from 40% to 90% B. The method was validated according to FDA guidelines. IM concentrations in fingerprints and plasma from 11 CML patients were compared. RESULTS AND CONCLUSION: The analytical run time was 6 minutes, with elution of imatinib and the internal standard at 1.7 minutes. The method exhibited precision (CV < 5.7%) and accuracy (89-103%), with an extraction yield of 98%. The calibration curve was linear between 5 and 5,000 pg/slide ($r > 0.99$ in 1/x). Imatinib concentrations in fingerprints ranged from 110 to 2,280 pg/slide and showed a significant correlation ($r = 0.67$, $p < 0.01$) with plasma levels ranging from 731 ng/mL to 2,210 ng/mL. Two patients were considered nonadherent to treatment, showing undetectable IM levels in both matrices.In conclusion, charcoal workers exhibit elevated PAH exposure, which correlates with increased global DNA methylation and adverse biochemical changes. The use of fingerprints to monitor imatinib concentrations has proven to be viable, with consistent detection. This technique has potential to be explored as a practical and non-invasive alternative for evaluating treatment.

Key-words: Imatinib; Therapeutic adherence; Fingerprints; UPLC-MS/MS; Chronic myeloid leukemia