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ORIGINAL RESEARCH

# Rapid, simple and highly sensitive LC-ESI-MS/MS method for the quantification of tamsulosin in human plasma

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ABSTRACT: A simple, rapid, sensitive and specific liquid chromatography–tandem mass spectrometry method was developed and validated for quantification of tamsulosin (I), a highly selective $\alpha$1-adrenoceptor antagonist used for the treatment of patients with symptomatic benign prostatic hyperplasia. The analyte and internal standard, mosapride (II) were extracted by liquid–liquid extraction with diethyl ether-dichloromethane (70:30, v/v) using a Glas-Col Multi-Pulse Vortexer. The chromatographic separation was performed on a reverse phase Waters symmetry $C_{18}$ column with a mobile phase of 0.03% formic acid–acetonitrile (30:70, v/v). The protonated analyte was quantitated in positive ionization by multiple reaction monitoring with a mass spectrometer. The mass transitions *m/z* 409.1 → 228.1 and *m/z* 422.3 → 198.3 were used to measure I and II, respectively. The assay exhibited a linear dynamic range of 0.1–50.0 ng/mL for tamsulosin in human plasma. The lower limit of quantitation was 100 pg/mL with a relative standard deviation of less than 10%. Acceptable precision and accuracy were obtained for concentrations over the standard curve ranges. A run time of 2.0 min for each sample made it possible to analyze a throughput of more than 400 human plasma samples per day. The validated method has been successfully used to analyze human plasma samples for application in pharmacokinetic, bioavailability or bioequivalence studies. Copyright © 2005 John Wiley & Sons, Ltd.

KEYWORDS: tamsulosin; LC-ESI-MS/MS; high-throughput; human plasma; pharmacokinetic study

## INTRODUCTION

Tamsulosin hydrochloride [tamsulosin; (–)-(*R*)-5-[2-[[2-(O-ethoxyphenoxy)ethyl]amino]propyl]-2-methoxybenzenesulfonamide hydrochloride], see Fig. 1, is a highly selective α-adrenoceptor antagonist used for the treatment of patients with symptomatic benign prostatic hyperplasia. It is selective for $\alpha_{1A}$ and $\alpha_{1D}$ receptors, which are predominant in the prostate, prostatic capsule, prostatic urethra and bladder. The relaxation of prostate and bladder smooth muscles is associated with improved maximal urine flow and reduction of lower urinary tract symptoms (Katherine *et al.*, 2002).

Tamsulosin is available as a modified-release once-daily oral formulation. The rapid absorption and increase in plasma concentration of immediate-release oral tamsulosin led to the development of the modified-release formulation to improve tolerability and prolong the active duration of the drug (Katherine *et al.*, 2002). Therefore the human plasma concentration is very low. After an oral dose of 0.2 mg the maximum plasma concentration of tamsulosin in adult humans is about 7 ng/mL (Matsushima *et al.*, 1998). The mean maximum plasma concentration is obtained ~6 h after intake, and its elimination half-life ($t_{1/2}$) is ~10 h (Katherine *et al.*, 2002).

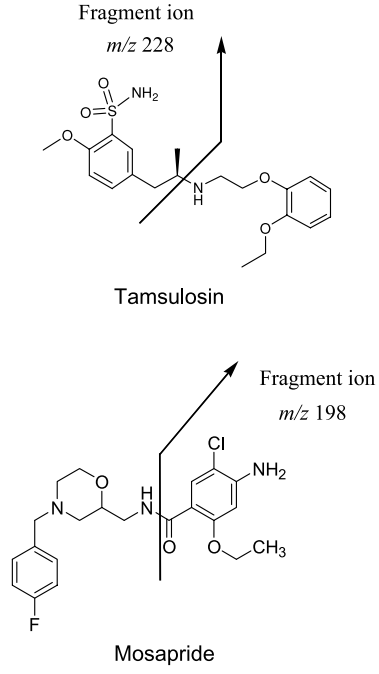


**Figure 1.** Chemical structures and proposed fragmentation pathway for tamsulosin and IS (mosapride).

The bioanalytical component of pharmacokinetic study requires a drug assay with simplicity, selectivity, high sensitivity, small volume requirements and rapid turnaround time. Only a few methods have been

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reported for the quantification of tamsulosin in plasma, which involves liquid chromatography with fluorescence detection (Soeishi *et al.*, 1990; Macek *et al.*, 2004) and liquid chromatography–mass spectrometry (Matsushima *et al.*, 1997; Ding *et al.*, 2002; Qi *et al.*, 2004). In Soeishi *et al.*'s (1990) reported method, the sample preparation involved a three-step extraction procedure which was tedious and time-consuming. Moreover, the limit of quantification was 0.5 ng/mL using 1.5 mL of plasma and run time was approximately 18 min. Macek *et al.* (2004) reported a rapid HPLC method eliminating the tedious evaporation step. The sample preparation involved liquid–liquid extraction from alkalinized plasma with butyl acetate and back-extraction of the drug to the phosphate buffer (pH 2). The limit of quantification was 0.4 ng/mL using 1 mL of plasma but the run time was 3.5 min. Matsushima *et al.* (1997) reported an LC-MS-MS method for the determination of tamsulosin in plasma dialysate, plasma and urine, in which plasma concentration was linear over the range 0.5–50 ng/mL. Recently, Qi *et al.* (2004) reported an LC-MS-MS method with an APCI source in selected reaction monitoring mode for the determination of tamsulosin in dog plasma. The limit of quantification was lower (0.1 ng/mL) using 0.2 mL of plasma and run time was 3 min. Ding *et al.* (2002) reported a method using LC-ESI-MS instead of LC-MS-MS. The detection limit was 0.2 ng/mL using 1 mLof plasma and run time was 5 min. In all the reported methods, plasma volume requirement was high, chromatographic run time was longer and sensitivity was inadequate for pharmacokinetic studies in modified release formulations.

The purpose of this work was to exploit the high selectivity and sensitivity of triple quadrupole MS system operated in MS-MS mode with an ESI interface for the development and validation of a robust reversed-phase LC-MS-MS method for tamsulosin quantification in human plasma. It was essential to establish an assay capable of quantifying tamsulosin at concentrations down to 100 pg/mL. At the same time, it was expected that this method would be efficient in analyzing the large number of plasma samples obtained for pharmacokinetic, bioavailability or bioequivalence studies after therapeutic doses of tamsulosin. The advantages of the method presented in this paper over those reported are: (1) less plasma was used (100 μL)—the volume of samples to be collected per time point from an individual during study was reduced significantly, allowing inclusion of additional points; (2) high sensitive (100 pg/mL)—the sensitivity could be further improved by sample concentration; (3) rapid—the sample turnaround time of 2 min makes it an attractive procedure in high-throughput bioanalysis of tamsulosin.

In recent years, a number of laboratories have reported the use of high-throughput bioanalytical procedures using LC-MS/MS (Jemal, 2000; Ramakrishna *et al.*, 2004a–e, 2005a,b). Our method is simple, rapid, robust, specific and sensitive, which makes it an attractive procedure in high-throughput bioanalysis.

## EXPERIMENTAL

**Chemicals.** Tamsulosin hydrochloride reference standard (99.3% pure, concentrations hereafter are reported as free base corrected for purity unless otherwise stated) was obtained from our R&D department. Mosapride was employed as an internal standard (IS) and was obtained from Torrent Pharmaceuticals Limited (Ahmedabad, India). Chemical structures are presented in Fig. 1. Drug-free human plasma, containing EDTA as an anticoagulant, was obtained from the Usha Mullapudi Cardiac Center (Hyderabad, India). Stock solutions of Tamsulosin (1 mg/mL) and IS (1 mg/mL) were separately prepared in 10 mL volumetric flasks with methanol. HPLC-grade LiChrosolv methanol and LiChrosolv acetonitrile were from Merck (Darmstadt, Germany). Diethyl ether, dichloromethane, formic acid and sodium hydroxide pellets were from Merck (Worli, Mumbai, India). HPLC type I water from a Milli-Q system (Millipore, Bedford, MA, USA) was used. All other chemicals were of analytical grade.

**LC-MS/MS instrument and conditions.** The HPLC, Agilent 1100 Series (Agilent Technologies, Waldbronn, Germany) was equipped with a G1312A binary pump, a G1379A degasser, a G1367A autosampler equipped with a G1330B thermostat, a G1316A thermostatted column compartment and a G1323B control module. The chromatography was on Waters Symmetry®, $C_{18}$ column (5.0 μm, 150 × 4.6 mm i.d.) at 30°C. The mobile phase composition was a mixture of 0.03% formic acid–acetonitrile (30:70, v/v), which was pumped at a flow-rate of 1.0 mL/min.

Mass spectrometric detection was performed on an API 3000 triple quadrupole instrument (ABI-SCIEX, Toronto, Canada) using multiple reaction monitoring (MRM). A turbo ionspray interface in positive ionization mode was used. The main working parameters of the mass spectrometer are summarized in Table 1. Data processing was performed on Analyst 1.4 software package (SCIEX).

**Sample processing.** A 100 μL volume of plasma sample was transferred to a 15 mL glass test tube, and then 10 μL of IS working solution (250 ng/mL) were spiked. The tubes were vortex-mixed and then 10 μL of 1 M sodium hydroxide solution were added. After vortexing for 30 s, a 3 mL aliquot of extraction solvent, diethyl ether-dichloromethane (70:30) was added using Dispensette Organic (Brand GmbH, Postfach, Germany). The sample was vortex-mixed for 3 min using Multi-Pulse Vortexer (Glas-Col, Terre Haute, USA). The organic layer (2.5 mL) was transferred to a 5 mL glass tube and evaporated to dryness using TurboVap LV Evaporator (Zymark, Hopkinton, MA, USA) at 40°C under a stream of nitrogen. Then the dried extract was reconstituted in 200 μLof diluent (water–acetonitrile, 50:50, v/v) and a 20 μL aliquot was injected into chromatographic system.

**Bioanalytical method validation.** Working solutions for calibration and controls were prepared from the stock

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**Table 1. Tandem mass-spectrometer main working parameters**

| Parameter | Value |
|---|---|
| Source temperature, °C | 250 |
| Dwell time per transition, ms | 200 |
| Ion source gas (gas 1), psi | 8 |
| Ion source gas (gas 2), psi | 7000 |
| Curtain gas, psi | 10 |
| Collision gas, psi | 7 |
| Ion spray voltage, V | 4500 |
| Entrance potential, V | 10 |
| Declustering potential (DP), V | 80 (analyte) and 65 (IS) |
| Collision energy, V | 31 (analyte) and 30 (IS) |
| Collision cell exit potential, V | 20 (analyte) and 10 (IS) |
| Mode of analysis | Positive |
| Ion transition for tamsulosin, *m/z* | 409.1/228.1 |
| Ion transition for mosapride, *m/z* | 422.3/198.3 |

solution by dilution using water–methanol (1:1). The IS working solution (250 ng/mL) was prepared by diluting its stock solution with water–methanol (1:1). Working solutions (5%) were added to 95% drug-free plasma (prepared in bulk) to obtain tamsulosin concentration levels of 0.1, 0.2, 0.5, 1.0, 2.0, 5.0, 10.0, 20.0 and 50.0 ng/mL. Quality control (QC) samples were also prepared in bulk, at concentrations of 0.1 (LLOQ), 0.3 (low), 20.0 (medium) and 40.0 ng/mL (high).

A calibration curve was constructed from a blank sample (a plasma sample processed without an IS), a zero sample (a plasma processed with IS) and nine non-zero samples covering the total range (0.1–50.0 ng/mL), including the lower limit of quantification (LLOQ). Such calibration curves were generated on five consecutive days. Linearity was assessed by a weighted ($1/x$) least squares regression analysis. The calibration curve had to have a correlation coefficient ($r^2$) of 0.99 or better. The acceptance criterion for each back-calculated standard concentration was 15% deviation from the nominal value, except for LLOQ, which was set at 20%. At least 67% of non-zero standards should meet the above criteria, including acceptable LLOQ and upper limit of quantitation.

The within-batch precision and accuracy were determined by analyzing six sets of quality control samples in a batch. The between-batch precision and accuracy were determined by analyzing six sets of quality control samples on three different batches. The quality control samples were randomized daily, processed and analyzed in position (a) immediately following the standard curve, (b) in the middle of the batch or (c) at the end of the batch. The acceptance criteria of within- and between-batch precision were 20% or better for LLOQ and 15% or better for the rest of concentrations and the accuracy was 100 ± 20% or better for LLOQ and 100 ± 15% or better for the rest of concentrations.

Recovery of tamsulosin from the extraction procedure was determined by a comparison of the peak area of tamsulosin in spiked plasma samples (six low- and high-quality controls) with the peak area of tamsulosin in samples prepared by spiking extracted drug-free plasma samples with the same amounts of tamsulosin at the step immediately prior to chromatography. Similarly, recovery of IS was determined by comparing the mean peak areas of extracted quality control samples ($n$ = 10) with the mean peak areas of IS in samples prepared by spiking extracted drug-free plasma samples with the same amounts of IS at the step immediately prior to chromatography.

## RESULTS AND DISCUSSION

In order to develop a method with the desired LLOQ (0.1 ng/mL), it was necessary to use MS-MS detection, as MS-MS methods provide improved limit of detection (LOD) for trace-mixture analysis (Jemal, 2000). The inherent selectivity of MS-MS detection was also expected to be beneficial in developing a selective and sensitive method. The positive ion TurboIonspray Q1 mass spectrum and product ion mass spectrum of tamsulosin and the IS are shown in Figs 2 and 3, respectively. $[M+H]^+$ was the predominant ion in the Q1 spectrum and was used as the precursor ion to obtain product ion spectra. The most sensitive mass transition was from *m/z* 409.1 to 228.1 for tamsulosin and from *m/z* 422.3 to 198.3 for the IS. LC-MRM is a very powerful technique for pharmacokinetic studies since it provides sensitivity, selectivity and specificity requirements for analytical methods. Thus, the MRM technique was chosen for the assay development. The MRM state file parameters were optimized to maximize the response for the analyte. The parameters presented in Table 1 are the result of this optimization.

### Method development

Different mobile phases consisting of water–methanol or water–acetonitrile were evaluated to improve HPLC separation and enhance sensitivity in MS. Modifiers such as formic acid and ammonium formate alone or in combination in different concentrations were added. The best signal was achieved using 0.03% formic acid–acetonitrile (30:70, v/v). The formic acid was found to be necessary in order to lower the pH to protonate the

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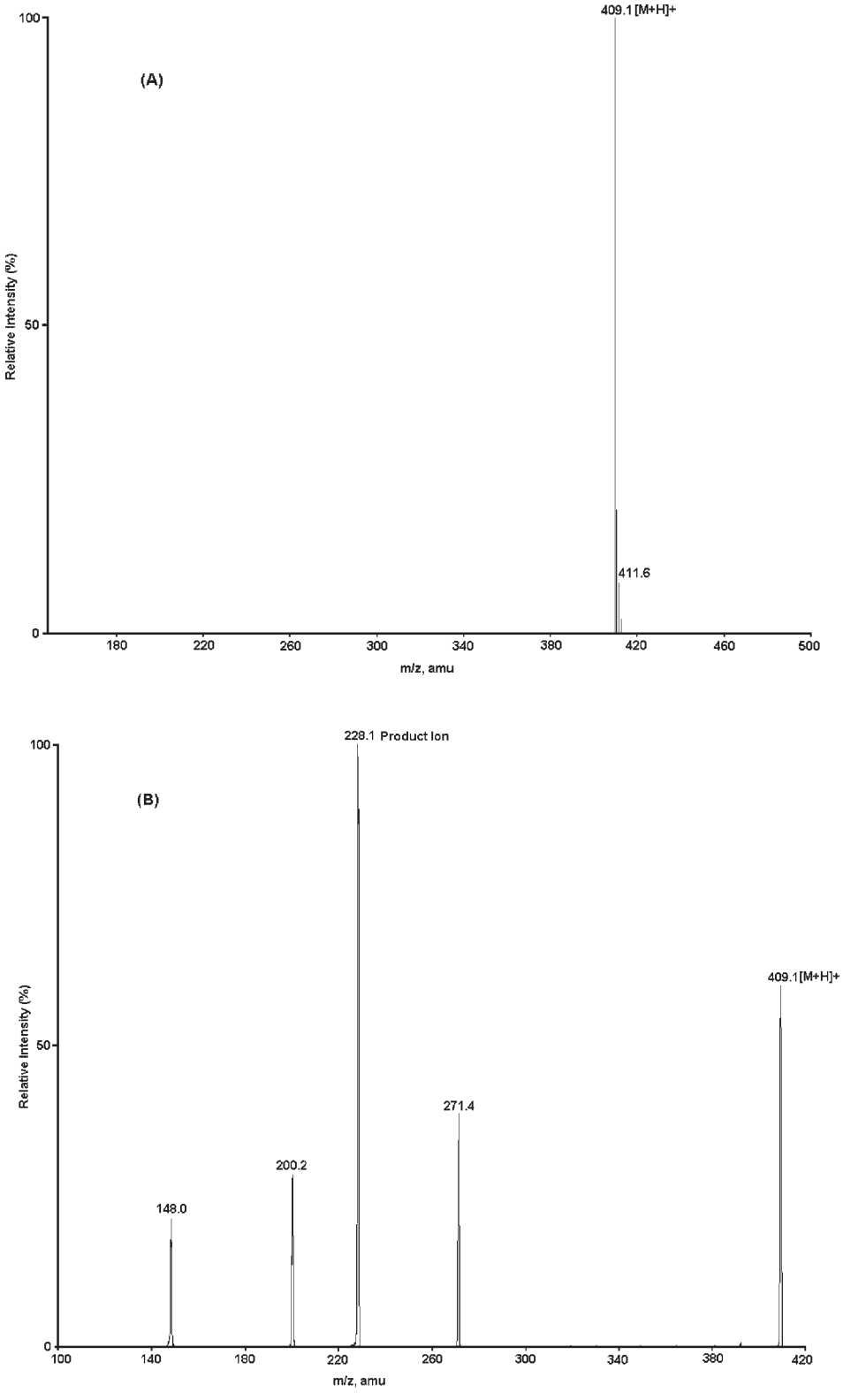


**Figure 2.** Full-scan positive ion turboIonspray (A) Q1 mass spectra and (B) product ion mass spectra of tamsulosin.

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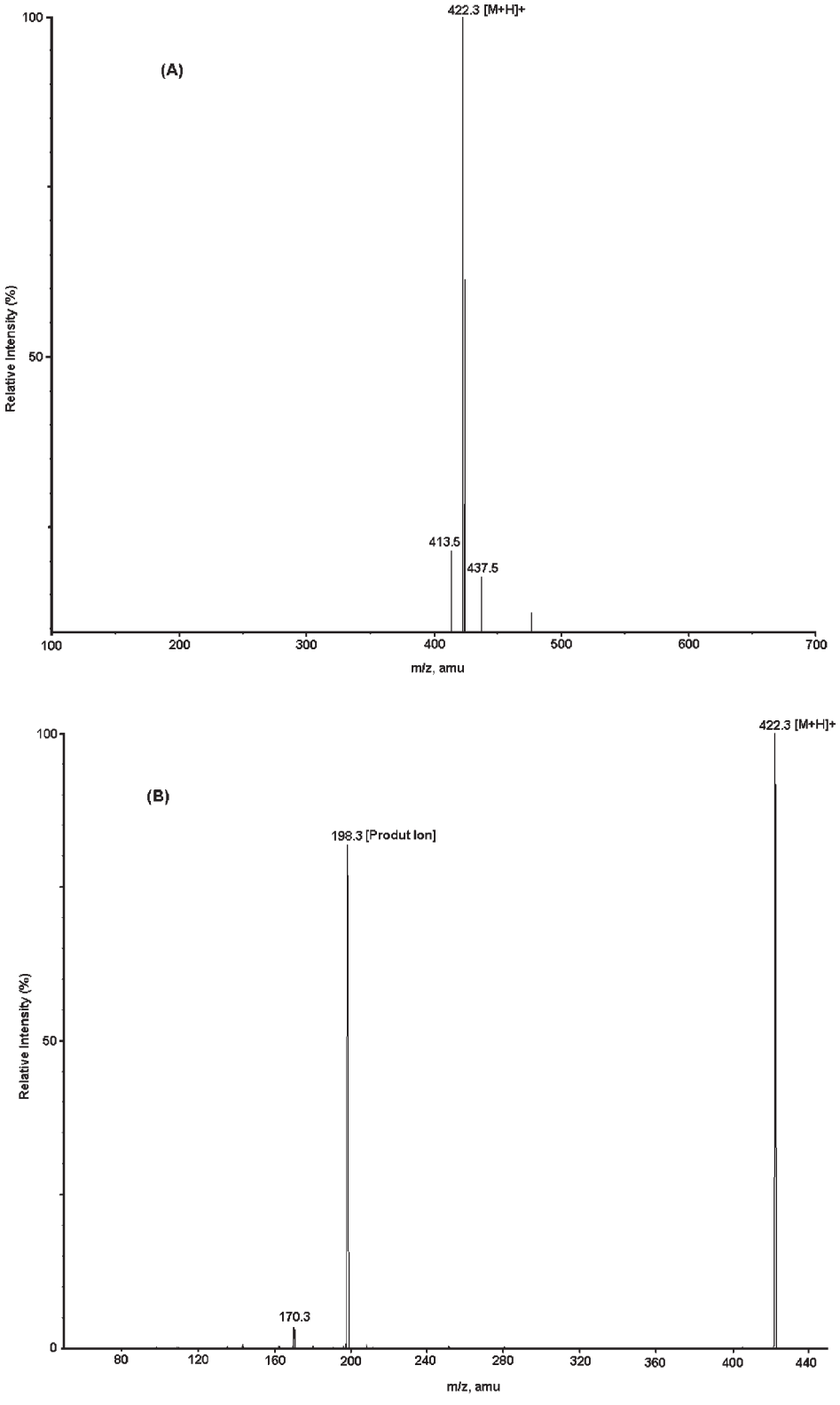


**Figure 3.** Full-scan positive ion turboIonspray (A) Q1 mass spectra and (B) product ion mass spectra of IS (mosapride).

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**Table 2. Precision and accuracy data of back-calculated concentrations of calibration samples for tamsulosin in human plasma**

| Concentration added (ng/mL) | Concentration found (mean ± SD, $n$ = 5; ng/mL) | Precision (%) | Accuracy (%) |
|---|---|---|---|
| 0.1 | 0.091 ± 0.004 | 4.0 | 91.0 |
| 0.2 | 0.193 ± 0.011 | 5.6 | 96.7 |
| 0.5 | 0.510 ± 0.034 | 6.7 | 102.0 |
| 1.0 | 0.975 ± 0.024 | 2.4 | 97.5 |
| 2.0 | 1.920 ± 0.161 | 8.4 | 96.0 |
| 5.0 | 5.234 ± 0.159 | 3.0 | 104.7 |
| 10.0 | 9.806 ± 0.353 | 3.6 | 98.1 |
| 20.0 | 21.036 ± 0.330 | 1.6 | 105.2 |
| 50.0 | 50.516 ± 0.417 | 0.8 | 101.0 |

tamsulosin and thus deliver good peak shape. The percentage of formic acid was optimized to maintain this peak shape whilst being consistent with good ionization and fragmentation in the mass spectrometer.

The tandem mass spectrometer allows the selective detection of substances with varying masses or fragments without chromatographic separation. The development of the chromatographic system was focused on short retention times, paying attention to matrix effects as well as good peak shapes. A high proportion of organic solvent [0.03% formic acid–acetonitrile (30:70, v/v)] was used to co-elute both the analyte and the IS at a retention time of 1.0 min. Flow rate of 1.0 mL/min produced a good peak shape and brought the run time to 2.0 min.

A stable isotope-labeled analyte may be used as an internal standard to deal with sample matrix effects. Since such an internal standard is not commercially available, an alternative approach has been used. The internal standard substance should match the chromatographic retention, recovery and ionization properties with the matrix of tamsulosin. Mosapride (Fig. 1) was found to fulfill these criteria sufficiently. The matrix effects were similar to the matrix effects of tamsulosin. Hence mosapride has been chosen as the internal standard in the quantitative assay for tamsulosin from plasma.

The calibration curve was linear over the concentration range 0.1–50.0 ng/mL for the analyte. The nine-point calibration curve gave acceptable results for the analyte and was used for all the calculations. The calibration model was selected based on the analysis of the data by linear regression with/without intercepts and weighting factors ($1/x$, $1/x^2$ and $1/\sqrt{x}$). The residuals improved by weighted ($1/x^2$) least-squares linear regression. The best fit for the calibration curve could be achieved with the linear equation $y = mx + c$ with a $1/x^2$ weighing factor. The linear regression equation of a calibration curve for the analyte was $y = 0.0197x + 0.0005$ where $y$ was the peak area ratio of the analyte to the IS and $x$ was the concentration of the analyte. The mean correlation coefficient of the weighted calibration curve generated during the validation was 0.999 for the analyte. Table 2 summarizes the calibration curve results for the analyte. The calibration curve obtained as described above was suitable for generation of acceptable data for the concentrations of the analyte in the samples during the validations.

## Specificity

The specificity of the method was examined by analyzing blank human plasma extract (Fig. 4) and an extract spiked only with the internal standard (Fig. 5). As shown in Fig. 4, no significant interference in the blank plasma traces was seen from endogenous substances in drug-free human plasma at the retention time of the analyte. Figure 5 shows the absence of interference from the internal standard to the MRM channels of the analyte. Figure 6 depicts a representative ion-chromatogram for the lower limit of quantitation (LLOQ, 0.1 ng/mL) of the calibration curve. Excellent sensitivity was observed for a 20 µL injection volume (LLOQ) corresponding to ca. 2 pg on-column. The product ion chromatogram obtained from an extracted plasma sample of a healthy subject who participated in a bioequivalence study conducted on 24 subjects is depicted in Fig. 7. Tamsulosin was unambiguously identified and was quantified as 10.35 ng/mL.

Owing to the components of the sample matrix, signal suppression or enhancement may occur. These matrix effects in the LC-MS/MS method were evaluated by spiking blank plasma extracts with low and high QC samples. The resulting chromatograms were compared with chromatograms of pure samples equally concentrated. Six independent plasma lots were used with six samples from each lot. The results (data was not shown) showed that there was no significant difference for peak responses between these samples. This effect is most likely due to the sample clean-up with LLE.

The extraction recovery of tamsulosin was 59.3% on average, and the dependence on concentration is

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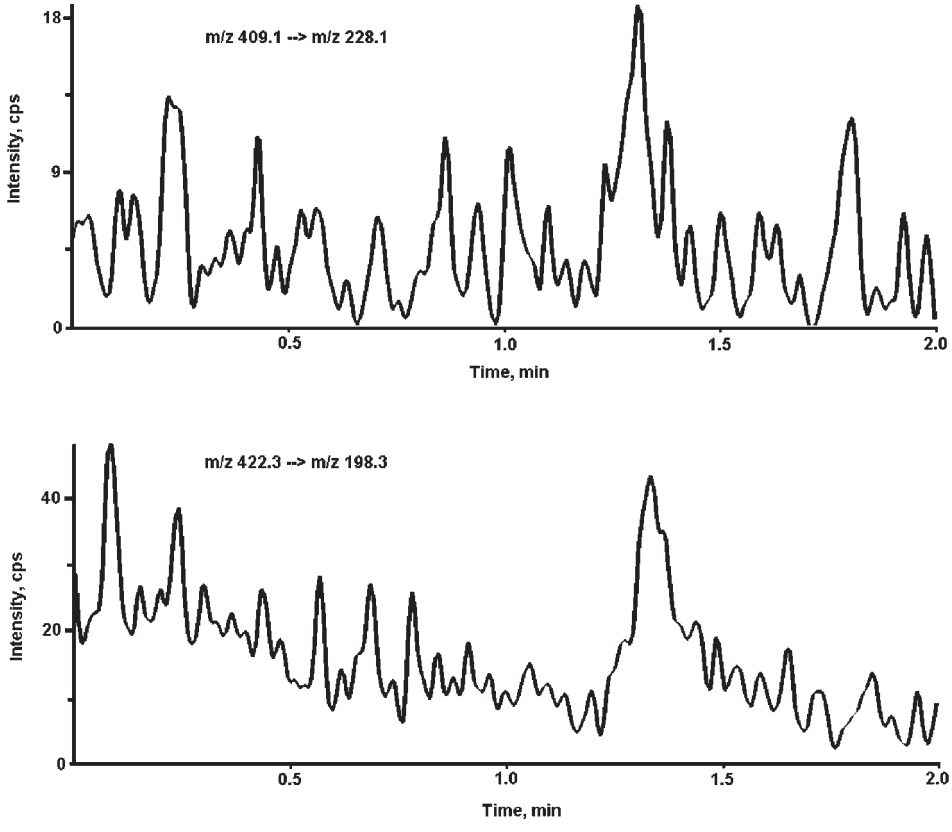


**Figure 4.** MRM ion-chromatograms resulting from the analysis of blank (drug and IS-free) human plasma for tamsulosin and IS.

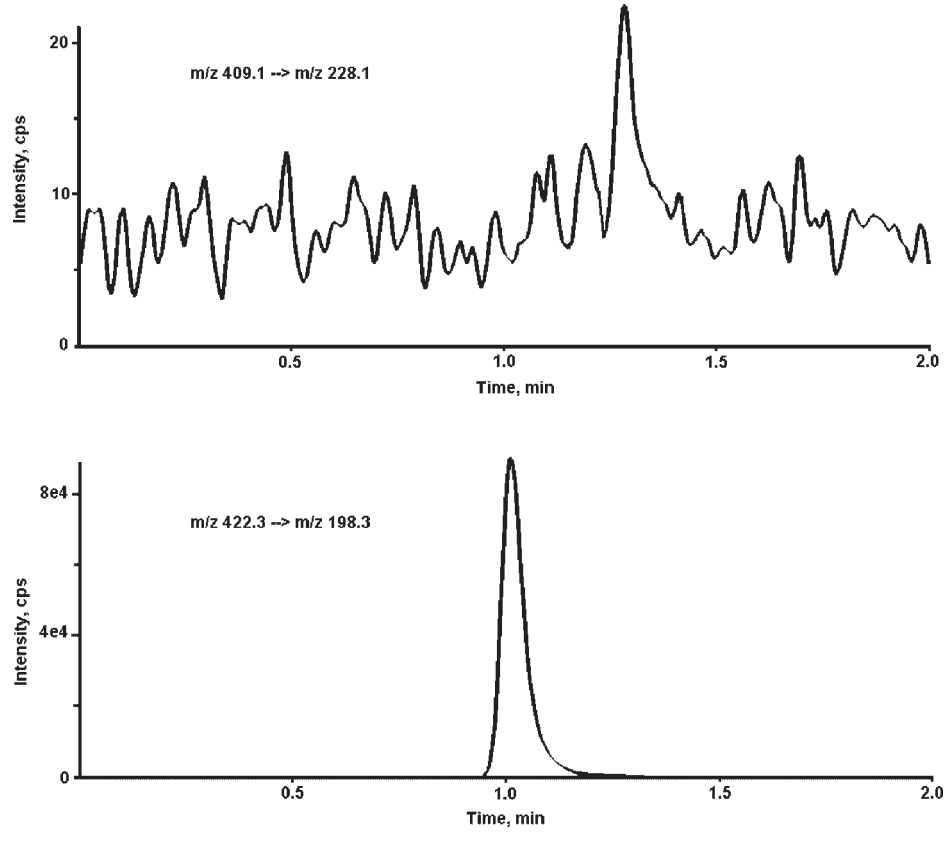


**Figure 5.** MRM ion-chromatograms resulting from the analysis of blank (drug-free spiked with IS) human plasma for tamsulosin and IS.

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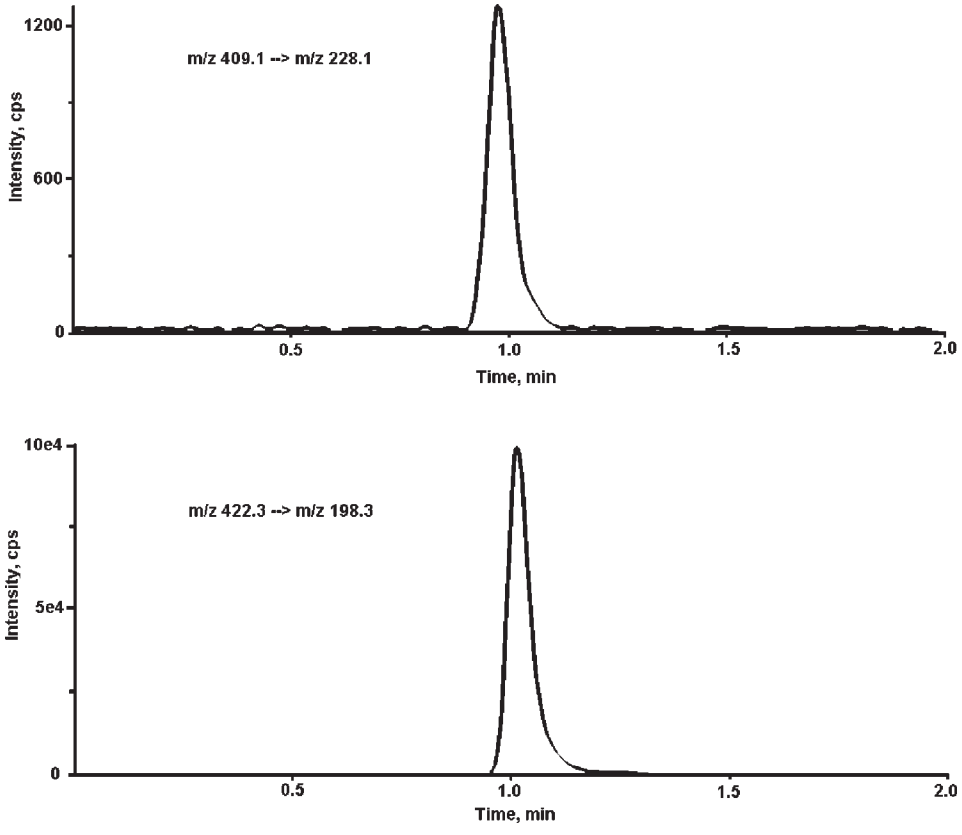


**Figure 6.** Representative MRM ion-chromatograms resulting from the analysis of 100 pg/mL (LLOQ) of tamsulosin spiked with the IS.

negligible. The recovery of the IS was 52.7% at the concentration used in the assay (250 ng/mL). Recovery of the analyte and IS was low, but it was consistent, precise and reproducible. With the consistency in the recovery of tamsulosin and IS, the assay has proved to be robust in high-throughput bioanalysis.

## Lowest concentration

The lower limit of quantitation (LLOQ) of tamsulosin in human plasma assay was 0.1 ng/mL. The between-batch precision at the LLOQ was 3.7%. The between-batch accuracy was 92.3% (Table 3). The within-batch precision was 6.9% and the accuracy was 95.8% for tamsulosin.

## Middle and upper concentrations

The middle and upper quantitation levels of tamsulosin ranged from 0.3 to 40 ng/mL in human plasma. For the between-batch experiment, the precision ranged from 2.6 to 3.6% and the accuracy ranged from 95.6 to 103.9% (Table 3). For the within-batch experiment, the precision and accuracy for the analyte met the acceptance criteria (<±15%) and precision was below 7% at all concentrations tested.

## Stability

The stability of the analytes in human plasma under different temperature and timing conditions, as well as

**Table 3. Precision and accuracy of the LC-MS/MS method for determining tamsulosin concentrations in plasma samples**

| | Within-batch precision ($n$ = 6) | | | Between-batch precision ($n$ = 3) | | |
|---|---|---|---|---|---|---|
| Concentration added (ng/mL) | Concentration found (mean ± SD; ng/mL) | Precision (%) | Accuracy (%) | Concentration found (mean ± SD; ng/mL) | Precision (%) | Accuracy (%) |
| 0.1 | 0.096 ± 0.007 | 6.9 | 95.8 | 0.092 ± 0.003 | 3.7 | 92.8 |
| 0.3 | 0.286 ± 0.015 | 5.3 | 95.2 | 0.287 ± 0.008 | 2.6 | 95.6 |
| 20 | 20.308 ± 0.779 | 3.8 | 101.5 | 20.784 ± 0.742 | 3.6 | 103.9 |
| 40 | 41.784 ± 2.910 | 7.0 | 104.5 | 40.944 ± 1.465 | 3.6 | 102.4 |

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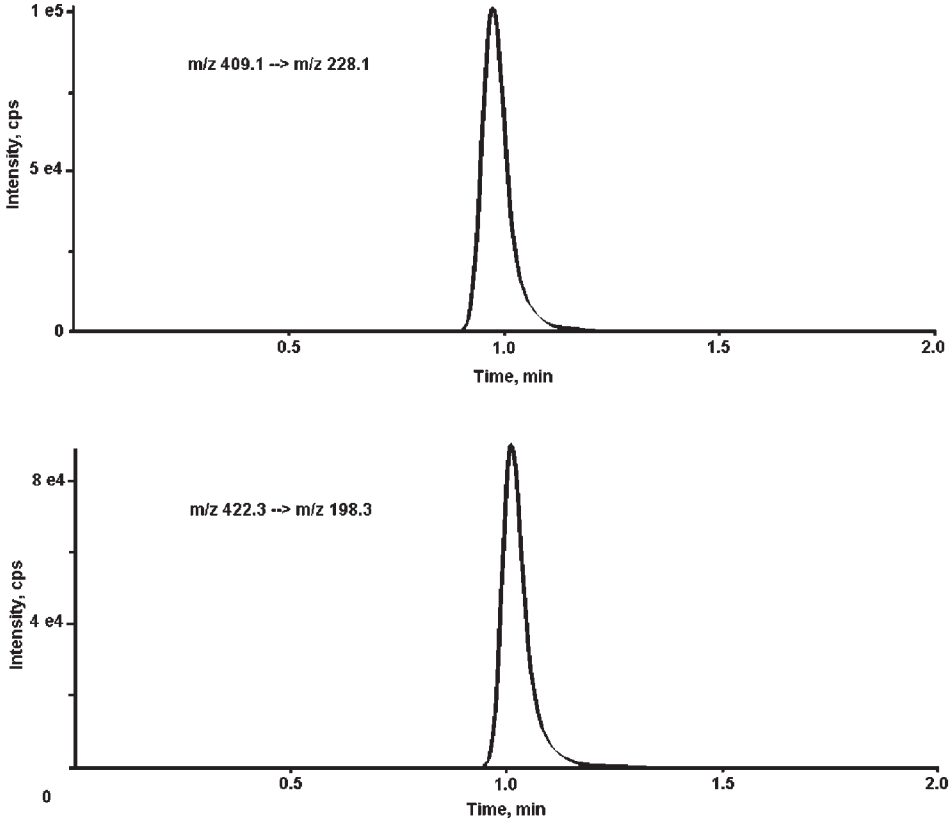


**Figure 7.** MRM ion-chromatograms resulting from the analysis of subject plasma sample after the administration of 0.4 mg oral single dose of tamsulosin. The sample concentration was 10.35 ng/mL.

the stability of the analytes in stock solution, was evaluated as follows.

For short-term stability determination, stored plasma aliquots were thawed and kept at room temperature for a period of time exceeded that expected to be encountered during the routine sample preparation (around 24 h). Samples were extracted and analyzed as above mentioned. Results are given in Table 4. Short-term stability indicated reliable stability behavior under the experimental conditions of the regular batches.

The post-preparative stability (autosampler stability) of QC samples kept in the autosampler for 25 h was also assessed. The results indicate that tamsulosin and internal standard can remain at the autosampler temperature for at least 25 h, without showing significant loss in the quantified values, indicating that

**Table 4. Stability of human plasma samples of tamsulosin**

| Sample concentration (ng/mL; $n = 6$) | Concentration found (ng/mL) | Precision (%) | Accuracy (%) |
|---|---|---|---|
| *Short-term stability for 24 h in plasma* | | | |
| 0.3 | 0.290 | 3.9 | 96.8 |
| 40.0 | 39.241 | 2.1 | 98.1 |
| *Three freeze–thaw cycles* | | | |
| 0.3 | 0.305 | 2.6 | 101.6 |
| 40.0 | 38.736 | 1.5 | 96.8 |
| *Autosampler stability for 25 h (after extracting and reconstitution)* | | | |
| 0.3 | 0.288 | 3.6 | 96.1 |
| 40.0 | 39.316 | 4.5 | 98.3 |
| *Stability for 30 days at <–50°C* | | | |
| 0.3 | 0.326 | 2.7 | 108.5 |
| 40.0 | 40.290 | 4.1 | 100.7 |

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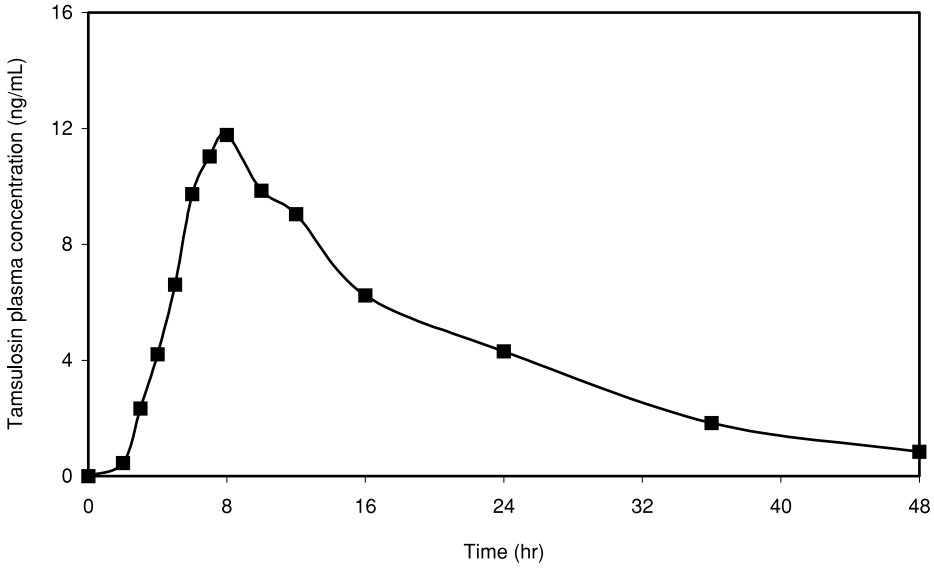


**Figure 8.** Concentration versus time profiles over 48 h of tamsulosin in human plasma from a subject receiving a single 0.4 mg SR capsule of tamsulosin.

samples should be processed within this period of time (Table 4).

The data representing the stability of tamsulosin plasma samples at two QC levels over three cycles of freeze and thawing are given in Table 4. The tests indicate that the analyte is stable in human plasma for three cycles of freeze and thaw, when stored at below –50°C and thawed to room temperature.

Table 4 summarizes also the long-term stability data of tamsulosin in plasma samples stored for a period of 30 days at below –50°C. The stability study of tamsulosin in human plasma showed reliable stability behavior as the mean of the results of the tested samples was within the acceptance criteria of ±15% of the initial values of the controls. These findings indicated that storage of tamsulosin plasma samples at below –50°C is adequate, and no stability-related problems would be expected during routine analysis for pharmacokinetic, bioavailability or bioequivalence studies.

The stability of stock solutions was tested and established at room temperature for 4 and 20 h and under refrigeration for 30 days. The recoveries for tamsulosin and mosapride were 106.8 (CV 1.7%), 100.7 (CV 0.7%), 104.2 (CV 1.0%) and 108.9 (CV 1.5%), 98.1 (CV 0.9%), 103.9 (CV 0.8%), respectively. The results revealed optimum stability for the prepared stock solutions throughout the period intended for their daily use.

### Application

The present LC-ESI-MS/MS method was for the first time employed to determine the pharmacokinetic parameters of tamsulosin in subjects' plasma samples of clinical studies. Figure 8 shows the representative concentration–time profiles of tamsulosin in one subject following a 0.4 mg oral dose of tamsulosin under fasting conditions. The maximum tamsulosin plasma concentration was 11.8 ng/mL, $t_{max}$ was 8 h and $t_{1/2}$ in the terminal elimination phase was 9.89 h.

## CONCLUSION

In summary, LC-MS/MS method for the quantification of tamsulosin in human plasma was developed and fully validated according to commonly accepted criteria (Shah *et al.*, 1991). This method offers significant advantages over those previously reported, in terms of improved sensitivity and selectivity, faster run time (2.0 min) and lower sample volume requirements. Thus the volume of samples to be collected per time point from an individual during trial is reduced significantly, allowing inclusion of additional points. The current method has shown acceptable precision and adequate sensitivity for the quantification of tamsulosin in human plasma samples obtained for pharmacokinetic, bioavailability or bioequivalence studies. The sensitivity could be further improved by sample concentration. Many variables related to the electrospray reproducibility were optimized for both precision and sensitivity to obtain these results. Furthermore, it was utilized for the analysis of hundreds of subject samples. The cost-effectiveness, simplicity and speed of liquid/liquid extraction and sample turnover rate of 2 min per sample make it an attractive procedure in high-throughput bioanalysis of tamsulosin. The validated method allows quantification of tamsulosin in the 0.1–50ng/mL range.

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