Fast Separation of Triptans in Rat Plasma on ZirChrom®-PBD

ZirChrom Separations, Inc.

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The following reviews a published comparison of the ZirChrom®-PBD column to the Hypersil BDS C18 column for the analysis of triptans in rat plasma. This pioneering work concluded that the ZirChrom®-PBD phase had a superior selectivity for these analytes; allowing for an isocratic method with comparatively enhanced selectivity, peak shape and efficiency with an analysis time of less than six minutes.

Introduction

Triptans, a class of seratonin antagonists, are most often prescribed for the acute treatment of migraine headaches. By stimulating the brain's seratonin receptors in a similar manner to seratonin, triptans allow the constriction of dilated blood vessels and thus alleviate pain and pressure associated with a migraine (1,2).

Traditional HPLC analysis of triptans has been complicated by the fact that they are very basic drugs. The amine moieties have a strong affinity for the silanol groups present on silica based HPLC columns causing poor peak shape, short lifetime and irreproducibility (2).

The following rapid analysis, developed and validated by Ahmed and Atia, at Taibah University (Saudi Arabia) and Assiut University (Egypt) respectively, strove to improve upon currently available methods(2). The zirconia-based ZirChrom®-PBD was chosen by Ahmed and Atia for its lack of silanol groups, different selectivity, and unparalleled thermal and chemical stability.

Experimental

Four triptans were analyzed: Sumatritan succinate (SMT), Zolmitriptan (ZLT), Eletriptan hydrobromide (ELT) and Rizatriptan benzoate (RZT). Standard stock solutions were prepared by dissolving the samples in pure acetonitrile to a concentration of 1 mg/mL. The samples were then diluted using the appropriate mobile phase and used to spike a sample of processed rat plasma to a final concentration of 1000 ng/mL. The following chromatographic conditions were used:

Column:	A: ZirChrom®-PBD, 150mm x 4.6mm, 3um (part # ZR03-1546)
	B: Hypersil BDS C18 150mm x 4.6mm, 3um
Mobile Phase:	A: 20/80 acetonitrile/10mM sodium dihydrogen phosphate buffer pH 3.0
	B: 40/60 acetonitrile/10mM sodium dihydrogen phosphate buffer pH 3.0
Temperature:	50 ºC
Flow Rate:	1 ml/min.
Detection:	UV at 225 nm

In the side by side comparison presented in Figure 1, the ZirChrom®-PBD not only clearly provided superior selectivity but was able to do so faster, more efficiently and with less organic solvent used than the silica column(2). The unique selectivity and thermal stability of the ZirChrom®-PBD phase allows for baseline resolution of the four triptans in under six minutes. The longer elution time and poor peak shape of the compounds on the Hypersil BDS C18 column was attributed by Ahmed and Atia to residual silanol interactions. The efficiency (N - theoretical plates) on ZirChrom®-PBD improved for all and for three of the compounds the improvement was ten-fold (2). When validating this method on ZirChrom®-PBD Ahmed and Atia found that the ZirChrom®-PBD column had a wider calibration range and improved sensitivity when compared to other HPLC/UV methods (2).

When asked about the performance of the ZirChrom®-PBD column, Dr. Ahmed states "The ZirChrom®-PBD column is a superior alternative to a conventional silica-based C_{18} column for separation of triptans in terms of selectivity, peak symmetry and analysis speed."

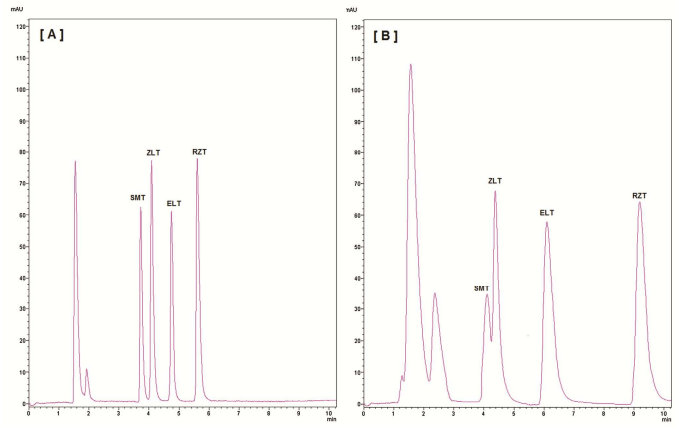

Figure 1: Comparison of (A) ZirChrom®-PBD and (B) Hypersil BDS C18 for the analysis of four triptans. *Used with permission(2)*

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References

(1)Diener, H.C; Kaube, H., *J. Neurol.*, **246**, 515-519 (1999).
(2) Ahmed, S; Atia, N.N., *Journal of Pharmaceutical and Biomedical Analysis*, **143**, 241-251 (2017).

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