

# Enantiomeric Separation of the Active Metabolite of Risperidone and its Application for Monitoring Metabolic Stability using UPC<sup>2</sup>/MS/MS

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## GOAL

To separate enantiomers of 9-hydroxyrisperidone and apply this method to monitor the formation over a metabolic time course.

## BACKGROUND

Many drug candidates, as well as their metabolites, contain one or more chiral centers. During the course of the drug development process, an essential step is to identify and monitor the various enantiomers that may exist. Supercritical fluid chromatography (SFC) is known to be a highly effective technique for performing chiral separations. In addition, the use of SFC provides benefits such as high efficiency, fast separations, and use of solvents that are MS compatible.

## THE SOLUTION

In this technology brief, we demonstrate the enantiomeric separation and detection of 9-hydroxyrisperidone, the active metabolite of risperidone, utilizing UPC<sup>2</sup>/MS/MS. Method optimization was performed using 9-hydroxyrisperidone standards in solution, then was applied to samples where risperidone was incubated with human liver microsomes. The conversion of parent to the hydroxylated

The combination of UPC<sup>2</sup> with MS detection facilitates the enantiomeric separation of 9-hydroxyrisperidone.

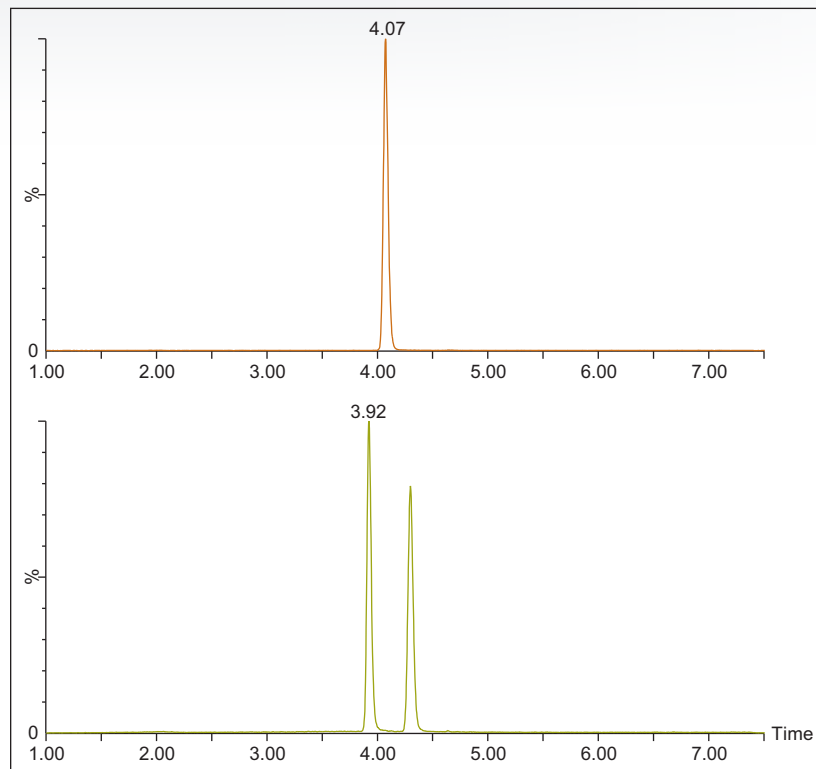


Figure 1. Risperidone (top) and R/S 9-Hydroxyrisperidone (bottom).

metabolite was monitored. Figure 1 shows the optimized chromatography for achiral risperidone and the R and S forms of 9-hydroxyrisperidone obtained using a Waters<sup>®</sup> Trefoil CEL2 3 x 150 mm, 2.5- $\mu$ m column, using ammonium formate modified methanol as the co-solvent.

This method was then used to analyze incubated samples quenched at  $t = 0, 15, 30, 60, 90,$  and  $120$  min, to monitor the conversion of the parent risperidone to the 9-hydroxy metabolite. An example injection is shown in Figure 2, where the two expected peaks for the 9-hydroxy metabolite are seen at 3.92 and 4.29 min. However, two additional peaks are seen at 4.48 and 4.76 min, which could be attributed to the minor 7-hydroxy risperidone metabolite described in the literature.<sup>1</sup>

The peak areas obtained for the parent compound, risperidone, and the four hydroxylated metabolite peaks were plotted as a function of time. Figure 3 shows that the majority of parent conversion to metabolite has occurred by 30 min. While the absolute identity of the R and S forms were not confirmed, published data<sup>2</sup> states that the formation of R-9-hydroxy risperidone is favored. We, therefore, postulate that the earlier eluting peak is the R form and the second peak is the S form.

## SUMMARY

The combination of UPC<sup>2</sup> with MS detection facilitated the enantiomeric separation of 9-hydroxyrisperidone, which is the active metabolite of risperidone. The ability to isolate the various chiral forms of a compound is an essential step during the drug development process. Additionally, we have shown that convergence chromatography can be successfully used in metabolic stability studies.

## References

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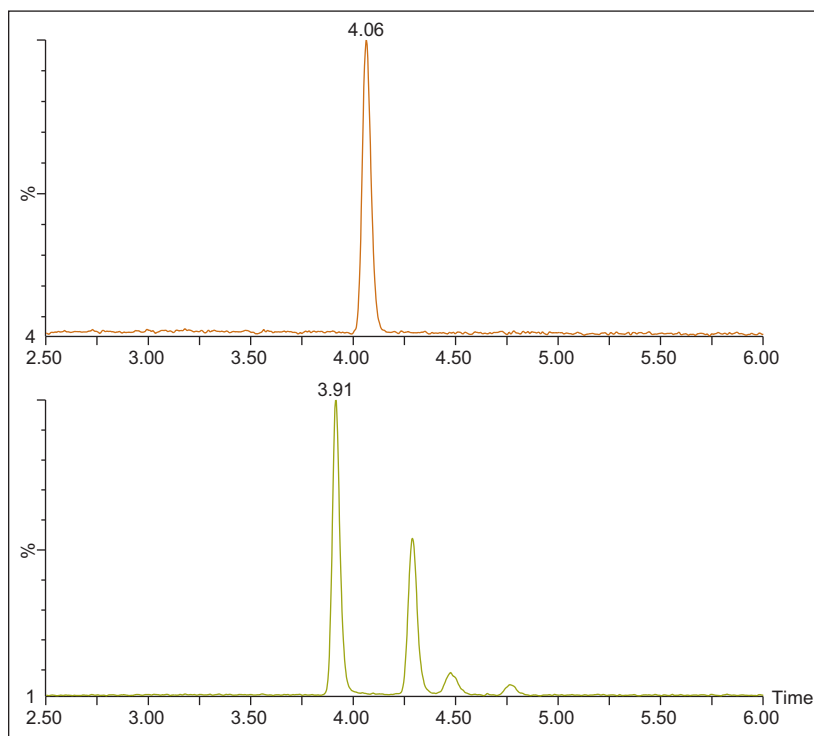


Figure 2. Risperidone (top) and hydroxy risperidone (bottom) for  $t = 120$  timepoint for risperidone microsomal incubation.

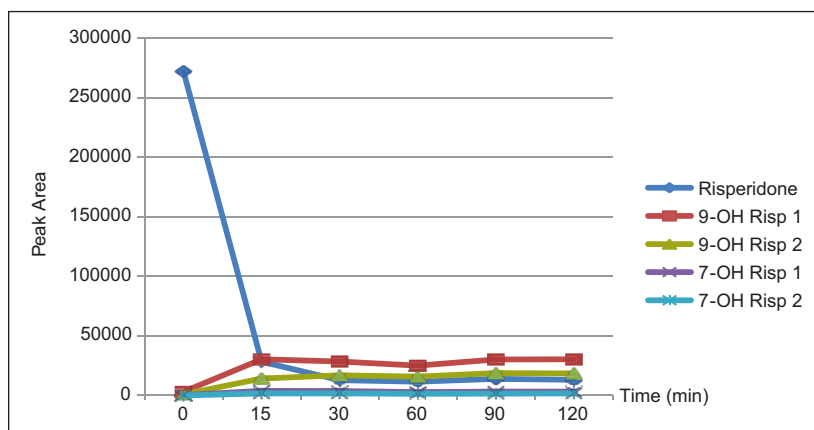


Figure 3. Time plot of measured peak areas for the parent compound (risperidone) and hydroxylated metabolites for incubations quenched after 15, 30, 60, 90, and 120 minutes.

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