

## Comparison of GLC and High-Pressure Liquid Chromatographic Methods for Analysis of Urinary Pseudoephedrine

**Keyphrases** □ Pseudoephedrine—analysis, comparison of GLC and high-pressure liquid chromatographic methods, urine □ GLC—analysis, pseudoephedrine, comparison with high-pressure liquid chromatographic method, urine □ Adrenergics (vasoconstrictors)—pseudoephedrine, analysis, comparison of GLC and high-pressure liquid chromatographic methods, urine

### To the Editor:

We recently reported a simple high-pressure liquid chromatographic (HPLC) method for the simultaneous determination of pseudoephedrine, chlorpheniramine, and their metabolites in urine (1). This method is specific and sensitive, has 98% recovery, and has been used successfully

fluorobutyric<sup>2</sup> acid for derivatization. The solvent then was acid washed to remove the excess reagent before GLC analysis.

The HPLC method (1) involved extraction of urine containing pseudoephedrine and norpseudoephedrine into ether-methylene chloride (70:30), followed by back-extraction into 0.5% phosphoric acid containing the internal standard (imipramine<sup>5</sup>). A portion of the acidic layer was injected for analysis.

The GLC and HPLC methods produced essentially identical results (Table I) for pseudoephedrine; the correlation between their results was highly statistically significant ( $r = 0.996$ ,  $p < 0.001$ ). Both methods showed minute norpseudoephedrine concentrations in these subjects. On the average, these subjects excreted 91% of the dose as intact pseudoephedrine, which is consistent with the data reported previously (1). The HPLC method does not resolve pseudoephedrine from ephedrine;

Table I—Comparison of the GLC and HPLC Methods for the Determination of Urinary Pseudoephedrine

Urinary Excretion Time, hr	Pseudoephedrine Hydrochloride <sup>a</sup> , μg/ml					
	Subject 1		Subject 2		Subject 3	
	GLC	HPLC	GLC	HPLC	GLC	HPLC
-2-0	0.00	0.00	0.00	0.00	0.00	0.35
0-12	41.9	41.3	46.3	43.7	43.5	42.3
12-24	32.6	34.1	47.9	50.2	44.2	42.3
24-48	7.24	8.43	8.29	9.65	3.19	3.87

<sup>a</sup> Determined in duplicate. Each value represents pseudoephedrine hydrochloride equivalents.

to study pseudoephedrine pharmacokinetics in humans. In this communication, the specificity of the HPLC method for pseudoephedrine is compared with that of a reported GLC method (2).

Standards were prepared by spiking blank human urine samples with pseudoephedrine<sup>1</sup> and its metabolite, norpseudoephedrine<sup>2</sup>. Urine samples from three normal subjects were collected at intervals of -2-0, 0-12, 12-24, and 24-48 hr after they received a capsule<sup>3</sup> containing 120 mg of pseudoephedrine hydrochloride and 8 mg of chlorpheniramine maleate. These samples and the standard urine samples were assayed (blinded study) independently in duplicate for pseudoephedrine and norpseudoephedrine by the HPLC (1) and GLC (2) methods.

The GLC method (2) involved extraction of urine samples containing pseudoephedrine, norpseudoephedrine, and ephedrine<sup>4</sup> (internal standard) into benzene. To a portion of the benzene were added pyridine and hepta-

ephedrine is used as the internal standard for the GLC method and it does not present a specificity problem in either method. The results indicate that the methods are equally specific for pseudoephedrine, with the HPLC method being less time consuming.

(1) C. M. Lai, R. G. Stoll, Z. M. Look, and A. Yacobi, *J. Pharm. Sci.*, **68**, 1243 (1979).

(2) E. T. Lin, D. C. Brater, and L. Z. Benet, *J. Chromatogr.*, **140**, 275 (1977).

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