

## Analytical Determination of Lisinopril Using UV Spectrophotometer and HPLC: An Overview

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### Abstract

Present review article determine the analytical methods for the quantitative determinations of lisinopril (ACE Inhibitor) by UV spectrophotometry and High-Performance Liquid chromatography. Pharmaceutical analysis of lisinopril requires effective analytical procedures for QC quality control analysis in Pharmaceuticals dosage formulations and human serum. An extensive survey for determination of LSP compiled from the research articles published in various pharmaceutical and analytical chemistry Journals. This appraisal illustrate that majority of the HPLC methods reviewed are based on the quantitative analysis of drug in Active Pharmaceutical ingredients (API), formulations, biological fluids such as serum and plasma and they are appropriate for therapeutic monitoring of drug, for pharmacokinetic purpose.

**Keywords:** Method development validation; High Pressure Liquid Chromatography (HPLC); Lisinopril

### Introduction

#### Lisinopril

Lisinopril (S)-1-[N<sup>2</sup>-(1-carboxy-3-phenyl propyl) -L- lysyl] -L- proline dihydrate a lysine analogue of enalaprilate, the colour of lisinopril is a white to off-white, state crystalline, no smell and powder having molecular weight of 441.52 and molecular formula C<sub>21</sub>H<sub>31</sub>N<sub>3</sub>O<sub>5</sub>·2H<sub>2</sub>O. It is soluble in water and sparingly in methanol, differs from captopril by lacking the sulfhydryl group. It is indicated for the treatment of hypertension, heart failure and acute myocardial infarction. It is indicated as adjunctive therapy in the management of heart failure in patients who are not responding adequately to diuretics and digitalis. It is used to treat hypertension, Myocardial Infarction (MI), heart failure and diabetic nephropathy or retinopathy (Figure 1).

#### Analytical methods

Assay method for any drug is very significant for pharmaceutical industries and it is always desirable to select and develop simple, least time consuming, precise, accurate and economical method for the determination of drugs in API pharmaceutical dosage forms and pathological samples like blood and serum. Analytical data are used to screen the potential drugs in biological samples, support formulation studies, aid in the development of drug syntheses, monitor the (API) bulk pharmaceuticals and finished products and also test final products for release [1].

#### Methods of analysis for lisinopril

There are different methods of analysis for lisinopril drug described in literature as,

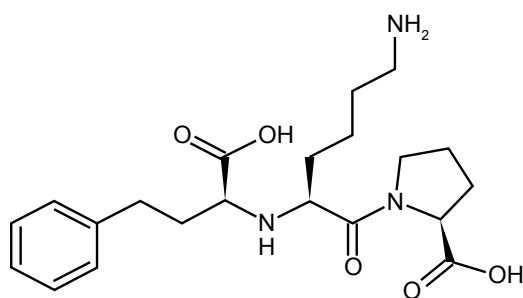


Figure 1: Structure of lisinopril.

- Combination of different methods or techniques
- Spectro fluorimetric methods for analysis by reaction modifications
- Electrophoresis /capillary electrophoresis methods
- ( HPLC) High Performance Liquid Chromatographic methods
- UV-visible Spectroscopic methods
- Miscellaneous Methods

#### Reported methods of analysis

There are numerous methods available for lisinopril analysis in single component or multi component formulation using spectrophotometry [2-4], gas-liquid chromatography [5] capillary electrophoresis and polarography [6,7]. Several High pressure liquid chromatography HPLC methods have been used for the analysis of lisinopril in human plasma [8-10]. Sagirli et al. [11] developed HPLC method for analysis of lisinopril in human plasma and urine at 477 nm. Linear quantitative response was generated over a concentration range of 5-200 ngmL<sup>-1</sup> and 25-1000 ngmL<sup>-1</sup> for plasma and urine samples.

However, all these methods required laborious experimental work high consumption of organic solvents and these methods were developed on single column. Our research group has worked on HPLC methods for the quantitation of inhibitors as captopril, enalapril and lisinopril alone and in combination with fosinopril and diclofenac sodium [12-16] in bulk drug, pharmaceutical formulations and serum. Sultana et al. [15] have also reported simultaneous methods for the determination of various ACE inhibitors with co-administered drugs as lisinopril with H<sub>2</sub> antagonists [17], NSAIDs [18] and with statins [19].

Lisinopril belongs to ACE Inhibitor therefor several methods simultaneously discovered of these ACE Inhibitors including

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captopril with H<sub>2</sub>-receptor antagonists [20] diuretics [21] and statins [22]. Enalapril maleate has been simultaneously determined with hydrochlorothiazide and furosemide commonly used diuretics [23], commonly used NSAIDs [24], anti diabetic drugs [25], cholesterol lowering agent statins [26] and with metformin, glibenclamide and glimepiride [27] in bulk material, pharmaceutical formulations and human serum using RP-HPLC. Spectrophotometric methods after derivatization of lisinopril and other techniques has been describe previously [3,6,28-33].

## Conclusion

Patients diagnosed with hypertension are prescribed multiple medications for therapy which increasing the risk of drug interactions and side effects [34-36]. In this article UV spectrophotometry and HPLC methods for the estimation of lisinopril in (API) active material, formulations and biological samples are reviewed alone or in combination with other drugs [37,38]. High pressure liquid chromatography HPLC methods required expensive equipment, labor-intensive sample preparation procedure and the personal skilled in chromatographic techniques [39]. Most of the HPLC methods reviewed have the potential application to clinical research of multi-drug pharmacokinetics, drug combination studies and also for interactions studies.

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