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Review Article

A Review on Analytical Techniques for the Ivacaftor

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Abstract

Ivacaftor is used for the management of cystic fibrosis. Cystic fibrosis is one of the most common life-threatening autosomal recessive disorders in the Western World. It acts as a Cystic Fibrosis Transmembrane Regulator gene potentiator, enhancing the function of the CFTR gene. A brief review of the analytical techniques such as spectrophotometry, liquid chromatography etc so far developed for the estimation of Ivacaftor were discussed in detail in the present study.

Keywords: Ivacaftor; Lungs; Liquid Chromatography

Introduction

Ivacaftor (CAS: 873054-44-5) (Figure 1) is a quinolinone-3-carboxamide derivative. It is used for the management of cystic fibrosis in patients aged 2 years and older [1]. Cystic fibrosis is an autosomal recessive life limiting disease that is caused by defective or deficient cystic fibrosis transmembrane conductance regulator (CFTR) protein. The CFTR gene mutation in cystic fibrosis patients causes excess mucus in the lungs Ivacaftor helps by improving airway hydration, decreasing mucus build up, enhancing mucus clearance from the lungs [2].

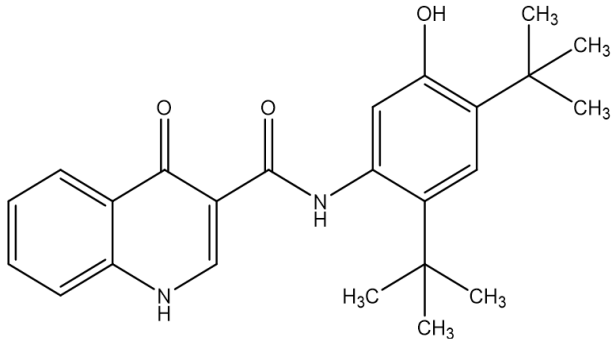

Figure 1: Chemical structure of Ivacaftor.

Janardhana Reddy., *et al.* [3] and Gautam [4] have developed spectrophotometric methods for the estimation of Ivacaftor using Methanol (λ_{max} 202 nm) and Acetonitrile (λ_{max} 255 nm) and the linearity was observed over the concentration range 1-5 µg/ml and 25-150 µg/ml respectively.

Manisha., *et al.* have developed RP-HPLC method [5] for the estimation of Ivacaftor using Kromacil C18 column and mobile phase consisting of a mixture of Methanol and Acetonitrile (50:50, v/v) with flow rate 1.0 mL/min (Detection wavelength: 254 nm) and the linearity was shown over the concentration range 5-25 µg/ml.

Roshani Singh., *et al.* have developed RP-HPLC method [6] for the estimation of Ivacaftor using Inertsil ODS 3V-C18 column and mobile phase consisting of a mixture of Methanol and Acetonitrile (60:40, v/v) with flow rate 1.0 mL/min (Detection wavelength: 225 nm) and the linearity was shown over the concentration range 5-25 µg/ml.

Saniye Özcan., *et al.* have developed high-performance liquid chromatography ion trap time-of-flight mass spectrometry method [7] using Phenomenex Kinetex C_{18} column with mobile phase comprising of 0.1% Formic acid and Acetonitrile (27:63) (pH = 2.5) with flow rate 0.25 ml/min (Isocratic mode) and the linearity was found to be over the concentration range 0.55–20.22 µg/ml.

A brief review of the liquid chromatographic methods developed for the estimation of Ivacaftor were summarised in Table 1.

Table 1: Review of Liquid chromatographic methods.

Mobile phase (v/v)	ƛ (nm)	Column	Linearity (µg/mL)	Reference
Methanol: Acetonitrile (50:50)	254	Kromacil C18	5-25	[5]
Acetonitrile and Methanol (60:40)	225	Inertsil ODS 3V-C18	5-25	[6]
0.1% Formic acid: Acetonitrile (27:63) (pH 2.5)	_	Phenomenex Kinetex C18	0.55–20.22	[7]

Conclusion

The present study represents a detailed review of the analytical methods so far developed for the estimation of Ivacaftor in pharmaceutical dosage forms.

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