A validated isocratic RP-HPLC method for determination of linezolid in pharmaceutical dosage forms

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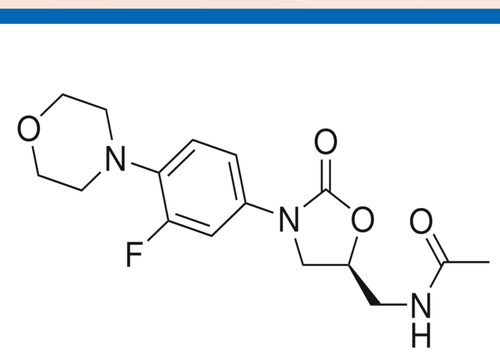
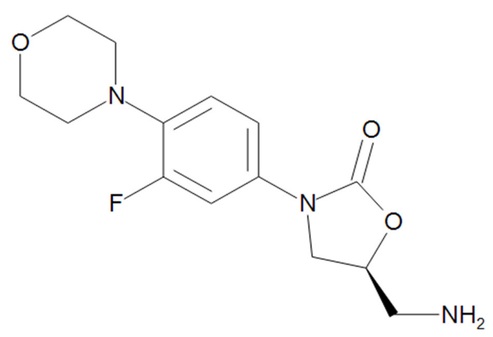
Introduction

Linezolid is an oral and parenteral antibiotic that belongs to a new group of synthetic antibiotics known as fluorinated oxazolidinones. It is indicated for Gram–positive infections and has been approved for vancomycin-resistant enterococcal infections, including bacterial pneumonia, skin and skin tissue infections, and infections related to susceptible organisms complicated by bacteremia (Hashemian et al., 2018).There is yet no monograph on linezolid in the current European Pharmacopoeia. Therefore, we aimed to develop simple, fast and reliable RP-HPLC method for determination of linezolid in dosage forms in the presence of its degradation products.



Formula of linezolid



Formula of linezolid related compound C

Materials and methods

The method was developed using Shimadzu Nexera–I LC-2040C 3D Plus Ultra-High-Performance Chromatographic separation was performed on a reversed-phase column Agilent ZORBAX SB C18 (250 x 4.6 mm I.D., particle size 5 µm), in an isocratic mode. The mobile phase is consisted of a mixture of methanol and water acidified with o-phosphoric acid, pH 2.6, 50:50 (V/V). The flow rate was kept at 1.0 mL/min.

The wavelength of 254 nm was chosen for detection. The injection volume was 20 µL. All separations were performed at a temperature of 30°C ± 2°C. Linezolid USP reference standard and Linezolid related compound C were used in the study. Methanol and o-phosphoric acid were purchased from Merck (Darmstadt, Germany). Double-distilled water was used to prepare the solutions. Samples of Linezolid 2 mg/mL solution for infusion were obtained commercially.

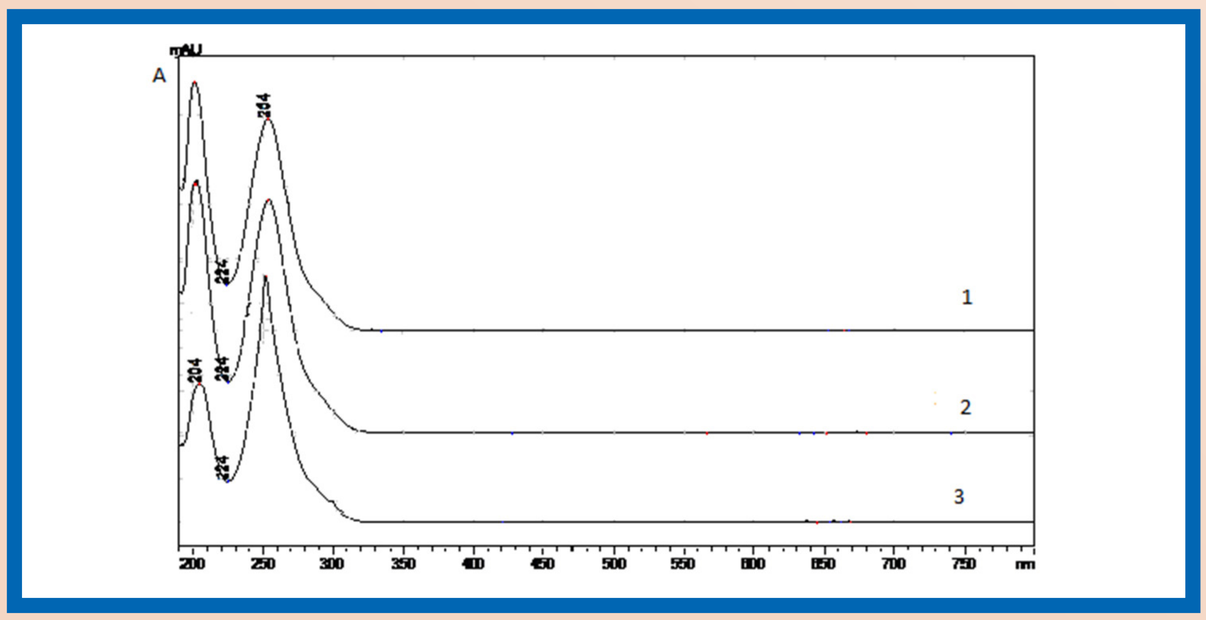


Fig. 1. UV spectra of linezolid peak from the linezolid standard solution (1), sample solution of Linezolid 2 mg/mL solution for infusion (2) and linezolid related compound C (3).

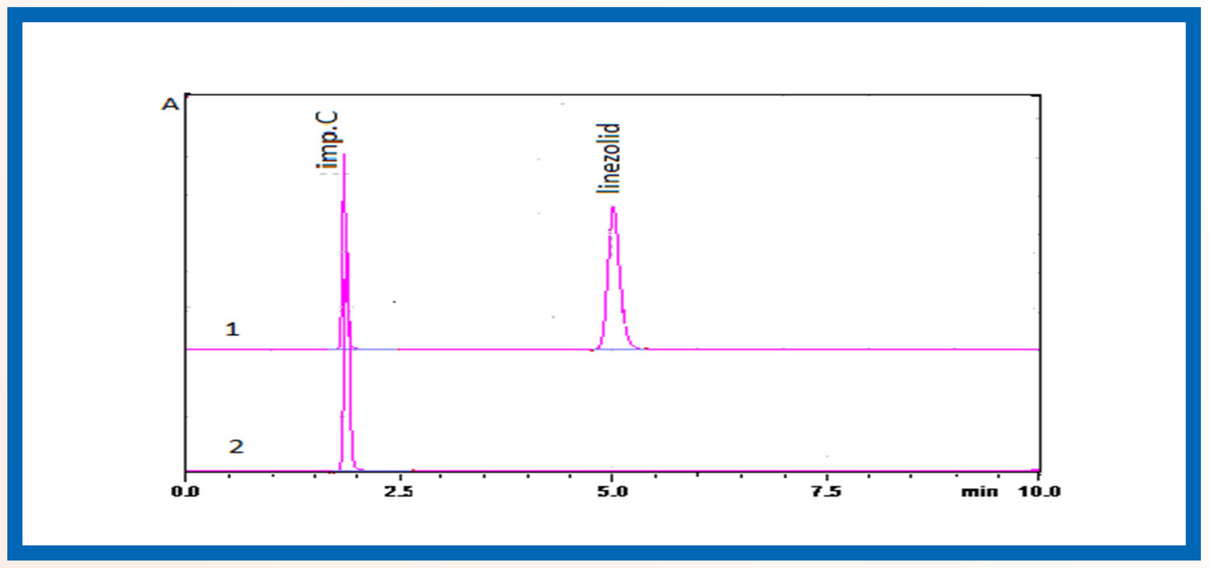


Fig. 2. Typical chromatograms obtained at 254 nm from a mixed standard solution containing linezolid (c = 0.12 mg/mL), linezolid related compound C (1) and linezolid related compound C (c = 0.14 mg/mL) (2).

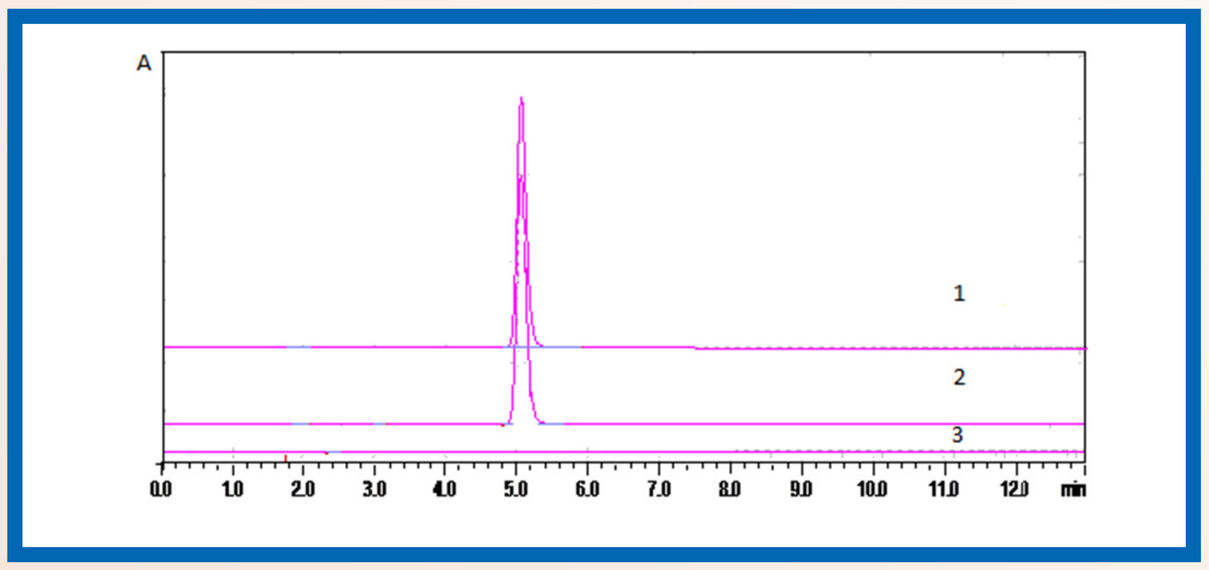


Fig. 3. Typical chromatograms obtained at a 254 nm from sample solution c = 0.12 mg/mL (1), linezolid standard solution (2) c = 0.12 mg/mL and blank solution (3).

Conclusion

The proposed RP–HPLC method allows simple, accurate and precise determination of linezolid in pharmaceutical dosage forms, in the presence of its degradation products and related compounds. The advantages of the method include short run time, simple sample and mobile phase preparation, isocratic mode of elution, and excellent peak symmetry. Therefore, the developed method can be applied for the routine analysis for determination of linezolid in pharmaceutical dosage forms in quality control laboratories.

References

Hashemian, S. M. R., Farhadi, T., &Ganjparvar, M., 2018. Linezolid: a review of its properties, function, and use in critical care. Drug. Des. Deve. L Ther., 12, 1759. https://doi.org/10.2147/DDDT.S164515

International Conference on Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use,2019. ICH Harmonised Tripartite guidelines, Validation of Analytical Procedures: Text and Methodology Q2(R1).

Mohapatra, S., Annapurna, M. M., Ravi Kumar, B. V. V., Anwar, M., Warsi, M. H., Akhter, S., 2011. Validated stability indicating RP-HPLC method for the estimation of linezolid in a pharmaceutical dosage form. J. Liq. Chromatogr. Relat. Technol., 34(18), 2185-2195. https://doi.org/10.1080/10826076.2011.585548