

## Determination of Colistin in Human Plasma Using Advanced Analytical Techniques

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**Introduction.** Colistin (polymyxin E) is a polypeptide antibiotic, an effective treatment of infections caused by multi-drug resistant (MDR) Gram negative bacteria, such as MDR *Pseudomonas aeruginosa*, *Klebsiella pneumonia* and *Acinetobacter baumannii*. Colistin is commercially available in two forms as the sulfomethate sodium salt and as sulfate. *In vivo* the colistin sulfomethate is converted to colistin sulfate by hydrolysis. Hydrolysis of colistin sulfomethate sodium to colistin provides the drug's antimicrobial activity. In Pauls Stradins Clinical University Hospital (PSCUH) colistin use has been increased approximately 13 times over the past nine years (from 930 till 12234 vials/year). The main adverse effects of colistin are nephro- and neurotoxicity; therefore, careful monitoring of plasma colistin levels could be beneficial.

**Aim, Materials and Methods.** The aim of this review is to compare different determination methods of colistin in human plasma using advanced analytical techniques such as high-performance liquid chromatography (HPLC) and high-performance liquid chromatography-mass spectrometry (HPLC-MS). In this review were included articles from PubMed database published in years 1981–2017. Search keywords were “Determination of Colistin chromatography”, and only articles published in English were included.

**Results.** Various methods for the assay of colistin in raw material have been developed, based on microbiological, thin-layer chromatographic (TLC), immunological, capillary electrophoretic and HPLC methods. Only few analytical methods are available for determination of colistin in human plasma using HPLC and HPLC-MS which could be used for monitoring colistin level in human blood. According to the literature data, the analysis of colistin in biological fluids by HPLC have problems. Taking into account the colistin is a polypeptide, it consists of two major components Colistin A (Polymyxin E1) and Colistin B (Polymyxin E2), which means sum of both peaks is required for precise quantification. Moreover, it has very weak ultraviolet absorption of colistin and absence of native fluorescence. Therefore, colistin cannot be quantified in biological fluids with high sensitivity by HPLC or tandem HPLC-MS without derivatization with UV-absorbing or fluorescent reagents.

**Conclusions.** The use of HPLC-MS for detection of colistin in biological samples provides high selectivity and high sensitivity. Nevertheless, analysis of colistin in blood samples using HPLC alone shows reliable results, thus plasma is useful for monitoring of colistin concentration during the therapy.