Pharmacokinetics of orally administered simvastatin in turkeys

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Abstract

The aim of the present study was to determine the pharmacokinetics of simvastatin (SIM) administered orally in 6-week-old turkeys at a single dose of 2 mg/kg b.w. The SIM concentrations in plasma were determined by validated HPLC-MS/MS method. Mean (± SD; n = 10) values of pharmacokinetic parameters evaluated were as follows: $C_{\text{max}} = 0.49 \pm 0.21$ ng/ml, $t_{\text{max}} = 1.6 \pm 1.1$ h, $\text{AUC}_{(0-\infty)} = 1.08 \pm 0.57$ h·ng/ml, $t_{1/2\text{kel}} = 2.14 \pm 1.3$ h and $\text{MRT} = 3.08 \pm 1.52$ h. The results indicate that the SIM is absorbed from the gastrointestinal tract of turkeys; however, achieved plasma level is lower compared to those observed in mammals.

Key words: simvastatin, pharmacokinetics, HPLC, turkey

Introduction

Simvastatin (SIM) is a reversible inhibitor of the microsomal enzyme 3-hydroxy-3-methylglutaryl-coenzyme A (HMG-CoA) reductase, widely used in the treatment of various types of hypercholesterolemia (Lupattelli et al. 2012). The SIM is pharmacologically inactive lactone (prodrug form) which is absorbed from the stomach and largely converted to several active metabolites in the liver (Jang et al. 2010). The HMG-CoA reductase inhibitors (also called statins) are known to decrease plasma cholesterol by inhibition of cholesterol biosynthesis. Elkin et al. (1999) showed that SIM reduced egg cholesterol contents in laying hens as well as liver and plasma cholesterol concentrations. Due to the significant contribution of cholesterol in the pathogenesis of atherosclerosis and coronary heart disease, it appears likely that the production of poultry eggs with reduced cholesterol content may be one of the elements of prevention and therapy of these diseases. SIM and other statins appear to be potential candidates for a feed additive for obtaining food products of animal origin with reduced cholesterol content. However, to our knowledge, the available literature contains no data on the pharmacokinetic profile of SIM in poultry. Therefore, the aim of this study was to investigate the pharmacokinetics of SIM after oral administration of a single dose of the drug in turkeys.

Materials and Methods

The study was performed on 6-week-old female turkeys (n = 13). The birds were clinically healthy,