

[P-68]**Environmental lead level and physiologically-based pharmacokinetic models (PBPK) for lead exposure**

Jung-Wan Koo¹, Donghan Yu², Young-Sun Han¹, Hyomin Lee³, Jisun Yang³ and
Ki-Hwa Yang³

¹*Dep. of Preventive Medicine, College of Medicine, The Catholic University of Korea,*

²*Korea Atomic Energy Research Institute, ³National Institute of Toxicological Research*

The purpose of this study was that the first was to collect the fundamental data of a lead kinetics in a body for the environmental lead exposure and the second was to develop a PBPK (physiologically-based pharmacokinetic) model in a body for lead.

We have reviewed the level of the domestic environmental lead exposure by the environmental media, the health effect of the susceptible groups to the lead, the mechanism of lead absorption, metabolism and excretion, the estimate of lead absorbed from air, dust, food and water. We have reviewed the essential physiological parameters for the PBPK model and have collected the fundamental data for absorption process of lead in a body.

A PBPK model of a lead kinetics in a body from ingestion of food stuffs has been developed and tested. Kidney, liver, other well-perfused tissues and other poorly perfused tissues was considered as organs in the model. Ingested lead was modeled as direct input into the liver. All transfers of lead out of the blood are related to plasma lead, which is a concentration-dependent fraction of blood lead. The bone consists of a cortical bone and trabecular bone, and in the trabecular bone, radial diffusion of lead outward from canalicules is approximated as exchanges between concentric cylindrical shells whose total volume is the volume of the diffusion region. Transfer between shells, and between the innermost shell and fluid passing through the canalicules, are diffusion-limited. Based on the differential mass-balance equations in the tissue groups and bone structures, the program has been developed under the user-friendly interface designed for application on personal computers. It was achieved by using the spread-sheet program Microsoft Excel and VBA(Visual Basic for Application) for the change of model parameters such physiological, metabolic, and bone parameters in the model.

Keyword : Lead, Pharmacokinetic Model