World Academy of Science, Engineering and Technology
International Journal of Biomedical and Biological Engineering
Vol:9, No:07, 2015

Modeling the Time Dependent Biodistribution of a 177Lu Labeled Somatostatin Analogues for Targeted Radiotherapy of Neuroendocrine Tumors Using Compartmental Analysis

Authors : Mahdieh Jajroudi

Abstract : Developing a pharmacokinetic model for the neuroendocrine tumors therapy agent 177Lu-DOTATATE in nude mice bearing AR42J rat pancreatic tumor to investigate and evaluate the behavior of the complex was the main purpose of this study. The utilization of compartmental analysis permits the mathematical differencing of tissues and organs to become acquainted with the concentration of activity in each fraction of interest. Biodistribution studies are onerous and troublesome to perform in humans, but such data can be obtained facilely in rodents. A physiologically based pharmacokinetic model for scaling up activity concentration in particular organs versus time was developed. The mathematical model exerts physiological parameters including organ volumes, blood flow rates, and vascular permabilities; the compartments (organs) are connected anatomically. This allows the use of scale-up techniques to forecast new complex distribution in humans' each organ. The concentration of the radiopharmaceutical in various organs was measured at different times. The temporal behavior of biodistribution of 177Lu labeled somatostatin analogues was modeled and drawn as function of time. Conclusion: The variation of pharmaceutical concentration in all organs is characterized with summation of six to nine exponential terms and it approximates our experimental data with precision better than 1%.

Keywords : biodistribution modeling, compartmental analysis, 177Lu labeled somatostatin analogues, neuroendocrine tumors
Conference Title : ICMPBE 2015 : International Conference on Medical Physics and Biomedical Engineering
Conference Location : Zurich, Switzerland
Conference Dates : July 29-30, 2015