PREDICTION OF HUMAN PHARMACOKINETICS FOR RADIOPHARMACEUTICALS BASED ON PHARMACOKINETICS IN PRE-CLINICAL ANIMAL MODELS

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Recent reports evidence a number of new radiopharmaceuticals for diagnostic and theragnostic purpose. However, they have been only biologically characterized using biodistribution studies. A more detailed information concerning their pharmacokinetic parameters is desirable for radiopharmaceutical's complete characterization. Easy-to-use tools to assist researchers in the assessment of the radiopharmacokinetic parameters are not available in nuclear medicine so far.

The overall goal of this paper is to show the feasibility of using weight based allometric scaling as a predictive tool to estimate human pharmacokinetic parameters from pre-clinical animal data after application of radiopharmaceuticals. Initially pharmacokinetic data from animal models were used to extrapolate to human though body weight allometric scaling. The impact of adjusting for plasma protein binding and the impact of metabolic stability in the different models was considered as important to be included.

The data presented in this paper can confirm that weight based allometric scaling of clearance from appropriate pre-clinical animal models can be clearly useful in predicting the human dose level of imaging and therapeutic radiopharmaceuticals for Phase I clinical testing. Allometric scaling of animal pharmacokinetic parameters (clearance, half-life and volume distribution) achieve a prediction of the human pharmacokinetic parameter with a high accuracy for all imaging and therapeutic radiopharmaceuticals with available clinical data

The need to assess and select appropriate animal models that will represent the human we highlighted and emphasized difficulty in trying to achieve models that will be robust and reliable across all situations. Our contribution is to use this approach and predict human biodistribution of Lutetioum-177 labeled antibody (Rituximab, Trastuzumab) from preclinical data after injection in mice (normal BALB/c mice and tumor bearing nude).