Animal Health M&S Society: A new society promoting model-based approaches for a better integration of quantitative pharmacology in veterinary sciences

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Background

• Situation: Modeling & Simulation techniques have been sparsely applied to projects in veterinary sciences. The challenges in this area comprise all apparent from the human field but include some additional specific to Animal Health.

• Opportunity: The foundation of this society provides the prospect to elaborate more systematically on the animal health specific challenges and to have a more organized exchange of ideas and experiences.

AHM&S Organization

• The Animal Health Modeling & Simulation Society (AHM&S) is a newly founded association (2012) that aims at promoting the development, application, and dissemination of modeling and simulation techniques in the field of Veterinary Pharmacology and Toxicology.

• The association is co-chaired by Pr. Johan Gabrielson (Europe) and Pr. Jim Riviere (USA), and currently consists of core members from both academia and industry.

Objectives

• The primary objective of the society is to support the community to maximize the value of pharmacokinetic/pharmacodynamic data to identify factors (behavioral, physiological, pathological, managerial) accounting for differences in drug safety and efficacy in animals and addressing human health issues (resides in edible tissues, dissemination of antimicrobial resistances).

Quantitative pharmacology

• Pharmacokinetics and pharmacodynamics comprise traditionally distinct disciplines within pharmacology. It is our intention to show that by deliberately, closely and systematically integrating these disciplines, our understanding of drugs and the efficiency and effectiveness of drug discovery and development may be greatly enhanced.

Trial design and analysis

• Optimization of trial design through simulation of scenarios; provide support to trial analysis, interpretation, and decision making. This goal includes but is not limited to: adaptive designs, dose finding, compliance modeling, and evaluation of endpoints.

Dosing regimen determination

• Conduct of dose/exposure/response modeling to estimate an efficacious and safe dose for a new or already existing molecule to be used in companion animals (individual treatment), and food producing animals (collective treatment).

Figure 1. Integrated pharmacokinetic/pharmacodynamic model of benazeprilat disposition and effect on the canine renin-angiotensin cascade

Figure 2. Distribution of red blood cells in blood versus inflamed joints

Figure 3. Collective treatment: Licking or not – PK profiles change

Figure 4. Inter-species scaling is not always simple – an example for salicylate half-life (from P-L. Toutain following [5]). In addition interspecific extrapolations is also an issue for fish, birds and exotic species

Figure 5. Withdrawal time determination

Withdrawal time determination

• In food animal medicine the veterinarian must ensure that an effective dose of drug is given but also that the edible products from the treated animals do not contain residues of the drug at or above the permitted concentrations when processed for marketing.

References:
