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The paradox of human equivalent dose formula: A canonical case study of piroxicam (feldene) in monogastric animals

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Allometric scaling is an empirical examination of the relationships between the pharmacokinetic parameters and body size. Piroxicam is a benzothiazine compound possessing an enolic 4-hydroxy substituent. It is anti-inflammatory, antipyretic and analgesic drug, 99% plasma protein bound with active enterohepatic circulation and prolonged half-life (30 – 85 hours). The empirical oral therapeutic doses of piroxicam in cat and dog are 0.26 mg/kg and 0.3 mg/kg body weight respectively. Therefore human equivalent dose formula (HED) which is equal to animal dose (AD) multiplied by animal km divided by human km was used to project the therapeutic doses of piroxicam in dog, cat, monkey, baboon, rabbit, micro-pig, mini-pig, guinea-pig, hamster, squirrel monkey, marmoset, ferret, rat and mouse using 20 mg of piroxicam for average adult-human (70kg). Km is body weight (BW) divided by body surface area (BSA). The canonical findings reveal that oral therapeutic doses of piroxicam in dog (0.53 mg/kg), cat (0.56 mg/kg), baboon (0.53 mg/kg), micro-pig (0.30 mg/kg) and mini-pig (0.30 mg/kg) confirm the paradox of human equivalent dose formula (HED) bearing in mind the 0.29 – 0.58 mg/kg body weight of human. However the calculated higher therapeutic doses in monkey (0.85 mg/kg) and rabbit (0.89 mg/kg) may connote faster rate of elimination of piroxicam in these animals. Nevertheless, the very-high therapeutic doses of piroxicam in ferret (1.53 mg/kg), rat (1.7 mg/kg), guinea-pig (1.8 mg/kg), marmoset (1.84 mg/kg), squirrel monkey (1.59 mg/kg), hamster (2.6 mg/kg) and mouse (3.6 mg/kg), may denote high level of complexity in both pharmacokinetic and pharmacodynamics handling of piroxicam in these animals that are used for basic research. In conclusion, all the extrapolated doses can be administered orally per day then every 2 days in dog, cat, baboon, micro-pig and mini-pig until therapeutic response is achieved. In monkey and rabbit the extrapolated doses can be administered per day then every 3 days whereas in ferret, marmoset, squirrel monkey and laboratory rodents, the extrapolated doses can be administered per day then every 4 – 5 days interval. But when any of the following signs (anorexia, melena and vomiting) is observed, piroxicam should be withdrawn immediately.

Biography

Saganuwan Alhaji Saganuwan is a senior Lecturer and the Acting Head Department of Veterinary Physiology, Pharmacology and Biochemistry, University of Agriculture, Makurdi. He has over 40 scientific papers mostly published in international journals of high repute and a few presented at national and international conferences. He is a renowned scholar in the fields of Ethnopharmacology, Toxicology, Anesthesiology, Malariology, Pharmacokinetics, Translational Medicine, Veterinary Medicine, Pharmaceutical Calculation, Clinical Research, Drug Development and Science Education. He is an Associate Editor for *Journal of Medical and Pharmaceutical Sciences*, Editorial Board Member Research in *Pharmaceutical Biotechnology*, *Journal of Infectious Diseases and Immunity*, *Journal of Diabetes and Endocrinology*, *International Journal of Pharmaceutical Biotechnology*, *Journal of Microbiology and Antimicrobials*, and Technical Editor *British Journal of Pharmacology*. His profile is in the Encyclopaedia of Who is Who in Nigeria. He is a Faculty member at the University of Agriculture, Makurdi. He holds Doctor of Veterinary Medicine (DVM), MSc and PhD in Pharmacology from the Usmanu Danfodiyo University, Sokoto, PGD in Statistics and PGDE in Science Education from the University of Agriculture, Makurdi respectively. He is a licensed member of Veterinary Council of Nigeria, member of Nigerian Institute of Food Science and Technology, Science and Technology Forum, Nigerian Society for Indigenous Knowledge and Development, Nigerian Veterinary Medical Association and Nigerian Academic Staff Union of Universities.

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