USING BODY TEMPERATURES (BTs), WEIGHTS (W_kgs) & BASAL METABOLIC RATES (BMR_kcals/kg) to COMPARATIVELY SCALE TREATMENT Rx-DOSAGES

Charles J. Sedgwick

From medication monographs published in medicine, prescription strategies (i.e., dose rates, Rx-dosages, frequencies and intervals), a clinician must recognize disparate patient body sizes (W_kgs) and metabolic intensities (cohort_kcals) to adjust prescriptions for veterinary patients.

With zoological veterinary medicine (ZVM), a clinician must extrapolate prescription strategies for new patients whose disparate body sizes (W_kgs) must be established by the clinician (a published monographs cannot cover all body sizes encountered in ZVM). The prescription comparisons between a proxy and a new, previously unappreciated patient are especially problematic especially where there is great disparity in sizes between the proxy patient and a new patient.

In this respect, the clinical challenges can be particularly noteworthy where the clinician must prescribe comparative Rx-dosage strategies for unfamiliar patients such as ruminants (like a tiny 0.8W_kg chevrotain Tragulus sp. or a huge 900W_kg banteng Banteng sp.; or a tiny 0.01W_kg pigmy dwarf lemur Lillowcebus sp. primate versus a huge 300W_kg male gorilla.

A proxy prescription strategy needs to be critically adjusted for each patient encountered in ZVM especially when there are patients of significantly disparate body sizes to be encountered. What, one may ask, is the weight of the tiger? Is it the same as a 7W_kg domestic cat? The question must be asked: “Which tiger do we have here? Is it a 7W_kg cub or a 400W_kg adult?” As clinicians we must be informed that the same dose rate for a 7W_kg tiger cub would create an over-dosage for a 400W_kg adult.

Clinicians must be capable of (by-sight) estimating comparative patient weights in ZVM. It’s not always possible to weigh an awake tiger on a scale to obtain its weight in kilograms (W_kgs) needed to appreciate needed numeric prescription adjustments. Clinicians must be capable of calculating the basal metabolic intensity of (M_kcals/kg) vertebrates that compose the usual patient constituencies in ZVM practices. In zoological practice clinicians must be aware of a prescription protocol that may not only include dose rates, Rx-dosages but also frequencies and intervals as various drugs are called for. For example: in a comparative prescription monograph for the antibiotic ceftizoxime Joyce Mordenti used the 0.023W_kg mouse (Mus musculus) to recognize a dose rate of 88 mgs/W_kg for an Rx-dosage of 2.02mgs and a frequency of 20 treatments, an interval of q1.2 h; while using a 70W_kg man (Homo sapiens) to receive the dose rate of 14.3mgs/W_kg an Rx dosage of 1001mgs. a frequency of 3 treatments for 24 hrs. a q 8 h interval. Both (mouse and man) required different prescriptions to achieve a desired clinical outcome of 141.5 micrograms (mcgs) ceftizoxime per ml serum for 24 h. Ref.: Dosage regimen design for pharmaceutical studies conducted in animals. J Pharm Sci 75(9):852-856, 1986. In common, both mouse and man are placental mammals and are therefore of the same body temperature BT @ ~ 38.1°C ~ 100.5°F. The Mouse (0.023W_kg) dose rate (mg/W_kg) _88_ Rx-dosage (mg) _2.02_ Interval q _1.2_ h frequencies – 20 per day. The man (70W_kg) dose rate (mg/W_kg) _14.3_ Rx-dosage (mg) _1001_ Interval q _8_ h frequencies – 3 per day.

In ZVM, intramuscular (IM) injectable anesthetics employed to sedate, capture, immobilize or anesthetize zoo or free ranging vertebrate wildlife (including use of some of the following drug examples listed below) when comparatively scaled to achieve an expected outcome were seen with the smallest member of a cohort receiving the highest dose rate, but the lowest Rx-dosage; the largest member of the cohort receiving the lowest dose rate, but the highest Rx-dosage:

- Acepromazine
- Carfentanil
- Etorphine
- Ketamine
- Naloxone
- Valium
- Atipamezole
- Cefotizoxime
- Fentanyl
- Medetomidine
- Naltrexone
- Xylazine
- Atropine
- Cyrenorphine
- Ganciclovir
- Meloxicam
- Phencyclidine
- Yohimbine
- Azaperone
- Droperidol
- Glycopyrrolate
- Midazolam
- Telazol
- Zolazepam