

Plasma Non-Steroidal Anti-Inflammatory Drug concentrations during carbon hemoperfusion in 18 dogs with Non-Steroidal Anti-Inflammatory Drug Toxicosis

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INTRODUCTION

- Carbon hemoperfusion (cHP) is gaining popularity as a treatment for Non-Steroidal Anti-Inflammatory drugs (NSAIDs) intoxication in veterinary medicine.
- Limited evidence exists regarding the changes in plasma NSAID concentration in dogs treated with cHP.
- This study aimed to describe the plasma NSAID concentrations during cHP in dogs with severe NSAID intoxications.

METHODS

- Prospective observational study from 2 veterinary teaching institutions.
- Carbon hemoperfusion was performed on standalone HP platform or in series with an intermittent hemodialysis (IHD) or continuous renal replacement therapy (CRRT) platform.
- Plasma samples were collected at several time points during cHP from pre- and post-carbon to calculate extraction ratios. Post-dialyzer samples were collected from dogs that underwent in-series cHP-IHD.
- Plasma NSAID concentrations were measured using liquid chromatography–mass spectrometry.

RESULTS

- A total of 18 dogs were included in the study. Dogs ingested ibuprofen (n=10, median 1,000 mg/kg, interquartile range (IQR) 400-1,800 mg/kg), carprofen (n=5, 200 mg/kg, 125-222 mg/kg), naproxen (n=2, 59 and 486 mg/kg), and meloxicam (n=1, 1.4 mg/kg).
- Dogs received various combinations of induction emesis, activated charcoal, and intralipid emulsion therapy at the attending clinician's discretion prior to cHP.
- The median time from suspected ingestion to the commencement of cHP was 7 hours (IQR 5-9).
- cHP was performed on IHD (n = 7), CRRT (6), and standalone HP platform (4).
- The median duration of cHP was 2 hours (IQR 1.4-2.9). The median total blood volume processed was 1.1 L/kg (IQR 1.0-1.3), equating to 13 times (IQR 11-15) the estimated blood volume of 80 ml/kg in dogs.
- Median (IQR) plasma NSAID concentrations were reduced by 58% (46-72%): 54% (32-61%) for ibuprofen (n=10), 72% (47-95%) for carprofen (n=5), 46% and 58% for naproxen (n=2), and 91% for meloxicam (n=1).

- Median (IQR) extraction ratio from cHP were 21% (-2~47%), compared to 4.7 % (-15-17%) from hemodialyzers.
- Post-cHP measurements were available for five dogs, which allowed for a comparison between the intrinsic elimination constant and the dialytic (cHP) elimination constant. The average dialytic (cHP) elimination constant was 18 times faster than the intrinsic elimination.

DISCUSSION

- Carbon hemoperfusion significantly reduced plasma NSAID concentrations.
- The half-lives of NSAIDs during cHP were markedly shortened compared to previously reported half-lives of therapeutic dosages in dogs, suggesting the efficacy of cHP.
- Due to the poor extraction ratio of hemodialyzers, standalone hemodialysis is not recommended for NSAID intoxication in dogs.
- Standardized sampling protocols involving a larger number of dogs are recommended for future studies to further investigate plasma NSAID concentrations during cHP.

Fig 1. Plasma NSAID concentrations during cHP

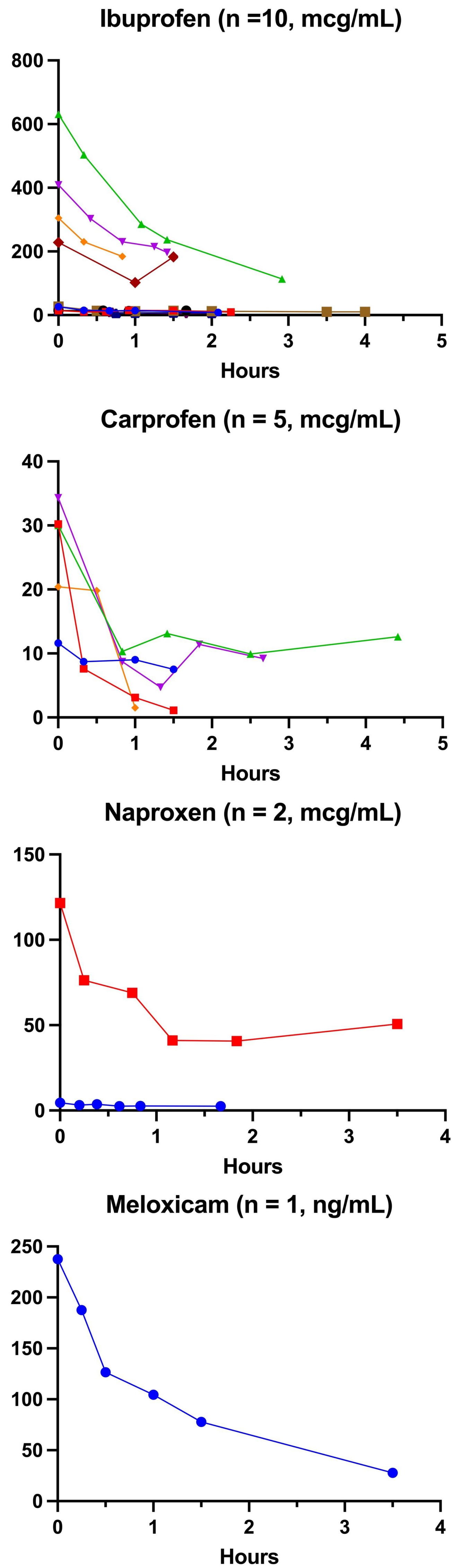


Table 1. Median (IQR) calculated half-lives (hours)

	During cHP	Reported
Ibuprofen	1.45 (IQR 1.2-2.9)	6
Carprofen	1.5 (IQR 0.3-3.1)	5-9
Naproxen	1.9-2.5	35-74
Meloxicam	1	12-36

Fig 2. Stand alone cHP

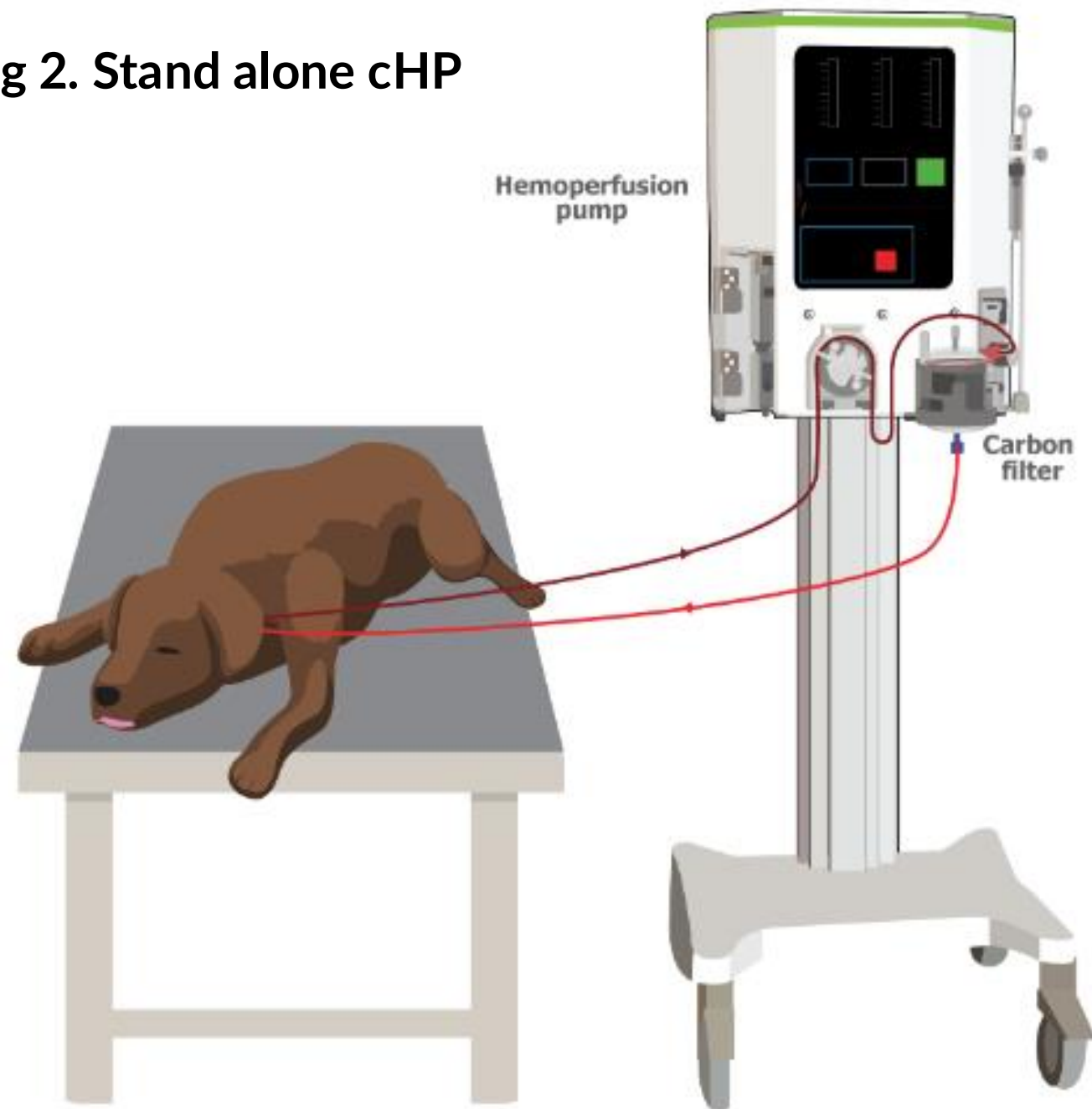


Fig 3. cHP in series with hemodialysis

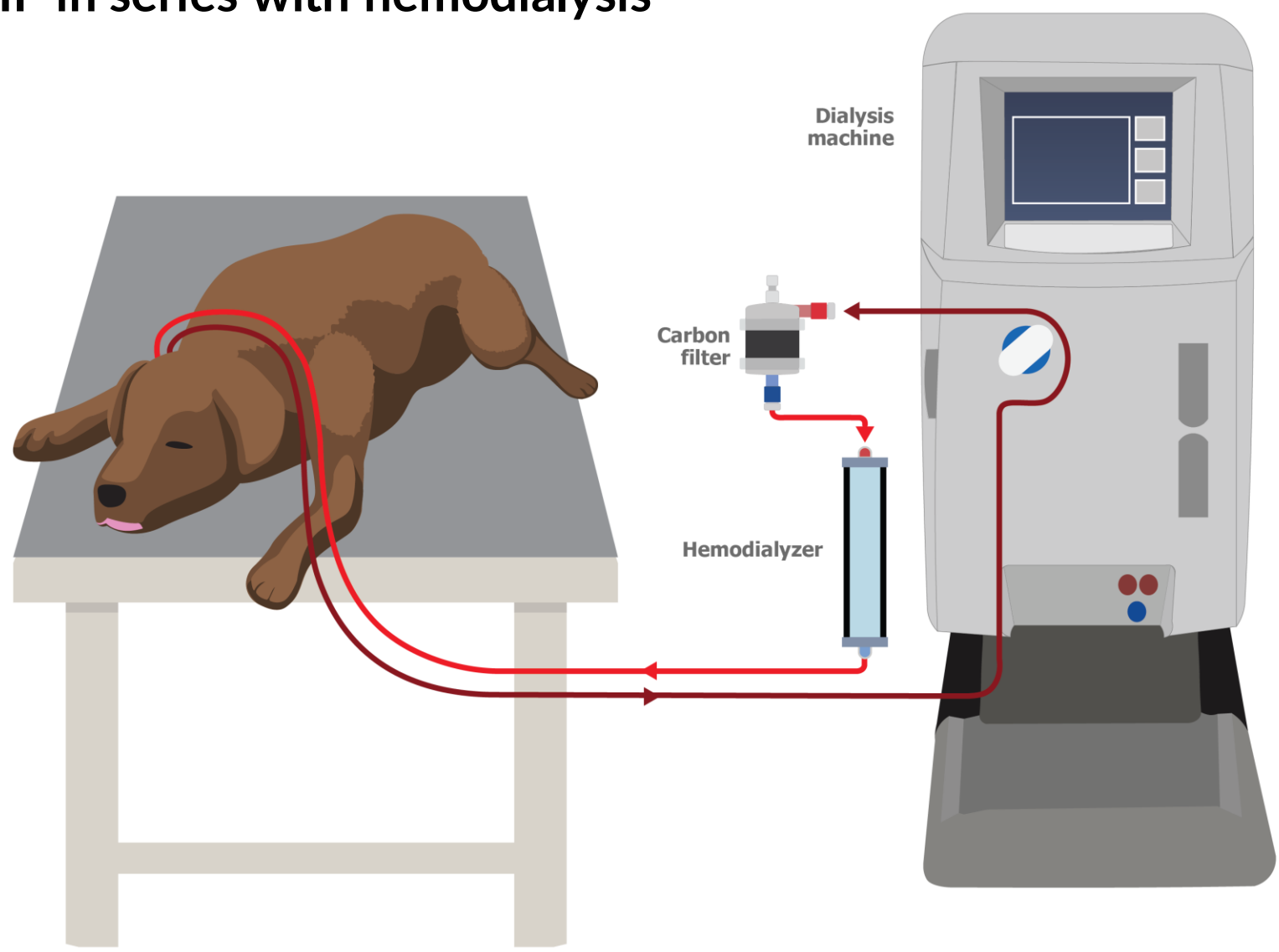


Photo 1. Stand alone cHP for ibuprofen toxicity

