Abstract of proposed student project
Proposal title: Postmortem Organic Acid Profiles in Dogs

Proposal

i. Brief Introduction: The ability to estimate the time of death of an animal is a question that is often asked during a forensic death investigation. Postmortem analysis of organic acids reflects the combined effects of physiology, autolysis, and microbial activity. After death, oxygen delivery to cells ceases and leads to anaerobic metabolism with the accumulation of lactic acid, while cellular breakdown and bacterial activity lead to changes in other organic acids over time. As decomposition progresses, there is an increase in the concentration of some organic acids, whereas other organic acids may be consumed or redistributed. Although the interpretation of postmortem organic acid profiles must account for postmortem interval, biological fluid type, environmental conditions, and stage of decomposition, organic acid profiling may theoretically provide useful information for estimation of the postmortem interval.

ii. Problem Description and Significance: The postmortem evaluation of organic acid profiles may be of diagnostic value; however, these compounds are uncommonly studied in animals after death. When performing an autopsy, macroscopic changes associated with decomposition are highly variable and can be difficult to interpret accurately with respect to time since death. As a result, reliance on gross postmortem findings alone may limit the precision of postmortem interval estimation. The evaluation of organic acids may prove useful for estimating the time since death by providing biochemical indicators of postmortem metabolic and microbial processes. The results of this study will expand our understanding of postmortem organic acid changes and their potential application in forensic death investigations of animals.

iii. Hypothesis and Objectives: The objective of this study is to evaluate postmortem organic acid concentrations in domestic dog urine and vitreous humor and to assess their potential utility for estimating the postmortem interval and identifying postmortem biochemical changes associated with decomposition.

iv. Study Design and Methods: Archived biological samples from deceased dogs previously autopsied at the Veterinary Forensic Sciences Laboratory (VFSL) will be utilized for this study. All autopsies were performed according to established standard operating procedures, and urine and vitreous humor were collected at known postmortem intervals and stored under controlled conditions. Organic acid analysis, including L-lactic acid and oxalic acid, will be performed using the Thermo Fisher Gallery™ discrete analyzer. Data will be recorded in a commercially available spreadsheet, and statistical analyses will be conducted using a commercially available statistical software program.

Role of the Veterinary Student: The student will process archived urine and vitreous humor samples collected from deceased dogs previously autopsied at the VFSL. The student will perform organic acid analyses on these samples using established laboratory protocols. The student will compile, manage, and analyze the resulting data.