

*Arctic – Marine Mammals*

**Chlorinated Fatty Acids (CFAs) in Alaskan Sea Otters**

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Recently, Kachemak Bay sea otters have been declining at an unusual rate (USFWS, 2006). A significant percentage of necropsies conducted on these animals revealed heart damage (valvular endocarditis) caused by bacterial infection (*Streptococcus bovis/equinus*; USFWS, 2006). The goal of this study is to measure the concentrations of different CFA homologues in Alaskan sea otter cardiac and skeletal tissues. Jones et al. (1983) discovered rats developed heart lesions when fed brominated corn oil with the dibromostearic acid ( $C_{18}Br_2$ ) homologue being the highest concentration in heart muscles. The impact of halogenated fatty acids like CFAs in the heart is being thoroughly investigated. The possible adverse effects of CFAs bound to membrane lipids may cause membrane disturbances such as improper regulation of membrane fluidity and permeability problems. The concentrations of CFAs in triglycerides, free fatty acids and phospholipids have been determined. Preliminary data revealed alarming levels of CFAs within sea otter heart and skeletal muscles. The total concentrations of CFAs per gram lipid were higher in heart muscle ( $9 \pm 20$  mg/g lipid;  $n = 18$ ) when compared to skeletal muscle ( $5 \pm 7$  mg/g lipid;  $n = 30$ ). Most of the CFA homologues were incorporated into the phospholipids. The concentrations of dichloropalmitic ( $C_{16}C_{12}$ ) and dichloroarachidic acids ( $C_{20}C_{12}$ ) were around 1 mg/g lipid for both tissue types. The concentrations of dichlorostearic acid ( $C_{18}C_{12}$ ) were significantly higher in heart muscle ( $10 \pm 14$  mg/g lipid) than in skeletal muscles ( $4 \pm 5$  mg/g lipid). The lowest concentrations of CFAs were found to be in storage lipids. Free fatty acids contained the second highest concentrations of CFAs in both tissue types. Cell studies using heart muscle cultures will provide a better understanding about the mechanism of CFA incorporation into the lipid bilayer.

Student Presentation



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