Abstract # WP114

Dietary exposure of mink (Mustela vison) to fish from the upper Hudson River, New York, USA: Organ mass and pathology

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The Hudson River is contaminated with polychlorinated biphenyls (PCBs) from Ft. Edward, NY to New York City. The contamination of PCBs in the upper Hudson River area is a federal disaster. adults in Ft. Edward and Hudson Falls, NY that manufactured electrical capacitors containing PCBs beginning in the 1930s. Reports spanning the past 20 years indicate that mink chronically exposed within a historic range of the upper Hudson River contained concentrations of PCBs in liver fat and been comparable to concentrations among transplant recipients inomit. Special interest, the mink liver PCB concentrations were then assessed for additional significance of pathological and histological evidence of hepatic fibrosis.

The abstract was conducted to evaluate the health effects of feeding mink diets containing PCBs contaminated with low to moderate levels of PCBs. The effect of different PCB concentrations at different exposure times were also assessed to determine the PCB concentrations that produce significant pathological changes in mink over different exposure periods. A range of PCB concentrations were administered to mink for up to 6 weeks using a 90% ration-fed diet. The experiments were conducted on wild-reared mink from the Hudson River area. The results were compared with previous studies conducted on mink fed diets with PCB concentrations at similar PCB levels. The results of this study will contribute to the understanding of the health effects of PCB exposure in mink and to the development of strategies to prevent or mitigate PCB contamination in the environment.

The objective of this study was to evaluate the health effects of feeding mink diets containing PCBs contaminated from the Hudson River. The study was conducted on wild reared mink from the Hudson River area. The results were compared with previous studies conducted on mink fed diets with PCB concentrations at similar PCB levels. The results of this study will contribute to the understanding of the health effects of PCB exposure in mink and to the development of strategies to prevent or mitigate PCB contamination in the environment.

PCB contamination of upper Hudson River
- Major source due to manufacture of electrical capacitors containing PCBs between 1940s to 1977
- PCBs continue to be detected in fat and liver of mink collected from upper Hudson River at concentrations comparable to those associated with reproductive impairment in controlled studies
- PCB concentrations have not decreased appreciably over time

Mink as a sentinel species
- Fish-eating mammal
- Exhibits chronic sensitivity to PCBs
- Top of food chain for aquatic habitat

To evaluate the health effects of feeding farm-raised mink diets containing PCB-contaminated fish from the Hudson River
- Effects on adult reproductive performance and offspring growth and mortality through 31 weeks of age (Platform: Wednesday, 4:10 p.m.; #514)
- Effects on adult mink and offspring organ mass and pathology

Effect of feeding mink River fish on adult mink thyroid mass

Effect of feeding mink River fish on 6-week-old mink heart mass

Effect of feeding mink River fish on 31-week-old juvenile mink adrenal gland mass

Effective concentrations of sumPCBs and TEOs in feed and liver producing jaw lesions in 20% and 50% of adult mink (EC20, EC50)

<table>
<thead>
<tr>
<th>Feed</th>
<th>EC20 µg sumPCBs/g feed</th>
<th>EC50 µg sumPCBs/g feed</th>
<th>95% Confidence Interval</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>2.3</td>
<td>3.9</td>
<td>1.5</td>
<td>4.6</td>
</tr>
<tr>
<td>15 µg TEOs/g feed</td>
<td>25</td>
<td>219</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>25 µg TEOs/g feed</td>
<td>4.4</td>
<td>3.7</td>
<td>1.1</td>
<td>5.1</td>
</tr>
<tr>
<td>50 µg TEOs/g feed</td>
<td>89</td>
<td>125</td>
<td>88</td>
<td>178</td>
</tr>
</tbody>
</table>

Statistics
- Treatment effects on adult organ masses tested with linear regression models
- Treatment effects on juvenile organ masses tested with linear generalized estimation equations (GEE) regression models to adjust for within-litter correlation
- Liver mass of 6-week-old kits exposed in uterus through lactation
- Juvenile mink exposed for approximately 31 weeks post-partum

Consumption of feed containing fish from the upper Hudson River resulted in:
- Thyroid mass of adult females
- Heart mass of 6-week-old kits
- Adrenal gland mass of juvenile mink
- Development of a jaw lesion in adult mink characterized as mandibular and maxillary squamous epithelial proliferation
- Dietary EC20 = 3.8 µg sumPCBs/g feed (25 µg TEOs/g feed); dietary EC20 = 2.3 µg sumPCBs/g feed (15 µg TEOs/g feed)
- Hepatic EC50 = 4.4 µg sumPCBs/g liver (151 µg TEOs/g liver); hepatic EC50 = 2.8 µg sumPCBs/g liver (89 µg TEOs/g liver)
- Jaw lesion EC20 is 6-fold greater than LC20 based on kit survivability and EC50 is 1.7-fold greater than LC50

Photomicrographs showing severity of jaw lesions