Mercury and Omega-3 Fatty Acids in Fish Sandwiches from Retail Restaurants

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ABSTRACT
Mercury and omega-3 fatty acids in fish sandwiches sold at six retail restaurants were measured. Total mercury ranged from 0.005 to 0.132 ppm and was well below the FDA action limit of 1 ppm. The sandwiches provided between 8 and 146% of the RfD for mercury for an individual weighing 60 kg. The omega-3 fatty acid content (EPA plus DHA) ranged from 0.021 to 0.259 g per fish sandwich.

METHODS
Fried fish fillets or tuna sandwiches were purchased from six retail restaurants (Burger King, Dairy Queen, Long Johns Silver, McDonalds, Subway, White Castle). Four stores were selected for each restaurant chain and 5 fish sandwiches were obtained from each store. The sandwiches were ordered without condiments or cheese, except for the tuna which contained mayonnaise, separated from the bun and homogenized.

The fish species were pollock or cod (Burger King), pollock or hoki (McDonalds), pollock (White Castle and Dairy Queen), cod (Long Johns Silver) and tuna (Subway).

Total fat was extracted with chloroform/methanol (2:1, v/v) using the method developed by Folch et al (1956) and further modified by Gallina al (2003). Fatty acid analyses were carried out using AOAC Method 991.39

Mercury analyses were carried out by Thermal Decomposition-Amalgamation/Atomic Absorption Spectrophotometry (TDA-AAS) using a DMA-80 Mercury Analyzer (Milestone, Inc, Monroe, CT). The analyzer was calibrated with standard reference materials TORT-2 and DORM-2 in the range of 0-470 ng total Hg.

RESULTS
None of the retail fish sandwiches/fillets exceeded the FDA action limit of 1 ppm of Hg.

Table 1: Mercury in composite (n=5) fish samples

<table>
<thead>
<tr>
<th>Restaurant</th>
<th>Number of stores</th>
<th>Hg content Mean ±S.D. (ppm)</th>
<th>Hg intake per fillet (μg)*</th>
<th>% RfD per sandwich*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burger King</td>
<td>4</td>
<td>0.016 ± 0.01</td>
<td>1.20</td>
<td>20</td>
</tr>
<tr>
<td>Dairy Queen</td>
<td>4</td>
<td>0.033 ± 0.30</td>
<td>3.19</td>
<td>53</td>
</tr>
<tr>
<td>Long Johns Silver</td>
<td>4</td>
<td>0.006 ± 0.00</td>
<td>0.46</td>
<td>8</td>
</tr>
<tr>
<td>McDonalds</td>
<td>4</td>
<td>0.132 ± 0.07</td>
<td>8.42</td>
<td>140</td>
</tr>
<tr>
<td>Subway</td>
<td>4</td>
<td>0.101 ± 0.04</td>
<td>8.78</td>
<td>146</td>
</tr>
<tr>
<td>White Castle</td>
<td>4</td>
<td>0.020 ± 0.02</td>
<td>0.75</td>
<td>12</td>
</tr>
</tbody>
</table>

*The calculation was based on an RfD of 0.1 μg/Kg body weight/day (EPA, 2001) for a 60 kg individual

CONCLUSIONS
- Mercury contents in fish sandwiches were below the FDA Action Limit of 1 ppm.
- The intake of mercury per sandwich was between 8 and 146% of the RfD for an individual weighing 60 kg.
- Fish sandwiches provided between 58 and 442% of the omega-3 fatty acid (EPA plus DHA) adequate intake for a pregnant and lactating woman.

REFERENCES
EPA. 2001. EPA/823-F-03-003.

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