Michigan Fish Consumption Advisory Program

FISH CONSUMPTION
NUTRIENTS, CONTAMINANTS, BENEFITS, AND RISKS

PRESENTED TO
OSU MARKETING AND PROCESSING WORKSHOP
MAY 15, 2015

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Michigan Department of Health and Human Services
Eat Safe Fish Program - Brochures
Eat 8!
A Guide to Help You Choose Fish Low in Mercury from Restaurants and Grocery Stores

EAT no more than 8 points per month

Get MI Serving
Point

1 Point
Anchovies
Carp
Crawfish
Herring
Mullet
Perch

2 Points
Cod
Freshwater Drum (aka Sheepshead)
Jack Smelt

3 Points
Bass (sea, striped, rockfish)
Bluefish
Herring
Lobster
Sablefish

4 Points
Scorpion Fish
Tuna (Albacore, canned white)
Tuna (fresh, frozen)
Weakfish (sea trout)

5 Points
Snapper

6 Points
To

8 Points

Do not eat these fish:
Shark, Swordfish, Thresher, King Mackerel

High in heart-healthy omega-3 fatty acids
Is the fish you’re buying caught in Michigan waters?
If so, please check the Eat Safe Fish Guide for advice.

Phone at 1-800-648-6942.
LEVELS OF ORGANIZATION
Saturated vs Unsaturated Fatty Acids

Saturated

Unsaturated
**Polyunsaturated Fatty Acids**

**Omega-3**
- α-Linolenic Acid
  - 18:3, ω3 (ALA)
- Eicosapentaenoic Acid
  - 20:5, ω3 (EPA)
- Docosahexaenoic Acid
  - 22:6, ω3 (DHA)

**Omega-6**
- Linoleic Acid
  - 18:2, ω6 (LA)
- Arachidonic Acid
  - 20:4, ω6 (ARA)

**Chemical Structures**
- COOH
- H₃C
- CH₃
- HOOC
**Physiologic Benefits of Long-term EPA/DHA Fatty Acid Ingestion**

- Reduces creation of inflammatory proteins
- Reduced systemic inflammation
- Lower triglycerides in blood
- Slow plaque formation in blood vessels
- More stable plaque in blood vessel
- Less blood vessel constriction
- Lower concentrations of apolipoproteins (marker of diabetes, heart disease, Alzheimer's)
- Improved endothelial function
- Improved plaque stability, may be due to increased EPA in the plaque reducing inflammation
**Effects of EPA & DHA (Benefits)**

- **Infant / Child**
  - Increased gestation times
  - Better developmental outcomes
    - visual acuity, cognitive function, motor skills

- **Adults**
  - Reduced risk of sudden death from a heart attack in people with a history of myocardial infarction.
  - Lower blood pressure

Source: Institute of Medicine of the National Academies. 2007. *Seafood Choices Balancing Benefits and Risks*
ADDITIONAL EFFECTS OF EPA & DHA

- Lower risk of coronary heart disease
- Lower risk of ischemic stroke
- Improved cognitive development (fetus and newborns)
- May reduce cognitive decline
- May help with depression
FATTY ACID FUNCTIONS

- Energy for the cellular functions
- Structural material for cell membranes
  - Increased cell membrane fluidity
  - Altered cell membrane function
- Metabolized to other chemicals that alter systemic inflammation, blood clotting, and blood vessel function.
2010 Dietary Guidelines
USDA & DHHS

- Increase seafood
- Choose seafood to replace a serving of meat and poultry.
- 8-oz per week, variety seafood (1,600-2,000 calorie per day)
- 250 mg EPA/DHA per day (1,750 mg per week)
USDA DATA: EPA+DHA by Fish Species

(Milligrams per 8-oz serving (measured raw))

http://ndb.nal.usda.gov/ndb/nutrients/index
Bioaccumulative & Persistent

- Mercury (coal-fired industries)
- PCBs (used in transformers and capacitors, banned in the late ’70s)
- Dioxins (chlorine manufacturers, industrial incineration practices)
- PFOS (used in fire fighting foams)
Some fish contain chemicals that can harm your health. To help you choose fish that are safer to eat from Michigan's lakes and rivers, MDCH tests fish filets from around the state. The Eat Safe Fish Guide lists the results of these tests.
Purchased Fish

US FDA – MethylMercury “Safety Tips”

- Advice for
  - Women who might become pregnant
  - Women who are pregnant
  - Nursing Mothers
  - Young Children

- Do Not Eat – Shark, Swordfish, King Mackerel, Tilefish

- Eat up to 12-oz per week variety of fish lower in mercury (shrimp, light tuna, salmon, pollock, catfish)

http://www.fda.gov/food/resourcesforyou/consumers/ucm110591.htm
US FDA Mercury in Purchased Fish

Mercury (ppm)

- TUNA (CANNED, LIGHT)
- TUNA (CANNED, FRESH/FROZEN)
- TUNA (FRESH/FROZEN)
- TROUT (FRESHWATER)
- ORANGE ROUGHY
- TROUT (FRESHWATER)
- SALMON (CANNED)
- POLLOCK
- PERCH OCEAN
- PERCH (Freshwater)
- SALMON...
- SNAPPER
- TILAPIA
- WHITEFISH
- TUNA (CANNED, LIGHT)
- HADDOCK (Atlantic)
- HALIBUT
- HADDOCK (Atlantic)
- COD
- CATFISH
- CARP
- BASS CHILEAN
**Mercury in Great Lakes Filets**

- **Erie**
- **Huron**
- **Michigan**
- **Superior**

Mercury (ppm)

<table>
<thead>
<tr>
<th>Fish Species</th>
<th>Erie</th>
<th>Huron</th>
<th>Michigan</th>
<th>Superior</th>
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</thead>
<tbody>
<tr>
<td>Brown Trout</td>
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<tr>
<td>Burbot</td>
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<td>Carp</td>
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<td>Catfish</td>
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<tr>
<td>Chinook Salmon</td>
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<td>Coho Salmon</td>
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<td>Freshwater Drum</td>
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<td>Lake Herring</td>
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<td>Lake Trout</td>
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<tr>
<td>Lake Whitefish</td>
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<tr>
<td>Siscowet Trout</td>
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<td>Steelhead (RBT)</td>
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<tr>
<td>Walleye</td>
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<tr>
<td>White Bass</td>
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<tr>
<td>White Perch</td>
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<tr>
<td>Yellow Perch</td>
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US FDA – Dioxin-like Chemicals in Purchased Fish

FDA - Purchased

Dioxin (ppt-TEQ)
DIOXIN-LIKE CHEMICALS IN GREAT LAKES FILETS

Erie  Huron  Michigan  Superior

Dioxin-like Chemicals (ppt-TEQ)

Brown Trout  Carp  Catfish  Lake Trout  Lake Whitefish  Siscowet Trout  Walleye  White Bass  Yellow Perch


Effects in Human or Laboratory Animal Cells and Organ Systems

- Cellular calcium dysregulation
  - growth, movement, metabolism, secretion and plasticity

- Neurodevelopmental
  - Disruption of neurotransmitter function
  - During development, altered nerve cell growth in the brain (linked to calcium regulation)

- Cardiovascular
  - Increase Arrhythmias
  - Changes in measures of decreased heart rate variability
  - Decreased function of inner lining of blood vessels (endothelial cells)

- Reproductive
  - Reduced sperm quality and quantity

- Thyroid
  - Hormone metabolism and function
## Effects in Human Populations

<table>
<thead>
<tr>
<th>Fetus or Child</th>
<th>Adults</th>
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<tbody>
<tr>
<td>- Mercury, PCBs, or Dioxins</td>
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<tr>
<td>- Neurodevelopmental</td>
<td>- Cardiovascular disease</td>
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<td>- Immune system suppression</td>
<td>- Reproductive effects (fertility)</td>
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<td>- Endocrine disruption</td>
<td>- Endocrine disruption (thyroid/metabolic effects/diabetes)</td>
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<tr>
<td>- Sperm quality reduction</td>
<td>- Reduced memory function</td>
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<tr>
<td>- Dental changes</td>
<td>- Immune system suppression</td>
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ACKNOWLEDGEMENTS

- EPA Great Lakes Fish Monitoring and Surveillance Program
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- Great Lakes Consortium of Fish Consumption Advisories
  - Meghan Williams, Wisconsin Department of Natural Resources
  - Candy Shrank, Wisconsin Department of Natural Resources
  - Patricia McCann, Minnesota Department of Health
CHECKOUT THE MATERIALS

www.michigan.gov/eatsafefish

Technical Reports
Eat Safe Fish Brochures (6 languages)
Buy Safe Fish Brochures (6 languages)
5 Regional Eat Safe Fish Guides
Multiple Topic and Location Specific Materials

More Information:
1-800-648-6942