

Shark fin soup from a toxicological perspective: Eat it or leave it?

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INTRODUCTION

By eating organisms from lower trophic levels, contaminants are passed on to organisms from higher trophic levels. Through this biomagnification process, predators at the top of the food web accumulate considerable amounts of pollutants in their tissues. Sharks are, as well as marine mammals, apex predators in marine ecosystems and accumulate considerable amounts of pollutants in their tissues. However, in contrast to marine mammals, sharks do not only accumulate contaminants through their diet, but also through their gills during breathing as they are fish. As such, sharks may even have higher levels of pollutants in their tissues compared to marine mammals.



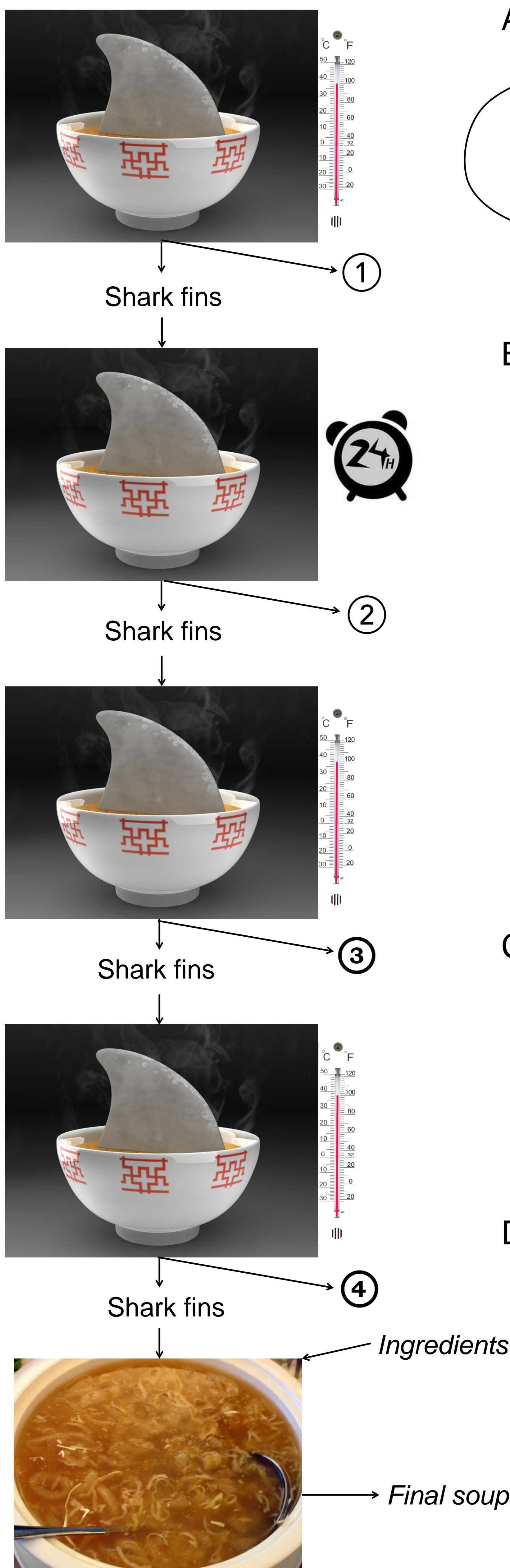
Although meat of some of the smaller shark species is eaten frequently by humans, the most notable consumption of sharks by humans is through shark fin soup. Recipes for making shark fin soup can differ from one country to the other, but all recipes have multiple sessions in common during which the fins are boiled in water to make them softer. After taking the fins out, the water is often removed without being further used in the recipe. Lipophilic contaminants like PCBs and PBDEs are not water soluble, are relatively stable and stay strongly attached to a lipid or solid matrix.

RESEARCH QUESTIONS

Is the lipid/solid matrix capable of withstanding several boiling sessions or do pollutants get lost along the way by throwing away the boiling water? To investigate this question, shark fins of bonnethead sharks (*Sphyrna tiburo*) as well as shark fin soup were analysed for PCBs and PBDEs by GC-MS.

Is it healthy to eat shark fin soup?

MATERIALS & METHODS



RESULTS

A) $\left. \begin{array}{l} \text{Boiling water} = \textcircled{1} \\ \text{Water} = \textcircled{2} \\ \text{Boiling water} = \textcircled{3} \\ \text{Boiling water} = \textcircled{4} \end{array} \right\}$
**All compounds:
 not detected or detected < LOQ**

B) *Ingredients*
 (corn oil, chicken broth, soy sauce)
**All compounds:
 not detected or detected < LOQ**

Ingredients
 (bamboo shoots, mushrooms, corn starch, chicken meat)
 - **Only PCB 66, PBDE 47 and PBDE 99 detected, other compounds not detected or < LOQ**
 - **Levels of PCB 66 and PBDE 47 ~ LOQ**
 - **Levels of PBDE 99: 12x LOQ**

C) *Shark fins (uncooked and unprepared)*
 - **Most penta- to deca PCBs detected (21 PCB congeners)**
 - **All PBDEs detected, except PBDE 28 and PBDE 154 (4 PBDE congeners)**

D) *Final soup*
 - **Higher chlorinated PCBs detected (11 PCB congeners)**
TOTAL: 624 pg/g ww
 - **Only PBDE 47 and PBDE 99 detected**
TOTAL: 25 pg/g ww

DISCUSSION & CONCLUSIONS

- The PCBs that are the most persistent in the environment and biota (e.g. PCB 153, PCB 180, PCB 187) were only measured in uncooked shark fins and in the final shark fin soup
- The PBDEs that are the most persistent in the environment and biota (e.g. PBDE 47, PBDE 99) were measured in some of the ingredients, in the uncooked shark fins and in the final shark fin soup
- Many PCBs and PBDEs are still present in the final shark fin soup!!
- 'Ordinary' chicken broth (chicken soup) contains less PCBs and PBDEs than shark fin soup, therefore...

