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METHYL MERCURY – THE DANGER FROM THE SEA

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In the marine ecosystem sharks are on top of the food chain, this means that they eat other marine creatures and through this take up all contained toxins. Substances that - once assimilated degrading only very little in the animals organism – are passed on after their death to their eater. These accumulate the toxin to a very large amount.

Many predatory species seem to manage high doses of toxic substances quite well. This is very different compared to humans. Designated heavy metals here play a key role. Predatory fish with a high content of Methyl Mercury are being sold on the markets under the name of “shark”, “swordfish” and “cream horn” ready to eat. Due to the high content of Methyl Mercury the consumption of those products can be considered extremely problematic for the human consumer. Sharks on the top end of the marine food chain are final depots to the poisons of the seas. **Methyl Mercury is one of the biologically most active and most dangerous poisons for men.**

In many scientific publications the exceptional position of methyl mercury as a high potential poison is attested. The warnings from many organisations to children and pregnant women indicate to refuse eating shark, sharkfins, cream horns and swordfish is simply not enough as

this “toxic food-information” just does not reach them when buying those goods.

The society does not understand the need for action to stop the trade with these toxic goods. The intoxication of individuals is considered possible and the consequences are accepted. Most fatal the sharks are endangered from extermination, the contamination with poison is being played down and no effective consumer protection nor a strategic protection to the marine ecosystem is being brought into place – even though this would be so easy.

But how does the mercury make its way into the shark?

Inorganic Mercury can be found very often in the environment and last but not least is being brought by men into the environment. Mercury steam once inhaled can cause severe forms of intoxications. That mercury intoxications have to be taken very serious could be observed during the discussion in the last years on amalgam in dentistry.

As soon as inorganic mercury gets into water environment, it is being metabolised by microorganism to organic mercury. This now even more toxic substance accumulates in the food chain in the tissues of fish to an even higher concentration. In the tissues of big and long-living aquatic predators enormous amounts of toxin are accumulated [1]. This is called age-accumulation.

The damages to men caused by eating shark products are huge. Even small quantities of shark meat can contain large quantities of poisonous methyl mercury.

When eaten methyl mercury is assimilated from the human body close to 100%. It passes the blood-brain barrier without any problems and reaches the brain undiluted what other toxic substances can't do. Even the mechanism that separates the mothers bloodstream from the embryo (diaplacental barrier) is passed without any problem, the protection of Mother Nature for the unborn baby is functionless. The accumulation of Methyl Mercury to the embryonic and developing brain and other vital organs can not be prevented. Massive developmental disorders of the brain, of the peripheral nervous system, severe damage to kidneys and mutations can be the result.

The american health administration – and meanwhile also the EU – publish intensive warnings not to eat shark meat to pregnant women and those in child-bearing age [2]

The circumstance that high doses over a short time period cause a more severe, sometimes irreversible damage to the human organism than lower doses over a long period of time makes this problem even worse. The national academy of science in the US estimates that only in the US more than 60.000 children are born each year with neurological damages caused by a methyl mercury exposure during pregnancy. [3]

The fact that **mutations, cancer and neurological damages to adults** and not only to children occur under the influence of methyl mercury is considered to be scientifically confirmed [4]. In the year 1998 scientists like Dr. Dickman and Dr. Leung found the consumption of shark meat as the main source for methyl mercury causing **a massive limitation in male fertility** [5]. Those results got proof in 2002 by a group of scientists around Dr. Choi of the Prince of Wales Hospital and Chinese University Hong Kong.

During a serial examination ordinary couples in Hong Kong had been tested for Methyl Mercury. A numerous amount of men was found with a high level of Methyl Mercury and diagnosed to have abnormal spermatozoa mobility and spermatozoa mutations [6]. **Another fact that makes the exposition of the human body to Methyl Mercury even more fatal: Even if you are aware of the poisons presence – the damages to the central nervous system can't be made undone [7].**

Examination of Shark meat

An examination of three different shark products bought on the German market, made by order of Sharkproject in may 2005, at the University of Mainz, revealed shocking results.

Blue shark, sea eel (other name for smoked shark on the market) and cream horn had been analysed at the Institute for inorganic and analytical chemistry of the Johannes Gutenberg University in Mainz, Germany by Prof. Dr. Klaus Heumann und Dr. Nataliya Poperechna [8]. The blue shark steaks contained 1400 µg/kg ($\pm 0,13$) Methyl Mercury, sea eel had 830 µg/kg ($\pm 0,02$) and cream horn 550 µg/kg ($\pm 0,01$).



A study ordered by the German Federal Ministry of Food, Agriculture and Consumer Protection [9] proofed these results by getting similar measured values. The top value for one shark was over 4mg MeHg/kg shark meat (= 4000 µg/kg). (Dr. R.Kruse and Dr. E. Bartelt „Exposition to Methyl Mercury by fish consumption“, Cuxhaven February 2008)

In this study the chance for consumer protection was blown. First a single fish meal wasn't compared with the toxic limit for one day but with the one for one week. Second the toxic analysis found the risk to be 208% of the JEFCA limit and 476% according to NRC Limit but it was calculated down to 21% and 49% according to the amount of products containing Methyl Mercury in the general basket of commodities – bad luck for consumers who just got poisoned by a single shark meat meal. Politicians seem to get blinded by the need for action. More honest according to consumer protection would be risk values of 1456% to the JEFCA limits and 3332% according to NRC limits as a single consumption already contains enormous

danger the values should not be calculated down a weekly consumption. That Methyl Mercury is one thousand times more toxic than mercury is mentioned but had no influence on decision-making for further actions.

The public discussion and committees work on the maximum quantity of human acceptance is conducted by lobbyists who are toxicological laymen. Medical risks cannot be lowered by changing statistic methods! Intoxication can change human fate and can cause huge social and medical consequential costs.

This is why you can choose the “appropriate” limit for every specific interest. The PTWI-Value (provisional tolerable weekly intake) of the JECFA (Joint FAO/WHO Expert Committee on Food) from 2003 is at 1,6 µg/kg for each kilo bodyweight. Since the year 2000 the other international accepted intake-limit as recommended by the EPA (Environmental Protection Agency) resp. the NRC (National Research Center / USA) is at 0,7 µg/kg for each kilo bodyweight per week.

Growing knowledge about the fatal influence of this poison on the human organism causes responsible-minded consumerists to ask for a harmonization and reduction of the legally tolerated limits. This is why the JEFCA classification might not be the right way of doing. The acknowledgment of the enormous toxicity (factor 1000) of the organic form of mercury (Methyl Mercury MeHg+) compared to the inorganic form of mercury (Hg²⁺) so far, has had no influence on any existing limits and so no improvement on consumer protection has been made.

Politicians have completely missed a mutual consent on joint safety standards and admitted that people are facing a severe risk of intoxication and an irrecoverable treasure of nature – the shark population – is being extinguished even though the economical benefit can be considered very low.

Summary:

Human health is endangered by the consumption of shark meat.

- High doses of Methyl Mercury (MeHg) can be found in shark meat
- High doses over a short time period cause a more severe - sometimes irreversible - damage to the human organism than lower doses over a long period of time
- MeHg, can be the reason for mutations on newborns, damages to the nervous system, developmental disorders, subfertility and others
- Shark meat as cream horn, shark steaks, sharkfinsoup, sea eel, etc. can be traded legally
- Worldwide sharks are endangered of being extincted but still are the main target for some fishermen
- From officials the risks caused by methyl mercury are played down, uniform limits are not binding
- No difference is being made between mercury and the a thousand times more toxic methyl mercury – the same limits apply!



- So far the interests of lobbyists took priority in comparison to consumer- and environmental protection

Basic knowledge:



Methyl mercury (MeHg) is measured in microgram (one millionth gram) per kilo meat.
 1000 µg/kg = 1 mg /kg (one thousand microgram equals one milligram)

In the EU up to 1000 µg MeHg/kg meat is allowed. Although the recommendation by the EU for food made from animals is not to exceed a MeHg-concentration of 20 µg/kg.

Tolerable amounts for admission of MeHg for humans are indicated in microgram per kilo bodyweight and timeframe (e.g. day or week).

The accepted maximum tolerable limit of MeHg per day from the toxicological point of view is:

- 1.-NRC, the safe standard 0,1 µg/kg bodyweight per day (National Research Council USA and the Environmental Protection Agency))
- 2.-JEFCA, the lax standard 0,23 µg/kg bodyweight per day (Joint FAO/WHO Expert Committee on Food)

Accordingly per week:

- 1.-NRC / EPA 0,7 µg/kg bodyweight
- 2.-JEFCA 1,6 µg/kg bodyweight

The average amount of MeHg found in shark meat of 800 µg/kg causes 240µg of MeHg to be incorporated by a shark steak of 300gr. According to international recommendations by the NRC 0,1 µg/kg per kilo bodyweight and

day should not be exceeded (0,23 µg/kg bodyweight according to JEFCA). A person with 70kg should not incorporate more than 7 µg MeHg, according to JEFCA not more than 16,1 µg.

A standard shark steak exceeds the lax JEFCA limit 14,9 times and the safe NRC limit 34,3 times.

European legislation tolerates limits by 1000 µg/kg (EU Limit for MeHg 1mg/kg meat) of this super-poison in fish that with a 300gr meal for a person of 70kg exceeds the NRC limit 42,8 times and the JEFCA limit 18,6 times.

If you take the scientific results by toxicologists for real and take into calculation that MeHg is 1000 times more toxic than mercury – legislation and international fishery authorities tolerate than people can incorporate a toxic dose with a single meal that exceeds the toxic tolerance limits of NRC by 42.800 times and JEFCA by 18.600 times.

There can be no question concerning consumer safety and consumer protection when it comes to Methyl Mercury!

We will make all trader of shark meat and fins aware of these facts providing documentation and giving detailed sources. Shark meat can intoxicate people. Every abandonment protects health.

Sources:

- [1] (US Environmental Protection Agency EPA): <http://www.epa.gov/owow/oceans/airdep/air3.html>
- [2] (FDAs opinion on mercury.htm Jan 12, 2001) <http://www.fda.gov/opacom/catalog/mercury.html> FDAs consumer advisory on explains the risks, of eating shark and swordfish for pregnant women and women of childbearing age.)
- [3] (-Toxicological effects of Methylmercury <http://books.nap.edu/books/0309071402/html/R1.html#pagetop> The report from the National Academies of Science estimates that each year 60,000 children may be born in the United States with neurological problems as a result of exposure to methylmercury in the womb.)
- [4] (Leonard A, Jacquet P, Lauwerys RR. Mutagenicity and teratogenicity of mercury compounds. Mutat Res Rev Gen Toxicol 114:1-18 (1983).)
- [5] (Dickman MD, Leung CK, Leung MK. Hong Kong male subfertility links to mercury in human hair and fish. Sci Total Environ 1998;214:165-174)
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