Fish: How to Determine Risks and Benefits?

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Introduction

Fish and seafood consumption has been connected to several beneficial health effects, especially with the prevention of cancer, decreased risk of coronary heart disease and cardiovascular disease as well as decreased inflammatory diseases as arthritis [1]. Historically the main effects of fish consumption have been attributed to the high content of long chain omega 3 (n-3) polyunsaturated fatty acids (PUFA). On the other hand it gets more and more clear that also other nutrients from fish have positive effects on human health. Beside the n-3 PUFA, fish and other seafood are a significant source of a well-balanced amino acid composition, taurine and choline, the Vitamins D and B₁₂ as well as calcium, phosphorus, iodine and selenium. Depending on the general nutrition of a population, fish and seafood also might provide significant proportions of Vitamin A, iron and zinc [1].

However, beside the positive effects on human health, heavy metals, dioxins, PCB’s and other contaminants in fish have been discussed for a long time and resulted in the question whether consumption of fish is beneficial or not [2-10].

The amount and proportion of possible contaminants in fish depend on many factors as for example feed and the environment were the fish come from, but also species and fat content. Therefore in many countries, there have been market studies in order to evaluate the presence and level of contaminants in order to be able to give consumers recommendations [4,6,9,11,12]. In general the levels of the analyzed contaminants as for example heavy metals, PCBs and dioxins were below the restriction levels both in the US [12] and in EU [4,6,9,13,14], and the authors concluded that there was no risk for human health from the evaluated species.

Nevertheless, it is very difficult to guess the content of contaminants in a specific fish or a fish product and in addition to evaluate the risks connected to its consumption for the consumer. Hence consumers still might be unsure whether fish consumption is beneficial or rather risky. Yet, considering that more and more fish is coming from aquaculture, subjected to strict control and monitoring, and also pond aquaculture is only executed in uncontaminated ponds and artificial feeds are controlled as well, consumption of this fish should be safe. There has been one well known scandal where accidentally contaminated material ended up in chicken feed (Belgian dioxin scandal). But to our knowledge something like this has never occurred with fish feed. Beside this, in an evaluation of the data concerning the benefits and risks of fish consumption, the authors show that the benefits of the recommended two servings of fish a week clearly exceed the potential risks [12]. The authors remind also that other foods are not necessarily uncontaminated but certainly do not contain the valuable long chain n-3 PUFA. They recommend even women in childbearing age to eat fish but to avoid selected species of fish. They conclude: ‘Avoidance of modest fish consumption due to confusion regarding risk and benefits could result in thousands of excess CHD death annually and suboptimal neurodevelopment in children’ [12]. Also the FAO published a report in 2011 on the risks and benefits of fish consumption in which the benefits of the nutrients especially the n-3 PUFA of fish are weighed against the risk of fish consumption, due to their contamination with for example dioxins and MeHg [15]. The report as well recommended promoting fish consumption, but also to assess the health risks associated with fish consumption also focusing on additional and new information [15]. Sioen et al. [7] summarized the risk and benefits from fish consumption related to n-3 PUFA and MeHg and suggested a framework using a calculated ratio between DHA and mercury content to determine the risk and benefit of consumption for each species. Solutions like this might be a good way to evaluate the risks and benefits also for other contaminants and give the consumers a relatively easy possibility to decide how much and what type of fish to consume.

Considering the available information, the consumption of fish twice a week as recommended by FAO and other authorities can only be supported. If in doubt the consumers can always choose fish from aquaculture or herbivorous fish which have a lower bioaccumulation of possible contaminants due to their lower position in the food chain. In addition, constant monitoring and sound publication of the contents of beneficial compounds as well as contaminants along with information about the reference dose (dose which can be consumed on a daily basis for a life time without expectation of adverse effects) or maximum allowed levels could help consumers to make sound choices.

As in many cases, proper communication is important along the whole production chain in order to assure safe products and make the consumers able to make sound choices for healthy food.

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