Heterocyclic Aromatic Amines Formation in Grilled Fatty Fish

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The consumption of fish provides utilization of proteins of high biological value, certain minerals, and vitamins. Additionally, fish and fish oil are rich sources of omega-3 fatty acids. Sardine (*Sardina pilchardus*) and salmon (*Salmo salar*) are fish species rich in omega-3 PUFAs. On the other hand, fish is usually cooked in different ways before consumption and heat treatment can lead to undesirable modifications, such as the loss of nutritional value and formation of undesirable mutagenic and carcinogenic compounds such as heterocyclic aromatic amines (HAAs).

To date, about 20 carcinogenic/mutagenic HAAs have been isolated and identified in cooked foods. Generally speaking, the types of cooking that involve temperatures of around 100ºC lead to a production of mutagenic agents that is too low to be quantifiable. However, grilling and barbecuing, the most common methods for preparation of fatty fishes, usually requires high temperatures of cooking, and HAAs are sometimes formed. Several studies show that charcoal-cooked meat presents higher amounts of these compounds [1]. Concerning fish samples, studies are scarce but indicate similar trend [2].

As HAAs are candidates in the aetiology of human cancer, the search for ways to minimise their intake by limiting their occurrence in cooked foods is very important. In the present study, we focused on conditions favouring the formation of HAAs during barbecuing of sardines (*Sardina pilchardus*) and Atlantic salmon (*Salmo salar*) to varying degrees of doneness and grilling conditions was evaluated by HPLC-DAD/FLD. Additionally, the influence of charcoal and electric heat source on formation of HAAs in grilled salmon was compared. Concerning sardine samples barbecued at 280 to 300ºC, "rare" samples produced not detected amounts of HAAs, "medium done sardines" presented IQ, MeIQx, PhIP and AαC, with levels of 1.9, 4.4, 3.3 and 2.0 ng/ g, respectively and "well done sardines" presented IQ, MeIQx, Trp-P-1, Trp-P-2, PhIP, AαC and MeAαC, with levels of 0.9, 2.2, 1.8, 8.2, 6.5, 17.7 and 10.6 ng/ g, respectively. Different qualitative and quantitative profiles of HAAs were observed in sardine and salmon samples cooked under similar conditions of temperature and doneness. The levels of PhIP, AαC, MeAαC and Glu-P-1 (13.3, 3.5, 1.13 and 3.18 ng/g, respectively) were significantly higher in salmon samples barbecued at 280-300ºC than in salmon samples barbecued at 180-200ºC or in the electric device. However, MeIQx content (0.5 ng/g) was lower in former than in the other samples.

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