



## Use of green tea to reduce methylmercury bioaccessibility in raw and cooked fish

Patrícia Anacleto<sup>a,b,c</sup>, Vera Barbosa<sup>a,c</sup>, Ricardo N. Alves<sup>a,d</sup>, Ana Luísa Maulvault<sup>a,b,c</sup>,  
Fabíola Fogaça<sup>e</sup>, Tomaz Langerholc<sup>f</sup>, António Marques<sup>a,c</sup>

<sup>a</sup>Division of Aquaculture and Upgrading (DivAV), Portuguese Institute for the Sea and Atmosphere (IPMA, I.P.), Rua Alfredo Magalhães Ramalho 6, 1495-006 Lisboa, Portugal; <sup>b</sup>MARE – Marine and Environmental Sciences Centre, Guia Marine Laboratory, Faculty of Sciences, University of Lisbon (FCUL), Av. Nossa Senhora do Cabo, 939, 2750-374 Cascais, Portugal; <sup>c</sup>Interdisciplinary Centre of Marine and Environmental Research (CIIMAR), University of Porto, Terminal de Cruzeiros do Porto de Leixões, Av. General Norton de Matos, S/N, 4450-208 Matosinhos, Portugal; <sup>d</sup>KAUST – King Abdullah University of Science and Technology (KAUST), Red Sea Research Center (RSRC), Thuwal 23955-6900, Kingdom of Saudi Arabia; <sup>e</sup>EMBRAPA, Embrapa Meio-Norte, Parnaíba, Brasil; <sup>f</sup>Faculty of Agriculture and Life Sciences, University of Maribor, Pivola, Hoče, Slovenia

### Abstract

Human exposure to methylmercury (MeHg) increases in diets rich in high trophic level species, raising human health-related concerns through seafood consumption. Nevertheless, the overall concentration of MeHg detected in seafood does not always reflect the amount that becomes available for absorption by the human intestinal epithelium during the digestion process, also defined as bioaccessibility. Recently, the health benefits attributed to green tea consumption are being highlighted, as well as their potential effects to reduce the bioaccessibility of contaminants. In this context, the aim of the present study was to assess the effect of green tea on MeHg bioaccessibility in raw and cooked fish species, namely yellowfin tuna, common smooth-hound, blue shark, swordfish, Atlantic wreckfish, European conger and black scabbardfish. Each sample was divided into two portions, one for raw assessment and another for a culinary treatment (grilling). A green tea infusion was mixed with fish samples in the beginning of the *in vitro* digestion protocol.

Results demonstrated that MeHg concentration ranged between 0.13 and 1.49  $\mu\text{g}\cdot\text{g}^{-1}$  wet weight (ww) in raw samples, and between 0.16 and 2.01  $\mu\text{g}\cdot\text{g}^{-1}$  ww in grilled samples. In general, grilling induced an increase in MeHg levels as a result of water loss. Regarding MeHg bioaccessibility in raw samples, the levels ranged between 67% (yellowfin tuna) and 35% (common smooth-hound), with most species presenting values below 50%. In grilled samples, the values of MeHg bioaccessibility varied between 40% (yellowfin tuna) and 12% (European conger). The bioaccessibility of MeHg was also affected by the presence of green tea, decreasing the amount of this contaminant between 17 and 57% (except in common smooth-hound) in raw fish and between 22 and 49% in grilled fish. This work clearly reveals that green tea is able to

reduce MeHg bioaccessibility, leading to lower risks associated with seafood consumption.

Reason for research:

Such information is certainly useful to help consumers to wisely select their seafood, and to enable food safety authorities and regulators to integrate this information in risk assessment and communication strategies. This study clearly demonstrates that the effect of culinary treatment (grilling) and the addition of the green tea led to a decrease in the levels of MeHg bioaccessibility which can have important and beneficial consequences in human health.