

# EVALUATION OF METAL BIOACCUMULATION (Cd, As, Pb, Zn, Cu, Cr, Ni, Hg) AND RISK TO HUMAN HEALTH IN MUSCLE OF EUROPEAN ANCHOVY (SICILY-ITALY)

**Chiara Copat** *Department of Hygiene and Public Health, University of Catania, Catania, Italy.*

**Giovanni Arena** *Department of Hygiene and Public Health, University of Catania, Catania, Italy.*

**Caterina Ledda** *Department of Hygiene and Public Health, University of Catania, Catania, Italy.*

**Roberto Fallico** *Department of Hygiene and Public Health, University of Catania, Catania, Italy.*

**Salvatore Sciacca** *Department of Hygiene and Public Health, University of Catania, Catania, Italy.*

**Margherita Ferrante** *Department of Hygiene and Public Health, University of Catania, Catania, Italy.*

**Introduction:** Marine pollution leads to environmental changes affecting biological components, and fish are certainly good bio-accumulators that provide information on the environmental quality. Hence, a monitoring to evaluate risks for human health associated with consumption of contaminated fish, is needed.

**Methods:** In this study 60 fish of European anchovy were sampled in the Gulf of Catania. In particular 30 fish were caught in winter and 30 in the summer period. For the lab tests 1 g of sample per fish was mineralized in a microwave system using a heated mixture of strong acids. The reading of Cd, As, Pb, Zn, Cu, Cr, Ni and Hg was performed with an ICP-MS.

**Results:** The average bioaccumulation level ( $\mu\text{g/g}^{-1}$ , w.w.) in winter follow the order Zn (8.96) > As (6.63) > Cr (0.89) > Cu (0.69) > Hg (0.10) > Cd = Pb (0.01) > Ni (< 0.007), in summer follow the order Zn (27.19) > As (5.61) > Cu (1.95) > Cr (1.15) > Ni (0.13) > Hg (0.05) > Cd = Pb (0.01). Zn, Cr, Cu and Ni concentrations are significantly higher in summer respect to winter ( $p < 0.001$ ), and vice versa for As ( $p < 0.05$ ).

We have also calculated the dietary exposure suggested by US-EPA (1994), and our estimate weekly intake are below the provisional weekly intake PTWI set by EFSA (2004, 2009<sub>a</sub>, 2009<sub>b</sub>, 2010) for Hg, As, Cd and Pb, and below the PTWI suggested by De et al. (2010) for Cu, Ni and Zn. Furthermore Cd, Pb and Hg concentration are below the limits set by E.C. 1881/2006 in muscle fish.

**Conclusions:** Results show that in the area of the Gulf of Catania, even if a bioaccumulation of metals is present, especially in the summer period, concentrations measured in European anchovy don't represent a risk for human health.

## References:

- T. K. De, M. De, S. Das, R. Ray, P. B. Ghosh, 2010. Level of Heavy Metals in Some Edible Marine Fishes of Mangrove Dominated Tropical Estuarine Areas of Hooghly River, North East Coast of Bay of Bengal, India. *Bull Environ Contam Toxicol* (2010) 85:385–390
- EFSA, 2004. Opinion of the Scientific Panel on Contaminants in Food Chain on a request from the Commission related to mercury and methylmercury in food *The EFSA Journal* 34, 1-14.
- EFSA, 2009. Scientific Opinion on Arsenic in Food (Request No EFSA-Q-2008-425) (adopted on 12 October 2009). EFSA Panel on Contaminants in the Food Chain (CONTAM). *The EFSA Journal* 7(10):1351
- EFSA, 2009. Cadmium in food. (Request N EFSA-Q-2007-138) (adopted on 30 January 2009) Scientific Opinion of the Panel on Contaminants in the Food Chain. *The EFSA Journal* 980, 1-139.
- EFSA, 2010. Scientific Opinion on Lead in Food (Request N. EFSA-Q-2007-137) (adopted on 18 March 2010). EFSA Panel on Contaminants in the Food Chain (CONTAM). *The EFSA Journal* 8, 1570.
- US-EPA, 1994. Guidance for assessing chemical contamination data for use in fish advisories. Risk assessment and fish consumption limits. EPA 823-B94-004. Washington, DC