

G. PERRA, E. FANELLO, C. GUERRANTI, S. FOCARDI, F. ANDALORO*, T. ROMEO*

Department of Environmental Science, University of Siena,
Via P.A. Mattioli, 4 - Siena, Italia.
perra@unisi.it

*Institute for Environmental Protection and Research (ISPRA), Via dei Mille, 44 - Milazzo (ME), Italia.

PRELIMINARY SCREENING OF PERFLUOROCTANE
SULPHONATE (PFOS) AND PERFLUOOCTANOIC ACID (PFOA)
IN A FISH SPECIES (*SERRANUS CABRILLA*)
FROM THE COAST OF SICILY (SOUTHERN TYRRHENIAN SEA)

SCREENING PRELIMINARE DI PERFLUOROTTANO SULFONATO
(PFOS) ED ACIDO PERFLUOROTTANICO (PFOA) IN UNA SPECIE
ITTICA DELLA COSTA SICILIANA (*SERRANUS CABRILLA*)

Abstract – Perfluorooctanoic acid (PFOA) and perfluorooctane sulphonate (PFOS) are environmental contaminants belonging to a chemical group known as perfluorinated compounds (PFCs). Extensive screening analyses of PFCs in biota samples from all over the world have identified perfluorooctane sulphonate (PFOS) as a global pollutant and have shown its behaviour similar to those of persistent compounds with regard to global biospheric distribution, bioaccumulation and biomagnification. In this study, a preliminary screening of PFOS and PFOA has been performed in liver samples of combers (*Serranus cabrilla*) from northern coast of Sicily.

Key-words: PFOS, PFOA, Perfluorinated compounds, Marine environment, Sicily.

Introduction - PFCs, typically epitomized by perfluorooctane sulphonate (PFOS) and perfluorooctanoic acid (PFOA), comprise a diverse class of chemicals that are used in a wide range of commercial and consumer products, as surfactants, water repellents, lubricants, adhesives, additives and coatings, and in fire fighting foams. Because of the high-energy carbon-fluorine bond, PFOS and related fluorochemicals are stable in the environment and resist hydrolysis, photolysis and biodegradation. They are nonvolatile, have high molecular weights and can repel both water and oils (Kannan *et al.*, 2001a). The toxicity of perfluorinated compounds has not been well characterized, but PFOS and PFOA have been found to exert endocrine disrupting effects in fish. In 2001 it was discovered that fluorochemicals such as PFOS were accumulating in biota throughout the world (Kannan *et al.*, 2001b). Perfluorinated compounds bind to blood proteins and accumulate in liver and gall bladder. The global distribution of PFOS and related fluorochemicals in fish, birds, marine and terrestrial mammals has been demonstrated by several studies from both North America, Europe and Asia. The present investigation reports the results from a screening of PFOS and PFOA in a fish species (comber, *Serranus cabrilla*) in order to provide a first clue to the levels of PFCs in the marine ecosystem off the northern coast of Sicily.

Materials and methods – Twenty samples of liver were excised from comber specimens (*Serranus cabrilla*) used for the investigation and caught in September 2009 by fishing off the northeastern coasts of Sicily (from Capo Peloro to the Gulf of Milazzo; Southern Tyrrhenian Sea). A fast sample treatment, followed by an LC–ESI–MS/MS method was followed (Corsolini *et al.*, 2008) for identification and quantification of PFOA and PFOS in liver of fish.

Results – In agreement with scientific literature on monitoring of perfluorinated acids in biota, PFOS was the predominant fluorochemical in the combers analyzed.

PFOS was found at concentrations above LOD (0.5 ng/g wet weight) in 6 out of 20 samples. The greatest concentration of PFOS in liver of comber was 8.5 ng/g wet weight. PFOS levels are lower than the mean level (176.3 ± 12.8 ng/g w.w.) found in liver of brown comber (*Serranus hepatus*) from the Augusta Gulf (Southeastern coast of Sicily) and higher than the concentration of PFOS in hepatic tissue (<5 ng/g w.w.) of brow combers from the Gulf of Castellamare (Northwestern coast of Sicily), reported by Perra *et al.* (2006). The concentrations of PFOA was below LOD or not detected for all samples. The results showed PFOA and PFOS levels in comber lower than those reported in a study (Nania *et al.*, 2009) to monitor the current levels of PFOS and PFOA in some types of Mediterranean Sea fish which are most consumed in Italy (mean levels of PFOS in liver: 13 ng/g w.w., in pelagic fishes - 53 ng/g w.w., in benthonic fishes; mean levels of PFOA in liver: 6 ng/g w.w. in pelagic fishes - 9 ng/g w.w. in benthonic fishes).

Conclusions – In summary, PFOS were detected in liver of combers from the northeastern coast of Sicily. Concentrations of PFOS in fish were an order of magnitude lower than the concentrations reported in previous studies of fish from industrialized countries. Our biomonitoring results did not show that the northeastern coast of Sicily had any particularly alarming pollution by PFCs. More data are needed about the spatial distribution of these compounds in the Sicilian coastal areas in order to trace their sources.

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