Human activities can contaminate the environment with substances that can have harmful effects (directly or indirectly) to the release into the aquatic environment of substances that can have harmful effects on living organisms and consequently on human health.

In addition to persistent organic compounds such as polychlorinated biphenyls and dioxins, some heavy metals such as lead (Pb), cadmium (Cd), and particularly mercury (Hg) can cause problems for consumers due to their bioaccumulation and biomagnification through the food chain (15), reaching the highest levels in predatory fish species at the highest trophic levels, such as tuna and swordfish (14, 46). Within these species, accumulation of contaminants, particularly Hg, is related to the age and size of the animal (6, 14, 27).

The presence of Pb, Cd, and Hg in fish products is one of the most serious chemical risks to food safety in the fishing industry. The gradual increase in pollution of the oceans, the globalization of markets, in terms of both production of raw materials and location of processing plants, and the increasing sensitivity of consumers to food safety issues make heavy metal pollution a critical factor for development and competitiveness in the fish industry. Human activities can contaminate the environment with metals, although contamination may also derive from natural geological sources (35, 38). The effects of Pb, Cd, and Hg toxicity in humans occur primarily in kidney, liver, and nervous system. In particular, the development of the nervous system of the fetus is affected irreversibly by methylmercury through the exposure of women during pregnancy (13, 31). The transfer of metals from the mother to the fetus is possible through the placenta, and carryover from breast milk can produce some symptoms in early childhood such as neuropsychological disorders and urinary tract defects (1, 11, 12, 17, 40, 42). Problems more frequently associated with heavy metal exposure from food include long-term effects in several tissues, in particular mutagenicity (25, 39), carcinogenicity (3, 8), teratogenicity (43), immunotoxicity (36), and endocrine disruption (34).

Because humans are exposed to these metals mainly through consumption of fish products, it is particularly important to verify and/or minimize exposure to humans by controlling the levels of contamination in fish products. The maximum limits of Pb, Cd, and Hg in fish and methods for determination of the concentrations of these metals are set by European Union (EU) legislation (20, 21). The maximum limits of Hg, Pb, and Cd in fresh tuna muscle are 1.0, 0.3, and 0.1 mg/kg wet weight (w.w.), respectively.

In recent years, many surveys have been carried out on seawater and sediments and on marine organisms (7, 10, 16, 23, 41, 47, 48, 51). Nevertheless, few studies have been conducted on processed and fresh fish products. The aim of the present study was to determine the concentrations of the heavy metals Hg, Pb, and Cd in samples of marketed canned tuna in olive oil, which is one of the most important canned foods in Italian markets (29).