

# Advisory on Heavy metal contamination in seafood

## Heavy metals in seafood

Heavy metals are commonly occurring environmental chemical contaminant in seafood. It include lead, cadmium, arsenic and mercury. These metals are highly toxic in nature with high environmental persistence and become a serious issue through bioaccumulation and biomagnification of food chain. Fishes can uptake and concentrate metals from water, other small fishes and vegetation. Accumulation in the tissue can depend upon environmental concentration and exposure period. Also in an aquatic ecosystem fishes are the most important bio monitor for estimation of heavy metal contamination. Based on the degree of toxicity, maximum allowable limit (MAL) is determined above which the consumers are exposed to harmful contamination.

**Natural sources** – atmospheric deposition, marine volcanism, geological anomalies and geothermal events

**Anthropogenic sources** – industrial effluents, mining wastes, intensive metallurgy and acidic rain

### Mercury

Mercury (Hg) is the metal of most concern and fish is considered as the most important source of mercury in case of humans. It can be methylated to form organic mercury called methylmercury (MeHg) which is the chronic toxic form. The major symptoms of MeHg in humans are impaired vision and hearing, headache, paraesthesia, difficulty in movement, less coordination, fatigue, tremors and ataxia

### Arsenic

Arsenic (As) is widely distributed in the environment due to natural and anthropogenic sources. Arsenic is present in both organic and inorganic form and the most toxic one among them is inorganic As which is stable, highly soluble and can be absorbed into the body easily. Various symptoms of As exposure in humans include abdominal pain, vomiting, diarrhea, muscle weakness and skin flushing.

## Cadmium

Cadmium (Cd) is a highly toxic heavy metal to all living organisms. Bivalves can accumulate this toxic metal and act as suitable bioindicator for pollution monitoring. Biomagnification of Cd also happen in the food chain and increased concentration will reach the end of food chain.

## Lead

Lead (Pb) is a highly toxic metal in aquatic system in which fish are at the top of food chain. The International Agency for Research on Cancer classified inorganic lead as probably carcinogenic to humans (Group 2A) in 2006. In addition to fish, the other sources of Pb include bivalves, cephalopods, crustaceans and oysters.

Heavy metals	Permissible limit (mg/Kg)			
	EU	USFDA	Codex	India
Mercury	Fishery products -0.5	All fishes (methyl mercury) – 1	Fishes – 0.5	Fishes – 0.5
	Certain fishes- 1		Predatory fishes - 1	Predatory fishes - 1
Cadmium	Crustaceans – 0.5	Crustaceans – 3	Bivalves – 2	Fish – 0.3
	Bivalves – 1			Crustaceans – 0.5
	Cephalopods – 1	Bivalves – 4	Cephalopods – 2	Bivalves – 2
	Fishes – 0.05 to 0.1	Crustaceans – 1.5	Fish - 0.3	Cephalopods – 2
Crustaceans – 0.5	Fish – 0.3			
Lead	Bivalves – 1	Crustaceans – 1.5	Fish - 0.3	Crustaceans – 0.5
	Cephalopods – 1			Bivalves – 1.5
	Fishes – 0.2 to 0.4	Crustaceans – 76	NIL	Cephalopods – 1
	Fish – 76			
Arsenic	NIL	Crustaceans – 76	NIL	Crustaceans – 76
		Bivalves – 86		Bivalves – 86

### Preventive measures



- Consumption of predatory fishes like shark, sword fish, king mackerel etc can be avoided or consume in smaller quantities to reduce the risk of mercury during pregnancy, breast feeding and in children
- Choose a variety of fish that are lower in mercury
- Avoid excessive consumption of shellfishes from industrially polluted water bodies

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