DEVELOPMENT OF AN ASSAY FOR CHOLINESTERASE INHIBITION IN FISH AS A "BIOMARKER" OF THE EFFECT OF POLLUTION

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Biochemical measurements to assess the biological impacts of pollution ("biomarkers") are increasingly being used to complement analytical chemical measurements of pollutant distribution. The inhibition of cholinesterases (ChE) has been used for many years to indicate the presence and effects of organophosphate and carbamate pesticides, but more recently ChE inhibition has been recognized as a possible indicator of the presence of other chemicals, including industrial quaternary ammonium detergents. In this paper we describe the steps involved in developing ChE as a biomarker in "sentinel" species of inshore fish in Korean waters; these include (a) characterization of ChE and optimization of incubation conditions *in vitro*; (b) assessment of natural variability of ChE in fish from a clean site as a result of seasonal variation and sexual maturation, and (c) demonstration that spatial variation in ChE activity may be attributable to ambient contamination. Studies on *Limanda yokahamae* (marbled sole) from a "reference" site Haegeumgang, Geoje, using specific substrates and inhibitors, have shown that the major ChE in brain is acetylcholinesterase (AChE); butyrylcholinesterase (BChE) or "pseudocholinesterase" represents <5% of total ChE activity; in muscle tissue, BChE represents about 30-40% and AChE 60-70% of total ChE activity. In gonadally immature fish there appears to be relatively little variability in brain or muscle ChE during spring and summer; samples from gonadally mature fish have not yet been analysed. Preliminary data suggest that fish from Masan Bay, a site known to be relatively contaminated, have lower muscle AChE activity than those from the reference site, though brain AChE appears not to differ.