THE DEVELOPMENT OF AN IMMUNOLOGICAL ASSAY FOR ASSESSMENT OF FISH QUALITY IN RELATION TO ORGANIC CHEMICAL POLLUTION

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The contamination of aquatic food chains has in recent years become an area of general concern (Haasch et al. 1993). Rather than direct monitoring for the process of noxious compounds in foods, indirect assessment through biomarkers is increasing. That is changes in metabolism are measured which are direct consequences of exposure to pollutants. These bio-indicators can be early warning sentinels of contamination of the food chains. The cytochrome P450s are modulated by several factors either internal effectors such as genetics, hormones, age and gender, or external factors including man-made and natural organic chemicals (Schenkman and Greim 1993). Many aquatic pollutants, such as polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs), are able to induce hepatic cytochromes P450 1A1 (CYP1A1), making it a useful bio-indicators, in fish. The levels in these bio markers can be used to assess the environmental quality of fish.

During these past few years, an immunological assays has been used as effectively as the conventional catalytic assay method, to detect the levels of cytochromes 1A1 (CYP1A1) in fish. Initially, immuno-blotting techniques or Western blotting techniques were used to demonstrate a correlation between the levels of CYP1A1 in fish and the levels of environmental contamination (Stegeman et al. 1988). Currently, simpler immunological techniques like ELISA (Enzyme Linked Immunosorbent Assay) have been developed and used to determine such biomarkers levels in fish in Northern Europe and America (Goksoyr 1991; Celander and Forlin 1991). Indirect ELISA, is very sensitive and rapid and suitable for handling large numbers of samples in field studies. No such specific reagents exist for fishes in Southern waters.

We are producing both monoclonal and polyclonal antibodies against *b*-naphthoflavone (BNF), non-toxic aromatic hydrocarbons-induced CYP1A1 in bream, a local fish in Australia. Our first experiments have been done to investigate the efficacy of existing antisera reactive against Atlantic cod-CYP1A1 when used against the CYP1A1 isolated from Australian fish. Thus the CYP1A1, so far has been induced in bream by BNF. This CYP1A1 contains both catalytic activity, 7-ethoxyresorufin O-deethylation, and immunological activity in ELISA and Western blotting by using mouse-anti-cod CYP1A1. The results show that bream-CYP1A1 contains some antigenic similarity in immunological site to cod-CYP1A1. Due to this conserved characteristics of CYP1A1 among species, it is a high possibility that anti-bream CYP1A1 antibodies are also able to recognise chemically induced CYP1A1 in other fish species. There is no correlation between the levels of catalytic activity and levels of immunological activity in each sample. Nevertheless, the levels of CYP1A1 can be determined by using immunological assay in a sample which has lost its catalytic activity. It, thus, seems to show that the catalytic site of CYP1A1 may be different from its immunological site. This obvious advantage of an immunological of an immunological assay over the conventional catalytic assay makes immunoassay very suitable for field assessment of the environmental quality of fish and other seafood.

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