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Neurobiochemical Analysis of Abnormal Fish Behavior Caused by Fluoranthene Toxicity

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Fluoranthene, a common polycyclicaromatic hydrocarbon (PAH), exhibits phototoxicity which may affect aquatic organisms. The eventual goal of this study is to develop a biomarker used in monitoring abnormal behaviors of Japanese medaka (*Oryzias latipes*) as a model organism caused by hazardous chemicals that are toxic and persistent in the ecosystem. In this study, we investigated neural toxicity of fluoranthene in Japanese medaka (*Oryzias latipes*) which was correlated with its behaviors. The untreated individuals showed common behavioral characteristics (*i.e.*, smooth and linear movements with small curvatures). Here the tracks did not have clear break points and appeared to be smooth and relatively linear. Treatment of the medaka fish with fluoranthene caused a significant suppression of AChE (acetylcholine esterase) activities in the body portion (without head portion). When fish were exposed to 1000 ppb of fluoranthene for different time periods, the body AChE activities decreased from 126.±31.89 (nmoles substrate hydrolyzed per min per mg

protein) to 49.51±11.99. Expressions of TH protein in the different organs from both head and body portions were comparatively analyzed using an immunohistochemical technique. Five organs of the medaka fish showing a strong TH protein expression were the olfactory bulb, hypothalamus, optic lobe, pons and myelencephalon regions. This study provides molecular and neurobehavioral bases of a biomonitoring system for toxic chemicals using fish as a model organism.