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Effects of PAHs on the early life stages of aquaculture fishes

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Marine oil spill accidents give a variety of adverse influences on aquaculture organisms for a long time. Polycyclic aromatic hydrocarbons (PAHs), one of the major crude oil constituents, have been reported to induce developmental inhibition, morphological deformity, histopathological effects and genetic damage on fishes. In this study, we evaluated the impact of the PAHs on early life stages of three aquaculture fishes (red sea-bream, *Pagrus major*, rock bream, *Oplegnathus fasciatus*, and olive flounder, *Paralichthys olivaceus*) using pyrene, 2-methylnaphthalene, and phenanthrene. Embryonic development and larval morphology were investigated for each species. The median effect concentration (EC50) was not estimated for pyrene, and phenanthrene for all test species. The EC50s for 2-methylnaphthalene of *Pagrus major*, *Oplegnathus fasciatus*, and *Paralichthys olivaceus* were 12.8, 10.9 and 18.0 $\mu\text{mol/L}$, respectively. The no observed effect concentrations (NOECs) for pyrene of *Pagrus major*, *Oplegnathus fasciatus* and *Paralichthys olivaceus* were 99, 99, 0.013 $\mu\text{mol/L}$, respectively. The NOECs for 2-methylnaphthalene of *Pagrus major*, *Oplegnathus fasciatus* and *Paralichthys olivaceus* were 5.5, 5.5 and 3.5 $\mu\text{mol/L}$, respectively. The NOECs for phenanthrene of *Pagrus major*, *Oplegnathus fasciatus* and *Paralichthys olivaceus* were 7.0, 224, 0.96 $\mu\text{mol/L}$, respectively. There was no morphological deformity in the hatched larvae of *Pagrus major* exposed three PAHs. The spinal curvature and fin deformity were observed in *Oplegnathus fasciatus* at 11 $\mu\text{mol/L}$ of 2-metylnaphthalene. Pericardial edema, ocular development inhibition, spinal curvature and fin deformity were observed in *Paralichthys olivaceus* exposed to 0.013 $\mu\text{mol/L}$ of pyrene, 3.5 $\mu\text{mol/L}$ of 2-metylnaphthalene, and 1.0 $\mu\text{mol/L}$ of phenanthrene. It was considered that *Paralichthys olivaceus* to be more sensitive than *Pagrus major* and *Oplegnathus fasciatus* to PAHs. Some embryo of *Paralichthys olivaceus* successfully hatched in lower concentrations, while morphological deformity was observed in these concentrations. PAHs seem to have large effects on the early life stages of aquaculture fishes.

Biography

Sung-Dae Moon is currently on the doctoral degree course and studies in fish toxicology. In addition, he serves as a Team Leader at NeoEnBiz.

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