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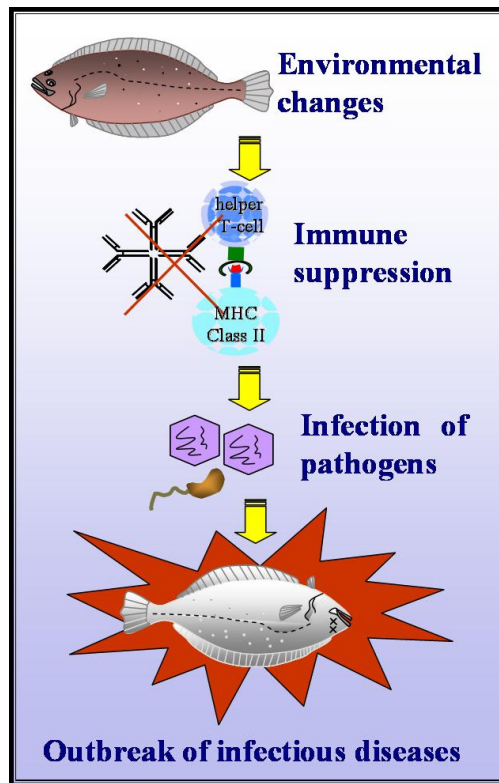
Studies on Outbreak Mechanisms of Infectious Diseases in Marine Organisms from Viewpoint of Environmental Changes

Viruses, bacteria, fungi and parasites cause serious infectious diseases not only in human but also fish and shellfish. Until now, researchers in microbiology have investigated the outbreak mechanisms of infectious diseases mostly from the viewpoint of pathogenicity of pathogens. However, it is still difficult to accurately account for the causes of many infectious diseases because of the complex factors deciding the pathogenicity of pathogens and immune state of host organisms. Therefore, we have focused on the outbreak mechanisms of infectious diseases from viewpoints of both pathogenicity of pathogens and environmental changes, because such changes are known to be able to induce stressors in host organisms resulting in suppressing their immune systems.

Specially, in the present Global COE program, our group investigates the effect of chemical pollutants in marine ecosystems on the immunity of fish. Among several pollutants present in the marine environment, we are interested in heavy oil contamination, because oil spills associated with marine transportation such as tanker accidents and offshore production facilities are one of the most prominent marine pollution sources in the world. For examples stranding of the tanker, Nakhodka in Japan in 1997 and ship collision in Korea in 2007 are famous tanker accidents in Asia.

Generally, the spilled oil contains many chemical components such as polycyclic aromatic hydrocarbons (PAHs), heavy metals and benzol. Exposure of fish to crude oil has been reported to elevate plasma adrenaline, nonadrenaline and plasma cortisol levels, indicating that the oil pollution may be a significant stressor that can lead to immune suppression in fish. However, the effect of crude oil on fish immune system is not yet well understood.

Our group examines the effect of heavy oil (bunker C) on specific and non-specific immune systems such as the 1) occurrence of infectious disease at the individual level, 2) immune suppression in the leukocytes at the cellular level and 3) gene expression at the molecular level in Japanese flounder, *Paralichthys olivaceus*, which is one the most important benthic fish species in Asian countries including Japan and Korea. The data obtained in the study may provide further scientific knowledge on fish diseases, environmental toxicology and fisheries science.



Outbreak mechanism of fish infectious diseases from viewpoint of environmental changes



Experimental exposure of heavy oil in juvenile Japanese flounder *Paralichthys olivaceus* to heavy oil.