

# FUNDING PROGRAM FOR NEXT GENERATION WORLD-LEADING RESEARCHERS

**Project Title:** Elucidation of biosynthesis, accumulation and transformation systems of the marine toxins concerning to food poisoning, and its application to food hygiene

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## 1. Background of research

Since Japan is surrounded by the sea, sea foods are important food resource for us, and they have been strongly influenced on Japanese food culture and economy. However, some of fish and shellfish are known to have natural toxins, and sometimes cause food poisonings, such as paralytic shellfish poisoning, diarrhetic shellfish poisoning, puffer fish poisoning, ciguatera fish poisoning, seaweeds poisoning, and so on. Most of these toxins are reported to be produced by planktons or bacteria, and accumulated by animals via food chain. Marine toxins is a global issue in the world, not only in Japan.

## 2. Research objectives

In order to reduce the food poisonings caused by sea food toxins, it is important to clarify, which organisms are producing toxins, what kinds of materials do they use to produce toxins, how do animals accumulate toxins in their body, how do these toxins pharmacologically act in human cells and tissues, and how can we analyze these toxins. These are all our research objectives of this project.

## 3. Research characteristics (incl. originality and creativity)

In our approach to these issues, both of chemical and biological methods will be used. Practically, we use highly functionalized LC-MS/MS systems and NMR spectroscopy, and organic synthesis, for the study of biosynthetic pathways of target small molecules. In the biological field, genetic approach to biosynthesis of toxins in microorganisms, purification of proteins related to toxin production, transformation and accumulation will be performed. Cellular and molecular biology and electrophysiology are also used for the study of mode of actions of toxins. Such manifold approach from different fields is characteristic in this project.

## 4. Anticipated effects and future applications of research

Our expected result can be applied to inhibit the marine toxin production, so it will work to reduce sea food poisonings and economic damage in aquaculture of sea foods. Furthermore, developments of highly sensitive analytical method of toxins and antibody against seafood toxins will be applicable to medical care for food poisonings. We believe that our results will contribute to human health in the world.