Elucidation of the Influence of the Rodenticide Spraying on Wildlife in the Ogasawara Islands

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[Abstract]

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Although anticoagulant rodenticides (ARs) are effectively used for the control of invasive rodents, nontarget species are also frequently exposed to ARs and secondary poisonings occur widely. However, little data is available on the effects of ARs, especially on wildlife. In this study, we evaluated the anti-coagulant rodenticides sensitivity in four main species in the Ogasawara Islands: the red-faced wood pigeon, the Ogasawara Buzzard, the Bonin flying fox, and the green sea turtle, to provide data for policy decisions related to rodenticides use. In Vitro metabolism studies suggested that pigeon rapidly metabolized warfarin in the liver and are less susceptible to its effects, whereas green turtles have a lower capacity to metabolize warfarin in the liver and are more susceptible to warfarin. Compared to rats, bats showed a rapid decrease in blood warfarin and diphacinone. In Vivo studies showed that warfarin metabolism and excretion was higher in buzzard and pigeons than in chickens. In Vivo studies of warfarin in green sea turtles showed that warfarin remained in the blood for a long period of time. The inhibition rate of VKOR activity in the black rat, the target species for rodenticides, was 99.2%, whereas the inhibition rate of VKOR activity in the pigeon was about 60%, indicating that the pigeon is expected to be less sensitive to warfarin than the rat. The low IC50 and low VKOR activity of buzzard suggests that they may be susceptible to rodenticides. In Vivo study using Egyptian bats suggested that bat would be more resistant to warfarin and diphacinone than rats. In Vitro VKOR activity inhibition by diphacinone showed comparable inhibition rate in bats compared to rat. These results suggest that bats are lower or comparative sensitivity with rats. In Vitro VKOR activity inhibition by warfarin suggested that sea turtles would be more sensitive to rodenticides compared to rats. Furthermore, analysis of blood coagulation time in sea turtles in In Vivo administration study revealed that blood coagulation time was prolonged even long after of warfarin administration. The risk of exposure of rodenticides from the marine environment may be higher in green turtles.

[References]

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