Bioconcentration Mechanisms of Mercury in the Body of Javan Mongoose Distributing Nansei Islands via Food Web of their Ecosystems

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[Abstract]

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Mongooses inhabiting Nansei Island accumulate high level of mercury in their liver. This suggests that possibility of high mercury exposure on this area. Our studies are focused on understanding the distribution and dynamics of mercury in the ecosystems of Nansei Islands using two types of approaches aiming to elucidate mercury concentration mechanisms in mongoose. One of our goals is to set up an *in vitro* experimental system to understand mercury metabolism *in vivo*. Additionally, our second goal is to understand mercury accumulation mechanism through food web at this area's ecosystem.

Most of the cells isolated from liver were identified as biologically active hepatocytes. Fibroblasts isolated from ear-skin could be maintained *in vitro* at least for 2 months. The fibroblasts could be cryopreserved, which could be supplied to other institutions. Two isoforms of mongoose *tert* cDNA were cloned by RT-PCR in testis. Then, we put each cDNA into an expression vector, pEF/GW-51/lacZ. The mongoose *tert* gene was constitutively expressed after introduced expression vectors into the mongoose cells. We refined and improved methods of isolation and primar culture of the cells from mongoose liver and skin in this study. These cells were useful to define mercury bioaccumulation and toxic resistance *in vivo*. It strongly suggested that variable immortalized cells could be established by introducing functional mongoose *tert* expression vectors into cells of mongoose.

We performed mercury and other heavy metals sensitivity test in hepatocyte from mongoose and rat. The rat hepatocyte showed stable response for mercury and some heavy metals between individuals, whereas the mongoose hepatocyte showed incoherent response that it seemed to depend on individual variation such as growing environment and feeding. In mongoose, hepatocyte delivered from specimen that accumulate high-level of mercury, exhibit resistance to mercury and high uptake rate. Consequently, these findings indicate that hepatocyte from mercury resistance mongoose, gives resistance against mercury. Conversely, in order to identify

the mercury-responsive genes, we assessed expression analysis of mongoose *GCS*, *GSR* and *TRX2*, showed that these genes were not essential to mercury resistance in mongoose.

We found out the reasons why mongooses inhabiting in Yambru and Amami Island accumulate mercury. When comparing with mongoose from three ecosystems, Yambaru, Onna village and Kagishima, mercury levels is depending on the length of food web up to mongoose in each area. In addition, we found out potentials of other heavy metal pollutions such as lead, cadmium and arsenic on Nansei Islands especially Okinawa Island.