

The development of immunocontraceptive vaccines based on zona pellucida antigens for control of feral raccoons (*Procyon lotor*) in Japan

Asano, M., Mori, N., Kuninaga, N., Suzuki, M.
Gifu university, Gifu, Japan

CONTACT: Makoto Asano, asanojr@gifu-u.ac.jp

In Japan, the raccoon (*Procyon lotor*) was introduced as pet animal in the 1970s and has subsequently spread throughout the country, mainly due to irresponsible release by the owners. Raccoons cause significant damage to agricultural crops, houses and native ecosystems and were therefore designated by law in 2005 as an invasive alien species. For control of the raccoon, local governments have principally used live-catch box traps mainly in farmland and residential areas. This has resulted in temporary reductions in damage and populations of raccoon. However, the high reproductive rate of raccoons means their population recovered rapidly. The development of other population control techniques is therefore required.

Since 2011, we have investigated immunological fertility-control for raccoons, particularly using zona pellucida protein C (ZPC) based vaccines. The ZPC gene of raccoon was sequenced and the amino acid sequence of the sperm-binding region identified. After comparing the homology of the amino acid sequence of the sperm-binding region among a range of species, we produced five synthetic peptides as antigen candidates for immunocontraceptive vaccines. Immune-histochemistry was used to assess antibody binding of sera from rabbits immunized against each of the five synthetic peptides to ovaries of raccoon and Siberian weasel (*Mustela sibirica*), Japanese marten (*Martes melampus*), Japanese badger (*Meles anakuma*), Japanese raccoon dog (*Nyctereutes procyonoides viverrinus*), Japanese black bear (*Ursus thibetanus*), Masked palm civet (*Paguma larvata*), small Indian mongoose (*Herpestes auropunctatus*), dog (*Canis lupus familiaris*) and cat (*Felis catus*). Rabbit sera against three out of the five synthetic peptides showed a raccoon-specific reaction, suggesting that these three synthetic peptides are potential antigens for development of an immunocontraceptive vaccine for raccoons.

Our next step is to evaluate the effect of the antigen candidates in vivo. We will immunize female raccoons with each of the three synthetic peptides, then evaluate immune responses and their ability to inhibit fertilization. Further studies will then be needed to develop practical fertility-control oral vaccines but our immunocontraceptive antigens shows promise as the basis for a new tool to assist with raccoon control.

This research was supported by KAKENHI (26430203).