Newcastle disease virus like particles – developing efficient production system.

Maciej Kosiński, Laboratory of Recombinant Vaccines, Intercollegiate Faculty of Biotechnology UG-MUG

Supervisor: prof. dr hab. Bogusław Szewczyk

Baculovirus protein expression is one of the most efficient system for production of heterologous proteins. It is able to produce higher yields of protein in shorter time with lower cost of production than mammalian cells. Insect cell culture is cheaper and baculoviruses are safe for mammals because they cannot replicate in vertebrates. Posttranslational modifications are similar to vertebrates, except lack of sialylation.

Paramyxoviridae is a family of viruses infecting vertebrates and causing diseases such as mumps, measles and infections of respiratory tract. Newcastle disease (ND) is one of two most infectious and dangerous poultry diseases causing respiratory dysfunction and often death of an animal. It infects more than 250 species of wild birds and poultry. ND has big economic impact for the sake of eradication of flock when disease is detected. Many studies showed that Newcastle Disease virus can replicate in cancer cells far better than in healthy human cells because of their bigger affinity to cancer cells due to high sialic acid levels on membrane surface. . ND virus like particles (VLP's) are safer in use due to their lack of genetic material.. VLP's can be used as delivery systems for drugs or as a direct oncolytic factor.

In my work I have created several baculoviruses containing 3 out of 6 structural protein genes of NDV under baculovirus polyhedrin and p10 promoters. Two of those proteins (F-fusion protein and HN- hemagglutinin neuraminidase …) are transmembrane glycoproteins responsible for attaching and fusion to host cell, third (M-matrix protein) provides structural integrity and is indispensable for VLP formation. For research purposes few of bacmids included fusion of fluorescent protein with genes from NDV enabling us to observe time course of infection and localisation of proteins inside *Spodoptera frugiperda* (SF9) cells. I have also optimised VLP purification in sucrose gradient ultracentrifugation. Part of my work was focused on purification of VLP's from baculovirus infected cell culture..

In further work I am going to examine how ND-VLPs interact with cancer cells.