Chondroitin sulfate (CS) forming proteoglycan with core-protein is an acidic polysaccharide existing ubiquitously in animal connective tissues such as cartilage, and plays important biological roles in development, organ morphogenesis, regeneration, and infection. Invertebrates including insects as well as vertebrates produce CS. Chondroitinas from bacteria digesting CS have been widely used for quantification and structural analyses of CS and recently applied to treatment of intervertebral disc protrusion and spinal cord injury.

Baculoviruses are pathogens of Lepidoptera. They are useful bio-controlled insecticides for strong toxicity to specific insect species and used for expression system to produce recombinant proteins in insect cells. We investigated that the envelope protein AcODV-E66 from the baculovirus Autographa californica M nucleopolyhedrovirus (AcMNPV) exhibited substrate specific chondroitinase activity.

BmODV-E66 from BmNPV has chondroitinase activity as well as AcODV-E66. Then we investigated presence and distribution of CS in silkworm (Bombyx mori) that is the host insect of BmNPV. Acidic polysaccharide fractions were extracted from the tissues of Silkworm fifth-instar larvae and analyzed with biochemical method. Sections of the tissues were stained immunohistochemically with anti-CS antibodies. CS existed in skin, silk gland, midgut basement membrane, and peritrophic membrane (PM) of the insect.

Recently, it was reported that the primary infection activity of AcODV-E66 deletion mutant virus of AcMNPV decreased 1/100 times compared with the control virus. The primary infection begins the invasion to the midgut epithelial cells through the PM that protects the invasion. The baculovirus chondroitinase ODV-E66 may digest CS in the PM and facilitate the infection of the host insect.