Pathological and Molecular Biological Studies on Canine Distemper

PREFACE

Canine distemper is a contagious, incurable, often fetal, multisystemic viral disease that affects the respiratory gastrointestinal and central nervous system. Distemper is caused by canine distemper virus (CDV). CDV is an envelop virus with negative stranded RNA genome, belonging to the genus Morbillivirus, family Paramyxoviridae. CDV occurs among domestic dogs and many carnivores including raccoons, skunks and foxes. CDV is fairly common in wildlife. Young puppies between 3 and 6 months old are most susceptible to infection and disease and are more likely to die than infected adults nonimmunized dogs that have contact with other nonimmunized dogs or with wild carnivores have a greater risk of developing canine distemper. Macrophages carry the inhaled virus to nearby lymph nodes where it begins replicating then spread virus through the lymphatic tissue and infects all the lymphoid organs within 2 to 5 days. By days 6 to nine, the virus spreads to the blood, then spreads to the surface epithelium (cell lining) of the respiratory, gastrointestinal, urogenital and central nervous systems, where it begins doing the damage that causes the symptoms as fever, loss of appetite, pneumonia, diarrhea, vomiting, seizures, paralysis, etc...

Although canine distemper (CD) has been generally control well throughout the world with live attenuated vaccine, the number of CD cases has increased in Japan, European countries and America. Many vaccinated dogs have been infected with CD virus. The question remains in field studies, but not in animal experiments, of whether CDV infection in vaccinated dogs is the result of infection with wild strain or reversion to virulence of vaccine viruses. Therefore, in these studies, I used new cell line Vero cells expressing CDV receptor named Vero cells expressing canine lymphocyte activation signaling molecule (Vero-DST cells) to isolate CDV from the recent canine distemper cases including vaccinated dogs and research on biological and molecular characteristics

of new isolates of CDV. This thesis is including 7 chapters. Chapter I described the growth profiles of the laboratory strain Ondestepoort, strain MD77 and strain KDK1 of canine distemper virus on Vero-DST cells. In chapter II, the recent CDV was isolated on Vero-DST cells from natural CDV infected dogs. The viral titers and growth curves of new isolated CDV were identified. Chapter III showed the comparative analysis of CDV isolates from clinical cases of CD in vaccinated dogs that infected with CDV. Chapter IV described that after isolation with Vero-DST cells, a new CDV isolate of strain 007Lm, was selected for studying the pathogenesis of new CDV isolates in dogs. Molecular analysis and growth properties of two different clusters of CDV recently isolated in Japan were compared in chapter V. Chapter VI showed the relationship between growth behaviors in Vero cells and molecular characteristics of recently isolated CDV. Stability of CDV after 20 passages in Vero-DST cells expressing the receptor protein for CDV was presented in chapter VII.

I hope that the results from these series of work will contribute modest values in understanding the pathological, biological and molecular characteristics of CDV and in resolving the urgent problems of vaccine against CDV.