Case report in Republic of Korea

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1. Epidemiological situation of rabies
2. Current control program in wildlife
3. Recent research project related to rabies
Epidemiological classification of animal rabies case in Korea

Since the first rabies occurred in 1907, in total, 16,129 rabies cases have been recorded in Korea.
Korea’s policy to control rabies in 1960’s
- Implement mass vaccination program to dogs.
- Slay stray dogs.
- Perform the education for people.

As the result, urban rabies was eradicated in 1985. Since 1993, sylvatic rabies has been reported in northern border area of Korea.
Most of rabies were detected in two provinces near the border of demilitarized zone. Korean raccoon dogs have played an important role in transmission of rabies since 1993.
Since 2007, rabies cases have not been reported in Gyeonggi province but continued to occur and move to north-eastward in Gangwon province. This result may be obtained from application of bait vaccine to two provinces.
No human rabies occurred between 2005 and 2011. Even though incidence of patients bitten by animals in rabies risk regions has been increased, the patients have been treated with postexposure prophylaxis (PEP) properly.
Incidence rate of rabies according to animal species

Rabies cases have been diminished in dog. But, since rabies was first confirmed in a Korean raccoon dog in 1994, the cases have been increase.
The monthly distribution of animal rabies during 18 years period peaked in Jan. The incidence rate was the highest during winter. That is because raccoon dogs did not accumulate enough fat in their body for hibernation and came down to villages to seek food.
Identification of Korean rabies isolates using IFA test and electronic microscopy

The confirmative diagnostic method is fluorescent antibody test (FAT). And an asset of virus isolation (VI) is availability for further characterization. Most of rabies isolates are propagated well in neuroblastoma cells (NG-108-15).
Application of RT-PCR and rapid kit to rabid brain samples

RT-PCR and rapid immunodiagnostic kit can also be used for the detection of rabies in brain or saliva samples of infected animals to make a rapid decision. These kinds of methods could be used as supplementary diagnostic tools.
Korean rabies isolates belong to **serotype I, genotype I**.
Based on the phylogenetic tree, Korean rabies isolates classified into 3 subclades.
and were most closely related to the eastern Chinese and Russian strains.
Korean isolates originated from a rabid animal in northeastern Asia.
Multiple alignments of amino acid sequences of glycoprotein from the 14 Korean isolates

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The arginins (R) at position 333 of the residue within the ectodomain of glycoprotein is essential for virulence. There were no changes of arginin among isolates. Therefore, rabies isolates circulating in Korea may pathogenic in several hosts.
Rabies case report occurred in March 2011

Species: cattle (Hanwoo), about 5 years old.
Date: 21 April 2011.
Location: Bukmyeon Inje Gangwon province
Latitude: 38.06,43 Longitude: 128.11.23.

Symptom: severe salivation, extreme tremors ataxia, paralysis.
Diagnosis: rabies.

Indication: All cattle of farm must be vaccinated.

According to statement from farmer, wild animal, raccoon dogs were seen wandering Around farm frequently.
Like this, recent rabies cases were related to attacks by raccoon dogs.

Indications are transferred to farmer associated with rabies
Current control program of rabies in Korea
Current Korea’s policy to control rabies

National animal rabies eradication program

1. Annual vaccination of dogs all around of Korea
2. **Obligatory vaccination of cattle** in rabies risk area
3. Distribution of bait vaccines for wild animals, raccoon dogs
4. **Carry out serosurveillance of rabies in** two provinces
5. Education for people
Amount of bait vaccine to be distributed into two provinces and intake rate

About 500 thousand doses were distributed in 2010. The amount of bait vaccine has been regulated according to the incidence of region. The points distributing bait vaccine are various ranging from 20,734 to 39,280. The time of distribution is spring and autumn twice a year.
Korean raccoon dog involved in rabies

Family: Canidae, Nyctereutesprocyonoides koreensis

American raccoon dog

Korean raccoon dogs do not bark and live near farm.
Population density of raccoon dogs is higher in Ganwon than in Gyeonggi.
Before distribution of bait vaccine, conduct education (wear gum glove), the vaccines were distributed near farm and small stream. Check locations and the vaccine three times each week. If no trace of taking bait vaccine, change the location of distribution. **After 2 month collect them** and check the remaining vaccine and report them.
Seroprevalence of rabies virus in domestic animals of Ganwon province

We need continuous surveillance to check national eradication program. From the result, about 70% of dogs demonstrated sero-positive against rabies. It is well known that the rabies is not popular if the antibody ratio of positivity is 70% or greater.
Recent research project related to rabies
Prepare the ingredients of bait

- Poultry meal
- Fish meal
- Soybean cake
- Tetracycline
- Corn
- Feather meal
- Sugar
- Poultry oil
- Beta dextrin
- Premix

=bait
Strategy for developing candidate for bait vaccine using reverse genetics system

The minimal infection unit of negative sense RNA genome is ribonucleoprotein and N, P, L genes are needed to recover recombinant virus.
The recombinant vaccine candidate is propagated well in both BHK and NG108 cells. After checking immunogenicity and efficacy of candidate, this strain will be Used for oral bait vaccine seed.
Trap-vaccination-release (TVR) program had been performed for 7 years. The Ontario state was declared with rabies free region at October 2008. Concentric rings around the location of a rabid animal represent vector population reduction (PR), TVR and ORV zones. It is important to get national model to control rabies.
Conclusion

- National eradication program including massive vaccination and distribution of bait vaccine for the control of rabies in wild animals was lead to a substantial decrease in number of rabies in Korea.

- When the new reinforced program is prepared and applied to the rabies risk areas, sylvatic rabies will be eradicated in Korea in the near future.

- These kinds of skills will be transferred to Asian countries.