Letter to the Editor

Dog-transmitted Rabies in Beijing, China

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Rabies remains a continuous threat to public health in Beijing. In this study, a total of 224 brain tissues were collected from suspected infected stray dogs within Beijing between January 2015 and December 2016. Among them, total of 67 samples were diagnosed positive for rabies. In the phylogenetic analysis, rabies in Beijing is currently a relatively independent public health issue originating from local rabid dogs apart from the imported cases from elsewhere in the country. Because vaccination of unregistered dogs against rabies is still neglected in Beijing and other regions of China, national and local authorities should play central roles in all related aspects, such as development of policies, engagement of stakeholders for public and professional education, entire vaccination process, and animal management.

Rabies virus is mainly transmitted by bites of infected dogs resulting in approximately 99% of human rabies cases worldwide, mainly in the developing countries in Asia and Africa[1]. In China, rabies remains a continuous threat to public health, because vaccination of reservoir animals, such as dogs (particularly stray dogs), against rabies is still neglected in most regions in this country[2]. The ineffective control and prevention of dog rabies has caused three large epidemic waves of human rabies since 1949[2]. The increased use of human rabies vaccines (currently 15 million doses annually) has reduced the reported human rabies deaths from the latest epidemic peak of 3,301 cases in 2007 to 561 in 2016[2]. In Beijing, the capital of China, no human rabies case has been reported during 1994-2004. However, since the emergence of one case in 2005, the numbers of reported human deaths caused by rabies have remained largely unchanged (from 1 in 2006 to peaks of 13, 12, and 2 in 2012, 2015, and 2016, respectively; the data from Chinese Center for Disease Control and Prevention). Unregistered dogs, particularly stray dogs, in the suburbs in Beijing provide a rabies reservoir because of the low vaccine-immunization coverage (< 20%)[3].

To analyze the genetic diversity and phylogenetic characterizaiton of dog transmitted rabies viruses in Beijing, a total of 224 brain tissues (59 in 2015 and 165 in 2016) were collected from suspected infected stray dogs with history of biting human and clinical signs of rabies within Beijing between January 2015 and December 2016. The samples were sent to our laboratory (Laboratory of Epidemiology, Military Veterinary Research Institute) by the Beijing Municipal Center for Animal Disease Control and Prevention. A total of 67 samples (22 in 2015 and 45 in 2016) were diagnosed positive for rabies using direct immunofluorescence test[2]. Viral nucleoprotein (N) genes were amplified by the reverse transcription polymerase chain reaction and sequenced in both directions[2], of which 42 duplicate N sequences were excluded. The rest (25 N sequences) were submitted to the GenBank, with accession numbers shown in the Figure 1 (▲). A phylogenetic tree was constructed using the maximum likelihood method in MEGA 7.0.14, as described previously[2]. Other reference sequences of the major lineages within China were retrieved from GenBank, with accession numbers shown in the Figure 1.

In this study, all detected viruses were classified as China I, which is currently the main lineage originating from dogs nationwide (Figure 1). Most viruses were similar to the dog-associated strains collected from contiguous regions in northern China, including Hebei, Tianjin, and Inner Mongolia (Figure 1).

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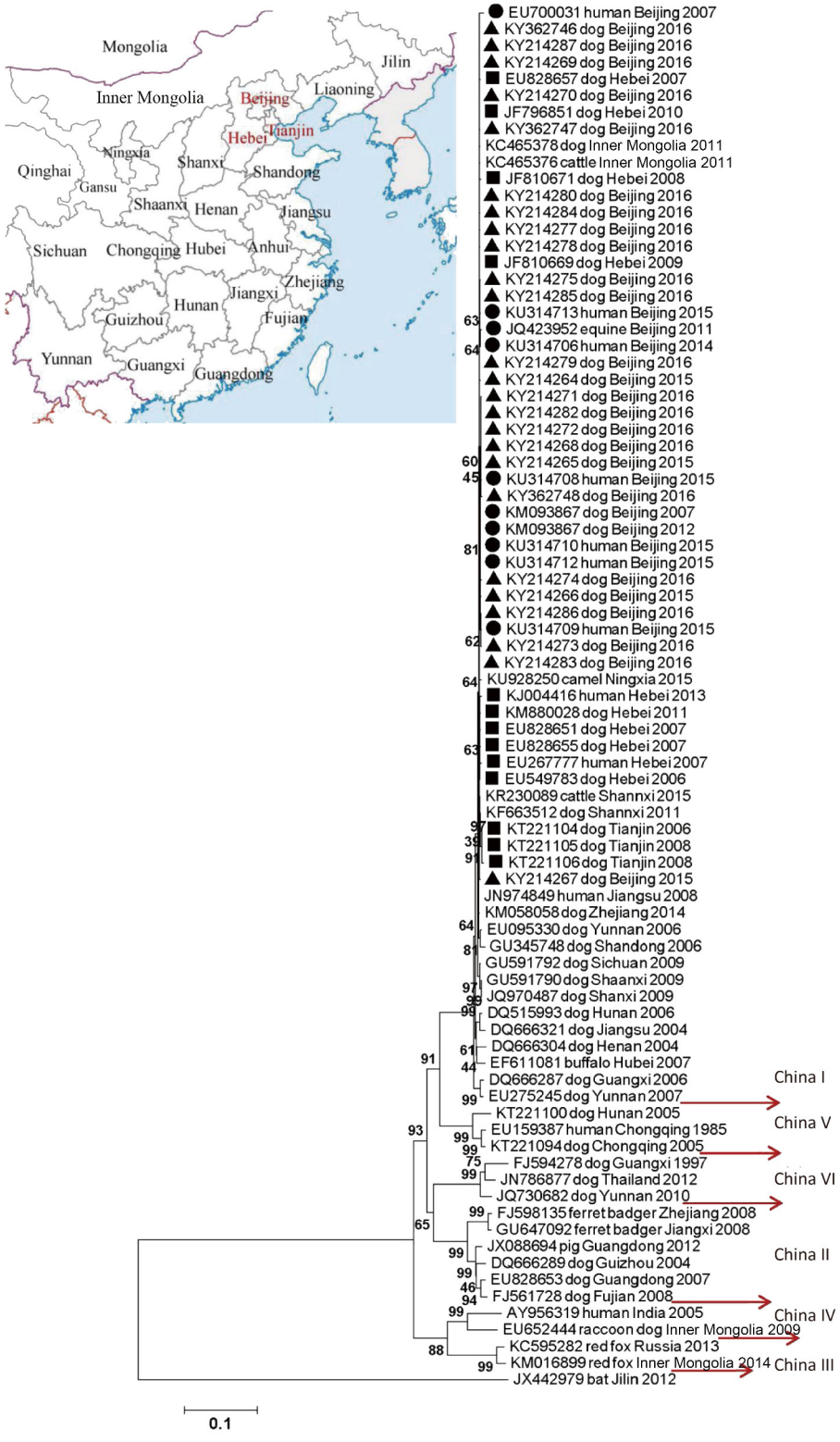

Figure 1. Maximum-likelihood phylogenetic tree based on the complete N gene sequences of rabies lyssaviruses isolated in China, rooted with Irkut lyssavirus (JX442979) isolated in China. ▲: Rabies viruses isolated in Beijing in this study. ●: Rabies viruses isolated in Beijing in previous reports. ■: Rabies viruses isolated in Hebei and Tianjin in previous reports.