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Comparative study of the prevalence of leptospirosis in urban rat populations living in different environments in Lyon, France

SORO S.¹, GROUD K. ¹, MEGARUS D. ¹, FAFOURNOUX A. ¹, LATTARD V. ¹

¹ *vetagro-sup, Marcy l'étoile, France*

Introduction

Re-emerging bacterial zoonosis of worldwide distribution, Leptospirosis is caused by a spirochete of the genus *Leptospira*. Rodents and in particular rats are considered as the main reservoirs of this bacterium. In Europe, metropolitan France is one of the countries with the highest number of cases of human leptospirosis. Rats, which are synanthropic generalist rodents, have been able to adapt to different urban environments and proliferate. Since the characterization of the transmission dynamics of leptospires between individuals is not yet fully elucidated and the environment would play a determining role, our study is to compare the prevalence of leptospirosis between populations of urban rats living in different environments in Lyon.

Méthods

The city of Lyon was chosen for this study and three environments where rats live were selected: sewers, surface areas communicating with sewers and surface areas without communication with underground pipes. The animals were captured alive with methods varying according to the environment. In the sewers, the capture is done with two-entry rat traps and in the other two environments, it is done by using ferrets that force the rodents to leave their burrows and come to the surface. Captured animals are transported to the laboratory of USC 1233 of Vetagro-sup and then euthanized and aseptically autopsied within 24 hours of capture. Kidneys are collected for the search of renal carriage of leptospires. Genomic DNA extraction is performed using the BioExtract SuperBall kit. Leptospires detection is performed using the real-time molecular biology PCR technique targeting the pathogenic 16S rRNA gene.

Résultats

More than a hundred rats, mostly adults, have already been captured in different locations in the city. Renal carriage of leptospires has been demonstrated in rats in the three different living environments selected. The circulating strain found belongs to the *Icterohaemorrhagiae* serogroup. Analysis of the results obtained tends to show a higher prevalence of renal carriage of leptospires in rat populations living in sewers and in surface areas accessing underground pipes. As these areas are characterized by the presence of sewage, these results suggest an environmental influence in the persistence and circulation of leptospires in rats.

Conclusion

This study suggests that environmental characterization is a factor to consider in the transmission of leptospires within a rodent colony. The study is still in progress and a component dedicated to the detection of leptospires in sewage is planned.