

Emerging Diseases—Hype or Reality

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Abstract: The scientific and lay press report “emerging diseases” with regularity, and there are concerns of a regression to the standard of the previous century. Antibiotic resistance, modernization of society, and varied other factors likely have a synergistic action in the “creation” of some emerging diseases, some of which can jump from animal to man. A few of the reported diseases in rodents, rabbits, and bats, as well as the actual types of conditions seen in a specialty diagnostic practice, are reviewed in this discussion. While some emerging diseases from the headlines may yet impact pets, zoological collections, wildlife, and man, more mundane conditions are most prevalent in our clinical experience. More rodents, rabbits, and bats are likely seen by veterinarians, and as a result, there is more opportunity to see what was likely there all along. A number of more common conditions need research efforts and data collection in order to better understand why these particular conditions are “emerging” as problems.

Introduction

There is a new era in human and veterinary public health as a continual increase in “emerging diseases” is routinely reported in the scientific and lay press. This presentation will mention some of the conditions considered “emerging diseases” in small mammals, and compare/contrast the reports with a few of those conditions that seem to be increasingly seen in a diagnostic pathology practice that specializes in “exotic” animals.

The question that should be answered is: What is an “emerging” disease? According to Lederberg, ““Emergence is in fact regression, a return to the standard that prevailed universally in the previous century.”¹ For instance, common microbes like *Staphylococcus aureus*, which used to be easily treatable by penicillin, have evolved to be antibiotic-resistant.

In addition, exposure to infectious diseases that pass from animals to humans is accelerating because of the modernization of our society. Humans are encroaching upon the environment and coming into contact with microbes, which can jump from animals, sometimes with fatal consequences. The factors responsible for new diseases are varied but probably have a synergistic action.

Most of these conditions have only been recognized in the last several years, and it is not clear if they are truly emergent, just more readily recognized. An example would be rodent *Helicobacter*. This paper will briefly discuss a few of the reported diseases in rodents, rabbits, and bats, as well as the actual types of conditions seen in a specialty diagnostic practice.

Rodents

In rodents, the following diseases have been identified, primarily by the laboratory animal community, as “emerging.”

1. *Helicobacter* infections of mice, rats, and hamsters.
2. Beta hemolytic *Streptococcus* infections of mice.
3. *Staphylococcus aureus* infections of athymic (nude) mice.
4. *Corynebacterium bovis* (Hyperkeratosis-associated coryneform or HAC) infections of athymic (nude) mice.
5. Atypical parvovirus infections (MPV and RPV) of mice and rats.
6. Atypical reovirus and paramyxovirus (parainfluenza) virus infections of guinea pigs.
7. Atypical mouse hepatitis virus (MHV) infections of mice.
8. Atypical mouse rotavirus (EDIM) infections of mice.
9. Rat respiratory virus (RRV) infections of rats.

Most of these infections seem to be clinically mild or inapparent. Many have not been associated with lesions or physiologic changes, and several may only be recognized by seroconversion.² These statements are based on experience with laboratory rodents, which often is different than what is happening with pet rodents.

Based on submissions to our diagnostic service, there appears to be an increase in the number of cases of central nervous system disease in rodents. Explanations for this include expansion of the pet rodent base, greater awareness by owners, and more concern for the possibility of a zoonotic disease, particularly lymphocytic choriomeningitis.

Lymphocytic choriomeningitis virus (LCMV) is a rodent-borne virus belonging to the family Arenaviridae, genus *Arenavirus*, which causes a wide spectrum of human disease. The virus is often considered a problem in hamsters, but can occur in a wide variety of rodents. Although it can affect humans, cases are seen infrequently.

We have seen sporadic cases of presumed viral encephalitis in chinchillas and a woodchuck and encephalomalacia of undetermined cause in a guinea pig. The largest number of cases, however, is of purulent meningoencephalitis due to bacteria. In these cases the organisms have been seen and/or cultured. This condition has been diagnosed in mice, rats, gerbils, hamsters, and guinea pigs. In addition cases of probable toxoplasma-induced encephalitis have been seen in rats and a prairie dog.

Rabbits

In rabbits, “emerging” diseases include rabbit hemorrhagic disease due to Calicivirus. It has been increasingly reported since being found in China in 1984. The disease has an unusually high death rate and hemorrhage. In addition, *Borellia burgdorferi* has been documented in rabbit ticks. Rabbits developed a rash similar to

the typical Lyme disease rash as well as the same type of immune response generated after being bitten by ticks infected with *B burgdorferi*.

We have seen occasional cases of hemorrhagic disease but have not documented Lyme disease in pet rabbits. We have seen an increasing number of cases of renal disease in pet rabbits, however. The primary condition is interstitial nephritis with lymphocytes and plasma cells, or occasionally heterophils. There may be fibrosis and mineralization. Tubular casts are occasionally present. In some animals, there is variable glomerulitis and glomerular sclerosis. A few cases are associated with a bacterial infection, but in most the cause is not apparent. Because the lesion is morphologically similar to renal lesions caused by *Encephalitozoon*, this protozoa is a primary etiologic candidate. This is true even though organisms are not seen. These organisms can be difficult to demonstrate, and they may not be present even though there is an ongoing immune-mediated inflammatory response.

Bats

Bats are being incriminated as carriers and possible reservoirs of several viral diseases, including Hendra and Nipah viruses, as well as lyssavirus.³ Some bats have also been considered possible carriers of the coronavirus that causes SARS, although there is some controversy concerning this assumption.

No documented cases of these infections have been seen in material presented for diagnosis. In most cases, the cause of the conditions submitted is not determined, but bacterial disease, probable nutritional/metabolic disorders, and neoplasia are seen. Organs most commonly involved include the lung, liver, and urinary tract (kidney and urinary bladder). Morphologically, both inflammatory and noninflammatory lesions are seen.

Discussion

Given the recent arrival, or at least, recent recognition of many of the reported conditions, particularly in rodents, there is minimal literature to give guidance as to their biology or importance. The biology of these infections is not well understood, but anecdotal reports and data suggest they may not be highly infectious, particularly the rodent diseases.

In the case of the conditions seen by our diagnostic service, it is probable that much of the increase is due to more animals being seen by veterinarians rather than newly emergent diseases. It would also appear that these more mundane conditions are the most prevalent in our real-world situation, even though they do not generate the headlines. It's not impossible that conditions now widely reported, and in some cases feared, will impact pets or zoologic collections in the future and they must be kept in mind as potential differential diagnoses. From the standpoint of the animal populations we have contact with, there are a number of more common conditions that need research efforts and data collection in order to better understand why these particular conditions are "emerging" as problems.

References

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