



Zoonotic diseases are increasingly impacting human populations due to the effects of globalization, urbanization and climate change. The book *Zoonoses. Infectious diseases transmissible from animals to humans* presents the most significant aspects of zoonotic diseases in a concise manner such as occurrence, transmission, clinical manifestations, diagnosis, therapy and prophylaxis.

Originally, zoonoses were regarded as animal diseases. Later, in the 19th century, they had a double meaning, animal diseases and diseases of humans transmitted from animals, directly (by contact) or indirectly (by a vector). Today, no difference is made with regard to the direction of transmission, such as animal to human or human to animal, although the latter play only a minor role in the epidemiology of zoonoses. More than 200 diseases occurring in humans and animals are known to be mutually transmitted. They are caused by viruses and prions (Chapter 1), bacteria (Chapter 2), fungi (Chapter 3) and parasites (Chapter 4).

Many new, emerging and re-emerging diseases of humans are caused by pathogens that originate from animals or products of animal origin. Emerging pathogens are now considered to be a major microbiologic public health threat. Different animal species, both domestic and wild, can act as reservoirs for pathogens that may be viruses, bacteria, or parasites. Major contributing factors in the emergence of these bacterial infections are: (i) development of new diagnostic tools, such as improvements in culture methods, and development of molecular techniques; (ii) increase in human exposure to bacterial pathogens as a result of sociodemographic and

Zoonoses. Infectious diseases transmissible from animals to humans

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environmental changes; and (iii) emergence of more virulent bacterial strains and opportunistic infections, especially those affecting immunocompromised populations.

A precise definition of their implications in human disease is challenging and requires the comprehensive integration of microbiological, clinical and epidemiological aspects. Classical infectious diseases, such as rabies, plague, and yellow fever, well known for centuries, are zoonoses that have not been eliminated despite major efforts. Recent epidemics of Ebola virus, Zika virus, avian influenza, and bovine spongiform encephalopathy have served as a reminder of the existence of infectious diseases and of the capacity of these diseases to occur unexpectedly in new locations and animal species. Zika virus is a flavivirus that was first isolated in 1947 from a febrile rhesus macaque monkey in the Zika Forest of Uganda, and later identified in *Aedes africanus* mosquitoes from the same forest. Zika virus is the focus of an ongoing pandemic and public health emergency. Zika virus were limited to sporadic cases in Africa and Asia, but the emergence of Zika virus in Brazil in 2015 indicated rapid spread throughout the Americas. Zika virus in the United States, Canada, and Europe has been limited to travelers from affected areas.

Although most Zika virus infections are characterized by subclinical or mild influenza-like illness, severe manifestations have been described, including Guillain-Barre syndrome in adults and microcephaly in babies born to infected mothers. Neither an effective treatment nor a vaccine is available for Zika virus; therefore, the public health response primarily

focuses on preventing infection, particularly in pregnant women. Despite growing knowledge about this virus, questions remain regarding the virus's vectors and reservoirs, pathogenesis, genetic diversity, and potential synergistic effects of co-infection with other circulating viruses.

The need for greater international co-operation, better local, regional and global networks for communicable disease surveillance and pandemic planning is also illustrated by these examples. These diseases have contributed to the definition of new paradigms, especially relating to food safety policies and more generally to the protection of public health.

Viruses that produce zoonoses belong to various virus groups that have similarities in the disease patterns that they induce, and they may also have similarities involved in host and vectors. Among the agents causing zoonotic diseases, viruses are the most abundant and the majority of zoonotic viruses have RNA (e. g., Alphaviruses, Flaviviruses, Bunyaviruses, etc.). RNA viruses do not have proofreading mechanisms, and every reproductive cycle will originate a great number of genetic variants. By chance, these new variants may have the ability to extend the host range to other hosts. All these variants will have to overcome a selection process that in most cases, restrict, or in some cases, improve their reproductive success (Chapter 1).

Bacterial zoonoses occur by transmission via one of several mechanisms: (i) Direct contact with animals or infected materials (e.g., *Bacillus anthracis*, *Brucella* spp., *Bartonella* spp., *Burkholderia mallei*, *Leptospira interrogans*). (ii) Animal bites and scratches (e.g., *Pasteurella multocida*, *Capnocytophaga canimorsus*, *Streptobacillus moniliformis*). (iii) Bites or mechanical transmission by arthropod vectors (*Borrelia burgdorferi*, *Yersinia pestis*, *Francisella tularensis*, *Rickettsia* sp.). And (iv) consumption of contaminated foods (e.g., *Salmonella enteritidis*, *Listeria monocytogenes*, *Yersinia enterocolitica*, etc.). The bacteria that cause the infections can sometimes be acquired by more than one transmission mechanism, complicating control measures (Chapter 2).

Fungal infections associated with zoonotic and/or sapro-notic (i. e., the source is environmental, interhuman transfer is exceptional, but could be pathogenic) transmission are among the group of the most common fungal diseases as dermatophytosis (fungi that are able to utilize keratin-containing structures, e.g., hair, nails, scales, etc.) from humans and animals. Nearly all fungi are able to thrive in the environment for extended periods, but pathogens have the evolutionary advantage of using a vertebrate vector during a part of their life cycle. Often animals other than humans are the prime target of the fungus, with humans as nonoptimal hosts. In Chapter 3, the genera *Microsporium*, *Trichophyton*, *Sporotrichosis* and *Pneumocystis* are described

Chapter 4 refers to the parasitic zoonoses caused by protozoa, helminths (e.g., trematodes, cestodes and nematodes); acanthocephalan; pentastomids and arthropods. Arthropods play an additional role as transmitter of viruses, bacteria, protozoa and helminths. Parasites are eukaryotes organisms with complex development cycles. Many zoonotic parasites involve one or several intermediate hosts in which further development and multiplication take place. Humans may be involved in these cycles as a final host or intermediate host.

Zoonoses. Infectious diseases transmissible from animals to humans is an update of information about different diseases occurring in humans and in animals and that are caused by viruses, bacteria, fungi and parasites. The book is based on the 4th German edition, published in 2013, and it is highly recommended for students and researchers interested in clinical microbiology.

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