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Guest Editorial

Zoonotic Diseases and the Species Barrier

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Many diseases are transmitted from different animals and other living organisms to humans, including worms, fungi, mammals and reptiles. These are mainly diseases that result from the attack of various microbes on the human body. However, many diseases in animals and plants are not transmitted to humans.

These diseases, such as the "avian flu", malaria, bilharzia, rabies, the neurological "mad-cow" disease, and recently the coronavirus (COVID-19), originate from animals. And humans are infected with them from these animals. Combating microbes shows that these almost uncurable diseases arise from the entry of the microbes into the human body. The complications caused, in many cases due to a failure of the immune system, are a source of concern. To this day, the Ahoshi race has managed to maintain its existence. But the microbial talent of rapid genetic changes and the creation of mutations. The complexities of the human immune system. They are a significant challenge to the laws and the developers of drugs, vaccines, and other drugs. Only the unification of forces and the transfer of knowledge between the people of Eden can overcome these attacks of the various microbes. But even these days, diseases such as the flu, malaria, and mad cow disease remain, with only partial solutions.

Pathogenic microorganisms, bacteria, viruses, fungi, and parasites generally infect only a limited number of species, often only one [1]. There are undoubtedly many anthropo-zoonose whose infectious agents can be transmitted to humans directly (brucellosis, rabies), or indirectly by vectors (diseases of Lyme, West Nile Virus). However, as a rule, infectious agents present in the animal world are not capable of causing infection transmissible to humans and a fortiori to give rise to human-to-human transmission. However, this assertion should be moderated. The great primates are carriers of viruses, and their kinship with the human species facilitates the passage. It probably requires a minimum of adaptation on the part of the pathogen to jump from one species to another. It is the case for HIV-1 and 2, filovirus such as Ebola virus, and monkey vaccinia. In addition, the recent identification in humans Hepa DNA virus and new Herpes viruses, obviously of simian origin, proves that the viral reservoir in primates is enormous and worrying and in fact, represents a research priority if we ultimately wish to anticipate the emergence of these viruses in *Homo sapiens* [2]. Beyond this particular situation, pathogens are constantly emerging in the human species, following contamination from a zoonotic pool not simian, transmitted directly or by vectors, in specific arthropods. He appears to be increasing in frequency of these emergence events. The growth sustained human population is undoubtedly one of the significant causes because the quest for new living spaces naturally leads to increased opportunities encountered by humans with wild animal species and insect vectors. Birds are also responsible for the transmission of viruses. It is the case of the virus West Nile, transmitted by arthropods but primarily maintained and amplified in several species of birds. Moreover, over the past century, several pandemics developed this way.

A transmissible spongiform encephalopathy (TSE) factor from one species usually transmits poorly to a new species, a phenomenon known as the species barrier. However, once in the new species, it naturally but not constantly adapts and more readily transmits within the new host (look on the COVID-19 development in China). No single test can accurately determine a prion strain's ability to transfer between species. Prion diseases or transmissible spongiform encephalopathies (TSEs) are a family of rare progressive neurodegenerative disorders that affect both humans and animals. For example, Creutzfeldt - Jakob disease (CJD), Chronic Wasting Disease (CWD).

The assessment of the species barrier for each fertile strain should consider as much information as can be gathered for that strain from monitoring and research. The interactions of the agent with a particular host can be measured by *in vivo* and *in vitro* methods and the species barrier assessed to use all the available tools fully. This paper will identify the essential considerations that need to appear when evaluating the species barrier [3].

Defining Distribution of Infectivity and ways of Transmission Possible transmission routes be different for host agent combinations; for example, BSE in cattle affects the CNS but shows little involvement in the peripheral tissues. The oral transmission route through infected meat is therefore considered the most likely manner in which humans acquire f variant Creutzfeldt-Jakob Disease (vCJD) [4]. However, when Bovine Spongiform Encephalopathy (BSE) was transmitted to sheep, both CNS and peripheral tissues harbored infectivity [5]. Transmission of BSE to humans in the form of vCJD has shown a very different distribution of infections than BSE in cattle [6-9]. This widespread distribution of infectivity in humans. It has led to the transmission of infectivity through blood. It was demonstrated experimentally [10-14] and in patients with vCJD [15,16]. The blood transfusion route appears to be a highly efficient route of prion transmission [17]. Chronic Wasting Disease (CWD) in deer seems to have extensive involvement of peripheral tissues [18-20]. Therefore, there are many routes by which Chronic Wasting Disease (CWD), can be transmitted both within and between species. Understanding the distribution of infectivity is an essential prerequisite for defining and testing possible transmission routes.

Corona virus disease 2019 (COVID-19), caused by SARS-CoV-2 (Severe Acute Respiratory Syndrome - Coronavirus-2) of the Coronaviridae family, appeared in Wuhan, Hubei Province, China as its epicenter in December 2019. This disease has been declared an international health emergency public by the World Health Organization on January 30, 2020, reached high-risk category status on February 29, and now has epidemic status (March 11, 2020). COVID-19 has spread to more than 195 countries/territories while killing nearly 19,600 humans out of cumulative confirmed cases accounting for more than 430,000 within a short period of just a few weeks. Most of the deaths were reported in Italy and China. Researchers around the world are making great efforts to tackle the spread of this virus and design effective vaccines and drugs/drugs. Few studies have shown the potential of human-animal interface and zoonotic links in the origin of SARS-CoV-2. Investigating the possible zoonosis and uncovering the factors responsible for its initial transmission from animals to humans will pave the way for stopping this disease transmission.

These are means for planning and implementing effective preventive pharmacies. Also, control strategies to prevent COVID-19. The present paper presents an overview of COVID-19 and the causative virus SARS-CoV-2, with special emphasis on the role of animals and their crossing of species barriers, experiences learned from SARS- and MERS-CoV, zoonotic links, and spillover events, transmission to children man and rapid spread, very briefly highlighting the prevention and control measures along with some of the latest research developments to deal with this epidemic virus/disease [21].

Current knowledge of the host range and circumstances surrounding reported cross-species transmission events of emerging coronavirus in humans and common domestic mammals. All of these viruses had similar host ranges. They were closely related (indicating rapid diversification and expansion) and their emergence was likely associated with high-host-density environments that facilitate multispecies interactions (e.g. shelters, farms, and markets) and the health or well-being of animals as definitive and/or intermediate hosts. More research is needed to identify mechanisms of interspecies transmission events that ultimately led to a surge of emerging coronaviruses in multiple species in a relatively short period of time in a world undergoing rapid environmental change [22].

More than thirty animals have tested positive for SARS-CoV-2, all infected by humans with COVID-19. Some animal experiments suggested the possibility of animal-to-animal transmission of virus that was detected in some cases of virus-infected animals. In the outbreak of the pandemic, Animal to human transmission was considered unlikely until investigations revealed the potential of mink to human communication of SARS-CoV-2 in the Netherlands.

Precautions are advised to prevent human-to-animal virus transmission and, in some areas, to avoid the spread of the animal-to-human pathogen. Further monitoring is required to assess the SARS-CoV-2 infection in animals as COVID-19 is a rapidly evolving condition worldwide. Cats and ferrets have a physiological resemblance, and genome sequencing studies propose the possibility of these species being used as animal models for investigating the SARS-CoV-2 infection. This might contribute in further studies and vaccine development against Covid-19 [23].

The COVID-19 pandemic has affected thousands of people worldwide and has been causing severe respiratory syndromes, which also has been a cause for the mortality of the people affected. This disease has been commonly referred to as coronavirus disease 2019 or COVID-19 [24]. Older people above 60 - 65 years and those having comorbidities are seriously affected and thus end up with multi-organ failure leading to death of the patient [25]. Spike protein binding is the main aspect that accelerates the entry of the virus particles into human cells, which is made possible by binding with the angiotensin-converting enzyme 2 (ACE2) protein in the host cell [26]. It increases the tendency of infection, with a mortality rate of up to 5.8% with an average of 3.4% and covers almost 210 countries worldwide [27,28]. Hence, it is of great concern that progress in the field of drug and vaccine development is growing at a dizzying speed. Pharmaceutical companies try to produce a strong vaccine by using an attenuated virus/or viral particle, viral RNA or using the targeting mechanism of a spike protein, which allows the virus to enter host cells [29]. An effective and rapid immune response against this virus is the endpoint considered in vaccine studies. Thus, to generate a high-level immune response, certain specific antigens are considered the ideal candidate for vaccine production, but this also requires a host. This is where animal models come into play so that tests can be performed easily without harming human life [30]. However, at present, animal models used to produce vaccines against acute respiratory syndrome coronavirus 2 (SARS-CoV-2) are still in testing stages for many vaccine candidates, and moreover the virus is supposed to cause a similar pattern of disease and pathogenesis, as in humans, for successful vaccine creation [31]. Therefore, it is important to summarize whether any of the currently used animal models prove to be an effective host reservoir [32].

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