Animals and Covid

Introduction

A number of animals worldwide have been infected with the virus that causes COVID-19, including pets like cats and dogs, farmed mink, and large cats, gorillas, and others in zoos, sanctuaries, and aquariums.

Reptiles and birds have not been affected by this virus.

Also Chickens and ducks do not seem to become infected or spread the infection based on results from studies.

Nature of spread

The risk of animals spreading the virus to people is low, but people with COVID-19 can spread the virus to animals during close contact.

Recent experimental research shows that many mammals, including cats, dogs, bank voles, ferrets, fruit bats, hamsters, mink, pigs, rabbits, racoon dogs, tree shrews, and white-tailed deer can be infected with the virus.

Cats, ferrets, fruit bats, hamsters, racoon dogs, and white-tailed deer can also spread the infection to other animals of the same species in laboratory settings.

A number of studies have investigated non-human primates as models for human infection. Rhesus macaques, cynomolgus macaques, baboons, grivets, and common marmosets can become infected with SARS-CoV-2 and become sick in a laboratory setting. There is some evidence suggesting that laboratory mice, which could not be infected with original strains of SARS-CoV-2, can be infected with new virus variants.

Role of CDC

Since the beginning of the pandemic, CDC has been leading efforts to improve our understanding of how SARS-CoV-2 affects animals and how the virus might spread between people and animals. CDC has also worked to improve coordination of federal, state, and other One Health partners.

- CDC leads the One Health Federal Interagency COVID-19 Coordination (OH-FICC) Group, which brings together public health, animal health, and environmental health representatives from more than 20 federal agencies to collaborate and exchange information on the One Health aspects of COVID-19. For example, the group researches and develops guidance on the connection between people and pets, wildlife, zoo animals, and livestock; animal diagnostics and testing; and environmental health issues relevant to COVID-19.
- CDC leads the State-Federal One Health Update Call to bring local, state, tribal, and territorial partners together with OH-FICC members.
- CDC, USDA, state public health and animal health officials, and academic partners are working in some states to conduct active surveillance (proactive testing) of SARS-CoV-2 in pets, including cats, dogs, and other small mammals, that had contact with a person with COVID-19.
- CDC deployed One Health teams to multiple states to support state and local departments of health and agriculture, federal partners, and others in conducting on-farm investigations into SARS-CoV-2 in people, mink, and other animals (domestic and wildlife). The teams collected samples from animals on the farms and from people working on the farms and in surrounding communities. These investigations are ongoing.

NEW CONCEPT OF A NEW VACCINE

Some of the prophylaxis strategies for SARS CoV2 are based on the development of antibodies targeting viral proteins.

IgY antibodies are a type of immunoglobulin present in birds, amphibians, and reptiles. They are usually obtained from egg yolk of hyper-immunized hens and represent a relatively inexpensive source of antibodies.

Specific IgY can be produced by immunizing chickens with the target antigen and then purifying from the egg yolk. Chicken IgY has been widely explored as a clinical anti-infective material for prophylaxis, preventive medicine, and therapy of infectious diseases.

Method and conclusions

E. coli BL21 carrying plasmid pET28a-S1 was induced with IPTG for the expression of SARS-CoV-2 S1 protein. The recombinant His-tagged S1 was purified and verified by SDS-PAGE, Western blot and biolayer interferometry (BLI) assay.

Then S1 protein emulsified with Freund's adjuvant was used to immunize layer chickens. Specific IgY against S1 (S1-IgY) produced from egg yolks of these chickens exhibited a high titer (1:25,600) and a strong binding affinity to S1 (K_D = 318 nmol L^{-1}).

The neutralizing ability of S1-IgY was quantified by a SARS-CoV-2 pseudotyped virus-based neutralization assay with an IC_{50} value of 0.99 mg ml^{-1}. In addition, S1-IgY exhibited a strong ability in blocking the binding of SARS-CoV-2 S1 to hACE2, and it could partially compete with hACE2 for the binding sites on S1 by BLI assays.

Administered non-systemically, IgY antibodies are safe and effective drugs. Moreover, passive immunization with avian antibodies could become an effective alternative therapy, as these can be obtained relatively simply, cost-efficiently, and produced on a large scale.

After immunization of chickens with our recombinant S1 protein, IgY neutralizing antibodies were generated against the SARS-CoV-2 spike protein S1 subunit; therefore, showing the potential use of IgY to block the entry of this virus.

IgY targeting S1 subunit of SARS-CoV-2 could be a promising candidate for pre- and post-exposure prophylaxis or treatment of COVID-19. Administration of IgY-based oral preparation, oral or nasal spray may have profound implications for blocking SARS-CoV-2.

Application done

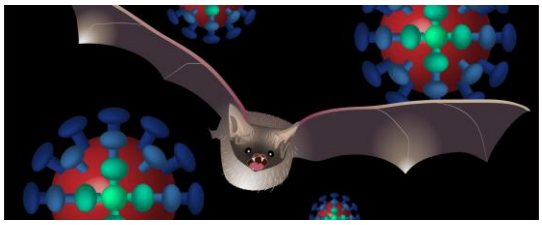
Plaque reduction and micro-neutralization assays showed the neutralization of MERS-COV in Vero cells by anti-S1 IgY antibodies and non-significantly reduced virus titres in the lungs of MERS-CoV-infected mice during early infection, with a non-significant decrease in weight loss.

However, a statistically significant (p = 0.0196) quantitative reduction in viral antigen expression and marked reduction in inflammation were observed in lung tissue. Collectively,

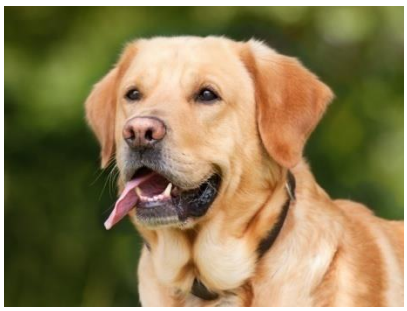
data suggest that the anti-MERS-CoV S1 IgY could serve as a potential candidate for the passive treatment of MERS-CoV infection.

Few interesting pictures

Donor animals (Few eg)

 Bats  Minks

Recpient animals (Few eg)

 Petdog  Cats

The world is not just made of humans. There is wildlife as well as pet lives. Also there are different types of animals.

Its time to think about interactions of humans and animals and may be where big Pharma companies are failing, our close pets and close door animals can give the vaccine proper as a solution to arrest Covid pandemic.

Summary

The most recent common ancestor (MRCA) of all coronaviruses is estimated to have existed as recently as 8000 BCE, although some models place the common ancestor as far back as 55 million years or more, implying long term co-evolution with bat and avian species, although known coronaviruses are circulating in animals that have not yet infected humans.

The International Committee on Taxonomy of Viruses (ICTV) announced "severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)" as the name of the new virus on 11 February 2020. This name was chosen because the virus is genetically related to the coronavirus responsible for the SARS outbreak of 2003. While related, the two viruses are different.

Coronaviruses are zoonotic, meaning they are transmitted between animals and people. Detailed investigations found that SARS-CoV was transmitted from civet cats to humans and MERS-CoV from dromedary camels to humans.

- The risk of animals spreading SARS-CoV-2, the virus that causes COVID-19, to people is low.
- The virus can spread from people to animals during close contact. This is important as people having pets at home may get vaccinated, unfortunately the chance of them still remaining transmitting the disease to humans remains same for their pets.
- *So far, the only known transmission of the COVID-19 virus from animals to humans was from farmed mink to workers on mink farms in Europe.*
- More studies are needed to understand if and how different animals could be affected by COVID-19.
- People with suspected or confirmed COVID-19 should avoid contact with animals, including pets, livestock, and wildlife.
- New concept on vaccine can evolve from animal products.
