Infectivity of SARS-CoV2 (COVID-19) to animals

One World One Health Research Forum











SARS-CoV2 belongs to beta coronavirus



M.A. Shereen et al./Journal of Advanced Research 24 (2020) 91-98

About SARS-CoV2

- The phylogenetic tree based on the full-length gene sequence of the new coronavirus (SARS-CoV2) is shown on the right.
 - Red is Pangolin-derived CoV
- Pink isolated SARS-CoV2 in China
- Green indicates bat-derived CoV with 96% similarity to SARS-CoV2.
- Viruses isolated from bats and pangolins and phylogenetic tree analysis show that they are closely related.
- ➤The origin of SARS-CoV2 is presumed to be from bats (Zhou, P. et al., 2020. Nature 579 270-273).



How the virus invades the animal host ?

- ACE2 (Angiotensin-converting enzyme 2) and TMPRSS2 (which cleaves viral S protein) on our cells are SARS-CoV2 host side receptors.
- ♦ACE2 is widely expressed in the body, including the heart, liver, testis, kidney and digestive tract.
- **◆TMPRSS2** is expressed in nasal mucosa and respiratory organs.
- ◆The SARS-CoV2 S protein binds to host cell ACE2 (RBD shown in green).
- After binding to the ACE2 receptor, it is cleaved by the enzymatic action of TMPRSS2, which activates the S protein and fuses it with the cell membrane.
- Coronavirus penetrates cells by host ACE2 and TMPRSS2.





Keep distance from SARS-CoV2sensitive animals

- Primates (chimpanzees, macaques, etc.)
- hamster
- Feline (cat, tiger, lion, etc.)
- Pangolin
- ferret
- Dog (does not multiply).
- the infection is unknown in livestock (it does not grow in pigs, horses and chickens).
- SARS-CoV2 can infect animals with receptors like humans, so stay away when you are unwell
- Domestic companion animals (cats, ferrets, hamsters) avoid contact with other susceptible animals and live a safe life against viral infections.
- In general, animals may have various zoonotic diseases, so close contact should be avoided.
- After touching the animal, wash your hands thoroughly with soap.

Predict host range by comparing spike protein recognition sites of mammalian ACE2 (14 position)

Species	Number matching human ACE2 amino acid	%
Human	14/14	100
Gorilla	14/14	100
Monkey (Macaque)	14/14	100
Hamster / cat	11/14	79
Pangolin	10/14	71
Dog / bat	9/14	64
Mouse	8/14	57

