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RESEARCH ARTICLE

Isolation of potent SARS-CoV-2 neutralizing antibodies and protection from disease in a small animal model

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CoViD-19, One Health, One Ocean, and Veterinarians

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Dear and Esteemed Editor,

As academic veterinarians (a pathologist and a clinician, respectively), we would like to take this opportunity to share with you and with the broad and highly qualified Readership of Science worldwide some thoughts on the dramatic and unprecedented SARS-CoV-2 pandemic. As you are well aware, the “official” number of SARS-CoV-2 infection cases worldwide have now exceeded 10 millions, with the “official” CoVID-19-induced/related/associated deaths having overtaken 500,000 cases globally. We know these numbers are “defective”, where less where more, in “depicting” the real epidemiological situation concerning the SARS-CoV-2 pandemic, with an esteemed 3-5% of the world population having been hitherto exposed to the virus, the seventh human coronavirus and the third highly pathogenic human beta-coronavirus recognized thus far, following the SARS-CoV and the MERS-CoV agents, which were first identified in 2003 and 2012, respectively.

Similarly to SARS-CoV and MERS-CoV, SARS-CoV-2 most likely originated through a natural selection process involving an “ancestral” and closely (96%) related bat (*Rinolophus affinis*) coronavirus, that was probably transferred to an “intermediate” (and still unidentified) species, from which the virus made the “definitive” spillover to mankind, thereby acquiring the best genetic “make-up” for perfectly interacting with ACE-2 - its main receptor on human host cells (1) -, thereby giving rise to the dramatic CoVID-19 pandemic the entire world has been and is still experiencing.


This clearly underscores the key role of the inter-sectorial collaboration between human and veterinary medicine, with special emphasis on the "One Health" (and “One Ocean”) concept(s), a strategic "crossroads" in which human, animal, and environmental health meet. Veterinarians who have known coronaviruses for over 100 years (as exemplified by the gamma-coronavirus responsible for “avian infectious bronchitis”), “were born from infectious diseases”, as significantly highlighted by the first Veterinary Medical Schools to be established in Europe, namely those of Lyon (France, 1761), Turin (1769), and Bologna (1784), the latter two in Italy. The main “historical reason” justifying the birth of these first Veterinary Faculties during has been identified in “Rinderpest”, a highly contagious morbilliviral disease which during the 18th century dramatically affected cattle herds in the “Old Continent” and which, thanks to the large-scale vaccination programmes implemented in Africa and Asia, was successfully eradicated in 2011

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 ing cats, ferrets, hamsters, lions, tigers, and minks, with such findings being counterparted by the apparent lack of susceptibility of avian species like chickens and ducks (2). particularly the feline one, and some wild species such as ferret, hamster, mink, tiger and lion, are sensitive to the virus. Although there is no scientific evidence, at the moment, of a viral “spillback” to humans from any of the aforementioned species (an exception to which might be represented by minks in the Netherlands), the role played by Veterinarians in monitoring and tracing such phenomena and the eco-epidemiological dynamics underlying them is pivotal, including that played by Veterinary Pathologists in investigating both the aforementioned and other experimentally SARS-CoV-2-challenged species as “comparative pathology models” for the study of human infection, similarly to what previously done with the SARS and the MERS coronaviruses (3).

2) Animals as key “environmental health biomonitors”: As brilliantly highlighted by Pope Francesco, “How can we imagine to stay healthy in a sick world?”, where over 9 billions people are supposed to live by the year 2050, and where - still in 2050 - more plastics than fish could be present in oceans and seas all over the planet (4), with the mean global temperatures having continuously increased during the past 6 years?

In this respect, the crucial relevance of animals - with special emphasis on “top predators” - as strategic “biomonitors” for detecting terrestrial, aquatic, and air pollution by a wide range of environmental contaminants should be adequately underscored (5).

3) Public health field: This is an investigation area of paramount importance for the surveillance and control of zoonotic infectious diseases, both viral (like CoViD-19) and non-viral, with Veterinarians - especially infectious disease Specialists and Pathologists - having an excellent knowledge about the management of viral and non-viral epidemics and pandemics like Rinderpest, Foot-and-Mouth Disease, Hog Cholera, African Swine Fever, and Bovine Spongiform Encephalopathy (BSE), just to cite a few. Alongside animal health surveillance and human health protection from zoonotic infections -accounting for over 70% of “emerging infectious diseases” -, an “historical” activity routinely carried out by Veterinarians concerns the “big and continuously size-increasing arena” of the safety and security of foods for human and animal consumption, including the assessment, analysis, and minimization of foodborne zoonotic and chemical risks.

As Veterinarians, we believe that more time and energies should be spent by us in making general public aware about the key role played by our Profession for public, animal, and environmental health protection, provided that many people in our Country (and in many others, we think) know “just very little” of what Veterinarians do “in their life”.

In conclusion, SARS, MERS, zoonotic avian influenza, and the 2009 pandemic AH1N1 influenza viruses, along with “mad cow disease” (over 30 years ago) and, nowadays, CoViD-19 have taught and are teaching us “lessons” we should never forget, among which the “intersectorial collaboration” and the “multidisciplinary work” (within the “One Health” and “One Ocean”

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Competing Interests: None declared.

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