International Journal of Global Science Research
Vol. 9, Issue. 2, October 2022, pp. 1841-1846
Available Online at www.ijgsr.com
© Copyright 2014 | ijgsr.com | All Rights Reserved
ISSN: 2348-8344 (Online)
DOI: 10.26540/ijgsr.v9.i2.2022.212

Review Article

Coronavirus disease 19 review

Hassina Guetarni
Laboratory of Natural Substances Valorization, University Bounaama Djilali of Khemis Miliana, Faculty of Nature, Life Sciences and Earth Sciences, Biology Department, 44225, Ain Defla, Algeria.
Corresponding author E-mail: kmhg2009@yahoo.fr

Received: 30/08/2022
Revised: 06/09/2022
Accepted: 18/09/2022

Abstract: Covid 19 is a virus that caused a wordwild pandemic, first detected in China at the end of December 2019. Most people witch infected by the virus develop a mild to moderate symptoms of the disease. In the present review, a pathophysiology of the disease linked to infection with the Covid 19 (SARS-CoV-2), has been detailed.

Keywords: Covid 19, Physiopathologie, PCR, vaccination.

Introduction:

On 31 of December 2019, the WHO China country office was informed of cases of pneumonia unknown etiology detected in Wuhan City, Hubei Province of China (WHO, 2020).

A new coronavirus, responsible of this respiratory disease, was identified on January 7, 2020 and was named "SARS-CoV2". This epidemic has continued to grow, with a number of people affected in steadily increasing, first in China, then spread to other countries, most cases being associated with travel from China (MSPRHA, 2020).

Some strains can be more virulent, such as severe acute respiratory s syndrome (SARS) Middle and East respiratory syndrome coronavirus *(*MERS-CoV*)*. The name SARS-Cov2 (for Severe Acute Respiratoy Syndrome Coronavirus 2) is used to refer to this new coronavirus, while the term COVID-19 (for Coronavirus Disease 2019) refers to infection caused by this virus. On January 30 2020, WHO Director General declared that the outbreak constitutes a Public Health Emergency of International Concern (PHEIC). The 11th of March it was declaring a global pandemic (INSPQ, 2020). COVID19 became a pandemic and spread to more than 212 countries and territories, and community transmission took place in many countries including the United States, Germany, France, Spain, Japan, Singapore, South Korea, Iran, and Italy. Thus far, millions of cases and hundreds of thousands of deaths have been recorded, with rapidly increasing numbers globally (Zhu *et al.*, 2020).

The Coronaviruses are a family grouping together many viruses affecting many animals(dogs, cats, pigs, cattle, mice, rats, bats, birds ...), and for some, the man. The diseases they cause are varied but

© Copyright 2014 | ijgsr.com | All Rights Reserved
ISSN: 2348-8344 (Online)
DOI: 10.26540/ijgsr.v9.i2.2022.212

principally affect the systems respiratory and digestive. From a public health perspective, the coronavirus responsible SARS (Severe Acute Respiratory Syndrome) affected nearly 8000 people in 2002/2003. In terms of animal health, many coronaviruses are known and infect in particular dogs, cats, pigs, ruminants, birds, as well as wildlife. These viruses are usually very specific to an animal species (ANSES, 2013).

The virus is thought to have a zoonotic origin and bats have been held responsible. It is unclear which animal is the intermediate species between bats and humans in the transmission of 2019-nCoV(Sheikh Salahuddin, 2020).

Coronaviruses have the ability to evolve through sudden changes in their genetic material allowing their to infect novel target organs or adapt to novel host species. So coronavirus SARS responsible for epidemic in 2003, resulted an adaptation of coronavirus present initially in some bats, to a small carnivore initially first time, then to human species. The new coronavirus (named MERSCoV) which is probably present since the second trimester 2012 in the Arabian Peninsula also probably has an origin animal, although yet to be known. The understanding of mechanisms underlying virus to be spread to other animals or to humans was an important mobilization topic for National Agency for Food, Environmental and Occupational Health Safety. Several laboratories working for various pathogens, which coronavirus (ANSES, 2013).

In humans, four species are known and are the cause of mild human upper respiratory infections (common cold). As such, coronaviruses are considered to have a broad host spectrum and a potential reservoir extended: birds, fish, mammals, man (MSPRHA, 2020).

Coronavirus:

Human coronaviruses (HCoV) are single strand RNA viruses. To date, there are four so-called « classical » or « novel » HCoVs, characterized by a winter circulation. These coronaviruses are responsible for mild respiratory infection in general population(Kin &Vabret, 2016).

The Coronaviridae family includes two subfamilies: Letovirinae and Orthocoronavirinae. The Orthocoronavirinae family consists of the α-coronavirus, β-coronavirus, γ-coronavirus , and δ- coronavirus genera . Many β-coronavirus are human pathogens and cause severe respiratory diseases: SARS-CoV, the Middle Eastern Respiratory Syndrome Coronavirus (MERS-CoV), and currently SARS-CoV2(Zhu *et al.*, 2020).

Spherical virus, enveloped 60-220 nm, includes from the outside inwards: *Spike* (S) protein (gives the coronavirus its crown appearance), envelope, membrane and nucleocapsid, icosahedral symmetry. It contains a viral genome: single-strand ribonucleic acid (RNA) (Kin & Vabret 2017), unsegmented and positive (29,881 base pairs**)** (Amir *et al.*, 2020).

The SARS-CoV2 genome measured approximately 30 kb , and it encoded at least 29 proteins: 16 non-structural proteins (NSP), 4 structural proteins, and 9 accessory proteins. Upon cell, the genomic RNA of SARS-CoV2 encoded two polyproteins, pp1a and pp1ab, from two open reading frames (ORFs), ORF1a and ORF1b, respectively. Subsequently, pp1ab is cleaved into 16 NSPs by two viral proteases NSP3 and NSP5: papain-like protease domain and a 3C-like protease domain, respectively (Fig. 1**)** (Zhu ***et al.,*** 2020).

However, coronavirus is sensitive to usual virucidal disinfectants such as sodium hypochlorite 0.5%, peracetic acid / hydrogen peroxide, ethanol or isopropanol 70% and glutaraldehyde (SFM, 2020).

International Journal of Global Science Research
Vol. 9, Issue. 2, October 2022, pp. 1841-1846
Available Online at www.ijgsr.com
© Copyright 2014 | ijgsr.com | All Rights Reserved
ISSN: 2348-8344 (Online)
DOI: 10.26540/ijgsr.v9.i2.2022.212

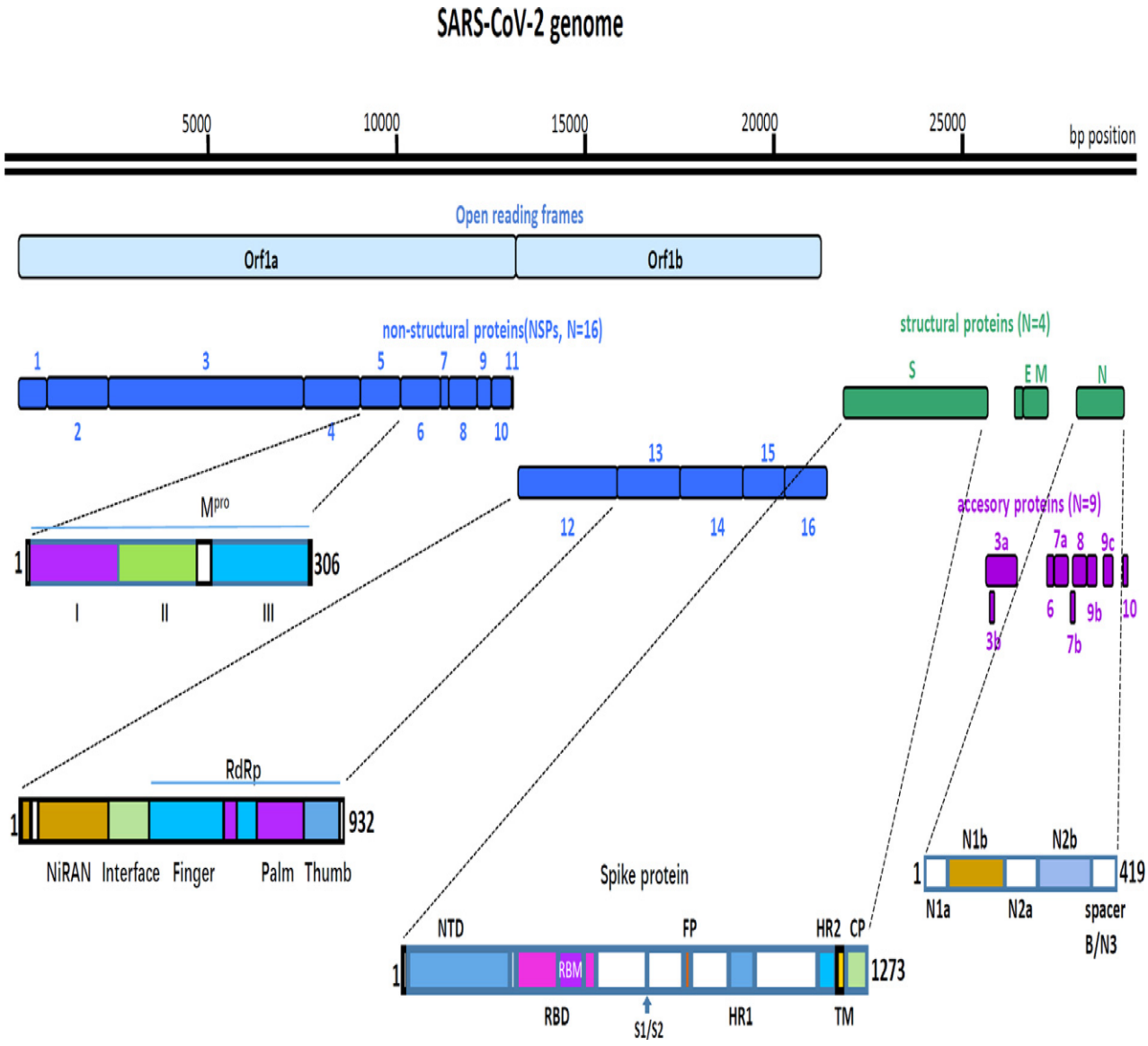

Figure 1. Schematic presentation of SARS-CoV2 genome organization, and the primary structures proteins (Zhu *et al.*, 2020).

Physiopathology

The ACE2 enzyme is the receiver allowing the virus to enter the cells it infected, is a molecule present on their surface (eg. heart, the vessels, intestines, lungs). Nevertheless, the entry of SARS-CoV-2 in target cells is also done through the intervention of a cell surface protein called TMPRSS2 (Transmembrane Serine Protease 2) which cooperates with ACE2 to promote the entry of virus in the cell. His presence in these various organs seems to explain the variety of clinical pictures and complications related to COVID-19. Its physiological role is to degrade angiotensin II, in order to limit its adverse effects (vasoconstriction, inflammation, thrombosis) related to AT1 receptor binding. The entry of SARS-CoV2 into the cell regulates the decreases ACE2 receptors, which then lose their ability to degrade angiotensin II. It is this loss of

International Journal of Global Science Research
Vol. 9, Issue. 2, October 2022, pp. 1841-1846
Available Online at www.ijgsr.com
© Copyright 2014 | ijgsr.com | All Rights Reserved
ISSN: 2348-8344 (Online)
DOI: 10.26540/ijgsr.v9.i2.2022.212

expression and activity of ACE2, which could be the cause of inflammation important pulmonary and microthrombotic phenomena observed (Fig.2) **(**INESSS, 2020; Di Gennaro *et al*., 2020; De Greef *et al.*, 2020).

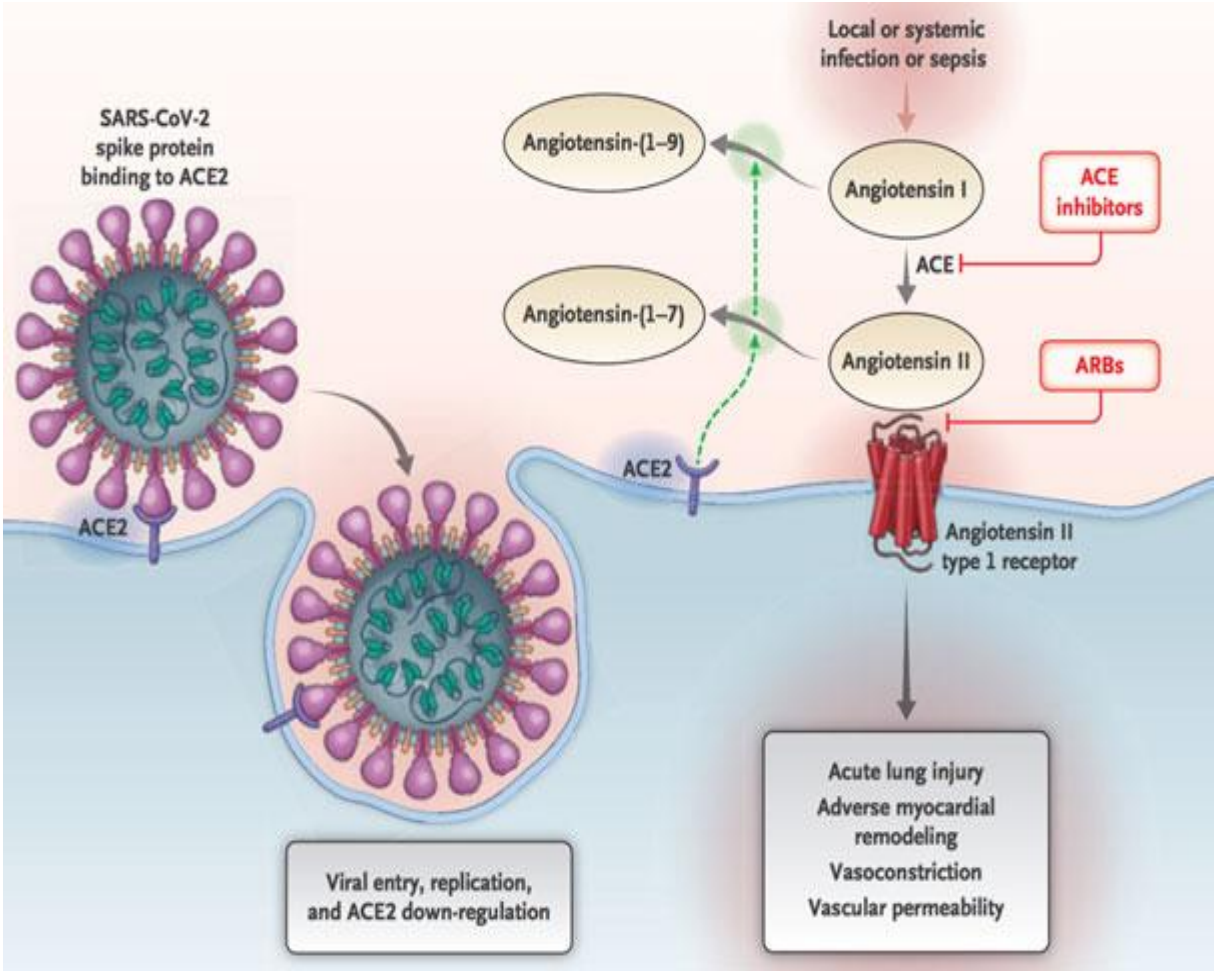

Figure 2: Interaction between SARS-Cov2 and the Renin-Angiotensin-Aldosterone System (RAAS) (Letonturier, 2020).

SARS-CoV2 detection and diagnosis of COVID 19

There are different procedures and techniques for detecting viral infection depending on the different stages of the disease. In the acute phase, the presence of the virus can be detected by amplifying its genetic material (molecular diagnosis) or by detecting viral proteins (antigenic diagnosis). The diagnostic of SARS-CoV2 is usually confirmed by Reverse Transcriptase Polymerase Chain Reaction(RT-PCR) from nasopharyngeal swabs. However, during the development of immunity, a few days after infection, the viral load may be significantly reduced and the diagnosis could be specified by a serological test (detection of antibodies directed against SARS-CoV-2) (INESSS, 2020).

This laboratory technique RT-PCR (Reverse-Transcriptase Polymerase Chain Reaction) makes it possible multiply a fragment virus's genome to make it easily detectable. When of a test, a positive and negative control are carried out

ISSN: 2348-8344 (Online)
DOI: 10.26540/ijgsr.v9.i2.2022.212
© Copyright 2014 | ijgsr.com | All Rights Reserved

simultaneously to ensure that the test has worked and that there is no technical fault as well as to check that there is no contamination of the test (eg by the handler) (Mouton, 2020).

As soon as the pathogen was identified, Chinese researchers shared the viral genome in free access. From two agreements are offered: real-time PCR(real time Polymerase Chain Reaction) and new sequencing generation. Loop-mediated isothermal Amplification (LAMP), developed by Notomi *et al.* in 2000, is a fast, sensitive and efficient visual method amplification of nucleic acids. Lately this technique has been widely used for isolation of many pathogens such as influenza viruses, Middle East Respiratory Syndrome CoV, West Nile virus, Ebola virus disease, Zika virus, yellow fever virus and a variety of other pathogens. After, Yan et al. in 2020 have developed a reverse transcriptase Lamp test (RT-Lamp) to detect SARS-CoV2 in people with Covid19 (Amir *et al*., 2020).

Prophylactic vaccine against SARS-CoV2

A lot of research teams are working on developing prophylactic vaccine against SARS-CoV2, able to induce a immune response cellular and/or humoral specific and neutralizing . The primary target antigenic today is S1 subunit of the Spike protein, like a vaccines developed for SARS-CoV1 and MERS-CoV, because its membrane exposure facilitates its recognition by the immune system. In addition, target this site would prevent entry of viruses in human cells. Though, other sites of Spike protein or non-structural proteins could be good candidates. Once the antigenic target defined, more vaccination strategies can be reviewed: vaccination from RNA, DNA, recombinant protein, or viral vector. The duration of protection offered by antibodies is different, and the levels of antibody anti-SARS-CoV1 were only detected during two years following infection in 176 patients. The induction of lymphocytic T memory response could also help to prevent severe forms of infection such as SARS-CoV-1. Certain researchers highlight at last the immunity cross induced by vaccines against the subunit binding to receptor of the Spike protein of SARS-CoV1 and can target SARS-CoV2 (Bonny *et al.*, 2020).

Conflict of interest

No conflict.

Conclusion:

In the end of December 2019, the world saw the emergence of a virus from the *Coronaviridae* family, called Covid 19. The virus has caused a pandemic around the word whose symptoms of disease vary from person to person. Prevention of contamination via the respiratory tract and vaccination remain the best solution to avoid any damage from Covid 19.

References:

WHO (2020) Novel Coronavirus (2019 - nCoV) SITUATION REPORT-1. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200121-sitrep-1-2019-ncov.pdf?sfvrsn=20a99c10_4.

MSPRHA (Ministère de la santé, de la population et de la réforme hospitalière, Algérie) (2020) Plan de préparation et de riposte à la menace de l'infection coronavirus covid -19. 114pp.

INSPQ (2020) Covid-19, caractéristiques épidémiologiques et cliniques. Québec. 21pp.

Zhu N., Zhang D., Wang W., Li X., Yang B., Song J., Zhao X., Huang B., Shi W., Lu R., Niu P., Zhan F., Ma X.,Wang D., Xu W., Wu G., Gao G.F., Phil D. and Tan W. (2020). A Novel Coronavirus From Patients With Pneumonia in China, 2019. N. Engl. J. Med., 382, 727–733.

ANSES (2013) Les coronavirus: Maladie animale zoonotique à transmission

© Copyright 2014 | ijgsr.com | All Rights Reserved
ISSN: 2348-8344 (Online)
DOI: 10.26540/ijgsr.v9.i2.2022.212

essentiellement non alimentaire. Fiche « maladies animales ». 2pp.

Sheikh Salahuddin A. (2020) The Coronavirus Disease 2019 (COVID-19): A Review. Journal of Advances in Medicine and Medical Research, 32(4), 1-9.

ANSES (2013) AVIS de l'Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail relatif à l' « Évaluation de la possibilité du caractère zoonotique du nouveau coronavirus MERS-CoV (NCoV) ». Saisine n° « 2013-SA-0079 ». 23pp.

Kin N. and Vabret A. (2017) Les infections à coronavirus humains. Revue francophone des laboratoires 487, 25-33.

Amir I. J., Lebar Z., Yahiaoui G. and Mahmoud M. (2020) Covid-19: virologie, épidémiologie et diagnostic biologique. Formation, Synthèse : OptionBio n° 619-620, 15-20.

SFM (2020) Fiche de gestion des prélèvements biologiques d'un patient suspect ou confirmé de la COVID-19 Version 6. Paris. 8pp.

INESSS (2020) CODIV-19 et détection moléculaire du SARS-CoV-2 chez les individus asymptomatiques. Québec. 78pp.

Di Gennaro F., Pizzol D., Marotta C., Antunes M., Racalbuto V. and Veronese N. (2020) Coronavirus Diseases (COVID-19) Current Status and Future Perspectives: A Narrative Review. Int. J. Environ. Res. Public Health,17, 2690 pp.

De Greef J., Pothen L., Yildiz H., Poncin W., Reychler G. and Brilot S. (2020) COVID-19 : infection par le virus SARS-CoV-2. Louvain Med 139 (05-06), 290-301.

Letonturier D. (2020) Bloqueurs du système rénine-angiotensine-aldostérone et Covid-19 : stop aux appréhensions médicale et médiatique. https://www.jle.com/fr/covid19-bloqueurs-du-systeme-renine-angiotensine-aldosterone

INESSS (2020) Covid-19 et Chloroquine/hydroxychloroquine. Québec. 88pp.

Mouton C. (2020) Diagnostic du Covid-19. Project : https://www.researchgate.net/publication/340885099_Diagnostic_du_Covid-19

Bonny V., Maillard A., Mousseaux C., Plaçais L. and Richier Q. (2020) COVID-19 : physiopathologie d'une maladie à plusieurs visages. La Revue de médecine interne 41, 375–389.