

SARS-COV-2 does Not Kill Us, the Response of Our Immune System does

Pedro Rocha-Cabrera¹, Elizabeth Córdoba-Lanús^{1,3}, José E Piñero^{1,2,3} and Jacob Lorenzo-Morales^{1,2,3*}

¹*Instituto Universitario De Enfermedades Tropicales y Salud Pública de Canarias, Universidad de La Laguna, La Laguna, Tenerife, Islas Canarias, Spain*

²*Departamento de Obstetricia, Ginecología, Pediatría, Medicina Preventiva y Salud Pública, Toxicología, Medicina Legal y Forense y Parasitología, Universidad De La Laguna, La Laguna, Tenerife, Islas Canarias, Spain*

³*Red de Investigación Cooperativa en Enfermedades Tropicales (RICET), Spain*

***Corresponding Author:** Jacob Lorenzo-Morales, Instituto Universitario De Enfermedades Tropicales y Salud Pública de Canarias, Universidad de La Laguna, La Laguna, Tenerife, Islas Canarias, Spain.

Received: July 15, 2020; **Published:** August 31, 2020

Abstract

Bats are important reservoirs of more than 60 types of viruses including SARS. Moreover, viral infections in bats are often mild due to a mutation of the STING protein (Stimulator of Interferon Genes). In the case of humans, STING leads to an uncontrollable storm of interferons and other inflammation-inducer molecules. Hence, in this work we propose that SARS-Cov-2 infections in humans are activating this pathway and therefore, application of immunomodulators during treatment are a key to solve complicated clinical cases. In conclusion, we must not only fight the viral infection but also the immune response triggered by it especially in cases of lung involvement, while we develop a vaccine which will be essential to stop this pandemic.

Keywords: SARS-COV-2; Bats; STING

Introduction

Bats are mammals with a key role in ecosystems ecology due to actions such as insect control, polinization, etc. Moreover, these actions provide food for humans and other animals species but bats are also threat due to their role as an important reservoir of around 66 viruses [1]. Furthermore, bats were established as the reservoir of Severe Acute Respiratory Syndrome (SARS) coronavirus and there have been a total of at least 30 bat coronaviruses reported in the last 15 years after the SARS epidemic in 2003. In addition, SARS-CoV2 also originated in bats and adapted to infect humans.

The contact between human and bats is known, tourist attractions in the caves for example, could risk visitors to get bitten by bats resulting in virus transmission. Moreover, Asian exotic food habits and traditional medicine including bat meat or bat soup, might be another chance of interaction with the human being. Furthermore, the extreme longevity of bats also allows to maintain and transmit these viruses to other vertebrates.

Discussion

The question is why bats are the main reservoir of all these viruses. To address it, it is important to mention that the STING protein of bats helps diminishing these mammal's immune response to viral infection [2]. Furthermore, The STING protein (Stimulator of Interferon Genes), detects pieces of DNA which are uncommon in the cellular cytoplasm. This free DNA is present during infections by RNA viruses which then activates a production of interferons as a response against the infection. Interestingly, bats present a mutation in the gene encoding STING which leads to a significantly milder interferon mediated response allowing coexistence of viruses in the bodies of these animals and a chronic inflammation process. In contrast, in humans, free DNA triggers an uncontrollable storm of interferons and other inflammation-inducer molecules [3].

Chloroquine and hydroxychloroquine could be used against COVID-19 because of their recently reported antiviral activity [4]. Furthermore, these molecules are excellent immunomodulators. In reference to the pathophysiology of the infection, we propose that other immunosuppressives and biological drugs could work as effective therapeutics against the infection. In children, COVID-19 practically presents no morbidity and mortality because children were not previously exposed to the viral antigen. Therefore, their immune system has not been given enough time to develop antibodies that are common to other coronaviruses existing in previous years and causing banal diseases like common cold.

The immune system response mediating the activation of a large amount of pro-inflammatory cytokines and chemokines induced by SARS-Cov2 infection causes an uncontrolled inflammatory reaction [5] in the pulmonary alveolus causing an abnormal air flow obstruction and therefore the cause reported fatalities in affected patients.

Therefore, it could be essential to have a multitude of drugs that could help us in treatment such as immunosuppressives like interferon, anti-TNF biological drugs such as adalimumab, infliximab, certolizumab, golimumab, among others, and interleukin inhibitors such as tocilizumab. These drugs could be a treatment of the dramatic immune response storm when lung injury is detected in COVID19 cases. Furthermore, antiviral drugs like remdesivir, an adenosine analogue that targets the RNA- dependent RNA polymerase and block viral RNA synthesis, or others like lopinavir, ritonavir, darunavir could also help us slow down the progression of the disease and even present a synergic action. Also, macrolides like azithromycin which has been reported as another weapon because of their immune-modulatory and anti-inflammatory effects in patients with MERS could be effective against SARS-CoV-2 in with combination hydroxychloroquine could be a good option in the early stages of the disease.

Conclusion

In conclusion, we must not only fight the viral infection but also the immune response triggered by it especially in cases of lung involvement, while we develop a vaccine which will be essential to stop this pandemic.

Authors Contributions

All authors performed and discussed reviews of current data. All author participated in writing the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

Funding

This research was funded by RICET [RD16/0027/0001 project, from Programa Redes Temáticas de Investigación Cooperativa, FIS (Ministerio Español de Salud, Madrid, Spain and FEDER). E.C-L. was funded by the Programa Agustín de Bethancourt, Cabildo de Tenerife, Spain. Additional funds were provided by Vicerrectorado de Investigación and the University of La Laguna chancellor's office as well as the Cabildo de Tenerife (Canary Islands, Spain).

Bibliography

1. Wood PCY and Lau SKP. "Viruses and Bats". *Viruses* 11 (2019): 884.
2. Zhang G., *et al.* "Comparative analysis of bat genomes provides insight into the evolution of flight and immunity". *Science* 339 (2013): 456-460.
3. Li X., *et al.* "Molecular immune pathogenesis and diagnosis of COVID-19". *Journal of Pharmaceutical Analysis* (2020).
4. Colson P., *et al.* "Chloroquine and hydroxychloroquine as available weapons to fight COVID-19". *The International Journal of Antimicrobial Agents* 5 (2020): 41.
5. Cao B., *et al.* "A Trial of Lopinavir–Ritonavir in Adults Hospitalized with Severe Covid-19". *The New England Journal of Medicine* (2020).

Volume 11 Issue 9 September 2020

All rights reserved by Jacob Lorenzo-Morales., *et al.*