## LETTER TO EDITOR / CARTA AL EDITOR

# Scientifically unproven treatments for COVID-19

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1295

Detected for the first time in late December 2019, a novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is the causative agent of an international outbreak of coronavirus disease 2019 (COVID-19). In late August 2020, approx. 24 000 000 cases, including 815 038 deaths, have been confirmed worldwide[1]. The WHO declared the outbreak of COVID-19 as a Public Health Emergency of International Concern, and it has been proposed that its spread may be interrupted by early detection, isolation, the implementation of a robust system to trace contacts, and a prompt treatment[2]. Nevertheless, there has not yet been any vaccine or effective treatment that has received approval[3]. Despite this, the FDA has recently issued an emergency use authorization for the investigational antiviral drug Remdesivir to treat COVID-19 in patients with severe disease[4]. Although there is still limited information regarding the safety and efficacy of this novel prodrug, it has shown potent *in vitro* antiviral activity against SARS-CoV-2 isolates, and therapeutic efficacy in animal models[5].

Furthermore, patients treated with this investigational drug, in clinical trials, have shown a significant shortening in recovery time in comparison with control subjects[6]. Besides Remdesivir, other antiviral agents, including nucleoside analogs (e.g., ribavirin and favipiravir), protease inhibitors (e.g., Lopinavir/Ritonavir), endosomal acidification inhibitors (e.g., chloroquine/hydroxychloroquine), among others, have also been investigated as drug candidates for the treatment of COVID-19. However, detrimental side effects and variable efficiency have been associated with its application on several patients[6]. Likewise, it has been reported that ivermectin, an anti-parasitic agent, inhibits the replication of SARS-CoV-2 *in vitro*, but clinical trials are still underway to test possible therapies[7]. Additionally, the potential interferon 1 (IFN1) treatment has been tested against SARS-CoV-2 both *in vitro* and *in vivo*, and combination or not with some of the above-mentioned antiviral agents, and it has been suggested that it may account for a safe and efficient treatment against COVID-19 in the early stages of infection[8].

The lack of standardized treatments has led to the emergence of unproven health advice, which doesn't rely on a scientific basis, for fictitiously treating or preventing COVID-19. In this context, the utilization of these fake therapies might be considered useless, but the consequences on human health can be innocuous to relatively harmless, or even absolutely dangerous. For instance, rumors indicating that garlic can be used as a home remedy for preventing COVID-19 have been widely spread. Even though garlic is considered a healthy food ingredient, there is no evidence suggesting that it can cure or prevent SARS-CoV-2 infection[9]. Additionally, the intake of copious amounts of garlic can result in throat inflammation and burns[10]. Other home recipes include drinking or gargling herbal tea and warm purified water, eucalyptus inhalant, essential oils, alcoholic beverages, and tinctures[11–13].

Remarkably, non-evidence-based information also proposes drinking disinfectant substances, such as colloidal silver and chlorine dioxide, not only as a home remedy but also as commercial products specifically "targeted" against SARS-CoV-2 infection[14]. It has been demonstrated that surface disinfection, and even wastewater treatment, using chlorine dioxide ($ClO_2$) is effective against coronaviruses, when appropriate (over 2.2 mg/L) concentrations are applied[15,16]. However, to the best of the current knowledge, there is no research describing the safety and efficiency of these products for treating any pathology. Furthermore, regulatory institutions, like the FDA,



**Figure 1.** The consumption of non-tested or fraudulent medicines may lead to adverse events, including serious and life-threatening harm.

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have warned about the risks related to the intake these for-mulations, since they have received several reports of people suffering severe adverse effects (i.e., nausea, severe vomiting and diarrhea, acute liver failure, life-threatening low blood pressure caused by dehydration) after drinking chlorine dioxide products[17].

## Conclusions

The promotion of fraudulent products, claiming to prevent or cure COVID-19, is not ethical, and its consumption may mis-lead a correct diagnostic, interfere with the appropriate medical treatment, and harm the patient's health. Therefore, the efforts of governmental regulatory agencies and legislation, all over the world, should be focused on preventing and sanctioning the occurrence of fraudulent products claiming to prevent or cure COVID-19. At the same time, scientists keep investigating multiple candidate therapies or vaccines against the novel co-ronavirus, authorities, health care professionals, and society, in general, reinforce biosecurity and social isolation strategies as preventive actions to avoid exposure to the virus. Additionally, scientific publications, mainly reviews, regarding the current state of research involving potential therapies against SARS-CoV-2, should be promoted and widely diffused, through appro-priate mechanisms, to inform the majority of society.

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