



# Taking Paracetamol and Vitamin C or Ibuprofen and Vitamin C Every Day Could Be a Simple Way to Prevent COVID-19 Infection

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**How to cite this paper:** Li, G.-D. (2022) Taking Paracetamol and Vitamin C or Ibuprofen and Vitamin C Every Day Could Be a Simple Way to Prevent COVID-19 Infection. *Open Access Library Journal*, 9: e9544.

<https://doi.org/10.4236/oalib.1109544>

**Received:** November 8, 2022

**Accepted:** December 20, 2022

**Published:** December 23, 2022

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## Abstract

Based on a novel antiviral theory, we propose that taking paracetamol and vitamin C or ibuprofen and vitamin C every day could be a very simple way to prevent COVID-19 infection. To prove the effectiveness of these drug combinations, urgent clinical trials should be carried out. Mass drug administration plays a very important role in the containment of COVID-19 pandemic. Prophylactic drugs might not provide 100% protection, but can reduce coronavirus deaths and severe cases, which might facilitate success of natural herd immunity. This natural herd immunity could be named as “drug-escort natural herd immunity”.

## Subject Areas

Drugs & Devices

## Keywords

Molecular Pharmacology, COVID-19, Prophylactic Drug, Paracetamol, Vitamin C, Berberine, Turmeric

## 1. Introduction

COVID-19 is an infectious disease caused by coronavirus (SARS-CoV-2). Since COVID-19 pandemic began, people have been always told that paracetamol and ibuprofen are not antiviral drugs, they can only be used to treat the symptoms of COVID-19. Mass drug administration is one of important containment measures for COVID-19 pandemic, but has not been adopted in almost 3 years of fighting COVID-19 because no antiviral drugs could be used as prophylactic drugs. Contrary to the views of many doctors and scientists, we think that taking

paracetamol and vitamin C or ibuprofen and vitamin C every day could be a very simple way to prevent COVID-19 infection. This idea is based on a novel antiviral theory proposed recently by us [1]. The key points of this theory are described as follows:

Viral infection is cell-type specific and the cells infected by virus is called viral target cells, for example, epithelial cells of respiratory system are the target cells of SARS-CoV-2. The reason why a virus can infect its target cells is because the target cell's gene expression pattern is suitable for the viral infection. Gene expression pattern in a cell type is determined by 3-dimensional (3D) genome architecture and genotoxic agents (including chemical, physical and biological agents) are the agents that can be used to directly or indirectly alter 3D genome architecture. The core value of our antiviral theory is to enable viral targets cells to temporarily become "non-viral target cells" through alterations of gene expression patterns in host cells.

We believe that some old drugs with genotoxic side effects could be used to temporarily alter 3D genome architecture in viral target cells so that gene expression pattern in the viral target cells could be temporarily altered, which could make gene expression pattern in the target cells become unsuitable for viral infection and thus might reduce the target cell's susceptibility to viral infection, for example, virus might not be able to enter the target cells, or might be difficult to form virion even after entering these cells. This strategy could be used to prevent all viral infections including infections with variant viruses. Currently, nearly all reported drugs that show preventive and curative effects on COVID-19 either have genotoxic side effects, or regulate many genes, which strongly supports our antiviral theory.

## 2. Drugs Suitable for Personal Use

Paracetamol, ibuprofen and vitamin C are old drugs with possible genotoxic side effects [2] [3] [4]. Based on our antiviral theory, they may have antiviral effects, and therefore could be daily used by everyone for preventing COVID-19 infection. To prove effectiveness of these drug combinations, urgent clinical trials should be carried out (note: in July 2020, we first proposed that paracetamol, ibuprofen, and vitamin C may have antiviral effects (ResearchGate DOI: 10.13140/RG.2.2.34686.61769/7). Two papers published in 2021 have indicated that paracetamol may have antiviral effects [5] [6], which supports our views.). Those who cannot take paracetamol and ibuprofen could take vitamin C and turmeric or vitamin C and berberine because both berberine and turmeric possess possible genotoxic side effects [7] [8] and are so safe that they could be served as prophylactic drugs for long term use.

In addition to the drugs or supplements as described above, there are numerous antimalarial drugs with genotoxic side effects, such as chloroquine, hydroxychloroquine, mefloquine, primaquine, amodiaquine, lumefantrine, artemether, artesunate, pyronaridine, etc. All these drugs could be used to prevent COVID-19

infection, but their safety for long term use should be taken into account. We predict that compared to non-malaria endemic regions, the number of COVID-19 cases is much smaller in malaria endemic regions in which many people take antimalarial drugs to prevent malaria infection. We also predict that during the pandemic period, cancer patients who are taking genotoxic anticancer drugs are much less likely to suffer from COVID-19 than cancer patients who didn't receive genotoxic anticancer drugs. In a word, only drugs or supplements including traditional Chinese medicinal herbs (most herbs that contain genotoxic molecules) that are genotoxic to coronaviral target cells, such as epithelial cells of respiratory system, could be used to effectively prevent and treat COVID-19 infection.

Based on our antiviral theory, repurposing old drugs for preventing COVID-19 infection could be done by anyone who can perform Google search. The guidelines for doing this are very simple. First, the old drugs must be safe and could be used for long time; second, the old drugs must have genotoxic side effects based on genotoxicity testing; third, to increase chances of success, drug combinations must be used, *i.e.*, don't use a single drug for preventing COVID-19 infection. The best drugs are those that are safe for long term use and show specific genotoxicity in epithelial cells of respiratory system. Unfortunately, it is difficult to find the genotoxic drugs with cell type specificity in near future. Therefore, at present, to prevent COVID-19 infection, we have to use non-specific genotoxic drugs that may be genotoxic to various cell types including epithelial cells of respiratory system.

### 3. Appealing for Mass Drug Administration

Since there is uncertainty in COVID-19 vaccine and anti-coronavirus drug developments, repurposing old drugs with genotoxic side effects for preventing COVID-19 infection will play a very important role in the containment of COVID-19 pandemic. Therefore, we are appealing for mass drug administration in all COVID-19 seriously-affected countries to curb the COVID-19 pandemic. New antiviral drugs might not be suitable for mass drug administration because no one knows the long term safety of these drugs. Therefore, for mass drug administration, we recommend 2 old, safe, and cheap drug combinations: No.1. vitamin C (500 mg) + paracetamol (500 mg), once a day for 2 - 3 weeks and No.2. vitamin C (500 mg) + berberine or turmeric (500 mg), once a day for 2 - 3 weeks. The two drug combinations can be alternately used for long time.

Taking prophylactic drugs might not provide complete protection, but can reduce coronavirus deaths and severe cases, which might facilitate the success of natural herd immunity that is a key to defeating COVID-19 pandemic. This natural herd immunity could be named as "drug-escort natural herd immunity".

### 4. Conclusions

During the fight against global COVID-19 pandemic, no prophylactic drugs

have been recommended by doctors or government's COVID-19 advisers because they thought that no antiviral drugs were available for the containment of COVID-19 pandemic. In this paper, we propose that old drugs with genotoxic side effects could be used to alter 3D genome architecture in viral target cells so that the gene expression patterns are temporarily changed and become unsuitable for viral infection. Based on this idea, many old and cheap drugs with genotoxic side effects could be used as prophylactic drugs or as drug candidates for experimental studies and clinical trials. This is a quick and efficient way to find antiviral drugs for the control of COVID-19 pandemic; while any new antiviral drug development might not be suitable for this purpose because no one knows the long term safety of the new antiviral drugs, not counting time-consuming and cost. Possibly, many lives could have been saved if mass drug administration had been adopted.

In ancient China, people burnt certain herbs to smoke house or carried perfume satchel that contains aromatic herbs for the epidemic prevention. Scientists today might not believe these old practices because smoke or herbal fragrance will not kill virus. But based on our antiviral theory, genotoxic molecules in the smoke or fragrant scent may temporarily alter genome architecture in epithelial cells of human respiratory tract and could reduce the susceptibility to viral infection. Many Chinese medicinal herbs contain genotoxic molecules which could be the main components for treating many diseases including COVID-19 through changes in gene expression patterns by altering genome architectures.

Currently, drug's genotoxic side effects are considered to be bad things, however, we assume that drug's genotoxic side effects are inseparable parts of drug's therapeutic effects. A drug can treat different types of diseases and its possible mechanism of action could rely on drug's genotoxic side effects which could change gene expression patterns in different cell types through alterations of genome architectures. In short, the role of drug's genotoxic side effects in treating diseases is still an uncultivated virgin land.

## Conflicts of Interest

In July 2020, the manuscript was first uploaded as a poster to ResearchGate (DOI: 10.13140/RG.2.2.34686.61769/7). The contents between this paper and the poster are quite similar. The author declares no conflicts of interest regarding the publication of this paper.

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