

Possible Treatments for COVID-19:

Last updated: 3/29/2020 17:00

Bottom Line: There are currently no proven treatments for COVID-19, but there are several under investigation. Clinical trials should be rapidly conducted to better understand which treatments work and which do not. Mild COVID-19 infection likely does not require use of these medications. Below are treatments currently being studied.

Remdesivir

Typical Use: No approved uses. An experimental intravenous medication with broad antiviral activity being used in moderate to severe cases of COVID-19 who are hospitalized. This medication is available to patients with confirmed COVID-19 who meet other study criteria and who are hospitalized at centers participating in clinical trials.

Why it might work in [COVID-19](#): Remdesivir incorporates into the RNA (building blocks) of the virus and prevents the virus from replicating (copying itself). Recent animal studies show the medication can prevent infection of cells with MERS and SARS, as well as prevent clinical disease after infection with those viruses.

Side Effects: Unknown since still experimental, but may cause liver inflammation, other gastrointestinal side effects.

Accessibility: low (an experimental drug with high costs), Gilead now requesting nearly all use to be through clinical trials. No longer available for compassionate use except for pregnant people or children with severe disease. <https://rdvdcu.gilead.com/>

State of the research and development: 3 clinical trials in US for moderate and severe disease, 2 clinical trials in China, 1 in Europe.

IL-6 Receptor Blockers (Tocilizumab and Sarilumab)

Typical Use: Immunosuppression in rheumatoid arthritis and juvenile idiopathic arthritis

Why it might work in [COVID-19](#): IL-6 is a cytokine, a protein inside that creates a cascade of processes leading to massive inflammation. These two medications block IL-6 from binding to receptors, which may mitigate the effects of inflammation and limit lung damage.

Side Effects: gastrointestinal perforation, elevated liver enzymes, increased infection risk

Accessibility: Low. Very expensive. Clinical trials beginning.

State of the research and development:

- [Clinical Trial of Sarilumab began 3/16/2020](#)
- [Clinical Trial of Tocilizumab announced 3/18/2020](#)

Hydroxychloroquine (Plaquenil) and Chloroquine

Typical Use: Lupus and other rheumatologic conditions; malaria

Why they might work in [COVID-19](#):

1. Lab studies show that these medications may prevent the virus from entering human cells
2. Lab studies also suggest that the medications may directly stop growth of the virus
3. These medications also have anti-inflammatory effects, and may reduce inflammation, (“cytokine storm”) that leads to heart and lung problems, as well as other organ failure in severe COVID-19 infection

Side effects:

Chloroquine has potential side effects including heart damage, abnormal heart rhythms, nervous system side effects, vision problems, rashes, and low blood counts. Despite many possible side effects, it is generally well-tolerated and considered an “essential medicine” by the WHO.

Hydroxychloroquine: generally considered to be safer with less side effects than chloroquine, however can still lead to an abnormal heart rhythm.

Accessibility: moderate (generic, moderately safe, inexpensive). These medications require prescription and oversight by a healthcare provider experienced with their use and side effect profile. There have been reports of pharmacies running out. Gov Cuomo issued an order limiting prescriptions to those with pre-existing conditions or to clinical trials to protect supply.

State of the research and development:

- Several clinical trials underway in China and Europe
- Lab study recently showed higher potency of hydroxychloroquine compared to chloroquine against the COVID-19 virus.
- Expert scientist Dr. David Ho expresses skepticism that these will work in humans; specifically, that the doses needed to achieve lab results are likely not safe for humans.

Hydroxychloroquine and azithromycin combined:

- A small, nonrandomized [clinical trial in France](#) showed use of hydroxychloroquine and azithromycin together was associated with a rapid drop in detectable COVID-19 virus levels.
- The validity of this study suffers from non-standard study design, small numbers, and significant dropout. It should not be considered evidence that this treatment combination is effective.
- Both medications are generally considered safe, but when used together, may place patients at higher risk of life-threatening abnormal heart rhythms.

Convalescent Serum

Typical use: Used since the 1890s to fight viral illness outbreaks; involves blood donations from patients who have recovered from COVID-19.

Why it might work in COVID-19: The antibodies made by people who have recovered from COVID-19 may help fight the infection in those who have early stages of disease and have not yet developed antibodies of their own. They may also serve as prophylaxis (prevention) for people at high risk of disease, including health care workers.

Side Effects: infusion reaction, infection from undetected illness, possible lung injury from antibody complexes

Accessibility: currently low; could be made available quickly with blood donations although would also need antibody test available for recovered patients

State of the Research and Development:

- *Reports of some success in China:* On 3/27/20 a case series was published in [JAMA](#) where 5 critically ill patients received convalescent plasma with subsequent clinical improvement, although there was no control group for comparison.
- On 3/23/20, Gov Cuomo announced trial of convalescent plasma in NY. Health + Hospitals is working internally to finalize a protocol.
- *Would not necessarily need clinical trials to be put into effect immediately:* As of 3/24/20, the FDA has [approved](#) access to COVID-19 convalescent plasma for use in patients with serious or immediately life-threatening COVID-19 through single patient emergency Investigational New Drug Applications (eINDs).
- *No FDA approved antibody test currently:* There are 30+ antibody tests under investigation currently, but it would be possible to use one of these tests if results are reported as research tests.

Other Medications under Investigation:

Angiotensin Converting Enzyme inhibitors and Angiotensin Receptor Blockers (ACEis and ARBS)

Typical Use: very common blood pressure medicines, especially for people who have both high blood pressure and diabetes, or high blood pressure and heart disease

Relevance to [COVID-19](#):

- People with hypertension, diabetes, and heart disease are at increased risk of death from COVID-19
- Why some are [concerned](#) about ACEis and ARBs:
 - The COVID-19 virus infects human cells using a receptor called ACE2
 - The use of ACEis and ARBs may increase expression of ACE2, which may increase patient susceptibility to the virus, but evidence is limited for how these medicines affect ACE2 levels in the blood or lungs
 - The significance of ACE2 expression on COVID-19 pathogenesis and mortality is not specifically known
- Why some are encouraged by use of ACEis and ARBs:
 - A mouse model studying lung injury in SARS suggested that mice with SARS may have improved with ARB treatment.
 - There is no direct clinical evidence that has proven ACE2 to be an effective treatment for viral-induced lung injury.

State of the Research and Development:

- Clinical trials beginning in US
- [Current recommendations](#) from medical groups are to have patients who are receiving ACEis and ARBs continue on their medications

NSAIDs (ibuprofen, naproxen, indomethacin, etc)

Typical Use: Pain and Fever

What's the relevance to [COVID-19](#):

- Similar to ACEis and ARBs, there is theoretical risk that NSAIDs may increase the expression of the ACE2 receptor

State of Research and Development:

- Minister of France recommend not to use NSAIDs to treat fever in COVID-19
- WHO issued guidance based on current available information, they do not recommend against the use of ibuprofen. (Editor's note: They also do not recommend for the use of ibuprofen)

Sources:

[Prophylactic and therapeutic remdesivir \(GS-5734\) treatment in the rhesus macaque model of MERS-CoV infection.](#)

[Remdesivir and chloroquine effectively inhibit the recently emerged novel coronavirus \(2019-nCoV\) in vitro](#)

[COVID-19: consider cytokine storm syndromes and immunosuppression](#)

https://www.actemrahcp.com/?cid=act_PS_MIACRA7141_1&c=MIACRA7141&gclid=CjwKCAjw3-bzBRBhEiwAgnnLCimyUiOr7jPyPALxU7EaX0ZqSjeYyiiL9Dok8g4sL82_WKnaBevQOxoCzI4QAvD_BwE&gclsrc=aw.ds

[Hydroxychloroquine, a less toxic derivative of chloroquine, is effective in inhibiting SARS-CoV-2 infection in vitro](#)

[Hydroxychloroquine and azithromycin as a treatment of COVID-19: results of an open-label non-randomized clinical trial](#)

[The convalescent sera option for containing COVID-19](#)

[Treatment of 5 Critically Ill Patients With COVID-19 With Convalescent Plasma](#)

[Investigational COVID-19 Convalescent Plasma - Emergency INDs](#)

[COVID-19 and Angiotensin-Converting Enzyme Inhibitors and Angiotensin Receptor Blockers: What Is the Evidence? | Pulmonary Medicine | JAMA](#)

<https://www.hfsa.org/patients-taking-ace-i-and-arbs-who-contract-covid-19-should-continue-treatment-unless-otherwise-advised-by-their-physician/>

<https://clinicaltrials.gov/ct2/results?cond=covid-19&term=&cntry=US&state=&city=&dist=>

[Are patients with hypertension and diabetes mellitus at increased risk for COVID-19 infection?](#)