



# When Science Doesn't Work

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*“In science the credit goes to the man who convinces the world,  
not to the man to whom the idea first occurs.”*

— Sir William Osler, MD

## Religion

Religion no longer plays the role it did in past cultures, where it was the first and last directive. Western religions today pale in comparison to the power once wielded by the medieval Catholic Church or the Mayan priests. Today we have science, but today's science plays a cultural role similar to yesterday's religions.

Both science and religion have a careful method for maintaining their power and expanding their domain. Both are hierarchical, exclusive, and financially involved with the state. And while religion was involved in state affairs while science was a private enterprise, those roles are now reversed.

Science prides itself on transparency, but rarely can anyone except a scientist can see through it. For the most part, the commoners have no idea what science is founded on and, instead, follow it dogmatically: trusting it, believing in it, and investing their health, earnings, and future in the directives of science.

Science delivers. Its foundations are broad, its methods sound, and its predictions reliable... most of the time. But science does make requirements of its practitioners, and while there is no final arbiter of scientific pronouncements, there are a number of luminaries who are given the powers of a pope. Despite the heavy hand of unelected government, industry, and military authority over scientific direction, we have developed a deep trust in scientific conclusions. This is in spite of the fact that virtually no one outside of the inner circle of historians and philosophers of science can tell you how science actually works. Most scientists can't.

## Outcome

Like Supreme Court Justice Potter Stewart's famous description of obscenity, "I know it when I see it," most people feel they know science when they see it in action. For the most part, anything that submits to test and confirmation has some scientific pedigree. This leaves a lot of open ground, but things seem to flow in the right direction when the details are allowed to work themselves out. At the moment, however, the details are very much not working themselves out.

What we expect of science is evidence, argument, accuracy, and agreement among experts. The first three are requirements of the scientific method—though the arguments are incomprehensible to most—but agreement among experts is not part of science. In fact, science more safely rests on disagreements among experts because science, by its nature, is uncertain.

Uncertainty makes consumers uncomfortable, so disagreements are generally kept out of public view and public policy. I had a dissertation advisor who called shortcomings and disagreements science's "dirty laundry," and I was told not to air it.

## Quality Ingredients

Two aspects of the scientific endeavor that nonscientists do not appreciate are the method by which one arrives at conclusions, and the foundation on which these conclusions rest. This might be referred to as "the recipe" and "the ingredients." People recognize science by the meal that's served,

but few understand what goes into it. This is important because sometimes—perhaps always, and certainly now—science is called upon to serve a meal before it’s ready.

The scientific method is a theoretical construct, there is no one such thing. The scientific method is a number of guidelines by which one conducts an investigation scientifically. It forms something of a check-list, but few researchers aim to follow it, rather, it’s something that’s put together after the fact, a kind of presentation.

The crucial components of the scientific method are confirmation and consistency. Confirmation is established through experiments done in a transparent manner that’s repeatable and confirmed through repetition.

Consistency is established on the basis of an existing underlying theory, and arguments of some merit—which is to say consensus—supporting the design of the experiment and the interpretation of the observations. Already, at this point, you can start to see uncertainties creeping in.

The “dirty little secret” of science is that there is no absolute standard for any of this. There are conventional standards but they are not formalized or even made clear. There is no written standard of ethics, morality, honor, or interpretation. One is expected to learn these through apprenticeship, but I can tell you, from my own experience, the latitude in these matters is shockingly broad.

The unspoken assumption in any scientific endeavor is that it will be carried out with great care and to a high standard. Of course, these are relative to the ways and means of the time, so this is largely a matter of social consensus. If you start with quality data and you apply rigorous arguments to it, then you’re almost certain to get a result that qualifies as good science.

## Is It Science, Yet?

When results are demanded before science’s method has concluded, the result is half-baked. In most cases, science-in-process does not look like finished science. Work in progress likely fails to meet any standards of finished science, yet non-scientists do not understand this.

Most practicing researchers understand that you can’t extract a scientific conclusion from a work in progress any more than you can enjoy a meal half-cooked. Yet we are now watching supposedly science-literate people do just this. As a result, the whole population is in a mud-slinging uproar that’s basically splitting scientific babies down the middle.

I educated myself about COVID-19. I’ve had the infection, nursed myself through it, and I’m publishing a book about my experience, the virus, and the social response. Using [THIS LINK](#) you can download a free, digital pre-release copy of the book which is titled “COVID-19, Illness & Illumination.”

Everyone wants a scientific solution to end the pandemic. In this, people are throwing themselves at preliminary research and expecting it to be as good as finished science. People in power and the pundits who guide them are making the egregious mistake of either truncating the scientific process, or selling solutions that are still in the test tube phase.

## Hydroxychloroquine

Hydroxychloroquine (HCQ) is a perfect example. This is one of a class of chemicals that's been in use for 65 years to combat malaria, lupus, and rheumatoid arthritis. It is not a medicine so much as it is a chemical agent that has a variety of effects. It's generally well-tolerated with few side effects, but can be dangerous if taken in excess.

Early reports indicated that HCQ was helping in the recovery of COVID-19 patients. A July 1 preliminary study titled, "Treatment with hydroxychloroquine, azithromycin, and combination in patients hospitalized with COVID-19" (Arshad, Kilgore, Chaudhry, et al., 2020)—now referred to as the Henry Ford study—claimed "hydroxychloroquine alone and in combination with azithromycin was associated with a significant reduction in-hospital mortality." This study did not apply strict methods and controls and, because of this, its conclusions have largely been rejected and its results have not been confirmed.

In their defense on July 31st, the leading physicians of the Henry Ford study wrote a letter to the journal's editor addressing the flaws in their methodology and repeating, "a safe dosage and early utilization of hydroxychloroquine reduced mortality in hospitalized patients. Similar published large cohort studies support our findings from New York City and France" (Zervos, Arshad, Kilgore, et al., 2020). Doctors from the same team wrote a second letter to the press expressing such dismay and disgust at the political response they'd received that they would have "no further comment about this outside the medical community" (Munkara and Kalkanis, 2020).

There were other suggestions as to how to administer the drug, and some ideas about how it might work, but the people with the suggestions and the people with the ideas were not the people who wrote papers testing the drug's effect. The clinical and biochemical guesswork were not in synchrony. You might wonder how this could be, "How can researchers test something they don't understand?" This happens all the time; it's the process of discovery. This is how scientists learn what they need to know.

The real process of science involves many attempts to do many things, and many things that don't work. It's only after a good deal of failure that a particular direction gains focus. This is what began to happen with HCQ: various people started trying various things just to gain some clarity about what was going on.

This is science in the oven, it's science as it's happening and it is not finished science. In this perverse circumstance, science's customers have stormed the laboratory and are demanding a finished result. The more careful researchers are withholding their judgement and results; the less careful researchers are broadcasting them.

No one seemed to know, or no one seemed to say, how, when, or to whom one should administer HCQ but, for lack of time, researchers applied a standard approach in the scientific toolkit: reductionism. Researchers in the Recovery Trial (Horby, Linsell, Bell, et al., 2020) tried to isolate HCQ's effect alone on the most seriously ill. The result was negative.

This is a fine scientific result, and the first in crossing a wide river. But people and policy makers expected a final solution and, failing to get this, started assigning blame to the study, researchers, method, or the claim that HCQ could work.

The scientific method is clumsy; it's supposed to be self-correcting. Clumsiness is next to godliness when accidental discovery leads to new understanding, and this almost always plays a role. Luck and accident are time-tested methods for gaining understanding where none is known to exist.

## The Fog of Publication

Three articles presented more observations. Two looked at clinical outcomes across a large population and were published in prestigious journals. After publication, objections quickly arose regarding implausible numbers quoted by these authors. It appeared that the data on which these articles were based was largely false. Both articles were retracted from publication, a highly unusual and embarrassing move for these journals.

Chris Martenson, an economist and research analyst, looked at the data in these papers in detail, reading them line by line. He also looked at the comments of editors at one of the journals, *The Lancet*, and calls these papers outright fraud. His observations are unusually detailed and provide great clarity to anyone interested in reading the article published in *The Lancet* (Martinson, 2020).

A third article titled, "A Randomized Trial of Hydroxychloroquine as Postexposure Prophylaxis for Covid-19," explored using HCQ prophylactically and also reported a negative result. In this study, they gave HCQ to subjects four days after exposure and monitored their rates of illness against a control group.

You must understand that scientific observations never prove anything, they only disprove a claim. This is an absolute and fundamental truth. An editorial in the same journal, (Cohen, 2020), published contemporaneously, emphasized the flaws in the study and emphasized the results were "more provocative than definitive." Indeed, administering anything four days after exposure is hardly

prophylactic. Four days is clearly outside the window of prophylactic effect for COVID-19, judged from animal studies (Sheahan, Sims, Zhou, et al., 2020).

In spite of these cautions, the questionable nature of the premise, and a host of inconsistencies in the study's methodology, the lay audience—which seemed to include everyone—concluded that HCQ didn't work. This conclusion fails to appreciate that it was not HCQ that was tested, but a somewhat contrived hypothesis under less than perfect conditions.

Again, this is how science proceeds: it pokes a stick into the darkness in order to feel around. The audience was viewing this negative result and performing their own non-scientific generalization. The claim made by one commentator was that there was too little time to keep chasing this idea. At least this reader understood he was making an assumption, but no one was really listening. There was simply an hysteria for a definitive answer. The authors of the study provide one, albeit without a compelling basis.

Then came the Recovery Trail (Horby, Linsell, Bell, et al., 2020) , a high-profile, well-funded, officially certified study out of the United Kingdom. The Recovery Trial's June 5th article was definitively titled, "No clinical benefit from use of hydroxychloroquine in hospitalised patients with COVID-19."

One of the chief investigators was quoted as saying, "Today's preliminary results from the Recovery Trial are quite clear—hydroxychloroquine does not reduce the risk of death among hospitalised patients with this new disease."

This was a bold statement given that the trial was preliminary, and was undertaken without much understanding of the virus or the effect of this drug on it. In fact, it was an unjustified statement because, as it now appears, hydroxychloroquine seems to be effective when taken in combination with other chemicals.

The Recovery trial tested something involving HCQ and observed no positive effect. Instead of asking what this "something" was, health authorities at the highest levels took the claim that HCQ did not work and moved not only to curtail further tests, but also to prohibit further research or experimentation, making HCQ almost unavailable.

It should be noted that, in all this, there was little adherence to the scientific method in the experimental design or the interpretation of the results. No one doing these experiments was asking how to test HCQ, they were simply testing some protocol or another. In the Recovery trial dosages were set at levels higher than considered safe because, apparently, researchers misspelled the drug and used guidelines for the wrong chemical. After this, research into the effects of HCQ ground to a halt.

# Science Bombs

On July 27th, a motley crew of renegade practitioners gave an unofficial press conference in Washington, DC, claiming that HCQ was a cure for COVID-19, when used properly. They substantiated their claim by personal experience, not published research.

These doctors were angry because tests being used to show HCQ was a failure did not use their prescription, and also because the government was denying them access to HCQ. The video of the press conference went viral and resulted in a public firestorm of ad hominem and political invective. Weaponized statements were launched for political gain. There was no science on display, and no discussion of it.

These doctors were brain-storming, a critical element in the generation of ideas, but not what people expect of science. But even this possibility was officially disallowed: the claims were dismissed, no record of the press conference was published, and videos of the event were removed from public view.

But the word had already gone out, and over 12 million people saw the video within a few hours of its release. I embedded a copy of the video in my post, which you can view here: [COVID-19: Frontline Doctors](#).

ALL QUIET  
ON THE  
SCIENCE  
FRONT



## Journalism Isn't Science

Most people equate science journalism with science, but it absolutely isn't. Some science journalists, like Ed Yong at *The Atlantic*, craft careful arguments. The editors at most science desks are reporters on the science beat more attuned to the dog whistle of spectacle than the hum of science.

A June 9th article in ScienceMag.org titled “Three big studies dim hopes that hydroxychloroquine can treat or prevent COVID-19,” is a case in point (Kupferschmidt, 2020). This article did not explore the history of HCQ research, the problems surrounding the conclusions being presented, the merit of these studies, or the alternative conclusions of other studies. The article provided no references or links to the research mentioned. This piece was neither scientific, an exposition of the science, nor an insight into the science; it was a report about the social response to selected publications whose implications were inconclusive.

This is typical: people think science is a static thing; a spectator event involving no participation. This is somewhat true of “finished” science—through for only as long as it stays finished—but it’s not true of science-in-progress.

To make sense of science while it’s in progress you must be involved at least to the extent that you know what’s being discussed. Science-in-progress involves researchers in various camps with unapologetically narrow focus. Research articles are not summary articles, and those who follow research are expected to know the context. Like watching fireworks with a telescope, mainstream science journalism misses the big picture, and its readers do, too.

Science journalism must teach people science. Science articles have a prescribed structure designed to facilitate an overview. Nonspecialists need only read two sections: the abstract and the conclusion. Digital publishing makes research abstracts available to nonsubscribers, but not the conclusions, unfortunately.

A majority of the research articles I follow are available in their full form from the authors—rarely from the publisher—but you have to know how to find them. Science journalists could help the whole endeavor of fostering understanding by agitating for open access to conclusions, without the author having to bear an extra cost, as they typically do now.

Science journalism cannot summarize unfinished science in the normal manner of quoting selected references of ongoing work. It must provide references to the background, the work in progress, and recognize that ongoing research is not balanced.

## Up From The Ashes

One angry, black doctor, harping on the phrase, “We have a cure; it’s called hydroxychloroquine, zinc, and zithromax!” may have restarted HCQ research. Science journalists have not caught on, or are being disallowed by their editors.

Judging from the polarization of the response, it appears that editors are refusing to follow this issue because they see it as providing political ammunition for Donald Trump. The lives of thousands of people are on the block, but those serving the information don’t seem to care.

In an opinion published in Newsweek on July 23rd, Harvey A. Risch, MD, PhD (Risch, 2020), a leading epidemiologist at Yale, states:

“As professor of epidemiology at Yale School of Public Health, I have authored over 300 peer-reviewed publications and currently hold senior positions on the editorial boards of several leading journals. I am usually accustomed to advocating for positions within the mainstream of medicine, so have been flummoxed to find that, in the midst of a crisis, I am fighting for a treatment that the data fully support but which, for reasons having nothing to do with a correct understanding of the science, has been pushed to the sidelines. As a result, tens of thousands of patients with COVID-19 are dying unnecessarily. Fortunately, the situation can be reversed easily and quickly. I am referring, of course, to the medication hydroxychloroquine.”

On July 29th, the Dean of the Yale School of Public Health joined Dr. Risch in further endorsing research into the efficacy of HCQ in an official publication of the school of public health (Vermund, 2020).

A publication titled, “Hydroxychloroquine and azithromycin plus zinc vs hydroxychloroquine and azithromycin alone: outcomes in hospitalized COVID-19 patients” is dated May 8th (Carlucci, Ahuja, & Petrilli, et al., 2020)

It states, “The addition of zinc sulfate ... increased the frequency of patients being discharged home, and decreased the need for ventilation, admission to the ICU, and mortality or transfer to hospice for patients who were never admitted to the ICU... (and resulted in significant increases in) frequency of being discharged home, reduction in mortality, or transfer to hospice...” The study concluded that this “provides the first in vivo evidence that zinc sulfate in combination with hydroxychloroquine may play a role in therapeutic management for COVID-19.”

A peer-reviewed article scheduled for publication in September in the journal Medical Hypotheses is titled, “Does zinc supplementation enhance the clinical efficacy of chloroquine/hydroxychloroquine to win today's battle against COVID-19?” (Derwand, & Scholz, 2020). The preprint states: “As zinc deficiency frequently occurs in elderly patients and in those with cardiovascular disease, chronic pulmonary disease, or diabetes... we hypothesize that the combination of CQ/HCQ with zinc in the treatment of COVID-19 patients, in an out- or inpatients setting, may help to improve clinical outcomes and to limit the COVID-19 fatality rates.”

A second study by the same authors, not yet peer reviewed and dated in June, is titled, “COVID-19 Outpatients – Early Risk-Stratified Treatment with Zinc Plus Low Dose Hydroxychloroquine and Azithromycin: A Retrospective Case Series Study.” (Scholz, Derwand, & Zelenko, 2020)

The study’s abstract summarized their findings that “treatment of COVID-19 outpatients as early as possible after symptom onset with the used triple therapy, including the combination of zinc with

low dose hydroxychloroquine, was associated with significantly less hospitalizations and 5 times less all-cause deaths.”

It finally appears that research is focusing on a proper theory, protocol, and test for the use of HCQ against the SARS-CoV-2 virus. This was almost quashed by political infighting and institutional ignorance in spite of it being what may turn out to be the most effective and easily available cure for the infection. Let’s hope that research can now proceed in the normal scientific fashion: chaotically. Let’s hope it will not be hamstrung by politicians or the media.

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