DISPATCHES FROM THE VACCINE WARS

FIGHTING FOR HUMAN FREEDOM DURING THE GREAT RESET

CHRISTOPHER A. SHAW

FOREWORD BY
ROBERT F. KENNEDY JR.

Children's Health Defense

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10 9 8 7 6 5 4 3 2 1

Library of Congress Cataloging-in-Publication Data is available on file.

Print ISBN: 978-1-5107-5850-6
Ebook ISBN: 978-1-5107-5851-3

Printed in the United States of America

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“The assumption that what currently exists must necessarily exist is the acid that corrodes all visionary thinking.”

—Murray Bookchin*

Dedication

For my new son, Lucien:

יְהוָה יִשְׁמָר־צֵאתְךָ וּבוֹאֶךָ מֵעַתָּה וְעַד־עוֹלָם׃

The LORD shall guard thy going out and thy coming in, from this time forth and forever.

Psalms 121:8

And in memory of my dearest friend, Lewis Dauber:

אוֹר זָרוּעַ לַצַּדִּיק וּלְיִשְׁרֵי־לֵב שִׂמְחָה׃

Light is sown for the righteous and gladness for the upright of heart.

Psalms 97:11

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* Murray Bookchin (1921–2006) was an influential American political philosopher. The quote is taken from “The Meaning of Confederalism,” *Green Perspectives*, no. 20 (1990).

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Acknowledgments

There are literally too many people to thank for their help with various aspects of this book in this short space. Some of those who helped are named here; others who equally helped, or helped in understanding some aspect of this very complex story, may not be named, since the very nature of the book might put their careers at risk. Of the first group, my deepest thanks to my laboratory colleagues Michael Kuo, Suresh Bairwa, and Janice Yoo, and Drs. Jess Morrice and Housam Eidi. Truly, the book would not have occurred without their help. Rabbis Dick Ettelson and Zev Epstein gave valuable critiques and religious information that were essential. Professor John Oller and Amy Newhook provided extremely valuable comments on a draft of the manuscript, and I owe them both my deepest gratitude for their careful and cogent suggestions. Drs. David Lewis and James Lyons-Weiler also provided much-needed critiques. Aaron Siri, Alan Cassels, Courtenay Stellar, Katrin Geist, and Bruce Cahan all provided feedback and encouragement. Thanks also to Leah Rosenberg, Dr. Mateja Cernic, Dr. Alvin Moss and Dr. Robert Sears, Ambra Fedrigo, Micheal Vonn, Jill McEachern, and Darcy Fysh. My thanks also to Tony Lyons for accepting the book's initial proposal and to Caroline Russomanno for her incredibly helpful copy editing. Annaka Cox designed an early version of the book cover. I thank Danika Surm for taking on the bulk of parenting of my smaller children while much of this book was being written. Also,

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thank-yous to those I cannot name: you've each contributed bits that have helped move this project to completion. Next, I need to offer a somewhat backward thanks to some former colleagues on the "left": watching some of you turn yourselves into pretzels to accommodate "progressive views" while kowtowing to the pharmaceutical cartel was a wonder to behold.

As this book goes to press, I want to acknowledge the passing of a friend and comrade-in-arms, Alex Moreau (Şervan): You fought against monsters, Alex. Your job is done; be at peace. Her biji!

Last, but definitely not least, my love to all of my children, Ariel, Emma, Caius, Tevah, and Lucien, for putting up with me being mentally absent much of the last year: I know this was tough; I can only hope that one day you will see that it might all have been worthwhile.

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Preface

Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less.

—Melvin A. Benarde[1]

The present book arose from diverse circumstances that were nevertheless related by a common theme: vaccine safety.

Vaccine safety, like the pejorative term “anti-vaxxer,” is a suitcase phrase in that within two simple words are a number of subthemes that span an enormous range. These include the concepts of what science is, and isn’t; what those who are pro- or anti-vaccine—not to mention a vast middle-of-the-road group—actually believe; the fears that people in both pro- and anti-camps harbor; how the questions raised by the various groupings have impacted and, in turn, been impacted by politicians; and, not least, the elephants in the room, the interlocking roles of the pharmaceutical industry (the “pharma”), the Bill and Melinda Gates Foundation, the World Health Organization (WHO), and the World Economic Forum (WEF).

The “pharma” is often seen in some circles as somehow a benign player. People, especially those whose stances tend to be highly on the pro-“vax” side, may acknowledge the serious money the industry makes from vaccines, acknowledge the very clear evidence that the same industry is rife

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with corruption and preventable disasters like Vioxx, and yet fail to see the possibility that money and corruption play a role in how vaccines are developed and rolled out to a public that has been trained to trust vaccine doctrine completely. Governmental agencies in the United States, such as the Centers for Disease Control and Prevention (CDC), and internationally, such as WHO, are often seen as neutral and generally beneficial bodies, even by people normally distrustful of pretty much anything governments do. This odd phenomenon crosses the political divide, often in some very peculiar ways.

I came into research in the vaccine safety area quite by chance. First, I should point out that I am not an ophthalmologist regardless of the medical department I am in at my university. In actual fact, I am a neuroscientist by training and profession who happens to be in an ophthalmology department solely because I once did basic research into eye disorders. Indeed, for much of my career as a scientist, I had pretty much no views on vaccines at all, apart from what I had learned as an undergraduate and graduate student that vaccines were uniformly safe and effective. This was all it seemed that I needed to know for many years. That view did not change until about 2005.

That was the year when a graduate student in my laboratory and I decided to seek another cluster of Lou Gehrig's disease (amyotrophic lateral sclerosis, or ALS). In brief, my laboratory had been studying the cluster of ALS on Guam and decided that, to find more clues to this disorder, we had to broaden our search. To do so, we sought another cluster that might serve to diminish the number of potential causes of the disease.

In due course, we found one in Gulf War Syndrome, the mysterious multisystem disorder that emerged after the American Coalition's 1991 war against Iraq. In this syndrome, ALS incidence in Coalition soldiers appeared to occur at a much higher incidence, and at a much younger age, than in the general population.

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In turn, our reading of the published literature led to the emerging epidemiology on the syndrome that, in some cases, pointed the finger at the anthrax vaccine that most soldiers had received. The correlation with this vaccine seemed to be independent of whether the soldiers actually deployed to the Gulf or not. This fact alone seemed to rule out environmental factors that arose during the war such as exposure to oil well fires or anti-nerve gas agents.

With this as a background, we attempted to purchase the anthrax vaccine, made at that time by a company called BioPort. BioPort refused to sell us the vaccines, so we decided to simply look at the listed ingredients and try the components individually that, based on the scientific literature, seemed most likely to be involved. Two such ingredients stood out, both adjuvants, or helpers, to the vaccine: aluminum salts, such as aluminum hydroxide; and squalene, a tripertene. The first was acknowledged to be in the vaccine; the second was not, but other investigators were able to show that it was there in at least some of the anthrax vaccine vials. Aluminum was recognized as a neurotoxin even then.

We conducted a typical in vivo animal model study in which we injected young male mice with a weight-adjusted amount of aluminum hydroxide or squalene, versus both, and all compared to control mice getting only saline. At this time, we felt that we would fairly rapidly discover that there were no negative effects and go back to look for other possible causal factors for Gulf War Syndrome.

To our surprise, we found that the aluminum, in particular, had a significantly negative impact on motor functions and reflexes. Further, histological examinations showed that the motor cortex and spinal cords of the aluminum-treated mice had significant increases in motor neuron degeneration.[2]

Now intrigued, from that point on we did what scientists are supposed to do and kept following the leads. The emerging data in adult and young

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mice supported the general notion that aluminum was harmful to the central nervous system (CNS). This alone was not particularly surprising, as we were to discover when we began a detailed survey of the existing experimental literature.

We went on from this early work to publish a number of reviews, experimental studies, and other commentaries on aluminum (see Chapter 5).

In science, provocative results are supposed to be met with attempts by others to replicate the findings in order to see if the data hold up to scrutiny. Indeed, various researchers were finding the same things we had seen. In contrast, agencies like WHO did not have experimental data, but rather simply dismissed our work out of hand using one of their sub-bodies, the Global Advisory Committee on Vaccine Safety (GACVS). Here is their comment in reference to several of our studies:

> The GACVS reviewed 2 published papers alleging that aluminium in vaccines is associated with autism spectrum disorders 3,4 and the evidence generated from quantitative risk assessment by a US FDA pharmacokinetic model of aluminium-containing vaccines. GACVS considers that these 2 studies 3, 4 are seriously flawed. The core argument made in these studies is based on ecological comparisons of aluminium content in vaccines and rates of autism spectrum disorders in several countries. In general, ecological studies cannot be used to assert a causal association because they do not link exposure to outcome in individuals, and only make correlations of exposure and outcomes on population averages. Therefore, their value is primarily for hypothesis generation. However, there are additional concerns with those studies that limit any potential value for hypothesis generation. These include: incorrect assumptions about known associations of aluminium with neurological disease, uncertainty of the accuracy of the autism spectrum disorder prevalence rates in different countries, and accuracy of vaccination schedules and resulting calculations of aluminium doses in different countries."[3]

In Chapter 5, we will see if the WHO/GAVCS comments are valid or not.

The second convergent event in my personal trajectory into vaccine research was actually a series of events that began to suggest to me that we were not wading into just any "typical" medical controversy such as those that populate ALS or other neurological disease research areas, but rather

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one that had frankly religious overtones. Actually, as we came to see, it was more cult-like than simply religious.

I had also begun to realize that "talking truth to power" was not sufficient.* Power in this case either knew what we knew, that is, that aluminum vaccine adjuvants are harmful, or simply didn't care. In either case, two possible reasons for the lack of response became clear: dogma and money. The first had served to convince most of the world's medical professionals that we had to be wrong because, after all, "the science was settled." And behind much of this was the naked fact of how much money vaccines brought into the pharmaceutical industry's profit margin.

The combination of these two, in turn, led to a series of actions that I believe have the fingerprints of the various companies smudged all over the question of vaccine safety. These included the demonization of both scientists and lay scholars who raised even the tamest questions about safety and the push for vaccine mandates around the world.

In the first case, we have seen this before when various industries find their products threatened, as will be discussed at length in later chapters. In other words, the attack on independent scientists studying vaccine safety was nothing new.

As so often in history, attempts to suppress people, either with mandates or anything else, tend to have predicable consequences, namely, pushback and outright resistance, actions that were emerging even before the COVID-19 pandemic rocked the world.

What had started as a fight for vaccine safety has since rapidly emerged as a fight for basic human rights, in this case that of security of the person.

Whatever the politicians and their pharma backers thought they might achieve by pushing for mandates has hit a wall of resistance, resistance that seemed to be growing then, and even more now, as this book goes to press: the more those in power push, the more they threaten and demean those critical of any aspect of vaccine safety, the greater the resistance grows.

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Anyone who has ever studied counterinsurgency warfare knows precisely how this process works and what the end result is likely to be. Fear can only be maintained for so long, even if it is increased by pandemics real or imagined.

What was emerging pre-COVID-19 and since can be described, fairly accurately I think, as a war. Not a war involving weapons, thankfully, at least not yet, but one of ideas and about rights. Hence, the title of this book. In the following pages, I will attempt to dissect the various issues that have emerged, and continue to emerge.

Certainly the most dramatic event to emerge since this book was started has been the COVID-19 pandemic, which is ongoing as I write and which will certainly be with us as the book goes to press and beyond. COVID-19 as a disease and the social and political responses to it, fanned by very accommodating media, are likely to be some of the long range aspects of the "new normal."

COVID-19, from its origins to the future, is the subject of a separate chapter that was not planned when this book was begun. However, I think readers will see in the pre-COVID-19 history what should have been clues to future events that have since transpired.

There are various books critical of vaccines, of course. And there are many books taking the opposite tack. Instead of trying to put myself into either camp, I have chosen to go back to basics and try to see what history and science actually tell us about vaccine safety. In so doing, I expect to find opponents from both camps. Some will think I am too "anti-vax" (many already do) for pointing out the flaws in vaccine theory, development, and administration. Others will find me not critical enough. My feeling is that getting vitriol from both sides is the right place to be. Individual readers will decide for themselves.

Needless to say, none of what follows should be considered to reflect the views of my current employer, the University of British Columbia, as it

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most certainly does not. I will discuss this point in some detail as I think it illustrates how heavily the pharmaceutical industry influences academia.

There are many people to thank, whose contributions I have already acknowledged. The discerning reader will note that some entities and individuals are deliberately not mentioned.

Last issues: In a book attempting to cover so much territory, there will be omissions and gaps, and not everything that might be cited has been. The subject of vaccines and vaccine safety with all of the associated scientific and social ramifications is just too broad. I apologize for any items that I missed and mean no slight to any of the authors of such articles or books.

Additionally, early on in the process of writing this book, I solicited opinions from a range of individuals on topics such as vaccine mandates. By no means was this a rigorous selection process: I simply sent a questionnaire to people I knew. I viewed this as a "temperature check" on various issues. The verbatim responses are shown after the last chapter.

Finally, needless to say, any errors of fact or interpretation are solely mine.

A selection of supplementary material, including appendices, a glossary of terms, and a questionnaire with people from various fields, on particular topics in the months before COVID-19, can be found online here: **dispatchesfromthevaccinewars.com**.

"Fight the power; do no harm," the slogan of the late Black Cross Medical Collective, expresses the basics of my social and medical beliefs, and most of what follows in the rest of the book is from this perspective.*

—Christopher A. Shaw
Victoria, British Columbia
January 31, 2021

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* The notion of “talking truth to power” is a phrase often used by those on the various ends of the political spectrum. In essence, it means that if you simply tell those in power what is true about a particular situation or problem, they might respond in a way designed to correct whatever that problem is. The concept presumes those in power don’t already know about the problem and/or their role in it and, further, that they care.
* The Black Cross Health Collective was a volunteer radical medic community based in Portland, Oregon. They are not now operational, but back when I was developing my street medic skills, they did a lot of training for new medics.

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Foreword

by Robert F. Kennedy Jr.

In *Dispatches from the Vaccine Wars: Fighting for Human Freedom During the Great Reset*, Dr. Christopher Shaw chronicles the long and troubled history of vaccination culminating in the raging global controversies over COVID-19 jabs. Shaw's book offers important new insights for the growing cohort of Americans who still love science and critical thinking and who feel growing discomfort with the mainstream media routine of force feeding Americans pharmaceutical industry pablum and state-sponsored propaganda which aggressively censors skepticism and dissent and abolishes debate altogether.

Shaw shows how official vaccine doctrine is almost entirely reliant upon appeals to authority—a feature of religion, not science—and crooked and fatally flawed studies ginned up by industry biostitutes. He introduces us to the high priests of *Vaccinology*, a coterie of richly compensated charlatans, flakes, trolls, and medical mercenaries. Shaw systematically obliterates the key canons of their orthodoxy.

The COVID pandemic has made the once exotic subject of vaccines required learning for the many Americans who still value our democracy and love freedom more than they fear disease. The media portrays

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Vaccinology as a benevolent medical discipline where “science rules” and where white-coated physicians and researchers commit their selfless lives to fighting disease and safeguarding public health. Their “miraculous” vaccines are always “safe and effective.” Shaw exposes this narrative as the self-serving mythology of a venal and homicidal Pharma/Medical cartel ruthlessly focused on profiting from the generously stoked fears of infectious diseases. It’s a polite fiction, Shaw demonstrates, to claim that our captive public health agencies do public health. Their real gig is pushing vaccines.

Shaw demonstrates how *Vaccinology* only survives by suppressing empiricism, stifling debate, enforcing dogma. Using its hundreds of billions of dollars in annual advertising expenditures, Pharma has transformed the once independent media into a quasi-religious inquisition that silences heresy, and burns heretics. Evidence-based research under the Pharma rubric has become a foreign language that exposes any scientist with fluency as a dangerous subversive subject to demotion, retraction, censorship, and bankruptcy. All orthodoxies are tyrannical, cruel, and often murderous and the vaccine orthodoxy has left a wide wake of human carnage.

In Shaw’s words, “Simply talking about the possible dangers of vaccine adjuvants is speaking a language that the medical cartel does not comprehend and cannot tolerate.”

Shaw shows how almost four hundred years after Galileo, the perils of challenging the “scientific” hegemony still has devastating costs. “The mind-set in the mainstream medical community is pretty clear: It is preferable to censor and self-censor data about vaccine safety than to do real science that invariably challenges official dogma precipitates career suicide.”

My father once said, “Few men are willing to brave the disapproval of their peers, the censure of their colleagues, the wrath of their society. Moral

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courage is a rarer commodity than bravery in battle or great intelligence. Yet it is the one essential, vital quality for those who seek to change a world that yields most painfully to change."

In *Dispatches from the Vaccine Wars*, Dr. Christopher Shaw demonstrates true moral courage.

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CHAPTER 1

Dispatches from the Vaccine Wars: An Introduction

One of the saddest lessons of history is this: If we've been bamboozled long enough, we tend to reject any evidence of the bamboozle. We're no longer interested in finding out the truth. The bamboozle has captured us. It is simply too painful to acknowledge—even to ourselves—that we've been fooled.

—Carl Sagan[1]

In the Beginning . . .

Early in 2019, I began to think about the sabbatical year that I was originally authorized to take in the fall of 2020. For those who don't know, a sabbatical for academics is a period, up to a year long, in which one can take leave of the university and most of the duties associated with a faculty position: the endless grant writing if one runs a laboratory, teaching of various types, daily supervision of graduate students and postdoctoral fellows, and the like. It's not that these are individually or cumulatively necessarily onerous tasks, but merely that they take their toll on one's time and freedom to explore new ideas, try different things, and perhaps launch thoughts or actual research in novel directions. Best of all, at least at my

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university, a sabbatical leave is mostly paid, making it economically feasible to take the time away.

I didn't know where I wanted to go then but did know that I wanted to write with two possible projects holding the most interest for me. One of these was the ongoing drama in northeast Syria in a region called Rojava by the mainly Kurdish population. It was here that the Kurds, Yezidis, and Syrian Christian communities had carved out an autonomous region in the midst of the chaos of the Syrian civil war. It was also here that these same populations had defeated the Islamic State and at the same time had begun the process of creating a very different political entity, one that actually rejected the notion of statehood, choosing instead a form of voluntary confederation of the different peoples of the region. The emerging revolutionary society embodied the equality of women and all ethnic groups, fostered bottom-up democratic decision making, and at the same time embraced what the American social philosopher Murray Bookchin had termed "social ecology."[2]

I had been fascinated by this social experiment since late in 2015, and by the end of 2018, I was fortunate to have been able to visit Rojava twice. Telling the story of Rojava to the Western world that largely did not understand what was happening there seemed an important and even possible project.

But there were serious problems with the actuality of carrying out this project. Not least, Rojava was, and remains, a war zone and is far from safe. So *not* safe, in fact, that I could not envision taking my family with young children into the area. Thus safety was the primary factor in my decision, but almost as crucial was the underlying assumption that my university attached to a sabbatical, namely, that the sabbatical year was to further one's knowledge or other capability *in one's own field*. As I am a neuroscientist, not a political scientist, it seemed a stretch to get the university to see that a sabbatical year in Rojava would further my ability to do better neuroscience

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research or medical school teaching. There were ways around this, of course, such as the notion of helping with the establishment of a medical school in Rojava, or teaching emergency first aid. While such solutions were plausible, the first problem still remained: safety.

The final concern was that a number of books have already been written about Rojava and its unique social experiment, many of them quite good.[3]

In the end, I was not sure that any contribution I might make to the revolutionary literature on Rojava as a very biased observer would overcome the other concerns already noted.

It was at about this time that the ongoing worries of some parents concerning vaccine safety erupted into a significant social movement in the face of vaccine mandates for schools being forced down people's throats in various places, notably in some US states.

The struggle in Rojava was all about people being able to make their own decisions on how they wanted to live their lives and to be free from the tyranny they had fought. In many ways, the struggle for health freedom was not all that dissimilar in a general sense, at least to me. Very few on the vaccine resistance side saw in the proposed mandates similarities to the utter brutality of the Islamic State or the Syrian regime. And yet, removal of freedom of choice about one's body, or the bodies of one's children, had all the hallmarks of totalitarianism even if the iron fist of the government was cushioned by the velvet glove of what has been described as "evidence-based medicine."[4]

Whether this view is right or wrong, and some would argue that it is wrong, it nevertheless led me to view the fight against vaccine mandates and all that they represent as part of a global freedom struggle: freedom from political and religious repression in Syria, freedom for Native people in Canada and elsewhere to control their lands and destinies, and freedom for parents to choose to exercise bodily autonomy for themselves and their children without fear of State reprisal.

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This is the view that then led to the decision to write this book, not merely as a scientific treatise on the pros and cons of vaccination theory and practice, but also in light of a broader struggle for human freedom.

What followed this decision was that I had to consider a range of pluses and minuses that might be involved in this decision. The key item on the plus side included the notion that this was a book that needed writing and that maybe I could do justice to the maze of conflicting pieces of information that seemed to abound when the subject of vaccination comes up in scientific circles, or even in social settings. As a scientist, I hoped my training would help sift through what can only be described as a scientific mess, in spite of the prevailing notion in the media and official entities such as the Centers for Disease Control and Prevention (CDC) and many others, particularly in the mainstream media, that the "science is settled," a decidedly nonscientific thing to say.

I knew from my work on aluminum adjuvants that this area of inquiry at least was very far from being "settled." In fact, if it was settled at all, then it was trending toward being settled in the opposite way from what the official narrative maintained. If the prevailing medical view is that aluminum in vaccines is harmless, and if this is almost certainly wrong (see Chapter 5), how much else in the official story is also wrong? Maybe nothing, but is that likely?

A second issue had to be whether I could bring to bear any aspect of impartiality to the vaccine issue that I could never do for the Rojava story. For the latter, I have been firmly committed to one side and have failed to see the merit in any arguments against. On vaccines, however, I decided I could at least be fair enough to examine critically the evidence in favor of, or against, the notion that vaccines are universally safe and effective if I approached it solely from my science background. To do so would necessitate my going back to much of the primary literature to evaluate the various published papers and the assertions that flowed from them. In

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addition, I would have to look at various reviews and meta-analyses, as well as the statements from entities such as the CDC and the World Health Organization.

To be even fairer, I would have to commit to doing the review as impartially as possible, keeping to the notion that I really had, or should have, no dog in this fight, at least from a purely scientific perspective.

The problem with such an approach was really two-fold. First, I was not sure if I could do so given what I had learned in the years since I first became involved in vaccine safety research and if I could ignore the prejudices that I have likely picked up over the years. Second, I realized that for some on the pro side, it really wouldn't matter at all how much I committed to trying to be neutral. For some people, *any* critique to *any* vaccine under *any* circumstances was proof that I was an "anti-vaxxer" and that I would remain so regardless of what the science actually showed.

There really was, and is, no answer to this problem, apart maybe from noting that it exists.

Taking a neutral perspective, one has to ask if the literature really needs another "anti-vax" book? Certainly there are enough books classified in this manner,[5] some of which make little effort to be neutral. Of course, the opposite is true, as well: the pro-vaccine books mostly look to be variants on one another in their praise of all things vaccine-related. Many of each will be cited in the chapters that follow.

Neutrality itself can be problematic, in practice if not in theory, and I note that a recent book by the Danish physician/scientist Peter C. Gøtzsche[6] plainly showed the problems with trying to hew too close to the center of the road. In brief, in his short book, Gøtzsche seemed to be almost bipolar in trying to both praise and damn vaccines and their respective proponents in virtually every chapter.

Particularly telling in the Gøtzsche book was the opprobrium heaped on Dr. Andrew Wakefield (discussed in detail in later chapters of the current

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book), the former medical doctor often considered to be fully disgraced with his work “debunked.” Oddly, in discussing Wakefield, Gøtzsche went on to praise the evidence about Wakefield from the nonscientist and highly conflicted journalist Brian Deer. From that, Gøtzsche did another 180-degree turn and critiqued the CDC (and WHO) as being almost completely untrustworthy while relying on their information on vaccine safety.

Clearly, there are dangers in any approach, pro-, anti-, or neutral, and any single one of these seemed likely to draw kudos or brickbats from the predictable voices on any side of the divide. Neutrality seemed to simply offer the chance to be clobbered by both sides.

It was in fact this last point that finally swayed me to do this book. Namely, that if I was going to draw flack no matter what I wrote, there really was nothing to lose if I wanted to do the book at all.

And I decided that I did: freedom for the people of Rojava was no different in kind from the freedom of people to make their own choices about health and what goes into their bodies. Human rights issues are human rights issues whatever the intensity of the violations and wherever they occur.

All of the above will come up again and again in what follows and will serve as the central theme of this book on the benefits versus harms of vaccination or any other medical treatment that may be on offer.

In the context of such human rights concerns, I will consider the basis of the widespread medical belief that vaccines are the best health defense yet invented against infectious diseases. To do so, in the following pages I will critically examine the scientific studies by the proponents of this view. I will also critically review the key evidence put forward by those who do not share this perspective, or those who hold a middle-of-the-road position.

But before I do so, I want to consider the basis of what is called the “scientific method” and what it can, and can’t, do and more specifically in

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regard to vaccines. In this consideration, we will see the value of the evidence from all sides.

The Scientific Method and What Science Can and Can't Do

The scientific method is considered to have arisen from the writings of Francis Bacon (1561–1626) in the seventeenth century. Bacon is often considered to be the first to formalize the concept, but the concept was in reality extant before this time, and Bacon and others were highly influenced by the earlier work of Copernicus (1473–1543) and Galileo (1564–1642). The Oxford online dictionary describes the scientific method as "A method of procedure that has characterized natural science since the 17th century, consisting in systematic observation, measurement, and experiment, and the formulation, testing, and modification of hypotheses,"[7] a definition that most scholars would generally agree upon.

It is important to keep this definition in mind in all that follows here, as it is clear that there is considerable misunderstanding about what is involved in the scientific method, both by some in the medical establishment and by lay people on the various sides of the vaccine issue.

The first thing to stress is that the scientific method is just that: a method for attempting to understand the natural world.

As per the above definition, the scientific starts with observation, then proceeds to the development of a hypothesis, the latter merely a more formal statement about how the person doing the observation thinks nature behaves. In the context of this book, I will use the oft-told story of how Dr. Edward Jenner came to be considered the father of vaccinology. This status is linked to how Jenner came up with his notion in the last decade of the eighteenth century to use pus from cowpox virus sores on milkmaids to inoculate people against the related smallpox virus.

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Jenner, so the story goes, observed that the milkmaids who had been infected with cowpox did not later become susceptible to smallpox. Although he did not state a formal hypothesis as such, he apparently believed (hypothesized) that he could duplicate the apparent immunity to smallpox by exposing others to cowpox.

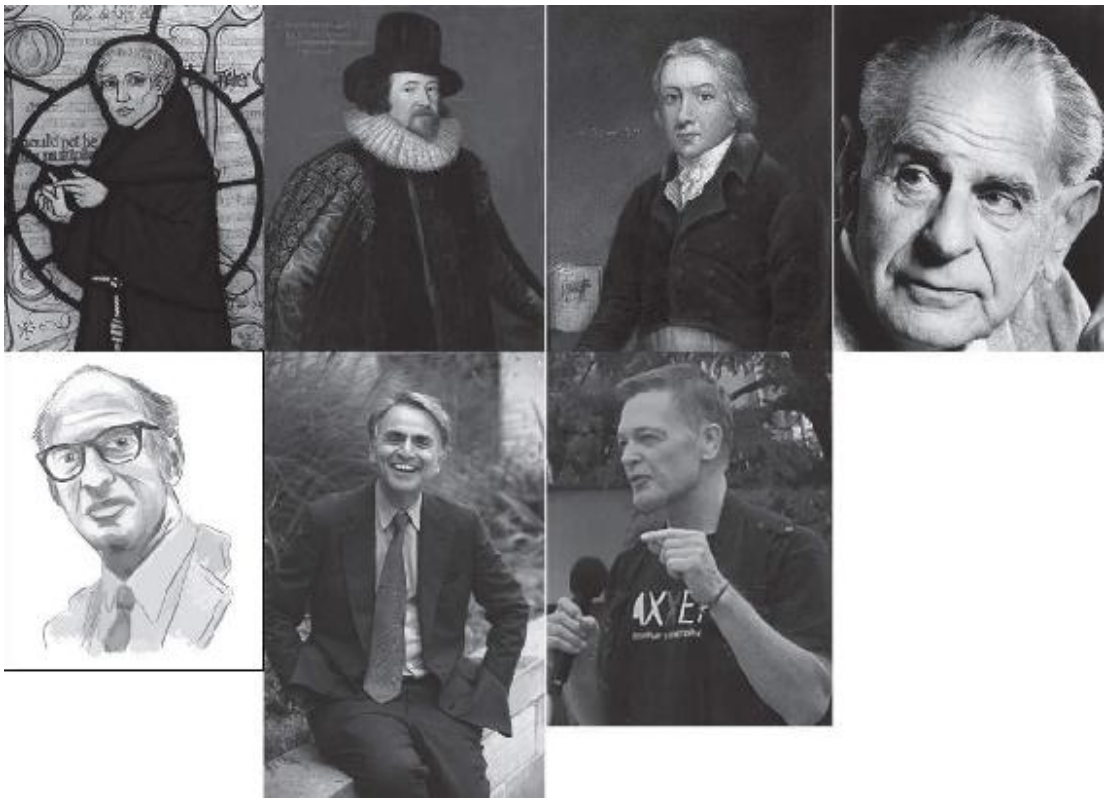

Figure 1.1. Composite of historical and current figures involved in describing the methodology of science regarding vaccine issues (shown chronologically): William of Ockham, Francis Bacon, Edward Jenner, Karl Popper, Thomas Kuhn, Carl Sagan, Andrew Wakefield.

Jenner's work will be examined in more detail in Chapter 2, but for now I will continue with the "official" story to note that Jenner then did an experiment that tested the hypothesis by deliberately exposing people to cowpox and then later observing if the subjects developed smallpox if challenged by the actual disease. The results convinced Jenner that his working hypothesis was correct and that inoculation with a substance that mimicked smallpox without actually giving smallpox would prevent a later

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appearance of the disease. The evidence that this worked seemed to confirm the hypothesis and led to the first vaccines and the widespread use of vaccination to provide immunity from many infectious diseases.

It is important at this stage to clearly define what a hypothesis is versus what a theory is. The terms are often used interchangeably, even by those who should know better, but they are very different, albeit related, things.

The best definition of theory that I have found comes from Wikipedia. I quote from it in detail, as it is important to get this correct right from the start:

> In science, the term "theory'" refers to "a well-substantiated explanation of some aspect of the natural world, based on a body of facts that have been repeatedly confirmed through observation and experiment."
>
> Theories must also meet further requirements, such as the ability to make falsifiable predictions with consistent accuracy across a broad area of scientific inquiry, and production of strong evidence in favor of the theory from multiple independent sources (consilience).
>
> The strength of a scientific theory is related to the diversity of phenomena it can explain, which is measured by its ability to make falsifiable predictions with respect to those phenomena. Theories are improved (or replaced by better theories) as more evidence is gathered, so that accuracy in prediction improves over time; this increased accuracy corresponds to an increase in scientific knowledge. Scientists use theories as a foundation to gain further scientific knowledge, as well as to accomplish goals such as inventing technology or curing diseases.[8] [For emphasis, italics are mine.]

In contrast, a hypothesis is defined by the Oxford online dictionary as "A supposition or proposed explanation made on the basis of limited evidence as a starting point for further investigation."[9]

In other words, a hypothesis is a hunch or a guess based on observation that depends on experiment for validation or rejection. A theory is based on a collection of outcomes from related hypotheses that create a general body of knowledge about some topic. It is important to keep in mind that both hypotheses and theories are the products of the human mind, not self-generating entities.

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Note that a key part of the definition of theory requires that it can be falsified by experiment. The same holds true at the hypothesis level in that a good hypothesis must also be able to be rejected based on the outcome of the experiment. So in the stages of the scientific method, the design of the hypothesis must lead to an experiment in which the hypothesis can be supported or rejected. A hypothesis that is validated by an experiment, however, is not "proof," nor for that matter is a theory built up of various observations proof. Both, in fact, are merely probability statements. For the first, this is where the statistical methods used in science come into play: they provide the probability that a given outcome to the testing of a hypothesis is likely to be correct. The cumulative probabilities of the various experiments that give rise to theories make the theory more likely, overall, to be also correct.

So how does one apply statistical inference to hypothesis testing? Basically, this is done by making two statistical hypotheses, the first being the *null* hypothesis (*H0*); the second is the *alternative* hypothesis (*H1*) in the comparison of bodies of data in some experiment. For example, if testing whether a particular drug will deliver a benefit (or an adverse effect) to a treatment group of subjects compared to untreated true placebo control subjects, one gathers experimental measurements for both groups and then analyzes these using various statistical methods that account for the variation in the data from some mean value (standard deviation or error). Testing the null hypothesis is basically testing the notion that there is no difference between groups. The probability value that results (the *p value*) tells you how strong the null hypothesis is. If the probability is very low, it means that the hypothesis is probably not correct. Typically, one rejects the null hypothesis if the p value shows that that it could be true at or less or equal than five times in a hundred. Thus the lower the p value, the more likely that the null hypothesis is wrong. If the null hypothesis is rejected, the alternative hypothesis is accepted. P value measurements are typically

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used in most biological experiments in comparisons between controls and one or more separate groups. In many vaccine safety trials, however, as we will see in Chapter 3, real controls are not typically used nor is it atypical to compare one vaccine against another or the vaccine against the adjuvant. In many epidemiological studies, researchers use confidence internals (CI) rather than p values. However, like p values, CIs measure the degree of uncertainty or certainty in a sampled population. Basically, a CI of 95 percent is the same as a p value of less than 5 percent.

In both cases, it is important to realize that we are speaking of probabilities. With this in mind, what does the frequently heard comment about vaccine safety that "the science is settled" actually mean in regard to the scientific method? The answer is that it is a meaningless and even nonsensical statement because being settled would imply that something had been proven. Rather, proof lies in the domain of mathematics and formal logic where a theorem can indeed be proven to be correct.

In the philosophy of science, there are several main views about how science progresses. As noted by Dr. James Lyons-Weiler,[10] objective science follows from the work of Karl Popper (1902–1994), who criticized what is termed "positivism," that is, the collection of facts that tend to support our own inferences or hypotheses. Popper proposed instead a form of "hypothetico-deductive" science based on a clearly stated hypothesis and what he called a "critical" test of that hypothesis, one in which the critical test is only such if the hypothesis can be falsified. A positive outcome to a critical test supports the hypothesis going forward; a negative outcome moves the science away from the hypothesis. This last, in turn, reinforces a view that the scientific method cannot *prove* anything but actually advances more by disproof, that, is the failure of a hypothesis based on the evidence, and thus the probability that it is not correct.

A somewhat alternative view of science was provided by Thomas Kuhn in his *Structure of Scientific Revolutions*,[11] which suggested that scientific

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theories about nature depend to a great measure on a majority view of those in the field that only change when enough experimental anomalies have arisen to make the majority view untenable. It is at this point that a new view arises that better addresses the anomalies and this new view becomes the dominant narrative.

Kuhn provides various examples of how “revolutions” in our understanding of nature arise and shifts the established scientific “paradigm” to another one. Such paradigm shifts are, in fact, relatively common. These are then, in turn, subject to further revisions. There are numerous examples of prevailing theories in medicine and in neuroscience and other disciplines where paradigm shifts have happened and then been subject to additional changes.[12]

It is against this backdrop that we have to evaluate the claims for and against any aspect of vaccination “theory,” practice, and policy. For example, does an objective view of the experiments done to date support the majority view on vaccination safety, or not?

In all the examples to be considered, it will be important to keep the lessons of the above clearly in mind: Is any experiment designed to be a critical experiment with a clear conclusion? Can the hypothesis to be tested be falsified by a negative outcome? Does the body of evidence suggest the probability that the existing theory is correct, or not? And finally, if the evidence is not clear and/or unambiguous, and if anomalies have arisen, what further information would we need to reject or modify the underlying theory?

In this regard, I want to quote a statement made about a controversy that involved two writers: Malcolm Gladwell, author *of Outliers: The Story of Success*,[13] and David Epstein, who in his book *The Sports Gene*[14] disputed Gladwell’s notion that intense specialization is key to mastering any skill. As Epstein noted about the subsequent debate with Gladwell:

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> *He [Gladwell] could have viewed our ideas as in zero-sum competition. But he didn't. He viewed it as an opportunity to engage in more discussion—often politely antagonistic but very productive discussion—and consequently we learned from one another. [This] set in motion what became not only a really productive intellectual relationship for me, but also a model of how two people publicly associated with certain ideas can engage without forcing zero-sum competition.*[15]

In brief, scientific controversies don't have to be zero-sum events.[16] And indeed, one question that will be implicit throughout the rest of this book is whether the contentions about vaccine safety and effectiveness are indeed a zero-sum game or instead amenable to civilized scientific and social dialogue. The evidence to date that the latter is possible remains to be demonstrated, but in my view, it is the only way out of what seem to be rapidly solidifying positions that are in some senses solitudes.

The notion that the competition of ideas can prove beneficial for both sides is well entrenched in Stoic philosophy.[17] With this in mind, in the following pages I will present the evidence by both mainstream vaccine proponents and the skeptical opposition.

To be as fair as possible, I will let the mainstream view on vaccine safety and effectiveness go first in Chapter 2 and follow it with the more skeptical vaccine narrative in Chapter 3. This is only reasonable, since (a) the pro-view of vaccine safety is the dominant view and (b) any gaps, real or imagined, in the claims about vaccines will serve to introduce the likely positions of the other side.

Some ground rules:

1. I will only consider in what follows the published and peer-reviewed articles cited as evidence for or against vaccine safety or effectiveness. In this regard, I do not consider statements or declarations from entities such as the CDC, Food and Drug Administration (FDA), WHO, or others to be informative to this discussion, unless, as above, primary references and sometimes

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meta- and systematic reviews in the peer-reviewed literature are cited.

2. The opinions of bloggers on any side will not be viewed as valid scientific arguments for the simple reason that such opinions are just that, opinions.
3. Articles that contain a lot of unsupported statements, such as "vaccines are the most effective medical treatment of all time" or "unvaccinated kids are healthier than vaccinated kids" will be discounted. Such statements may well be true but if so deserve to be fully referenced to the scientific literature. Anything else is opinion and/or speculation.
4. Logical fallacies such as the appeal to authority or ad hominem comments are automatic fails.

Occam's Razor and the Role of External Players

A long-established scientific principle is termed Occam's Razor (variant spelling: Ockham), also more formally termed the "**law of economy"** or the "**law of parsimony."**

In brief, Occam's Razor was first clearly stated by the philosopher William of Ockham as "*pluralitas non est ponenda sine necessitate,"* or "plurality should not be posited without necessity." In other words, simplicity is best when comparing different hypotheses or explanations for any phenomenon such that the simpler one, if equally able to explain the phenomenon, is more likely to be correct.[18]

It is not always true that the simpler explanation is the best, but it is true often enough to give some weight to the notion that nature prefers simpler solutions.

Occam's Razor is also used in criminal investigations, even if it is not called by this name. For example, police and others know that most crimes of violence such as murder are not committed by perfect strangers, but rather by someone the victim knew, if only in passing. It is for this reason

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that if a murder is committed, investigators first seek to rule out the family and friends of the deceased.

If we apply Occam's Razor to the question of vaccine mandates and the obdurate refusal of much of the medical profession to accept the reality of vaccine damage, the principle serves to shortlist the likely culprits for this state of affairs. Could the vaccine-injured patients or their relatives be responsible for such legislation? Maybe, but such would require an active conspiracy of people who likely don't know one another to force on themselves something that most of them profess to believe is an outrage. Could it be the legislators themselves are seemingly independently convinced that this is something they must do for the common good? Again, maybe. But anyone who has known people in any legislative body knows full well that most legislators are decent, hard-working people, and thus the notion that one or more of them would independently seek to potentially estrange their electors seems highly unlikely. What's left?

This is where, if we had followed police procedure, we would have asked ourselves, cui bono, who benefits? Now the likely answer becomes clearer: the pharmaceutical industry that makes the very vaccines that mandates are designed to foist on the population. We now have motive: money (or greed, one of the seven deadly sins; maybe pride as well and a vast host of others[19]). Occam's Razor and good police procedure would now zero in on those who had motive (greed) and opportunity (control of legislators through donations), namely, the same industry.

Occam's Razor doesn't always work, of course, but in this case it likely does. The hypothesis is vastly simpler than the alternatives while explaining all the facts: the endless push for legislated mandates, the lobbying of Congress in the United States, and all the other items so well documented in *Trust Us, We're Experts*, a book discussed in more detail later.

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The Benefits versus the Adverse Effects of Vaccines

Weighing the benefits versus harms of any medical procedure, just as in any human endeavor, is key to deciding whether or not that procedure should be implemented. This consideration applies whether one is contemplating a treatment for an individual or a population. The two are often intertwined, but not always. For example, the Framingham Heart Study (FHS) of cardiovascular disease monitored 5,209 of people aged twenty-eight to sixty-two years old over decades documenting a range of cardiovascular and biochemical measurements. In so doing, the FHS provided a clear list of risk factors for such disease as the population aged. This study is now working with the grandchildren of the original participants.[20]

Based on these data, individuals can now be evaluated by their health-care provider for their own individual risk of developing cardiovascular disease, heart attacks, or stroke and advised on some steps to take to diminish the risk factors.

When it comes to vaccines, however, the issue is less clear-cut. At a population level, the various phase trials of any vaccine can evaluate the overall effectiveness of a new vaccine in a subject population and detail some of the identified adverse effects, if any, in that same population. So, for example, with the current measles, mumps, and rubella (MMR) vaccine, the conventional view in the mainstream medical community is that two doses of MMR confer 97 percent protection in the population at large.[21]

A problem that can arise lies in the selection process for this: Is this 97 percent effectiveness for all ages both sexes, and for all racial groups, or is it not? Further, how would you know if you were one of the 3 percent where the vaccine did not work?

Obviously, one way to find out would be if you got measles. Another way would be to be tested for antibody levels for measles, but very few people do this unless they are in the health professions and need to know if

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they need to receive a booster shot or not. The general population is not likely to do this. In the face of this, many doctors are likely to simply recommend another booster from the perspective that “it can’t do any harm given that adverse effects are extremely rare,” an often-heard medical opinion. If adverse reactions are not as rare as stated, it will significantly alter the benefits-to-harms ratio.

In broad strokes, the benefit of receiving the MMR vaccine is that for those not in the 3 percent with primary vaccine failure, the vaccinated are now thought to be protected from the three diseases. The protection afforded can now be compared to the negative outcomes of the disease itself, which can include all of the symptoms of the disease, but also the potential for encephalitis, hospitalization, and death, mostly in the youngest and oldest segments of the population.

How many of those who get measles have one of these outcomes? The numbers are actually very unclear and largely depend on whom one asks. The CDC makes a claim that one (or more) people in one thousand people who get measles will die.[22] In North America, this number is likely to be highly inflated,[23] thus leading medical organizations to promote vaccination as an alternative. However, in order to do the full benefit-risk calculation, one needs the numbers per thousand (or whatever number of the population) who have significant adverse vaccine outcomes. The actual number is harder to calculate, as it depends on the various surveillance systems designed to monitor negative vaccine outcomes, as described in Chapter 3. One such is the sometimes-maligned Vaccine Adverse Events Reporting System, VAERS, maintained jointly by the CDC and FDA.

A major complaint about the system is that anyone can file a report. However, those same complainants tend to forget that all reports are vetted by physicians working for the CDC who can reject reports that appear (to them) to be spurious. However, since reporting adverse events is not mandatory, in many cases adverse reports are not filed at all. In part, the

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lack of complete reporting stems from two main factors: one, doctors who make up the bulk of those submitting reports are often too busy to do so routinely; and two, medical doctors trained to believe that adverse vaccine events are extremely rare may simply not believe a patient's complaint. In Chapter 3, I will show that while it is convenient for those defending vaccines to critique the VAERS system, it remains for many the primary repository of vaccine adverse effects and is often used by those same researchers in attempts to provide evidence for the safety of various vaccines.

To determine just how effective VAERS is in general, a private company, Harvard Pilgrim, was contracted by the CDC. Harvard Pilgrim concluded that less than 1 percent of adverse reactions were reported.[24] The extent to which this is true means that getting the correct ratio of benefits to risks is going to be inaccurate, maybe wildly so by overestimating the benefits and underestimating the risks. The same problem with evaluating the risks attends many vaccination recommendations, notably for the human papilloma virus (HPV) vaccines and many others.

All of the above simply illustrates that, in the absence of accurate information, risk-benefit ratios are actually hard to calculate and, with an apparently increasing skeptical population of most things medical, harder to get people to comply with vaccine recommendations.

The risk-benefit analysis for vaccines actually forms the core of the controversy about vaccine safety and effectiveness, and it is here in this arena that the two very unequal adversaries battle for the scientific, social, and moral high ground

Although aspects of this risk-benefit analysis will be presented throughout the following pages, let me start by presenting, as I understand it, the concerns of differing sides in the "debate" that one side, the mainstream medical side, typically refuses to have.

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Let me emphasize at this point that to many from the mainstream perspective, my analysis is likely to be biased by being considered to be an "anti-vaxxer." I don't consider myself to be anti-vaccine, but then those who make this claim would go on to say that anti-vaxxers never do.

Fair enough. Let's see what a summary of the data shows when we get to Chapter 3.

What Evidence Should Any Side in the Vaccine Wars Present To Best Support Their Position? (Part 1)

With these rules in mind, what sort of evidence would be needed to make the case for or against vaccine safety or effectiveness?

In regard to safety, the pro side would have to demonstrate with actual verifiable numbers vaccine-preventable damage versus injuries arising from the vaccines developed as protection against the actual disease. For example, with measles outbreaks being heavily covered in the news in the United States and Canada in 2019, a quantitative evaluation of these numbers of deaths or serious injuries to the disease compared with the same for the vaccine would be essential. Ideally, it would have to provide this evaluation for each vaccine in the CDC's schedule. Further, the evaluations would have to be done in the same general populations such that potentially vaccine-preventable deaths or serious injuries to measles in Kenya, for example, would not be juxtaposed with serious measles vaccine adverse events in the United States. Vaccine-induced herd immunity, or the more politically correct form of what is called "community immunity," if evoked, would need to be validated by studies in actual animal herds or in humans. The concept of herd/community immunity that occurs in nature and is purported to be possible with vaccination will be addressed in Chapter 4. Additionally, any reliance on computer modeling without any adjustment for possible secondary vaccine failure would not be acceptable. Further, the

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time period of the study should be of sufficient length to allow for slowly emerging negative outcomes, such as those associated with autoimmunity, to be recognized and documented.

In terms of vaccine effectiveness, the ideal data would consist of challenge studies in humans in which a randomized control test (RCT), the "gold" standard of practice, was in place. In an RCT, two clear groups of subjects, randomly assigned, are given either the actual vaccine or a real placebo control. By placebo, I mean that the placebo treatment should be something that is deemed to have no possible effect, such as saline. The use of another vaccine as a control, or an aluminum adjuvant as the control, is simply unacceptable, in spite of a great deal of the literature used to justify such treatments as valid. The study should state a hypothesis that in the study design was falsifiable. The study would have to be adequately powered to detect what it intended to detect, and appropriate statistical methods would have to be used.

In the challenge part of the study, the people or animals in both groups would have to be exposed to the pathogen in the same way and for the same duration, and both groups would have to be representative of the actual populations being considered for vaccination. For example, excluding people with certain conditions such as autoimmune disease would not be acceptable generally, at least without some commentary in the final report that the study did not apply to that part of the overall population nor could vaccine safety for that subpopulation be assumed in vaccination recommendations. Since vaccines are in fact mostly given to populations at large without any screening for conditions such as autoimmunity, without such stipulation there would be no evidence that this fraction of the population might not be at risk and should be exempt from this vaccine.

It is a widespread method in pharmaceutical company trials to compare an experimental drug that is intended to address some medical condition with an older drug for the same condition. In this case, the comparison is

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designed to compare drugs with one another for efficacy, not against a “no” drug real placebo control. In vaccine safety or efficacy trials, however, as cited above, the use of another vaccine as a control for the novel vaccine is problematic, since it presumes that the older vaccine has a demonstrated safety profile that may not actually be in evidence, particularly if that older vaccine was tested in the same manner. In addition, different vaccines are designed for specific diseases, not diseases in general, and are developed on different platforms and with different antigens and hence may vary significantly in their immunogenicity and the types and levels of adjuvants used.

Further, the use of the adjuvant alone, usually one of the traditional aluminum salts or newer proprietary formulations with aluminum, does not constitute a real control, merely a test of whether the whole vaccine with antigen and aluminum and other excipients is different from the adjuvant alone. If, for example, the aluminum adjuvant was shown to be a prime factor in adverse reactions in some vaccines, then no difference would be expected between health outcomes in the two conditions. Indeed, this tends to be what is found in many studies and points to the obvious fact that such a study design is probably the best way to *not* find adverse outcomes. Such study designs may be standard in the field, but that fact does not make the methods here any less careless or even deceptive.

Let’s take another example, not vaccine-related, to see how such a study might play out in a study of the impact of toxins on the nervous system. For example, perhaps I want to know if a toxin (Toxin “A”) that has been described in the scientific literature will generate motor neuron loss in our laboratory mice if presented in diet or by injection. If I use as the comparator group another toxin (Toxin “B”) that also might trigger motor neuron loss, all I know at the end of the study is that toxin “A” is more, less, or the same in toxicity compared to toxin “B.” If it turns out that the

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outcomes are the same, I am not justified in concluding that toxin A is not toxic.

In academic studies, any master's or doctoral student who tried this without a control arm would rapidly find their thesis rejected if they tried to justify this study design by claiming that past studies of the older toxin had once upon a time been compared to controls. Given how much might have changed since such an older study was completed, an assumption that the previous control could carry over to the newer study would certainly be discounted.

The lack of controls thus looms as a significant methodological flaw no matter who performs the experiment. As an example, a relatively recent article by the Exley group that claimed that brain samples from people with autism had high levels of aluminum deposits was roundly, and I think somewhat justifiably, critiqued for the lack of control samples by many of the same bloggers and mainstream sources who routinely accept the lack of real controls in vaccine trials. Such a dichotomy is more likely to be driven by some agenda than by a desire to protect the scientific method.

A second caveat, to be explored in more detail in the next chapter, concerns the use of "surrogate" markers of the stages of a disease or of the strength of an immune response. This is understandable in vaccine trials, since actual challenge experiments in human trials are quite rare. The reason this is so is that they might require exposing test subjects to the actual disease-causing agent.

The Combatants and Bystanders in the Vaccine Wars

In this section, I will consider who the players are in the "vaccine wars." The actual history of vaccination and the stages in its evolution as the dominant paradigm for disease control in modern medicine will be presented in Chapter 2.

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The "Pro-Vaccine" Camp

The first grouping can be described as the "pro-vaccine" group. It comprises most medical doctors trained in any medical school that might be described as "allopathic." The Merriam-Webster dictionary definition of allopathy:

> relating to or being a system of medicine that aims to combat disease by using remedies (such as drugs or surgery) which produce effects that are different from or incompatible with those of the disease being treated."

In other words, allopathic medicine is what is conventionally considered modern medicine, ideally evidence-based by being rooted in peer-reviewed scientific studies.

It would be safe to say that most graduates of allopathic medical schools believe, or profess to believe, that the practice of vaccination against various infectious diseases is one of the fundamental and most important advances in medical history. Such doctors (and nurses) credit vaccination with saving millions of lives and much suffering since its initiation in the late eighteenth century.

These medical professionals also usually hold that any adverse effects of vaccination are mostly minor (i.e., a sore arm) and thus inconsequential to general health. Similarly, it appears to be a widespread belief that serious adverse events, for example, seizures, neurological disorders (including autism spectrum disorder, or ASD), and those impacting other organ systems are *extremely* rare. Thus, for those trained in this perspective, the risk-to-benefit equation vastly favors vaccinating over not vaccinating. Also, since in this view the risk is microscopic for any serious adverse event for any one vaccine, increasing the number of vaccines does not measurably change the equation.

Medical doctors have spent considerable time (and money) getting their credentials, first in whatever premedicine program they followed, then in medical school, later in their medical residencies. They consider themselves

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to be experts on things medical, as they often are in their own particular specialties, and usually very much resent lay people disagreeing with such hard-won expertise: eight or more years in medical training is likely to be vastly superior to studying at “Google University,” and thus medical doctors have little time for those whose “training” is from the Internet. In this regard, doctors are not dissimilar to those in other professions: plumbers don’t like nonplumbers telling them how to solder pipes; lawyers don’t usually like lay persons explaining torts to them, etc.

Some medical doctors have even seen the ghastly impact of “vaccine-preventable” deaths, especially in young children, and such events are highly likely to influence how they view people who choose not to welcome what they may consider the life-saving impacts of the various vaccines on offer.

In other words, summing up, the mainstream allopathic view toward those who don’t, or won’t, vaccinate would be something like the following:

> I am the expert in this, not you; vaccines save lives and I’ve seen it the preventable deaths that a vaccine would have saved, you haven’t. In fact, vaccines work so well that they are victims of their own success. You have never seen the real consequences of not vaccinating. Your sources concerning vaccine safety are pseudoscience since vaccines are highly tested and screened for adverse effects, most of which are trivial. Those who disagree are cranks whether they hold advanced degrees or not, and/or grifters out for a fast buck. You are endangering your child by refusing to accept my expertise and the wealth of science that proves what I am saying. Thus, those who choose to reject the science, which is “settled,” are the reason why we need vaccine mandates.

This may not be the views of all allopathic doctors and nurses, but I suspect the vast majority of the same would agree with most of this.

I should mention that I actually understand the annoyance that many medical doctors feel when challenged by patients or laypersons about vaccines or anything else. Certainly, most neuroscientists I know are not particularly welcoming to lay people who want to try out their Internet-

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derived hypotheses on us. I get more than a few of these hypotheses every year, often cloaked in a potpourri of neuroscience terms that make the hypothesis (usually described as a theory) sound superficially more credible than it actually is. The worst part is not the hypotheses/theories per se, rather the inability to accept that some/most of the premises and "evidence" leading to the theory are simply wrong. I spent four years getting my bachelor's degree, another three doing my master's, five years in a PhD program (although some of this time was eaten up by army service), and eight years as a postdoctoral fellow/research associate. It's a lot of time and lots of dues paid to even get to an assistant professorship. For this reason, I get how doctors feel about being challenged, I really do.[25]

What's the difference between basic science people and some MDs? One thing I think is true is that scientists, maybe especially neuroscientists, as arrogant and Type A as many can be, do mostly realize that what we understand about the brain in health and disease is always changing. Maybe this fact doesn't provide better behavior, but it at least encourages more humility in regard to the reality of changing evidence and the interpretations of this evidence. In contrast, at least when it comes to the entire subject of vaccines, many MDs approach the topic as though it were part of Holy Scripture. Thus, challenging any part of it is not merely annoying and an attack on their expertise, but rather an attack on their "faith." (See Chapter 8.)

It is worth remembering in this regard that the training basic researchers in any field receive versus that of MDs is quite different. Admission to graduate school and admission to medical school are in general fairly challenging, but once one is admitted, the expectations and paths vary considerably. Graduate school candidates are not usually looked on as particularly special or elite people just because they got into grad school. Medical students, however, are, and this sense of specialness permeates much of their self-image that emerges over the course of their training from

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the first years on through residency and beyond. In medical school, challenging your instructors on medical issues is not usually a path to career success.

In contrast, in graduate school challenging accepted paradigms may well be a good choice, since it is accepted that your role is to provide some original insight into your chosen scientific field. Indeed, throughout their careers, basic scientists are used to having their hypotheses challenged and to finding out that these hypotheses are often, in fact usually, incorrect. Scientists are used to their field evolving such that many of the things they learned in graduate school or as postdoctoral fellows will eventually be shown to be incomplete, or just frankly wrong. Make no mistake, no one likes abandoning a pet hypothesis or finding out that some core concept they have carried for years is incorrect. However, in my experience, with minor exceptions, few neuroscientists are so enamored of their hypotheses that losing a pet hypothesis creates much professional pain.

Medical doctors, in contrast, *are* their profession. They are used to the social prestige that being a doctor conveys and to upholding the teachings they have received. Challenging their training tends to be seen as challenging them as people.

Of interest, a number of MDs also hold PhDs, and this makes for an odd mix: unwilling to be challenged professionally as doctors, but quite used to being challenged as scientists.

This is not to say that medicine doesn’t evolve in its knowledge of human health and disease and in treatment options. It does. However, the process by which it does is different. Some examples will be cited later in the book.

Of course, all of this is a generality. Not all MDs are the same, nor are all basic scientists the opposite. However, having known more than a few of both professions, I think it fairly safe to say that, in general, these observations apply.

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One other key aspect distinguishes medical doctors from basic scientists: the public perception of what each does and how this is often portrayed in popular culture. For example, there are numerous television shows about doctors, few to none about bench scientists. Doctors are seen to inhabit a rarefied world of life-and-death decisions, the stuff of drama, where their training and experience make the difference about who lives and who dies. In contrast, scientists tend to be personified as sort of nerdy, often chasing weird, improbable hypotheses. The television show *House, MD* versus the movie *Back to the Future* comes to mind, and these are, I think, pretty typical depictions of what is portrayed to the general public about what each profession does. Given this, whom are lay people expected to trust with their health? It's obvious, and in news interviews or courtrooms, scientists rarely carry the respect and gravitas of medical doctors on any given medical topic.

I will come back to this in the next sections, but I really think that this is the root of much of the disconnect between parents and the medical profession that the vaccine wars have generated, namely, prestige and type of training.

True "Anti-Vaccine" Proponents

A distinctly contrasting view to the ideologically pro-vaccine mainstream medical profession is held by those who could legitimately be described as "anti-vaccine" in that they are simply against the practise of vaccination. Those who fit this description are much like those opposed to genetically modified foods in that they don't believe the claims made by the proponents in regard to the science behind the practice, the safety profiles of the products, or the reality of the benefits.

In regard to anti-vaccine positions, true anti-vaccine proponents tend to flatly disbelieve that vaccines provide any level of immunity to the infectious diseases for which they were developed; if they believe in germ theory at all, find the published or reported scientific literature wanting; and

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frankly believe that vaccines can only cause harm, rather than any benefit. A corollary view is that vaccination and vaccines are somehow unnatural and hence violate the sacred nature of the body. Some of the anti-vaccine stance in some opponents is religious in nature, and some aspect of this has existed since the earliest attempts to vaccinate human populations. Indeed, the pro-vaccine side tends to dredge up this now-ancient vaccine meme from the years after Jenner's seminal reports and endlessly attempts to tar the current vaccine-hesitant with the same brush.[26]

What fraction of those typically described as "anti-vaxxers" do these individuals comprise? It is hard to say precisely, but a best guess is that they are a distinct minority, although a minority that may be growing. As alluded to elsewhere in this book, the growth of true anti-vaccine sentiment may be driven in part by a "pushback" to the oftentimes-condescending attitudes and behaviors of the pro-vaccine camp. Some in this grouping even have degrees in the related subjects of immunology and base their objections to vaccination based on their understanding of immunology and how the immune system operates in health and disease.

The Vaccine-Hesitant or Resistant

By far, most of those who have any objections to vaccines in any aspect of efficacy or safety fall into this camp. Many of these, at least in my experience, are quite knowledgeable about vaccinology theory and practice and tend to be relatively up-to-date on emerging studies on vaccine safety in particular. They may also be quite adept at seizing on and critiquing the statements of pro-vaccine proponents, particularly medical professionals who may not be as firmly grounded in vaccine theory as they should be and hence not equipped to defuse, let alone debate, the knowledgeable vaccine-hesitant. The status that medical doctors once seemingly enjoyed by right of their medical degrees, that is, the "trust us, we're experts" mantra, has fallen flat with this group.

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The numbers of this grouping have been swelled by several key factors. One is that much of this group originates in those who believe that people they are close to, often their own children, have been injured by vaccines. Or, they are simply tired of feeling bullied, pressured, and dismissed by the by pro-vaccine side and the latter's unwillingness to engage in debate/discussion except to denigrate them as tin foil (or aluminum) hat conspiracy theorists, a position taken by far too many on that side of the issue.

An argument could be made, as various commentators have done, that this grouping represents the bulk of opposition to vaccine mandates and reflects the very predictable response to pressure, particularly pressure coming from those who may have the *official* credentials but actually may know less about vaccines than those they are belittling.

One interesting aspect of the categorization of this group as anti-vax is that it tends to sweep in medical doctors and research scientists who have apparently deviated from the true faith (see Chapter 11). The assumption, often stated by bloggers such as Orac or Skeptical Raptor (see Chapter 9), is that doctors who ask questions have forgotten, or abandoned, the vaccine wisdom they learned in medical school. Indeed, such comments suggest that medical doctors in this category should lose their licenses. Particular targets of such ire are Drs. Bob Sears and Yehuda Shoenfeld, the first a pediatrician in Southern California from a well-known family of other pediatric specialists, the latter a lead researcher on autoimmunity. There are many others, in particular the now legendary Andrew Wakefield, briefly mentioned later in this chapter and in detail in Chapter 4. Wakefield is considered in some pro-vaccine circles, and much of the mainstream media, to be the virtual godfather of the anti-vaccine movement, whatever it is that movement really represents.

In much the same way, bench scientists who publish any data raising vaccine safety concerns have now joined the legion of "scientists who used

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to do good work until they went over to the dark side." Certainly, a number have fallen into this bracket, including this author, as well as Drs. Chris Exley, an aluminum expert at Keele University in the United Kingdom, and Romain Gherardi, a Paris-based researcher who has looked intensively at aluminum adjuvant transport into the nervous system. There is a host of others who will be mentioned in the following sections of this book.

By so attacking and demonizing those who dissent, the mainstream medical community and the bloggers simply demonstrate time and time again the essentially fundamentalist religious nature of vaccinology (Chapter 8).

The Remainder

The rest of the population, much as in most political issues, is made up of those who simply have no concrete opinion on the subject of vaccination, or simply don't care. They either go along with vaccine schedules because they have always done so or were told to do so by their physicians. Alternatively, others innately distrust any governmental organization and refuse to go along, regardless of the subject. The former tend, for the purposes of accounting, to fall in the pro-vaccine side; the others usually, but not always, into the vaccine-hesitant/skeptical camp. (In later chapters, I will explore in more detail the sometimes bipolar nature of what is termed the "left" when it comes to vaccine belief and compliance.)

All of the above should make clear that vaccine acceptance or rejection comes in many flavors and reflects a variety of attitudes, not all hostile to vaccination in general. Attempting to reduce this spectrum of attitudes to vaccination as a "you are either with us, or with the terrorists" polarity is simply incorrect in the same way that former President George W. Bush's statement after September 11 misrepresented the range of responses around the world to the events of that day and afterward. The end result of such simplistic thinking led inevitably to the US invasion of Iraq and the endless

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wars in other parts of the world. Trying to force people into one or the other extremes in the vaccine wars is just as likely to backfire.

Once an “Anti-Vaxxer,” Always an “Anti-Vaxxer”

My colleagues and I sort of suspected that we had been branded as anti-vaxx early in 2011. In that year, a new postdoctoral fellow in my laboratory, Dr. Lucija Tomljenovic, and I had submitted a grant application to the Canadian Institutes for Health Research (CIHR), the Canadian equivalent of the US National Institutes of Health (NIH). The grant was designed to look at the toxicity of aluminum from various routes of administration: inhalation, diet, and injection. The word *vaccine* was mentioned only as an example of injected aluminum, without any comment by us about vaccines in general or in relation to autism.

The grant was reviewed and rejected. Not a great outcome, but not really an unexpected one given that CIHR review panels only fund about 12 percent of applications, often less. Perhaps it was just a poorly constructed application? Sure, maybe. However, of greater interest were the comments of two of the three reviewers, both of whom said that the proposed experiments added nothing novel, since, to paraphrase, Andrew Wakefield’s original article had been retracted and thus all of his work “debunked.”

It was in this rejection of our grant that one sees the power of the frame: a grant that was all about aluminum exposure by *any* route was rejected with comments about a study and vaccine that had nothing whatsoever to do with aluminum. In brief, in the view of the reviewers, Wakefield had been debunked, which then meant that any critique of vaccines of any form was also debunked.

The second major revelation to me about the frame came much more recently as I was just starting to write this book. One of my main interests outside of academia, as previously noted, is the struggle of the Kurds and other minorities in Rojava for autonomy.

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In October 2019, the Turkish army invaded parts of Rojava in order to crush the nascent autonomous region. A medical group I helped found (Rojava Emergency Medical Service) had a member inside Rojava working to coordinate medical personnel and supplies in aid of those injured in the fighting.

Our member, who goes by the nom de guerre of Argeş, was the man on the ground coordinating the supplies and people that I was able to send into the country. One odd *Signal* message suddenly came from Argeş, something along the lines that some of the potential donors from a Chicago- based anarchist collective for our medical group were concerned about me being an "anti-vaxxer."

What Argeş wanted to know was if I really was an anti-vaxxer, although he stated that he didn't have an opinion about it one way or the other, apart from how it might impact donations. Needless to say, I gave Argeş a serious dressing-down that started with the words "Are you serious?"

The bottom line is that Argeş, an activist fighting for a political cause and a radical by most definitions, is not someone educated in, or even particularly interested in, medical issues. And yet, he had found that somehow anarchist donors had thought I was anti-vaccine and hence were wavering on providing medical assistance to Kurdish refugees fleeing an invasion. Seriously?

The point of these two vignettes is this: the demonization of Andrew Wakefield, and all those deemed to be his successors, spreads to all aspects of medical research and practice, no matter how remote or far away from any aspect of vaccination. Further, it spreads to people far removed from the very theory and practice of vaccination.

Science Literacy versus Illiteracy: It's Not Just Confined to Lay People

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It’s typical that those in the pro-vaccine camp tend to present science in a very nonscientific light. Included in those who do so are most mainstream medical health providers; the official medical organizations; entities in the United States such as the CDC and FDA and those internationally, including WHO, along with the pharmaceutical companies that make vaccines; and the freelance and for-hire Internet bloggers (Chapters 9 and 10 explore these links in more detail). By and large, most mainstream media tend to go along (see Chapter 10).

For each of the above entities, there seems to be a tendency to label the status of vaccine safety as “settled,” an odd thing to state given that it is not the fundamental nature of science to be settled about much of anything. Such a statement is often uttered or written with a corollary statement that some study, for example, “proves” that vaccines don’t cause autism.

I suspect that most scientists working on vaccines know all of this fully well and further know that stating that science is settled is nonsense. The statement about vaccine science being settled, however, is likely not meant for them, but for the lay public, whose overall grasp of the scientific method and what it can and can’t do is often meager.

It is in this latter statement that we can see the level of confusion about what science really is, and isn’t, as described earlier in this chapter. Proof, as cited previously, is the domain of formal logic and mathematics. In contrast, science does not prove anything, but merely builds by experimentation a body of data that makes certain assertions about nature more or less likely. In some cases, this body of knowledge can become pretty overwhelming, but this is still not proof, but rather probability.

Of all the sciences, perhaps the discipline where it can be said the least is in vaccinology. Hence, rather than being settled or proven, the very best that might possibly be said is that, based on a number of studies, a high probability exists that vaccines are safe, that they do not cause autism or

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any other developmental disorders, and that they are effective at preventing the diseases for which they were developed.

However, to anyone with both science training and an even partially open mind, such statements have to contend with a number of rather fundamental challenges. For example, what is one to make of the experimental data that contradict these notions? Further, how are the studies that support the "safe and effective" perspective chosen, and why are those studies that dispute it rejected? Which criteria are used for either? Even if true in one population or age group, what about other populations or age groups? What about temporal effects in which a vaccine may experimentally be considered safe on the day of administration, but not after a year? Are such vaccines equally safe for both sexes? What about combinations of vaccines given sequentially, or simultaneously, the latter incidentally a question never answered by any studies until that of Eidi et al., 2020?[27] All it would take to lower the probability that the blanket safe and effective designation for vaccines is true would be a contrary outcome to any of these questions.

In actual fact, it is not that such negative outcomes don't exist in the experimental literature, but rather that the pro-vaccine lobby is remarkably effective at cherry-picking its way past such studies to focus on only those that give the desired outcome.

Not only is this not science in any traditional sense, but rather is a form of pseudoscience in the pursuit of an agenda. Professor John Oller has termed such approaches akin to "calculated bias and loaded dice."[28] What that agenda is will be explored in more detail in Chapter 6. I suspect that most working scientists would tend to agree with this view, at least those who are able to leave behind their own self-interest and examine the issue rationally based on their training.

It should be mentioned that medical doctors are not necessarily scientists in the real sense of the word. Some are, of course, but most are

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not, and the process of scientific enquiry is not the fundamental part of their training compared to research scientists. True, most people who go on to medical school have basic undergraduate science backgrounds, and it is also true that many of the greatest medical scientists, past and present, have been primarily trained in medicine.

However, medicine, while increasingly backed by scientific inquiry, is not in many cases actually scientific. Rather, it is an assumed body of knowledge, some based in experiment and observation, some based on intuition and indeed the "art" of medicine. While most MDs have, in their training, been exposed to most of the broad strokes of medical theory and practice, few are likely to be masters of any but a small part of this.

How Much Vaccine Education Does One Get in Medical School?

Medical doctors oftentimes denigrate laypersons who disagree with them, particularly when the subject is vaccines and vaccination, by pointing out that they have the medical training to understand medical issues and the laypersons have only the "misinformation" provided by "Dr. Google" or some blog.

Let's imagine for a moment that this is true. If so, can we quantify how much formal education most MDs have on the subject coming out of either medical school (usually four years) or after a residency? At my university, the latter is typically five years in length for most specialties, with two years being the required time for "family practice."

Not all medical schools are equal in this regard, but those that have adopted a "problem-based learning" structure are likely relatively similar.[29] It is important to remember that the four years of primary medical training are jam-packed with information, and a lot of in-depth material simply cannot be presented in the time available.

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However, given this, I want to explore some examples, starting with my own school, the University of British Columbia's Faculty of Medicine.

Based on a current list of the "blocks" of subjects in the first two years, there are none devoted to vaccines or vaccinology. However, within the various blocks are a number of lectures that touch on immunology, infectious disease, and related subjects. Here are the numbers:

Year One:
The number of lectures that seem to focus on vaccines (each lecture is fifty minutes long): one; The number of lectures that *might* touch on some aspect of vaccination theory or practice: seven.

In the former category is the following lecture in the fifth week of instruction: "Vaccines and Immune System Review." This follows three lectures two days earlier on: "Introduction to Immunology," "T cells," and "Bridging the innate and adaptive immune systems." The next day, the students get: "B cells" and "Immune dysregulation and deficiency." One assumes that this crash course on immunology, a rather complex subject, is designed to provide the basis for understanding how vaccines work, or are intended to work.

Year Two:
Zero and two, respectively. I note that in the first teaching block of Year 2, students have a case involving developmental neurological delay that turns out not to be due to vaccination, but due to a gene deletion. Nonetheless, the program inserts a short article from the Canadian Pediatric Association that assures the students that vaccines are safe and effective and that Andrew Wakefield's work was debunked. This document can be found online in Appendix 1.

Year Three (the clinical rotation or "clerkship" year):

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In this year, the students rotate through four main clerkship blocks of ten weeks each that include:

Women's and children's health: This includes two weeks' worth of topics in pediatrics and obstetrics/gynecology. Included in this block are subjects such as infant developmental milestones, a consideration of autism spectrum disorder (ASD), attention deficit hyperactivity disorder (ADHD), and other causes of speech and language delays. In a session titled "The Newborn," students receive instruction on the "importance of vitamin K administration in [the] newborn period." [Brackets for addition are mine.] More specifically for vaccination, there is a block called "Pediatric Health Supervision," in which students are taught to "identify [the] routine immunization schedule in BC; [and] counsel parents on contraindications and side effects of common immunizations." [Brackets are mine.]

Surgical and perioperative care, which includes general surgical practices and exposure to some of the sub-specialties: nil.

Brain and body, including a week of psychiatry: nil.

Ambulatory care: nil.

In a sub-block week titled "Family Practice," one session is on "Immunization" and includes the following objectives:

1. Appraise evidence for various vaccinations, including appropriate timing and administration, immunization schedules, indications and contraindications;
2. Demonstrate the ability to counsel patients and parents on the risks and benefits of vaccinations, including *dispelling myths and misconceptions*;
3. Counsel parents and families on the risks and benefits of travel vaccination and medical planning;
4. Identify the patient vaccination status. [Italics are mine.]

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Finally, by the end of Year Three, students are expected to be able to demonstrate a range of clinical skills. Relevant to vaccination in the Family Practice section of Ambulatory care is item 22, “injection administration.”

Within this year, the students also get a week each of dermatology and ophthalmology.

Year Four is the year in which students in twenty-four weeks take “electives” from a list of 590 possibilities and some other courses to help them get ready for their residencies as they start to transition to the actual practice of medicine. Of the 590 electives, there are some nineteen general categories with some having more than one possible subsection. Examples of some of these electives are anesthesiology, dermatology, internal medicine, surgery, public health, pediatrics, and many more. The large number of listings reflects not only similar electives running within hospitals in Vancouver, but also others from other areas of the province and even out of the province or the country.

Clearly, in some of these areas, such as in pediatrics, there will be lectures and other instruction on vaccine-related issues. Whether such instruction serves to actually present the pros and cons of vaccination, rather than just check the box that “vaccines are safe and effective,” is not clear.

These numbers seem to be broadly similar to the numbers from other medical schools examined in conversations with MDs elsewhere, but specific comparisons are difficult.

However, in regard to UBC’s medical school, several points should be considered: First, the amount of material the students are expected to absorb and master is enormous, and clearly there is little time for going into any of the broad range of subjects in particular depth. Second, depending on how it’s calculated, students at UBC may get more instruction on vaccine theory and practice than medical students at other universities. This, of course, is very good.

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What is uncertain, however, as above, is just how critical such instruction is. The note above on the training for “dispelling myths and misconceptions” may give us some clue and may not be surprising given the general consensus in medical schools about vaccination and the uncritical view of its benefits in general.

At the end of the day, the goal of programs such as at UBC is to encourage the use of what is called “evidence-based medicine” (EBM), that is, the practice of medicine based on valid experimentation and evaluation. One definition of EBM is:

> Evidence based medicine (EBM) is the conscientious, explicit, judicious and reasonable use of modern, best evidence in making decisions about the care of individual patients. EBM integrates clinical experience and patient values with the best available research information.[30]

The “best available research information” should be, in turn, derived from actual research, rather than assumptions and statements of faith.

Medical schools and their students are officially committed to this concept. The challenge is to ensure that EBM actually occurs, and to do that requires that physicians know, and act on, the best research in any field. In order to effectively do this, they have to know all sides of the issue, whatever that issue might be, not merely parrot information that they have been told but not researched themselves.

Residencies

What about residencies at the University of British Columbia (UBC)? How much vaccine content is there?

This seems to depend on the program itself. For example, Family Practice and Pediatrics, in which the bulk of vaccine delivery actually occurs, will likely feature some of it. The question again is how much of this is critically evaluated with a concern for all of the peer-reviewed

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literature, rather than those parts cherry-picked to drive home a particular point.

Again, various medical programs may be quite different, and from talking to colleagues at other schools, it seems that UBC's level of instruction about vaccines and vaccination is far more extensive than most.

Overall, this training consists of the basic history of vaccines, what is in them, some of the purported success stories such as smallpox eradication and the control of polio, and the fact that vaccines in general are safe and an effective means of infectious disease control. As noted above, medical students in Years Three and Four get more information about immunology and vaccinology as they rotate through various medical departments, but again this knowledge is not extensive unless they later choose to specialize and do residencies that delve in more detail into such topics. For this reason, trying to convince the average MD that, for example, aluminum is neurotoxic is largely a fool's errand.

Back to What Science Is (and Isn't)

The same lack of a broad knowledge of subfields applies to scientists in any discipline. For example, I am trained as a neuroscientist particularly in neurophysiology, but neuroscience is a vast field, and, while I have likely heard in passing details about most of the subfields, I can't claim any expertise in the majority of them, let alone in various other branches of science.

As noted earlier in this chapter, science is primarily a method for exploring nature and attempting to establish probabilities that any of the hypotheses proposed and the experimental outcomes found are, in fact, likely to be correct. A large enough body of evidence, the collated body of experiment from tested hypotheses, can become a theory, but even so it remains a probability discussion. Discrepancies, anomalies, etc. in the testing of aspects of a theory can lead to its downfall if enough of them arise. As philosopher of science Thomas Kuhn, cited above, observed,

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science does not advance by proof, since absolute proof is unattainable; rather, it advances by disproof, and disproof only requires one negative result. This is key, as cited previously: a truly acceptable scientific hypothesis has to be falsifiable, that is, it has to be open to negation.

Much of the stated belief that the science of vaccine effectiveness and safety is settled can only arise from the deliberate denial of the actual scientific method in which only those who appear to agree with the conventional wisdom are accepted, while those who disagree are ignored or cast out. As such, the process by which scientific finds are accepted or censored has more to do with religion, a topic that will occur frequently in this book, than the scientific method.

As noted above, most working scientists speak in terms of probabilities and don't make definitive statements about much of anything being settled. This can be annoying for nonscientists who often expect that science will do what mathematics does: prove things. Thus, it is typical for a scientific paper to have statements like "The evidence thus indicates that 'molecule x' plays an important role in the regulation of 'protein y,'" or something like that. Non-scientists raised on Disney movies want more definitive statements, statements that working scientists are usually loathe to provide. And for good reason: one of the best ways to get your figurative butt handed to you on a platter is to "go beyond your data" in a grant application or a manuscript. This is particularly true given that the next scientist who does the same experiment might find something very different. Or, worse—but it happens—you might not even be able to duplicate your own original findings.

This last is termed the "decline effect," in which previously robust and statistically significant outcomes in an experiment simply become less and less significant with replication. This doesn't always happen, of course, but it happens enough to make it a real concern. The reasons for this are uncertain but may have to do with subtle changes in study design or

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execution, or simply the fact that even with what should be adequate statistical power, greater variations in measurements for whatever reason can collapse p values to the point where statistical significance vanishes.

For the lay public, pronouncements in the mainstream media are often taken as fact. And since the media tend to favor pro-vaccine statements over those more skeptical, the lay public, not necessarily particularly scientifically literate, goes along. The forcing of some narrative along the path of a particular belief or agenda is termed a "frame," a concept that will be revisited throughout the chapters that follow.

A Brief Introduction to the Wakefield Controversy

A common example of the public going along is the oft-repeated claim that the *Lancet* study of autistic children and gastrointestinal abnormalities of Dr. Andrew Wakefield and colleagues was "debunked." The Merriman-Webster dictionary defines "debunk" as "to show that something (such as a belief or theory) is not true: to show the falseness of a story, idea, statement, etc."[31]

I will deal with this case in greater detail in Chapter 4, but it is worthwhile briefly considering it here in order to understand how the use of this term has been deliberately manipulated to make Wakefield the whipping boy of the pro-vaccine camp and the mainstream media.

First, it would be safe to say that the majority of journalists and most of the public have never read the original Wakefield et al. article, because, if they had, they might all appreciate that the data in the article were not in reality "debunked" at all.

The original observations on which this case series was based were these: twelve children[32] were referred to the Royal Free Hospital in London at which Wakefield worked. The children, eight with and four without regressive autism, showed signs of intestinal pathology. The article's

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authors recorded the observation by the parents of the children that gastrointestinal (GI) abnormalities and regressive autism arose *after* the MMR vaccine. In regard to these points, various other investigators have confirmed that children with autism often have such GI abnormalities, so this observation and the data in the Wakefield paper have not been debunked at all. Brian Deer, a British journalist, claimed that these data in the Wakefield study were fake, but his evidence that this is so has been subject to claims that his evaluation of the study has itself been "debunked," as discussed in detail in Chapter 4.

Did the children in the study suffer from autism? Yes, they did, so this point has not been debunked, either. Did the MMR vaccine cause these negative GI and neural outcomes? Maybe not, but this cannot have been debunked, since Wakefield et al. made no such claim.

Hence, what has been constantly described as a rogue study being completely fake is simply wrong. The observations made in the study have not been contradicted by other researchers or by the authors themselves. The interpretation others put on these outcomes were never written by the authors. Yes, the paper was retracted by *Lancet*, but that is not the same as being shown to be fraudulent, and indeed the notion that the data were fake hinges completely on the interpretation of one man, Deer, a nonscientist.

What is possible here is that the GI analyses in this article were incorrect, but being wrong happens a lot of the time in biomedical research[33] and certainly does not involve scientific malfeasance in most cases.

So, in this most famous of "anti-vax" studies, the mainstream media reportage that has served to influence much of what the public thinks it knows about vaccines and vaccine injuries comprises a knowledge base that is distinctly false and blatantly misleading.

It is difficult to avoid the interpretation that such attempts to mislead the public at large are not random, and it is to this point that I will return in

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Chapter 8.

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CHAPTER 2

Vaccination History, Theory, and Practice: A Brief Overview

Ere I proceed, let me be permitted to observe, that truth, in this and every other physiological inquiry that has occupied my attention, has ever been the object of my pursuit; and should it appear in the present instance, that I have been led into error, fond as I may appear to the offspring of my labours, I had rather see it perish at once, than exist and do a public injury.

—Edward Jenner[1]

Edward Jenner and the Formal Beginning of Vaccination

Dr. Edward Jenner is widely considered to be the founder of the theory and practice of vaccination based on his work and publications concerning smallpox in the late 1790s and later. In turn, Jenner's work, along with that of Dr. Louis Pasteur, fifty or so years later, is also believed to have laid the foundations for the science of immunology. Most of the published literature I have seen broadly agrees with this assessment.[2]

However, as noted by Gross and Sepkowitz, scientific breakthroughs in any field are rarely due to one person alone. As these authors write:

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