

This document contains the text (circulated with permission) of the introduction by Martha R. Herbert to the book THIMEROSAL: LET THE SCIENCE SPEAK edited by Robert F. Kennedy Jr. (Skyhorse, NY, 2014). This document also contains the book's cover, the title and copyright pages of the book, and the Table of Contents. The book's website, that contains most of this material, is [www.thimerosalbook.com](http://www.thimerosalbook.com).

# Introduction: Removal of Mercury from Vaccines in the Epoch of Error Correction

This book is aggressively pro-vaccine. Its focus is not on vaccines in any general way, but only on one particular ingredient, Thimerosal, which contains ethylmercury.

Although the conversation surrounding vaccines, as with any medical issue, has many facets (especially when you consider technical issues), many people are aware of only two black-and-white options: you are either pro-vaccine, or anti-vaccine. If you are a reader who wishes to absorb and evaluate the information in this book, I ask you to consider that, at minimum, there is a third alternative: you can be pro-vaccine and at the same time seek to improve the vaccine program.<sup>i</sup>

This book advocates one specific step to improve vaccines: removing a known neurotoxin (mercury, in the form of Thimerosal) from

the list of ingredients. To make a strong case for taking this step, the book presents voluminous evidence of:

- The toxicity of Thimerosal
- Its ineffectiveness even in the bactericidal role it is supposed to play
- Safer alternatives to Thimerosal that are already available
- A history of the calls of scientists and high-level governmental and international agencies around the world to remove Thimerosal entirely from vaccines
- Implementation of this course of action in some other countries

It argues that removing Thimerosal entirely will improve both vaccines themselves and people's trust in them.

That mercury is toxic cannot be disputed. To say otherwise is to pick a fight with the periodic table and the fundamental principles of physical chemistry. Consider the organization of electrons in atoms. Mercury is a large, heavy atom with more orbitals than lighter metals, like copper or zinc, and has a greater capacity to pick up and exchange electrons. The specific ways it can do this are not as tightly determined as in lighter atoms, making it a biochemical "wild card." Mercury is thus a metabolic poison because it can insinuate itself into situations where it doesn't belong. In particular it can substitute itself for lighter metals like zinc and selenium around which critical ancient enzyme systems are designed. This grossly cripples the specificity of enzymes and rates of reaction, and can spread chaos in the networks of metabolic processes, which try to generate workarounds to this logjam—but at great cost to biological and energetic resources, and often without success. This chaos may disrupt development as well as ongoing function throughout life.

Moreover, while claims have been made that the ethylmercury in Thimerosal is safer than the much better-studied methylmercury, these claims are based on weak, questionable evidence and poorly

chosen assumptions. As reviewed in Chapters 4–6 herein, available data suggests that the toxicity of these two forms of mercury is at least comparable, and that ethylmercury may leave the blood more quickly—only to persist more stubbornly in organs and tissues of the body, particularly the brain.

Furthermore, mercury’s toxicity can be even worse in the presence of aluminum, which is also an ingredient in many vaccines and has toxicity issues of its own (Chapter 11).

This all being the case, why are we still putting mercury in vaccines—or in any medical product (roughly 169 consumer products including eyedrops and nose drops still contain Thimerosal)—and how can we bring ourselves to stop doing this?

To generate the fortitude to do the right thing, it may help to put this problem in a broader context.

Although potentially hazardous substances have long been buried in the seams of the earth’s mantle, leaching slowly or on occasion volcanically exploding into the living environment, human activities have contributed greatly to bringing them to the surface and putting them into circulation. Our clever, problem-solving minds have created a flood of ingenious products that increase demand for—and exposures to—these sources of potential harm.

For many years our measurement instruments were blunt enough that we only detected problems when exposures were severe. Concerns about an underbelly to our inventions were buried under elation about remarkable innovation and progress. There was little motivation to look broadly for latent or downstream effects.

Today, however, our confidence in progress is no longer so dominant, and we have entered a period of pervasive fragility. Planetary biogeochemical cycles are becoming unstable; economic vulnerabilities are persisting rather than resolving; large numbers of people are chronically ill despite enormous health care expenditures; 100,000 people a year die from unintended effects of medications used according to label;<sup>ii</sup> and systems science is increasingly suggesting

that we need fresh approaches to health care, product development, energy, and ecosystems management.

It appears that our world is finally grasping our pileup of a huge number of errors, and we are at last entering an epoch of error correction.

What is an error? Put simply, it is a mismatch between our predictions and the outcomes. Put in systems terms, an “error” is an action that looks like a success when viewed through a narrow lens, but whose disruptive additional effects become apparent when we zoom out.

Why do predictions fail to anticipate major complications? Ironically the exquisite precision of our science may itself promote error generation. This is because precision is usually achieved by ignoring context and all the variation outside of our narrow focus, even though biological systems in particular are intrinsically variable and complex rather than uniform and simple. In fact our brains utilize this subtlety and context to make important distinctions, but our scientific methods mostly do not. The problems that come back to bite us then come from details we didn’t consider.

Once an error is entrenched it can be hard to change course. The initial investment in the error, plus fear of the likely expense (both in terms of time and money) of correcting the error, as well as the threat of damage to the reputations of those involved—these all serve as deterrents to shifting course. Patterns of avoidance then emerge that interfere with free and unbiased conduct of scientific investigations and public discourse. But if the error is not corrected, its negative consequences will continue to accumulate. When change eventually becomes unavoidable, it will be a bigger, more complicated, and expensive problem to correct—with further delay making things still worse.

Some errors happen out of naïveté and then perpetuate themselves—the introduction of nonnative species, such as rabbits in Australia that lack local predators, need not be repeated for the problem to perpetuate itself. Some catastrophes, such as the British

Petroleum oil spill in the Gulf of Mexico, are local but with widely dispersed consequences, and they dramatize the need for upgrading workflows and standards to prevent similar catastrophes in the future. Some disasters occur through a combination of errors—for example, in the case of Hurricane Katrina and the flooding of New Orleans, the combination of institutional failures and a global warming-driven increase in the power and frequency of storms. These catastrophes and disasters are often worsened by a series of unfortunate actions and/or inaction.

When it comes to mercury, not only is it clearly toxic, even at very low exposures,<sup>iii iv v</sup> but our bodies derive no physiological benefit from it whatsoever. Nevertheless, one out of six children in the United States is born with levels of mercury high enough to be put at risk for neurological complications like learning disabilities, motor skill impairments, and short-term memory loss.<sup>vi</sup>

We can be exposed to mercury by eating fish (particularly those predators high on the food chain), being downwind of coal-fired power plants and other coal-fired industrial processes such as cement kilns, being near mines, being downwind of trash incinerators that burn hazardous and medical waste, breaking mercury-containing devices such as older thermometers, and having dental amalgams. People, including infants and pregnant mothers, can also be exposed to mercury through vaccines. In the United States, this exposure comes mainly from influenza vaccines. Although Thimerosal was removed from mandatory childhood vaccines in the United States, cumulative exposure is still high due to regular Thimerosal-containing flu shot administration starting in pregnancy and infancy. In other countries, however, particularly in developing countries (Chapters 2 and 3), more types of vaccines may contain mercury, and at higher levels.

To reduce the population's exposure to mercury from non-vaccine sources requires policy, educational, and technical changes targeting wide swaths of the population and many different industries and

communities. It is a protracted process that will be slowed by significant industry pushback. In addition, the oceans, atmosphere, waterways, and areas of land that have been contaminated with mercury will be very difficult to clean up comprehensively.

To take mercury out of vaccines is a different matter. It is used as a preservative in multidose vials, even though it doesn't actually do that job so well (Chapter 10), and we have safe and effective alternatives (Chapter 12). Companies making vaccines could either change the preservative or shift to single-dose vials, which actually will not increase societal costs as much as has been claimed, because of wastage associated with multidose vials (see Chapter 12 and the book's recommendations). The big point here is that there are a finite and modest number of entities that need to make a discrete and specific change—and then the job of getting mercury out of vaccines will be done.

You may ask why we should take mercury out of vaccines if there's no definitive proof that vaccines or the mercury in them causes autism. To this I will answer: that is not the right question. The right question is, *why do we persist in putting a potent toxin into a vital medical product when we don't really need to?*

Complex chronic illnesses are generally multifactorial—genetic weak spots may create vulnerability—but a pileup of noxious exposures and stressors is what wears the system down. I include autism in the broad category of complex chronic disease because of the thousands of papers now in the scientific literature documenting pathophysiology such as oxidative stress, dysfunction of mitochondrial bioenergetics, and immune/inflammatory responses that greatly overlap with what we are finding in other chronic illnesses.<sup>vii viii</sup> For all of these conditions the tipping point is not just the environmental insult itself, but the way it overwhelms the system, which has been pushed close to the edge by a prior accumulation of environmental insults that have been progressively degrading the physiological systems in our bodies and brains. The shift into an illness state

may be gradual, or it may occur at some particular point when the physiological systems cannot compensate anymore and shift their functioning to a less resource- and energy-demanding (and thereby less efficient) state. I predict that ultimately we will determine that it is not any one or a few environmental risk factors that uniquely tip people over into chronic illness, but rather the total, degradative load (or “allostatic load”) of exposures, stressors, and low-nutrient-density food that tips most people over the edge into illness from latent vulnerabilities.<sup>ix x xi xii</sup>

From the vantage point of a total (allostatic) load model of chronic disease, basic management and prevention principles include reducing noxious exposures and stressors as much as possible, and also increasing nutritional and lifestyle supports.<sup>xiii</sup> Every little bit counts—and in the case of mercury, it is so toxic that even a little bit can go a long way in dragging the system down. As a metabolic “wild card” mercury does not have a one-to-one relationship with specific illnesses; but rather, by disturbing fundamental developmental processes and acting as a metabolic poison, it degrades the integrity of the system and aggravates people’s vulnerabilities. In particular, it poisons critical core regulatory and protective pathways (including methylation, DNA repair, and thioredoxin)<sup>xiv xv xvi xvii xviii</sup><sup>xix xx</sup>—and, when such systems are dysfunctional, many things suffer. Even at low doses it can interfere with chemical processes in brain and body, lead to gross and subtle neuromotor problems and subtle or dramatic cognitive impairment,<sup>xxi</sup> promote autoimmune conditions such as rheumatoid arthritis and multiple sclerosis,<sup>xxii</sup> and bias the system toward being more fragile and vulnerable to future challenges.

Even so, while our physiology has environmentally vulnerable spots where mercury can contribute to this process of system overload and degradation, those same physiological processes are also vulnerable to myriad other noxious influences.<sup>xxiii</sup> From both the total (allostatic) load and the precautionary points of view, mercury

is among a broad range of noxious exposures that degrade body and brain health. Such exposures should therefore be totally avoided, if possible.<sup>xxiv</sup> Different people may have different weak points, making epidemiology of particular diseases an insensitive way to pick up the range of mercury's impacts.

With all of this in mind, the bottom line is that *by exposing the population to unnecessary mercury in vaccines, we are gambling with population health through the same intervention that we use to protect it.*

The painful truth is that our country and planet face a rocky road in years to come—unstable weather patterns, fires, natural disasters, risks of novel infectious diseases, risks of food and water shortages, health problems exacerbated by these environmental challenges, and prospects of recurrent economic constriction. Under these circumstances, why would we want to expose our population to yet another noxious stressor that could further deplete our resilience and interfere with our ability to think straight—when it is totally unnecessary?

Based upon all of this, it is clear now that mercury is something to which no one should be deliberately exposed. As such, it is an error to include it in vaccines or indeed in any therapeutics—and in these domains it is an error within our grasp to correct, and prudent to do so. We tend to take a long time to correct errors<sup>xxv</sup>—it took seventy-five years to get the lead out of gasoline.<sup>xxvi xxvii</sup> Let's do a better job this time. So many considerations and pieces of evidence are compiled in this one comprehensive volume. I hope and implore that it moves us all to do whatever it takes—make whatever adjustments necessary—to correct this error, because it CAN be corrected—indeed MUST be corrected—so let's just DO IT. THEN we can focus more effectively on the harder problems lying ahead.

Martha R. Herbert, PhD, MD



# Notes

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FROM *NEW YORK TIMES* BESTSELLING AUTHOR ROBERT F. KENNEDY, JR., COMES A SCIENCE-BASED CALL FOR THE IMMEDIATE REMOVAL OF THE DANGEROUS MERCURY-CONTAINING PRESERVATIVE THIMEROSAL FROM VACCINES.

OVER A DECADE AGO, FOLLOWING A SHARP rise in developmental disorders such as autism and ADHD, the mercury-containing preservative Thimerosal was widely believed to have been eliminated from vaccine supplies in the United States and abroad. However, dangerous quantities of Thimerosal continue to be used, posing a significant threat to public health and leading to a crisis of faith in vaccine safety.

In this groundbreaking book, Robert F. Kennedy, Jr., examines the research literature on Thimerosal and makes a very clear statement about its potentially dangerous effects. In the past, the CDC, FDA, NIH, and AAP, as well as the US Congress, the American Academy of Family Physicians, the US Department of Agriculture, the European Medicines Agency, and the California Environmental Protection Agency have expressed concerns over the use of Thimerosal in vaccines. But despite the many voices calling for action, the media and policy makers have repeatedly failed to adequately address the issue.

Now, with *Thimerosal: Let the Science Speak*, the science supporting the elimination of this toxic chemical from the world's vaccine supplies, and its replacement with already available safer alternatives, is all in one place. Making this change should increase vaccination rates by restoring the trust of concerned parents in the vaccine program—a program that is so vitally important to public health.

NEW YORK TIMES BESTSELLING AUTHOR

ROBERT F. KENNEDY, JR., EDITOR

# THIMEROSAL LET THE SCIENCE SPEAK

The Evidence Supporting the Immediate Removal of Mercury—a Known Neurotoxin—from Vaccines



Preface by **MARK HYMAN, MD**

*New York Times* bestselling author of *The Blood Sugar Solution* and founder and medical director of the UltraWellness Center

Introduction by **MARTHA R. HERBERT, PhD, MD**

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ROBERT F.  
KENNEDY, JR.

THIMEROSAL  
LET THE SCIENCE SPEAK



## PRO-VACCINE PERSPECTIVE

*Vaccines are critical for public health and have saved the lives of millions around the world. Nevertheless, without adequate safety research, faith in regulators, and full transparency, trust in the vaccine program continues to wane.*

*Taking toxic and unnecessary Thimerosal out of vaccines will go a long way toward restoring the public's confidence in a program that is essential for the health and safety of the world's populations.*

## ANTI-MERCURY PERSPECTIVE

“Would you expose the unborn child or infant of a loved one to a vaccine containing mercury, a known neurotoxin, if you knew there were other safer alternatives? Does it make any sense that even though Thimerosal is banned as a topical antiseptic and is considered hazardous waste that can't legally be thrown in the garbage, that it is somehow safe to inject into pregnant women and babies?”

—**MARK HYMAN, MD**, founder and medical director of the UltraWellness Center and chairman of the board of the Institute for Functional Medicine

“The evidence of Thimerosal's neurotoxicity is so overwhelming that anyone who is willing to read the science must conclude that Thimerosal can cause brain damage.”

—**ROBERT F. KENNEDY, JR., JD, LL.M.**, clinical professor of environmental law, codirector of the Pace University School of Law Environmental Litigation Clinic, and senior attorney at the Natural Resources Defense Council

“When vaccines contain the potent toxin mercury, they can harm public health while they protect it. This is a serious paradox and an error. I hope and implore that this book's overwhelming scientific evidence moves us all to do whatever it takes to correct this error, because it is unnecessary, and it CAN and MUST be corrected.”

—**MARTHA R. HERBERT, PhD, MD**, assistant professor of neurology at Harvard Medical School and pediatric neuroscientist at Massachusetts General Hospital

“One can be uncertain about the adverse health effects of ethylmercury in vaccines and, after reading Mr. Kennedy's captivating and extensively documented book, still be persuaded beyond a reasonable doubt of two things: the neurotoxicity of ethylmercury, even at low doses, is indisputable; and, given the existence of alternatives, the intentional exposure of humans to mercury in therapeutics must be prohibited.”

—**SHELDON KRIMSKY, PhD**, Lenore Stern Professor of Humanities and Social Sciences, Tufts University; adjunct professor, Department of Public Health and Community Medicine at Tufts University's School of Medicine



**ROBERT F. KENNEDY, JR., JD, LL.M.**, is senior attorney for the Natural Resources Defense Council, chief prosecuting attorney for the Hudson Riverkeeper, and president of Waterkeeper Alliance. He was named one of *Time* magazine's “Heroes for the Planet” for his success in helping restore the Hudson River, and he continues to fight for environmental issues across the Americas. He is the bestselling author of *Crimes Against Nature*.

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**SKYHORSE PUBLISHING, INC.**  
New York, New York  
www.skyhorsepublishing.com

Jacket design by Brian Peterson  
Jacket photograph: Thinkstock  
Printed in the United States of America

# THIMEROSAL LET THE SCIENCE SPEAK

The Evidence Supporting the Immediate Removal of  
Mercury—a Known Neurotoxin—from Vaccines

Robert F. Kennedy, Jr.

Preface by  
Mark Hyman, MD

Introduction by  
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Skyhorse Publishing

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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.

Cover design by Brian Peterson

Cover image: Thinkstock

Print ISBN: 978-1-63220-601-5

Ebook ISBN: 978-1-63220-602-2

Printed in the United States of America

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