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Introduction

Following this introduction page is this reviewer's analysis of an article titled, "**Stick With the Science**", by Seth Berkley, which was downloaded from http://www.nytimes.com/2013/01/18/opinion/global/a-blanket-mercury-bank-would-block-needed-vaccinations.html on Friday, 18 January 2013.

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This analysis, titled "**Draft Review of: 'Stick With the Science'"**, begins on the next page.

Introductory Remarks

First, to simplify this analysis, each portion of the article being reviewed is first quoted in its original fonts.

Further, when some sentence, clause, phrase, or word is being addressed within the review, it is quoted in an *italicized* "Times New Roman" font.

Second, this reviewer's assessments are written in a "Verdana" font, follow each quoted portion of the article, and are indented to clearly separate the review remarks from the preceding portion of the document that is being addressed.

Third, when other sources are quoted or referenced in the review narrative, the text is in an "Arial Narrow" font.

Finally, should anyone find any significant factual error in this review for which they have independent[a], scientifically sound, peer-reviewed published substantiating documents, please submit that information to this reviewer so that he can improve his understanding of factual reality and, where appropriate, revise his views and this analysis.

Respectfully,

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[To whom all responses should be directed]

[a] To qualify as an independent document, the study should be published by researchers who have no direct or indirect conflicts of interest from their ties to either those commercial entities who profit from the sale of vaccines or those entities, academic, commercial or governmental, who directly or indirectly, actively promote vaccines, the development of vaccines, and/or inoculation programs using vaccines.

Draft Review of: "Stick With the Science"

This reviewer, an analytical chemist and student of the toxicity of all forms of mercury, agrees with the writer of this article that we should "***Stick With the Science***" when it comes to issues of mercury.

However, the "***Science***" we should stick with in making decisions about the use of mercury compounds is '**Toxicology**'[1].

This is the case because only toxicology's properly designed and executed studies can establish the safety, or lack thereof, of a given dose of a given mercury species in a specific population segment.

When the issue is safety (toxicity), we should reject those studies that are based on medical population statistics and its science ('**Epidemiology**'[2]) because neither can prove safety – all that these can do is establish, at a given confidence level, the probability of a correlation between an exposure and a subsequent adverse outcome.

Since such correlations do not prove causation, such studies and their science can only be used to establish that there may or may not be evidence of harm from a given "use" of a particular mercury-based material.

With the preceding realities in mind, let us examine the statements made by the writer, Seth Berkley, "*a medical epidemiologist and chief executive of the GAVI Alliance, a public-private global health partnership to increase access to immunization in poor countries*" (who may be contacted *via* info@gavialliance.org).

"GOVERNMENT representatives are meeting in Geneva this week to decide whether to introduce a global ban on mercury that could include thiomersal, a mercury-based preservative that has been used in some vaccine manufacturing since the 1930s to prevent bacterial or fungal contamination of multi-dose vials of vaccine.

Hosted by the United Nations Environment Program, the intergovernmental negotiating committee is charged with drafting a global treaty to rid the world of the threats posed by mercury."

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1 Toxicology is the study of the adverse effects of chemicals on living organisms. It is the study of symptoms, mechanisms, treatments and detection of poisoning, especially the poisoning of people. The relationship between dose and its effects on the exposed organism is of high significance in toxicology. The chief criterion regarding the toxicity of a chemical is the dose, i.e. the amount of exposure to the substance (http://www.news-medical.net/health/Toxicology-What-is-Toxicology.aspx).

2 Epidemiology is the study of the distribution and determinants of health-related states or events (including disease), and the application of this study to the control of diseases and other health problems. Various methods can be used to carry out epidemiological investigations: surveillance and descriptive studies can be used to study distribution; analytical studies are used to study determinants (http://www.who.int/topics/epidemiology/en/).

Here, this reviewer agrees with the writer that the charge to the "*international negotiating committee*" (INC) was, "*drafting a global treaty to rid the world of the threats posed by mercury*".

However, factually, "*thiomersal*" is not a "*preservative*"; and the term "*preservative*" is but the name for one of the possible pharmaceutical uses of "*thiomersal*" (it is also common used as an in-process sterilant in processes used to make certain vaccines).

Actually, "*thiomersal*" is one trade name for a chemical, sodium ethylmercurithiosalicylate, that is not only highly toxic but also a bioaccumulative toxicant that is a known human carcinogen, mutagen, teratogen and reproductive toxicant at levels below 1 part per million (ppm).

Though "*thiomersal*" is 49.55% mercury by weight and has been used in the making of some serums, vaccines and other biological drug products since the 1930s after the chemical was discovered and patented, the use of "*thiomersal*" as a preservative that prevents "*bacterial or fungal contamination of multi-dose vials of vaccine*" has never been proven to be toxicologically safe (nontoxic) for this purpose.

If, as the writer of this article later states,

"*One of the core principles of medicine is 'primum non nocere': first, do no harm*"

then, medicine has permitted the use of "*thiomersal*" as a vaccine preservative without toxicological proof that largest vaccine dose delivered is nontoxic (safe) to the most susceptible of the targeted recipient groups.

In so doing, medicine has knowingly violated its "first, do no harm" principle since 1948, if not earlier.

This is the case because, in 1948, researchers commissioned to study the toxicity and effectiveness of Merthiolate, an older trade name for "*thiomersal*", reported it was too toxic for human use and not effective as a bacteria-killing agent in the ***Journal of the American Medical Association*** (***JAMA***)[3], one of medicine's leading medical journals.

If medicine had adhered to its "*first, do no harm*" principle, then medicine would have stopped its use in the USA in 1948.

However, ignoring this core principle, medicine did not stop the use of "*thiomersal*" in 1948.

3 Morton HE, North LL, Engley FB. The bacteriostatic and bactericidal action of some mercurial compounds on hemolytic streptococci. ***JAMA*** 1948; **136**: 37-41.

"Despite the ominous connotations of mercury, the decision should in theory be a no-brainer: The scientific and medical consensus is that thiomersal poses no human health risk, and that rather than saving lives, a ban would put millions of the world's poorest children at risk of deadly diseases by disrupting vaccination programs."

Here, the writer begins by making an assertion concerning a "*scientific and medical consensus*" that:

1. Is not supported by the applicable science (toxicology),
2. Does not claim that the use of "*thiomersal*" in the manufacture of vaccines or as a preservative is "safe" (nontoxic), and
3. Uses the language of epidemiology to assert, *without any qualification*, that "*thiomersal poses no human health risk*".

In addition, the writer's claim that "*a ban would put millions of the world's poorest children at risk of deadly diseases by disrupting vaccination programs*" is illogical, if not irrational.

This is the case because, as with all such treaties, there will be grace periods that may last more than a decade before any such ban would become fully effective.

Since there are viable alternative chemicals that have been, can be, and are being, used as preservatives in vaccines, the grace period would allow those who make vaccines using processes that use "*thiomerosal*" and/or produce vaccines preserved with it to switch to some other effective compound that is not a bioaccumulative mercury poison and establish that these vaccines are at least as safe and effective as the "*thiomersal*"-containing vaccines that they will replace.

Given the preceding realities, there should be no disruptions of vaccination programs caused by the eventual ban on "*thiomersal*".

"But with vaccines, logic and evidence don't always prevail. In the late 1990s we were at a similar juncture when, as part of a broader remit to find ways to reduce the human health hazards posed by mercury and under pressure from anti-vaccine lobbyists, the U.S. Food and Drug Administration turned its attention to the safety of thiomersal (known in the U.S. as thimerosal).

Despite a lack of evidence that it was harmful — and in the absence of any evidence to show that it wasn't — the F.D.A. decided to take a precautionary approach and urged manufacturers to reduce or eliminate thiomersal from almost all vaccines in the United States."

While the writer's unsupported narrative tells an interesting story, the applicable science and the actions taken based on its findings

clearly show proof of the toxicity of "*thiomersal*" (also known in the United States of America [USA] by the trade names Merthiolate and Thimerosal [TM]) in humans.

Contrary to the writer's claim of "*a lack of evidence that it was harmful*", the applicable scientific record clearly provides proof of its toxicity.

Factually, there are more than 150 case and toxicity studies which collectively have proven that "*thiomersal*" is a bioaccumulative toxin with long-term adverse effects in animals and humans.

Further, contrary to the writer's statements, there was sufficient toxicological evidence about the toxicity of TM by the 1980s that:

1. In 1982, FDA officials recommended banning TM's use in over-the-counter (O-T-C) topical antiseptics and spermicides;
2. In 1983, the former Union of the Soviet Socialist Republics banned TM's use in vaccines and other drugs;
3. In the 1990s, the Scandinavian countries had removed all TM-preserved vaccines from their vaccination programs; and
4. In 1998, the FDA banned the use of TM in the manufacture of O-T-C topical antiseptics and spermicides because the allowed 0.1% TM products were toxic and <u>not</u> effective.

Further, all of the case and toxicological studies in animals and humans involving exposures to TM or to some other ethylmercury compound at vaccine levels or low levels that only produce chronic toxicity have found evidence of persistent neurological damage, and other adverse effects, from exposures to all these ethylmercury compounds.

"Since then, scientists have published unequivocal evidence of its safety, including a 2006 study which showed that thiomersal is broken down by the body into ethylmercury. Unlike methylmercury, say from contaminated fish, which can make its way through the food chain and accumulate in the body, ethylmercury is naturally flushed out of the body within a couple of weeks. Despite such clinical and laboratory evidence, the damage to thiomersal's reputation had already been done, and anti-vaccine campaigners are still trying to fan the flames."

Again, the writer's statements depict a view of reality that is completely at odds with the findings of the applicable hard science (toxicology).

Studies going back to the original patents have established that, when dissolved in aqueous [water-based] solutions, **a)** TM, sodium ethylmercurithiosalicylate, is converted into neutral ethylmercury

compounds that have lost the sodium and thiosalicylate moieties and **b)** the resultant solutions become more toxic over time as the conversion to these neutral ethylmercury species progresses.

Further, ^{203}Hg radiolabelled studies of ethylmercury compounds, including ethylmercury chloride and ethylmercury phosphate, have shown that, when injected, these ethylmercury compounds do not rapidly clear the test subjects bodies[4,5].

In addition, a more-recent study in monkeys[6] have shown:

- The bioaccumulation of the mercury end-product metabolite, tissue-retained inorganic mercury, in the brains of monkeys injected with vaccine levels of TM was, on average, two to three times higher than the level of the same end-point metabolite's bioaccumulation in the brains of those monkeys force-fed with a corresponding amount of a methylmercury compound, and
- The estimated half-life for this tissue-retained inorganic mercury end-point metabolite in the brains of both groups of organic-mercury-compound-treated monkeys was estimated to be much greater than 120 days ["The half-life of inorganic Hg is too long (>120 days) to be accurately estimated from the present data (i.e., r is not significantly different from 0)", where "r" is the estimated slope of the decrease in "inorganic" mercury concentration over time; from the paper referenced in footnote "6"].

Finally, after studying the half-life of this tissue-retained inorganic mercury in various human organs, a Japanese study found that this mercury's half-life was 18-20 years in the human brain[7].

Turning to the unidentified 2006 study mentioned by the writer, the nearest applicable research studies (not reviews) that purport to address the clearance of TM from humans of which this reviewer is aware are three (3) studies (led by Michael E. Pichichero, MD) that made measurements of the apparent clearance of mercury from the

4 Takeda Y, Kunugi T, Hoshino O, et al. Distribution of inorganic, aryl, and alkyl mercury compounds in rats. T***oxicol Appl Pharmacol*** 1968; **13**: 156-164.

5 Takahashi T, Kimura T, Sato Y, Shiraki H, Ukita T. Time-dependent Distribution of $^{[203]}$Hg-Mercury Compounds in Rat and Monkey as Studied by Whole Body Autoradiography. ***J Hygenic Chem*** (Japan) 1971; **17**(2): 93-107.

6 Burbacher TM, Shen DD, Liberato N, Grant KS, Cernichiari E, Clarkson T. Comparison of blood and brain mercury levels in infant monkeys exposed to methylmercury or vaccines containing Thimerosal. ***Environ Health Persp*** 2005; **113**(8): 1015-1021.

7 Sugita M. The biological half-time of heavy metals. The existence of a third, "slowest" component. **Int Arch Occup Environ Health** 1978; **41**(1): 25-40.

blood of infants given TM-preserved vaccines[8,9,10].

Since the radiolabelled study on the monkey cited by this reviewer (see footnote "5") showed similar rapid clearance from the blood while the mercury level in the monkey's brain was still increasing and, at sacrifice, exceeded the dosing level,

- Mercury clearance from the blood does not equate to mercury clearance from the body and
- As the outcomes from the incidental human exposures to ethylmercury-based fungicides on treated grain used to make the bread they were eating have established, TM is a bioaccumulative toxin where the adverse effects for low-level exposures can have a significantly delayed onset.

In addition, a recent rat study[11] that injected TM at vaccine levels and speciated the mercury found in the blood over time as well as the mercury found in various organs (brain, heart, kidney and liver) at sacrifice.

The mercury level in the blood rapidly declined and most of the mercury found in the blood rapidly became inorganic mercury.

At sacrifice, in addition to the expected inorganic mercury species at significantly higher levels than were found in the blood samples, the tissues were found to contain significant levels of a methylmercury component (in the heart) or both a methylmercury component and an ethylmercury component (in the brain, kidneys and liver) in addition to the long-retained "inorganic mercury".

Based on these findings, it is clear that, in the tissues, some of the ethylmercury species are converted into the methylmercury species and the inorganic mercury species that bioaccumulate in the tissues even though the blood only contained very low levels of inorganic mercury species when the rats were sacrificed.

Since the writer has conceded that any methylmercury species bioaccumulate, the speciation results from this study and the

8 Pichichero ME, Cernichiari E, Lopreiato J, Treanor J. Mercury concentrations and metabolism in infants receiving vaccines containing thiomersal: a descriptive study. ***Lancet*** 2002; **360**(9347): 737-1741.

9 Pichichero ME, Gentile A, Giglio N, Umido V, Clarkson T, Cernichiari E, Zareba G, Gotelli C, Gotelli M, Yan L, Treanor J. Mercury Levels in Newborns and Infants After Receipt of Thimerosal-Containing Vaccines. ***Pediatrics*** 2008 Feb; **121**(2): e208 -e214 .

10 Pichichero ME, Gentile A, Giglio N, Alonso MM, Mentaberri MVF, Zareba G, Clarkson T, Gotelli C, Gotelli M, Yan L, Treanor J. Mercury Levels in Premature and Low Birth Weight Newborn Infants after Receipt of Thimerosal-Containing Vaccines ***J. Pediatrics*** 2009 Oct; **155**(4): 495–499.e2.

11 Rodriques JL, Serpeloni JM, Batista BL, Souza S, Barbarosa Jr F. Identification and distribution of mercury species in rat tissues following administration of Thimerosal or methyl mercury {chloride}. Arch Toxicol 2010; 84: 891-896

outcomes from the consumption of grain contaminated with low levels of an ethylmercury-based fungicide should compel the writer and other vaccine apologists to concede that ethylmercury species formed from TM also bioaccumulate in the body.

Because the writer's initial statements here are at odds with factual reality and the overall science shows long-term mercury retention in tissues after exposure to TM or other ethylmercury compounds, the writer's unsupported closing statement here should be ignored.

"Anti-vaccination groups have long campaigned against the use of thiomersal, claiming that this organic mercury derivative was responsible for increases in developmental disorders such as autism. What's more, they argue that with a precautionary reduction already in place in the United States, denying children in developing countries access to the same thiomersal-free vaccines would be a global injustice."

Here, the writer begins by speaking about "*Anti-vaccination groups*" and a campaign "*against the use of thiomersal*" – an approach that definitely is <u>not</u> one that sticks with the science but is rather a political attack.

Factually, the claim that "*this organic mercury derivative was responsible for increases in developmental disorders such as autism*" has been repeatedly supported by independent peer-reviewed published epidemiological studies whose findings have <u>not</u> been refuted by any unbiased science-based review of the same data sets.

In addition, documents obtained from the US Centers for Disease Control and Prevention (CDC) by freedom of information requests (FOIAs) and by congressional requests have shown that the data in at least one study[12], whose published findings claim no such link, clearly support a causal link between exposure to TM and the risk of the TM-exposed infants' being subsequently diagnosed with an autism spectrum disorder (ASD).

From this Danish study (footnote "12"), overseen by the CDC, this reviewer has published a small portion of the evidence that removal of TM-preserved vaccines from the Danish vaccination program in 1992 led to a subsequent drop in the both the incidence and prevalence of those diagnosed with "autism"[13].

12 Madsen KM, Lauritsen MB, Pedersen CB, Thorsen P, Plesner A-M, Andersen PH, Mortensen PB. Thimerosal and the Occurrence of Autism: Negative Ecological Evidence From Danish Population-Based Data. ***Pediatrics*** 2003 Sep; **112** (3): 604 -606.

13 http://dr-king.com/docs/20120331_FalsusInUnoFalsusInOmnibusAThimerosalpreservedVaccineConundrum_b.pdf, "'Wed 13-11-2002', some, if not all, of the authors in the key Danish study cited in this discussion and the CDC's liaison person knew that 'the incidence and prevalence' [of 'autism'] 'are still decreasing in 2001'")

Thus, both independent and CDC-overseen studies have shown a causal linkage between the level and timing of TM exposure and the subsequent risk of being diagnosed with a neurodevelopmental (or other developmental or behavioral) disorder.

Moreover, the maximum mercury exposure risk from TM-preserved vaccines has not been reduced in the USA[14] as the writer's,

"... *with a precautionary reduction already in place in the United States*",

would indicate.

This is the case because as the early childhood vaccines that were TM-preserved were being replaced, first with reduced-TM vaccines and then with mostly no-TM vaccines, the flu shots, for which almost all doses were TM-preserved in 2002 and more than 50% of all doses are still TM-preserved today, have, since 2002, been urged on pregnant women during pregnancy as well as recommended for babies from 6 months of age to, now, at least annually every year thereafter.

For children, born in 2010, whose mothers got two TM-preserved flu shots (seasonal and pandemic) while they were *in utero* and then subsequently get the all their recommended influenza vaccine shots as TM-preserved flu shots, the maximum exposure to Thimerosal will actually be more than "double" by the time they are 18 years of age as compared to the level of exposure in children born in 1999 to mothers did not get a flu shot or any TM-preserved serum and were then vaccinated according to the CDC's 1999 recommended vaccination schedule with TM-preserved vaccines as children born in some of the Eastern European countries are still being vaccinated.

Thus, though the American Academy of Pediatrics (AAP), the United States Public Health Service (USPHS), CDC, other groups and the vaccine manufacturers apparently agreed to reduce the mercury exposure from TM in the 'early childhood' vaccines, the CDC, other public officials and the vaccine makers have colluded to actually increase the maximum mercury exposure to American children from TM-preserved vaccines by: **a)** adding the inactivated-influenza shot to the vaccines recommended for pregnant women, **b)** recommending that all children get flu vaccinations starting at 6 and 7 months of age and at least annually thereafter, and **c)** ensuring that most of the doses of the inactivated-influenza vaccines have remained TM-preserved doses.

14 http://dr-king.com/docs/090813_fnldrft_TheNoThimerosalPreservedVaccineLie_r6b.pdf

Had all Thimerosal-preserved vaccine doses been removed from the recommended vaccines for pregnant women and children in 1999, as Denmark did in 1992, then, the survey rate for American children diagnosed with an "ASD" (also known as a "Pervasive Developmental Disorder") who were born in "2000" or later should be:

- Approaching the "1 in 1200-plus" level observed in Denmark for children born Jan 1, 1994 through December 31, 2004 as calculated from the basis data for Danish births and Danish children diagnosed with a pervasive developmental disorder (PDD) contained in a 2010 study of children with jaundice[15], and
- Not the "1 in 88" rate that was reported by the CDC in 2012.

Thus, by continuing and actually increasing the the maximum TM exposure in American children, US government public health officials, the US healthcare establishment, and the vaccine makers have colluded to maintain and increase the maximum TM exposure in developing children apparently to avoid the parents' discovering the on-going, and now certainly knowing, mercury-poisoning of US children exposed to vaccines and other drugs that use TM as a preservative.

Moreover, based on the much lower rates for ASD diagnoses in Denmark and other countries that have truly stopped using TM-preserved vaccines and serums and on the near-absence of children with an ASD diagnosis in the population groups of children who have never been vaccinated in the USA, this reviewer and other vaccine safety advocates recognize that "*denying children in developing countries access to … thiomersal-free vaccines would be a global injustice*".

Further, we recognize that this injustice is still being visited on the surviving offspring of pregnant women who get TM-preserved flu shots during pregnancy[16] and those children whose parents and guardians continue to allow their children to be given TM-preserved flu shots.

Here, the excuse is that, **if** the USA were to ban TM-preserved vaccines, **then**, TM-preserved vaccines would not be available in the developing nations.

15 Maimburg RD, Bech BH, Vaeth M, Moller-Madsen B, Olsen J. Neonatal Jaundice, Autism, and Other Disorders of Psychological Development. Pediatrics 2010 Nov; 126(5): 872-878.

16 Goldman GS. Comparison of VAERS fetal-loss reports during three consecutive influenza seasons: Was there a synergistic fetal toxicity associated with the two-vaccine 2009/2010 season? Hum Exp Toxicol 2012 Sep 27 0960327112455067.

Thus, *though our government agencies and public health officials apparently do not*, the American people support banning the use of TM in medicine because it will stop the mercury-poisoning of our children and, increasingly, ourselves because flu-shot mandates are now being promulgated for various groups of adults (healthcare workers and, more recently, those who work in daycare and schools) as well as for the on-going mercury-poisoning of the "*children in developing countries*".

"Nothing could be further from the truth. Quite apart from the mountain of scientific evidence refuting any link between thiomersal and autism, with some studies involving hundreds of thousands of children [pdf], banning thiomersal or phasing out this agent would have a devastating impact on global health and lead to millions of children being denied access to life-saving vaccines."

With respect to the writer's statement here,

"*Nothing could be further from the truth*"

this reviewer simply notes that the writer's statement seems to be a "Freudian" slip because, as this review has shown, denying any child a no-TM vaccine is not only an "*injustice*" but also a knowing criminal assault on that child's health.

Turning to the first half of the writer's next assertion,

"*Quite apart from the mountain of scientific evidence refuting any link between thiomersal and autism, with some studies involving hundreds of thousands of children [pdf], ...*"

this reviewer reminds the writer, an epidemiologist and avowed vaccine apologist, that:

- None of the epidemiological studies to which he is alluding can be used as "*scientific evidence*" unless: **a)** all of the original raw and derivative data sets, study designs, models, and data manipulations are freely available to independent researchers to examine and verify, **b)** some of the qualified independent researchers who have independent access and have thoroughly reviewed all aspects of the study agree that the study calculations, inferences and findings are essentially as they were reported, and **c)** any discrepancies that are found by any independent reviewer are not significant, have been acknowledged, and, to the extent possible, appropriate corrections have been published.
- No epidemiological study can prove the "safety" of TM.

- There is a mountain of toxicological and case evidence that clearly shows that: **a)** vaccine levels of TM are toxic to developing animals including primates and humans, and **b)** a vaccine-level dose of TM or a similar small dose of another ethylmercury compound given to a "mother" just before or during her pregnancy has repeatedly been shown to cause observable harm to her offspring.

Having:

- Been informed that the original data sets and the ancillary information underpinning the validity of the mountain of published epidemiological studies on which this writer is apparently relying have been lost or that they are not available to the independent research groups with whom this reviewer works or to other independent research groups,
- Found, or been informed of, significant errors and serious misrepresentations in some of these studies that the original authors have been unable or unwilling to address or deny, and
- Helped to uncover and connect documents, obtained from the CDC by a FOIA request or congressional inquiry, which clearly show that some of the published claims of no link between TM exposure and the risk of a subsequent diagnosis of a serious adverse outcome (e.g., ASD) are fraudulent,

this reviewer knows that this writer's "*mountain*" is only a mountain of published studies that do not meet the "quality of evidence rating" (QER) standards required for "*scientific evidence*" because these studies' published findings: **a)** cannot be independently confirmed, **b)** have not been independently confirmed, and/or **c)** have been found to be problematic or fraudulent.

Turning to the second half of the writer's second statement here,

> "*banning thiomersal or phasing out this agent would have a devastating impact on global health and lead to millions of children being denied access to life-saving vaccines*"

as discussed earlier, since any ban in the treaty would probably be effective more than 10 years in the future and there alternative chemicals that have been, can be, and/or are currently being, used as preservatives, **if**, for cost or cold-chain reasons, multi-dose vials must continue to be used, **then**, the writer's remarks should simply be ignored as a baseless fear-mongering rant that demands that the *status quo* be maintained essentially forever even though TM-

preserved vaccines are mercury-toxic to those who are directly administered them or indirectly exposed to them *in utero* when their mothers are vaccinated during pregnancy.

"To some extent, thiomersal is still used in vaccines in the United States and Europe, for example in some flu shots, but if there were a ban we could easily switch to single-dose vials."

Here, this reviewer notes that when the 1999 recommendation was made to phase out TM-preserved vaccines, at least one manufacturer developed, obtained rapid FDA approval and then marketed a multi-dose DTP vaccine formulation which used 2-phenoxyethanol (2-PE) as a preservative.

In addition, in developing a multiple-dose formulation for its Prev(e)nar 13™ pneumococcal vaccine, Pfizer found that TM was not acceptable for use in the formulation and that, in the formulation, 2-PE was a totally acceptable alternative for use as a preservative as the reported in a published study[17].

Importantly the Pfizer study reported that 2-PE "at a concentration of 5.0 mg/dose was stable and met EP recommended criteria for antimicrobial effectiveness tests when the formulation was kept over a 30 month period" and that, in the vaccine formulation, TM "did not meet EP antimicrobial effectiveness acceptance criteria" even at a concentration that was four times the normal nominal 0.01% level (0.04%).

In addition, in the USA, 2-PE is also used as a preservative in an inactivated polio vaccine.

Further, a recent comparative toxicity study examining preservative levels of the compounds studied reported[18],

> "Overall, the relative toxicity index values were:
>
> 2-phenoxyethanol (4.6) < phenol (12.2) < Thimerosal (>330)".

Based on these findings and the fact that 2-PE is <u>not</u> a bioaccumulative toxicant but TM is, not only can 2-PE be used but, at preservative concentrations, 2-PE is also safer to use than TM.

Finally, a comparison of the direct costs of using 2-PE instead of TM as a preservative has established that the per-dose costs are <u>not</u> significantly different[19] and, *if the much higher cost for properly*

17 Khandke L, Yang C, Krylova K, Jansen KU, Rashidbaig A. Preservative of choice for Prev(e)nar 13TM in a multidose formulation. ***Vaccine*** 2011 Sep 22; **29**(41): 7144-7153.

18 Geier DA, Jordan SK, Geier MR. The relative toxicity of compounds used as preservatives in vaccines and biologics. ***Med Sci Monit,*** 2010; **16**(5): SR21-27

19 http://mercury-freedrugs.org/docs/20110105_CoMeD_onepager_Preservatives_rb.pdf

disposing of any TM waste were included, might be essentially the same as, or even lower lower than, the per-dose costs of using TM.

Thus, when the ban on the use TM finally becomes effective, "*United States and Europe*" and the rest of the world would have had more than a decade to either switch to an alternative preservative or, as this writer suggests, "*switch to single-dose vials*" or adopt some of the very low cost, single-dose, needle-less delivery systems that are currently being developed.

"In developing countries this is not so simple. Not only are single-dose vials less cost effective and less practical for mass vaccinations, they also take up more space in refrigerators, which are already at peak storage capacity. In the absence of any alternative preservative, far fewer vaccines would reach children in developing countries."

Based on this reviewer's remarks in the previous section, the writer's statements are clearly at odds with the reality that, given a decade-plus development window, those who make vaccines for the developing countries would have more than enough time to either reformulate to use a different preservative or adopt one of the low-cost needle-less sealed-packet single-use vaccine delivery systems in which 10 doses would take up less than half of the cold-chain space needed for a 10-dose vial.

"This would be a tragedy. In 2010 alone it is estimated that more than 1.4 million child deaths were prevented through the use of thiomersal-containing vaccines. Little wonder that organizations such as the World Health Organization, Doctors Without Borders, the American Academy of Pediatrics, the U.S. Institute of Medicine and the GAVI Alliance oppose a ban."

While this reviewer accepts that the "*use of thiomersal-containing vaccines*" may prevent some deaths in the children administered these vaccines, this reviewer also recognizes that using TM-preserved vaccines contributes to and/or causes injuries to, or the deaths of, some of the children inoculated with them – injuries or deaths that the no-TM vaccines might not cause because these no-TM vaccines would be less toxic than the TM-preserved ones currently being used.

From this reviewer's point of view, the opposition to a treaty ban for "*thiomersal*" by "*organizations such as the World Health Organization, Doctors Without Borders, the American Academy of Pediatrics, the U.S. Institute of Medicine and the GAVI Alliance*" is either irrational or based on a "hidden agenda" that seeks to use vaccination programs for purposes other than

disease prevention and/or to continue trying to conceal the damage caused by TM-preserved vaccines.

"Indeed thiomersal is not the main target of the anti-mercury treaty, but rather an unfortunate by-catch. Even so, in many ways the situation mirrors the debate that took place more than a decade ago. This time it is the U.N.E.P. that is undertaking the laudable task of reducing the human health impact of mercury. The problem is that under pressure from anti-vaccine groups, hard scientific evidence is sometimes disregarded."

This reviewer simply notes that the writer's remarks here identify the writer and those pro-vaccine groups for whom and with whom he works as the groups that are disregarding the toxicity-applicable "*hard scientific evidence*" – the independent, peer-reviewed published, toxicological studies – that has clearly established that TM is too toxic to be used as a preservative in vaccines and other drugs given to pregnant women and developing children.

"A recent example of this took place in December in a French case involving a claim by a former state employee that the aluminum content of vaccines given to him at work made him chronically ill. Although the court was not convinced of a probable link between the man's illness and vaccinations, and in the absence of any scientific evidence of a link or any other explanation, it ruled in favor of the employee."

That is not to say that taking precautions isn't intrinsically sensible; it's just that sometimes dodging the issue in this way is not the best precaution, and instead of solving problems it sometimes creates them."

Since the writer's remarks in the previous paragraph do <u>not</u> address any issue concerning the toxicity of TM or the lack of proof that a preservative level of TM is "safe" (nontoxic) to all those given vaccines that are TM-preserved, this reviewer, <u>not</u> having access to an English translation of the cited "*French case*" and having little knowledge of the workings of the French legal system sees <u>no</u> need to address the apparent disconnects between what the writer states and the current state of knowledge concerning the immunotoxicity of the polymeric aluminum-based hydrated salts used as adjuvants in vaccines.

"One of the core principles of medicine is 'primum non nocere': first, do no harm. But given the sheer numbers of lives at stake there is a strong argument that the burden of proof be shifted to the detractors."

Factually, regardless of the number of lives claimed to be at stake,

the burden of proving that a disease-preventive vaccine is safe falls to the manufacturer of that vaccine.

Moreover, the only manner in which a manufacturer of a vaccine, which is regulated as a biological drug product, can truly meet its burden to prove that one of its vaccine is safe is to conduct all of the requisite preclinical toxicological studies required to prove that each component of that vaccine is safe (because each component of a drug is a drug) and that the combination of all the components at the highest levels permitted for any that are "active" or "intrinsically toxic" in the vaccine formulation is safe (nontoxic) and appropriately stable.

Having read the package inserts (or leaflets) for the vaccines that are licensed by the US FDA (and other government's agencies in some instances), this reviewer repeatedly finds that, *even though these vaccines are to be given to healthy individuals as a disease-preventive measure*, the package inserts reveal that the requisite preclinical studies required to prove that, *at the maximum permitted level in the vaccine formulation*, each component and the vaccine formulation is neither carcinogenic, mutagenic, teratogenic, nor a reproductive toxin (for biological substances) nor a reproductive toxicant (for commercially synthesized chemicals) have not been conducted.

Absent the required toxicological proofs of safety for the components and the finished vaccine formulation, no vaccine can meet the scientific standards established for the safety of such drug products (**42 U.S.C. § 262(a)(1)(C)(i)(I)**), emphasis added, "**…** (C) The Secretary shall approve a biologics license application - (i) on the basis of a demonstration that - (I) the biological product that is the subject of the application is safe, pure, and potent; and …") much less the higher safety standards set forth in **21 C.F.R. § 6101.15(a)** for a compound used as a preservative in a biological drug product (emphasis added … Any preservative used shall be sufficiently nontoxic so that the amount present in the recommended dose of the product will not be toxic to the recipient, …).

Until, these studies are conducted and each vaccine's package insert (leaflets) changed to confirm that the requisite studies have been conducted and the components and vaccine meets all of the established safety standards and safety standard current good manufacturing practice (CGMP) minimums, all vaccines lacking these proofs are intrinsically unsafe.

Absent all of the requisite proofs of safety, all that epidemiological studies can do is, at best, provide poor estimates of the degree of

harm that the vaccine may cause to some of those administered them.

Hopefully, if the writer, the "*chief executive of the GAVI Alliance*", is truly concerned about the issues this reviewer has raised, he will, at a minimum, demand these studies from those vaccine makers that supply the vaccines his organization buys and distributes.

"Where a vaccine already has an established and strong safety record and is saving lives, the onus should be on producing evidence of a genuine risk before there is any change in policy related to its availability.

With millions of vulnerable lives at stake, the treaty negotiators need to engage and recognize that a ban on thiomersal would be bad policy based on bad science."

Hopefully, after reading this review and checking the cited studies, the treaty negotiators will recognize that a ban on "*thimerosal*", which will become effective only more than a decade after the treaty is published and sufficient countries adopt the treaty, is:

- The right policy based on the available toxicological evidence, the only science that can prove the safety of the dose of "*thiomersal*" in a vaccine, and
- A policy that will force the vaccine makers to provide safer vaccine formulations, be they multiple-dose or single-dose, to the developing countries.

From a toxicological point of view, the current estimate for the safe (nontoxic) level of TM exposure to the fetus or the developing child is: less than 0.0086 microgram of TM (less than 0.0042 microgram of mercury from TM) per kilogram of the developing individual's body weight per day[20] – a level that obviously renders one dose of a TM-preserved vaccine that delivers 25 micrograms of TM unsafe unless the developing child weighs more than 2 907 kilograms [or more than 6 409 pounds].

Since no developing fetus or developing child weighs anywhere these amounts much less more than them, clearly TM is not safe to use as a preservative in vaccines given to pregnant women or developing children.

Reviewer's Closing Remarks

In conclusion, at a minimum, this reviewer anticipates that this in-depth review of Seth Berkley's article titled, "***Stick With the Science***", will

20 http://dr-king.com/docs/090812_fnldrft_TheTruthAboutTheToxicityOfThimerosalr5b.pdf

cause all who read this review to understand that Dr. Berkley's statements do not "stick with" the applicable science, toxicology, and represent the unsubstantiated views of the typical vaccine apologists who irrationally defend the use of "*thiomersal*" as a preservative in vaccines.

Such defenses are clearly irrational because the ever-growing body of published toxicological evidence clearly has established that injected "*thiomersal*" is:

a. An organic mercury-based compound that is highly toxic to developing humans at exposure doses more than 1000 times lower than the least exposures in developing children given "thiomersal"-preserved vaccines or indirectly exposed in utero when their mothers are given such vaccines during pregnancy;

b. To varying degrees, converted in the developing children's tissues into bio-accumulative, persistently toxic, inorganic mercury species having half-lives in the human brain of 18 to 20 years; and

c. Unsafe to use as a preservative in vaccines given to pregnant women and developing children.

That the adopted treaty on mercury excludes "*thiomersal*" used in vaccines does not alter the realities that: **a)** "*thiomersal*"-preserved vaccines are mercury toxic to developing children and **b)** those organizations who are engaged in any aspect of supporting the continuing use of such vaccines seem to be knowingly engaged in encouraging the mercury-poisoning of the world's developing children for reasons other than protecting the health of those children.

About the Writer, Seth Berkley

*"**Seth Berkley** is a medical epidemiologist and chief executive of the GAVI Alliance, a public-private global health partnership to increase access to immunization in poor countries."*

From: http://www.tagsup.com/tag/Seth+Berkley

"**Seth** Franklin **Berkley**, M.D. (born in 1956 in New York, NY) is a medical epidemiologist by training.

He is the CEO of the GAVI Alliance and a global advocate on the power of vaccines.

He is also the founder and former President and CEO of the International AIDS Vaccine Initiative (IAVI)..

Graduated McBurney School, New York, 1974, he received a Bachelor of Science and medical degrees from Brown University, and trained in internal medicine at Harvard University.

Berkley has been featured on the cover of Newsweek and recognized by Wired Magazine as among "The Wired 25" - a salute to dreamers, inventors, mavericks and leaders - as well as by TIME magazine as one of the "100 Most Influential People in the World" in 2009.

In 2010, Fortune magazine named **Berkley** as one of its "Global Forum Visionaries."

Speaking at the TED 2010 conference, Dr. **Berkley** explains how innovative vaccine design and production technologies are bringing us closer to controlling global health threats like flu and ...

Organizations founded: International AIDS Vaccine Initiative
Date of birth: 1956;
Education: Brown University;
Gender: Male "

About the Reviewer, Paul G. King, PhD

Beyond the general information that is available on his Internet web site, http://www.dr-king.com/ (The Know Zone), Paul G. King, PhD Analytical Chemist, is the Science Advisor to, and current Secretary for, the Coalition for Mercury-Free Drugs (CoMeD, Inc., which is a 501(3)(c) not-for-profit corporation) that maintains an Internet web site at http://www.mercury-freedrugs.org/.

As a scientist and student of the federal regulations and statutes that govern drugs, including vaccines, Dr. King has led CoMeD, on two (2) separate occasions, in the drafting and submission of a "Citizen Petition" seeking to have the federal government comply with the law, and, based on the improper denial of the Citizen Petition submitted, a federal lawsuit seeking to have the Federal District Court for the District of Columbia compel the Secretary of the Department of Health and Human Services (DHHS) and the Commissioner of the FDA to comply with the statutes, laws (regulations) and policies that regulate the lawful conduct of the Secretary of the DHHS, the FDA commissioner and CDC and FDA official's. The second civil suit, 1:2009-cv-00015, is still being litigated.

Additionally, Dr. King has, on several occasions, drafted legislation for submission to the Congress of the USA as well as to the legislatures of various States, submitted cogent comments in opposition to proposed changes to federal and state regulations that are not in the public interest or appear to be at odds with the law, reviewed numerous documents, and written articles on a variety of vaccine-related and other issues.

Further, Dr. King has provided diverse groups with his analysis of various Congressional bills, resolutions and treaty documents as well as federal and state judicial proceedings.

Moreover, he has been an author of several papers bearing on issues related to the toxicities of Thimerosal and other compounds and, if any, their connection to a range of chronic neurodevelopmental, other developmental and behavioral abnormalities that appear to be:

- well-above (> 1 in 10 children; asthma),
- above (> 1 in 100 children; the autism spectrum disorders),
- at (> 1 in 1000 children; non-genetic childhood type 1 diabetes),
- or approaching (> 1 in 5000; life-threatening peanut allergy)

epidemic childhood levels.

Most recently, Dr. King was the co-author of a paper in the journal ***Vaccine*** with Dr. Gary S. Goldman[21].

21 Goldman GS, King PG. Review of the United States universal varicella vaccination program: Herpes zoster incidence rates, cost-effectiveness, and vaccine efficacy based primarily on the Antelope Valley Varicella Active Surveillance Project data. ***Vaccine*** 2012 May 31 online.