

UNITED STATES DISTRICT COURT  
NORTHERN DISTRICT OF CALIFORNIA

<p>IN RE: ROUNDUP PRODUCTS LIABILITY LITIGATION</p>	<p>MDL No. 2741 Case No. 16-md-02741-VC</p>
<p>This document relates to: <i>Bulone v. Monsanto Co.</i>, Case No. 20-cv-03719-VC</p>	<p><b>ORDER GRANTING MOTION TO EXCLUDE DR. LUOPING ZHANG AND GRANTING SUMMARY JUDGMENT TO MONSANTO</b></p> <p>Re: Dkt. No. 18022</p>

Monsanto’s motion to exclude the testimony of Dr. Luoping Zhang is granted. This order assumes familiarity with the Court’s prior orders on general and specific causation and the Ninth Circuit’s opinion in *Hardeman*. See generally, e.g., *In re Roundup Products Liability Litigation*, 390 F. Supp. 3d 1102 (N.D. Cal. 2018) (Pretrial Order No. 45, Dkt. No. 1596); *In re Roundup Products Liability Litigation*, 358 F. Supp. 3d 956 (N.D. Cal. 2019) (Pretrial Order No. 85, Dkt. No. 2799); *Hardeman v. Monsanto Company*, 997 F.3d 941 (9th Cir. 2021). It also assumes familiarity with the record from the *Daubert* hearing on Zhang that took place on April 24, 2024. See Hearing Tr. (Dkt. No. 18297).

Zhang’s presentation is based on a meta-analysis of the epidemiological literature that she published in 2019. There are several issues with her opinion, each of which is an independent ground for exclusion. First, Zhang’s meta-analysis is junk science. It has deep methodological problems, not the least of which is that it doesn’t achieve its stated aim of examining only “highly exposed” individuals. Instead, it examines an arbitrary selection of the available data. Second, Zhang’s only engagement with the epidemiological literature is her meta-analysis, and

her meta-analysis can't substitute for a reliable general causation opinion. In other words, even if the meta-analysis were somehow useful in the field of epidemiology, it still couldn't reliably serve as a litigation expert's sole engagement with the epidemiological literature. Both of these problems are exacerbated by the fact that Zhang struggled to answer basic questions about her own paper, and the studies discussed in that paper. Nor can either problem be cured by intoning that the paper was peer-reviewed and developed before an expert became personally involved in litigation—those facts are relevant, but a court can't wave junk science through the *Daubert* gate simply because it survived some prepublication peer-review process. For each of those reasons, Zhang's testimony must be excluded. And without Zhang, Bulone has no admissible general causation opinion, so Monsanto is entitled to summary judgment.

## I

Dr. Zhang is a biochemist and a professor emeritus of toxicology at the University of California, Berkeley. She has been designated to testify as a general causation expert in the *Bulone* case. Zhang is Bulone's sole expert on general causation.

Zhang's presentation is different from those of past general causation experts in that the only opinions she disclosed are those contained in two journal publications that she co-authored. *See* Zhang Expert Report (Dkt. No. 18113-1) at 2 (stating that her "opinions in this matter, and the bases for them, are set out in the following," and citing two articles, without further comment); *see also* Order Denying Motion to Strike Expert Report of Luoping Zhang, Ph.D. (Dkt. No. 17743). In effect, these two publications are Zhang's expert report. Only one of these studies, Zhang's 2019 meta-analysis, grapples with the epidemiological evidence.<sup>1</sup> That study is the focus of Monsanto's attack on Zhang's presentation. Because an admissible expert opinion on general causation is necessary to survive summary judgment, and because a complete general causation opinion must address the epidemiological evidence, Bulone's case will stand or fall on

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<sup>1</sup> *See* Zhang et al., *Exposure to Glyphosate-Based Herbicides and Risk for Non-Hodgkin Lymphoma: A Meta-Analysis and Supporting Evidence*, 781 *Mutation Research* 186 (2019) ["Zhang Meta-Analysis"] (Dkt. No. 18351-4).

whether Zhang's 2019 meta-analysis is an admissible treatment of the epidemiological evidence. *See* Pretrial Order No. 45 at 13 ("As the parties acknowledge, epidemiology is central to the general causation inquiry, and where such evidence exists, it must be addressed by the experts.") (citing *Norris v. Baxter Healthcare Corp.*, 397 F.3d 878, 882 (10th Cir. 2005)); *see also id.* at 6.

Zhang's 2019 paper is a meta-analysis of six epidemiological studies of varying sizes, methods, and quality: McDuffie (2001), Hardell (2002), De Roos (2003), Eriksson (2008), Orsi (2009), and Andreotti (2018). The paper's approach is based on the "*a priori* hypothesis" that, if glyphosate were carcinogenic, people who had been exposed to more glyphosate would be more likely to show an increased risk of NHL. *See* Zhang Meta-Analysis § 2.3. Accordingly, the authors purported to conduct the meta-analysis by isolating the data from the highest-exposure groups, where available, across each of the studies and analyzing them using a fixed-effect statistical model. However, not all of the epidemiological studies that Zhang analyzed broke out their data into groups based on exposure levels. Some of the underlying studies only reported their results on an ever-exposed/never-exposed basis. For those studies, the meta-analysis simply used all of the data. *See id.* § 2.6.

The results of the meta-analysis are presented in the form of a "meta-risk ratio" of 1.41, with a 95% confidence interval of 1.13–1.75. *Id.* § 3.1. Based on this top-line finding, as well as summary discussions of other kinds of animal studies and mechanistic studies, the meta-analysis concludes that "[t]he overall evidence from human, animal, and mechanistic studies presented here supports a compelling link between exposures to [glyphosate-based herbicides] and increased risk for NHL." *Id.* § 9.

Monsanto's motion to exclude Zhang focused on an EPA critique of her meta-analysis produced during the agency's review of glyphosate's registration under FIFRA. *See* Hsu Decl. Ex. D, EPA Review (Dkt. No. 18022-5) at 8. The *Daubert* hearing brought some additional issues to light, and the Court ordered further briefing. Bulone doesn't dispute that the Court can consider the issues raised at the hearing in ruling on Zhang, particularly given the supplemental briefing. *See Miller v. Baker Implement Co.*, 439 F.3d 407, 413 (8th Cir. 2006) ("A district

court's *Daubert* inquiry need not take any specific form, and its *sua sponte* consideration of the admissibility of expert testimony is permissible so long as the court has an adequate record on which to base its ruling.") (citing *Kirstein v. Parks Corp.*, 159 F.3d 1065, 1067 (7th Cir. 1998)).

## II

In this litigation, the general causation question is "whether a reasonable jury could conclude by a preponderance of the evidence that glyphosate can cause NHL at exposure levels people realistically could have experienced." Pretrial Order No. 45 at 2. Presenting an admissible general causation opinion requires "offering independent and relatively comprehensive opinions that the epidemiological and other evidence demonstrates glyphosate causes NHL in some people who are exposed to it." *Id.* at 3. The admissibility of any opinion that Roundup is capable of causing NHL has always been a "very close question." *Id.* at 1. Reliably offering such an opinion requires serious engagement with the relevant literature: general causation experts must be able to "assess whether a study is credible, to explain why they relied on one study more than another, and to articulate how they reached their conclusion in the face of conflicting evidence." Pretrial Order No. 288 (Dkt. No. 17504) at 5; *see also* Pretrial Order No. 45 at 35.

## A

The most fundamental problem with Zhang's testimony is that her meta-analysis was not reliably performed. It has several methodological problems that, when taken together, make its analysis of the epidemiological literature indefensible.

First, the meta-analysis was based on the hypothesis that, if glyphosate caused NHL, then people with the highest levels of exposure would be most likely to get sick. Zhang and her colleagues justified this hypothesis with reference to "the understanding that higher and longer cumulative exposures are likely to yield higher risk estimates, given the nature of cancer development." Zhang Meta-Analysis § 2.2; *see also* Hearing Tr. at 122:3–15. They also argued that data from high-exposure groups are less likely to be affected by confounders or to be diluted by low-exposure data points. Zhang Meta-Analysis § 2.2. But the meta-analysis doesn't grapple with the fact that the Andreotti study, which it says is the highest-quality epidemiological study

available, doesn't show any kind of dose-response relationship between glyphosate exposure and NHL. *See* Pretrial Order No. 45 at 26 (discussing Andreotti, which reported risk ratios below 1 for every exposure quartile, with the highest risk ratio reported for the third-highest quartile); Zhang Meta-Analysis, Table 2 (ranking the quality of the studies included in the meta-analysis and listing Andreotti as the best study); *see also* Pretrial Order No. 45 at 40 (discussing the ambiguous evidence regarding dose response issue).

Second, in applying its hypothesis, the meta-analysis ends up mixing different types of studies and different types of data in a way that ultimately seems hard to justify. Only half of the studies that Zhang considered broke out their results according to the subjects' exposure levels: Eriksson, McDuffie, and Andreotti. *See* Hearing Tr. at 50:6–9. For the remaining three studies—which reported their results on an ever-exposed/never-exposed basis—the meta-analysis simply incorporated all of the studies' data. So the meta-analysis used only a portion of the data from three of the studies, and the entirety of the data from the other studies. *Id.* at 59:9–12 (“[The Court]: So you took portions of the group of people studied in Eriksson and McDuffie and Andreotti and put them together with all of the people studied in the other three studies? A: Yeah.”). One result of this uneven mixing of studies is that the meta-analysis, in effect, artificially limited its use of data from Andreotti, the study Zhang said is the strongest and the one that showed no statistically significant association between glyphosate and NHL for any level of exposure. This issue was noted in the EPA's assessment of Zhang's study. *See* EPA Review at 8. Using a small portion of Andreotti's data might be defensible if the meta-analysis really took only a portion of the data from *every* study. But instead, the study methodologically de-emphasizes high-quality data that would tend to reduce the “meta-risk ratio,” while using the full datasets from most of the lower-quality studies.<sup>2</sup>

Third, the studies that did stratify their results by exposure level used different exposure

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<sup>2</sup> The treatment of the Andreotti data is especially misleading given that the meta-analysis touts itself as “the first meta-analysis to include the most recently updated Agricultural Health Study (AHS) cohort,” *i.e.*, the Andreotti data. Zhang Meta-Analysis § 1.3; *see also* Hearing Tr. at 49:21–50:5.

cut-offs and measured exposure differently. As a result, it's likely that some people *excluded* by the meta-analysis had as much or more exposure than people who were *included*. This makes the method even more arbitrary. For example, the high-exposure category in McDuffie included people who reported at least two exposure days per year. Hearing Tr. at 55:3–7. If that cutoff were applied to the Andreotti data, it would probably capture many of the subjects from that study's third quartile (38.74–108.4 cumulative lifetime days of exposure) and even some from the second quartile (13.75–38.74 cumulative lifetime days of exposure).<sup>3</sup> But these people were uniformly excluded from Zhang's analysis. Here again, the meta-analysis's application of its high-exposure hypothesis didn't, in practice, result in the inclusion of only highly exposed people. Instead, it resulted in the arbitrary exclusion of data from Andreotti and the over-representation of unadjusted data from the case-control studies.

That leads to the fourth point: the meta-analysis mixes results adjusted for the use of other pesticides with unadjusted results. *See* Hearing Tr. at 80:8–81:17. Indeed, the meta-analysis's selection criteria sometimes led Zhang to choose unadjusted data even when adjusted data was available, which seems inexcusable. That is what Zhang did with the Eriksson study: Eriksson reported unadjusted results stratified by exposure level, and Zhang included that data. However, the study also reported adjusted results on an ever/never basis, and she ignored that data. *Id.* at 91:2–24. (And then Zhang's paper misleadingly states that five of the seven studies reported data adjusted for other pesticides, which implies that it counted Eriksson as a study that reported adjusted data. But the data from Eriksson that Zhang actually used in the primary meta-analysis was unadjusted. *See* Hearing Tr. at 94:21–95:7.) The inclusion of the unadjusted data seems to have had a significant impact on the results, as evidenced by one of the paper's sensitivity analyses. That analysis substituted the Hohenadel study for the McDuffie study. The Hohenadel study used the same subjects as the McDuffie study, but it adjusted for exposure to

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<sup>3</sup> Gabriella Andreotti et al., *Glyphosate Use and Cancer Incidence in the Agricultural Health Study*, 110 *Journal of the National Cancer Institute* 1 (2018) (Dkt. No. 1136-1) at 3.

malathion, an insecticide. *See* Hearing Tr. at 103:2–19; *see also* Zhang Meta-Analysis, Table 6, Row: “Other”. (The relevant McDuffie data is unadjusted for other occupational exposures.) With that substitution, Zhang’s “meta-risk ratio” became statistically insignificant. *See id.*

The issues with unadjusted data are especially important because they tend to undercut the assumptions underlying Zhang’s entire method. Recall that part of the paper’s justification for focusing on “high exposure” groups is that they are “less likely to be dominated by confounding or other biases[.]” Zhang Meta-Analysis § 2.2. But, in this context, exposure to other pesticides is the major confounder, and people with high exposure to glyphosate (who tend to be agricultural workers or landscapers) are likely to have *more* exposure to other pesticides, not less. *See* Pretrial Order No. 45 at 24. That means that when Zhang isolated unadjusted, “high-exposure” data from McDuffie and Eriksson, she may have *increased* the effect of confounders on the meta-risk ratio. At the very least, it isn’t likely she reduced their effect.

The upshot of these four points is that the meta-analysis’s methods are impossible to justify—and that becomes clear when one starts to drill down into the details. The stated purpose of the meta-analysis is to test the *a priori* hypothesis by examining what the totality of the epidemiological evidence shows about NHL incidence “following high cumulative GBH exposure.” Zhang Meta-Analysis § 3.1. But the study doesn’t really do that. Instead, it slices and dices the available epidemiological evidence in a way that doesn’t actually isolate high-exposure data. It takes all of the data from some studies that don’t report exposure levels; it excludes subjects from Andreotti who were probably as highly exposed as subjects from McDuffie; and it mixes whole datasets with partial ones, notably using only a small portion of the NHL cases from the highest-quality study. Finally, the meta-analysis mixes adjusted and unadjusted data, even choosing the latter in Eriksson even where adjusted data was available. *See* Hearing Tr. at 81:10–17.<sup>4</sup> In short, the meta-analysis restricts itself to a more or less arbitrary subset of the

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<sup>4</sup> This is not to suggest that it would never be appropriate for a meta-analysis to combine adjusted numbers with unadjusted numbers. But to avoid using adjusted numbers for no apparent reason is a different matter altogether. And when you combine that with the previous three problems discussed above, it becomes clear that Zhang’s meta-analysis is simply not an

epidemiological data points. And it does so in a way that seems likely to exacerbate, rather than ameliorate, problems with confounding. Even on its own terms, it is junk science.

## B

There's a second, independent problem. Even if Zhang's paper could somehow be considered a reliable meta-analysis, a reliable meta-analysis is not the same thing as a reliable general causation opinion. In this respect, it matters that Zhang's entire engagement with the epidemiological studies is based on her meta-analysis. Accordingly, the right way to think about Zhang's presentation is not just to ask whether it amounts to a reliable meta-analysis (although it must at least be that). Instead, one also has to ask whether the meta-analysis is a reliable approach to answering the question: "Does Roundup cause NHL in humans?"

To see why these are different questions, consider that the authors of the McDuffie, Eriksson, or Orsi studies probably have fair claims that their case-control studies were reliably conducted. Those studies were peer-reviewed and published, and they've no doubt been widely cited in the scientific debates about glyphosate. But that doesn't mean they would make for admissible general causation opinions. Imagine, for example, that a plaintiff offered Dr. McDuffie herself as their sole general causation expert. Imagine further that at the expert disclosure deadline, McDuffie served her 2001 study, describing it as a statement of her "opinions in this matter, and the bases for them." To survive a *Daubert* motion, it would not be enough for McDuffie to show that she had reliably conducted a case-control study. Instead, she'd have to explain why her methods in that study (now functioning as an opinion on general causation) were a reliable way to decide, using epidemiological evidence, whether glyphosate did or didn't cause NHL.

The same is true here. Obviously, the difference between a meta-analysis and a case-control study is that the former purports to synthesize the results of multiple studies. But that doesn't mean that a meta-analysis can necessarily stand in for a holistic general causation

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objective, reliable scientific undertaking.



opinion, especially where the meta-analysis is designed to examine only a subset of the available data. Just like the McDuffie study could be useful to epidemiologists without being able to prove, by itself, that glyphosate causes cancer, a meta-analysis like Zhang's might (if performed reliably) offer a useful addition to the scientific literature without being able to prove anything about general causation. Perhaps Zhang's meta-analysis is best understood as a statistical experiment designed to see what can be learned by massaging the data in a certain way. As such, perhaps it could be useful to experts in some fashion. But here, the meta-analysis has been offered as Bulone's *only* opinion about the epidemiological evidence and general causation. That means Zhang has opened the study up to the types of questions necessary to determine whether it reliably analyzes that evidence—not just by the standards that govern epidemiological meta-analyses, but by the standards that govern general causation testimony in this litigation.

Zhang's meta-analysis can't meet those standards. First, and maybe most fundamentally, the paper doesn't seem to offer the necessary conclusion about general causation. Zhang concludes that there is a "compelling link between exposures to [glyphosate-based herbicides] and increased risk for NHL." Zhang Meta-Analysis § 9. Similarly, the study's key figure, the 1.41 meta-risk ratio, is described as underscoring the fact that "exposure to GBHs is associated with an increased risk of NHL." *Id.* § 6. But saying there is a "compelling link" or an "association" isn't the same as saying that Roundup is capable of *causing* NHL in humans—which is what a plaintiff's general causation evidence must enable the jury to conclude.<sup>5</sup> See Pretrial Order No. 45 at 2; *cf. also* Pretrial Order. No. 263 (Dkt. No. 14432) at 2 (excluding a

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<sup>5</sup> The other paper that Zhang disclosed as a statement of her opinions, which deals with the mechanistic evidence on glyphosate, also doesn't offer an opinion about causation. It concludes:

The totality of evidence from mechanistic studies in human and animal studies [sic] suggest that glyphosate and its formulations possess several of the ten key characteristics of carcinogens. . . . Overall . . . our findings our findings of strong evidence of glyphosate's ability to cause genotoxicity, epigenetic alterations, oxidative stress, chronic inflammation, and endocrine disruption, as well as its demonstrated perturbation of the gut microbiota outline several avenues implicated in lymphomagenesis.

Zhang Expert Report (Dkt. No. 18113-1) at 65.

specific causation expert who concluded that “‘it is possible’ glyphosate contributed to” the plaintiff’s NHL).

Second, because the meta-analysis was published in 2019, Zhang can’t offer an up-to-date account of the epidemiological evidence on glyphosate and NHL. In the roughly five years since the meta-analysis was published, further epidemiological studies have come out. Zhang admitted that if she conducted the meta-analysis today, she would incorporate several of them. *See* Hearing Tr. at 104:5–105:21 (“Q: So if you were starting today to do the same study with your *a priori* hypothesis, you would use Pahwa instead of McDuffie and De Roos 2003; correct? . . . A: That’s correct.”); *id.* at 110:18–111:12 (Zhang admitting that if she were “doing the same analysis with the same *a priori* hypothesis,” she would incorporate updated data from three studies that post-dated her 2019 meta-analysis). It also seems like, if Zhang applied the same methods today, the more recent data points would tend to reduce her “meta-risk ratio.” *See id.* at 109:9–23. At any rate, an expert testifying in 2024 couldn’t reliably opine that glyphosate is carcinogenic if they only considered epidemiological evidence published before 2019.

Finally, the methodological problems described in the preceding section show not only that the paper is an unreliable meta-analysis but also that it’s unreliable as a standalone treatment of the epidemiological evidence. If an expert offering a more conventional Bradford Hill–oriented general causation opinion arbitrarily limited the scope of the data they examined, elided the distinction between adjusted and unadjusted data, and simply assumed the existence of a dose-response relationship, their opinion would be inadmissible. *Cf.* Pretrial Order No. 288 at 2–5 (excluding general causation opinion where, among other things, the expert “cherry-picked the findings of the epidemiology studies, reporting only certain odds ratios—those most favorable to his ultimate opinion,” and misstated whether the McDuffie and Eriksson studies were adjusted for other pesticides). The same has to be true here.

To be clear, none of this is to suggest that a well-performed meta-analysis could never independently support an expert opinion on causation. One could imagine a well-conducted epidemiological meta-analysis that yielded such a high risk-ratio that no further work would be

necessary to conclude that a particular substance can cause an illness. It's just that Zhang's meta-analysis can't support a finding that Roundup causes NHL, even assuming it makes some sort of contribution in the world of epidemiology.<sup>6</sup>

### C

Zhang's testimony, rather than addressing the problems with her opinion, made it even less reliable. At the hearing, Zhang struggled to answer basic questions about her meta-analysis or the handful of studies it incorporated. For example, she couldn't remember the names of all six studies that she analyzed. *See id.* at 48:8–51:17. She couldn't remember important facts about how the high-exposure groups were defined in each study. *See id.* at 51:20–52:20, 55:3–57:20. She couldn't remember whether key data points were adjusted or unadjusted. *See id.* at 93:25–94:20. She couldn't remember which studies were used in some of the sensitivity analyses, and she was therefore unable to explain problems with them that were raised on cross-examination. *See id.* at 100:11–102:21. This is clear enough from the transcript of the hearing; it's even more obvious from viewing the recording.

Bulone says that Zhang didn't expect the hearing to get into issues that weren't raised in Monsanto's motion, and that she may have been flustered by a change in the hearing format from in-person to Zoom. Some allowances can be made for that. But, frankly, nothing can excuse Zhang's inability to answer basic and straightforward questions about her own paper and the epidemiological literature about which she is being offered as an expert. Zhang's lack of familiarity with her own opinion is itself a basis to exclude her testimony. *See* Pretrial Order No. 288 at 4 (excluding general causation opinion in part because the expert “was not able to discuss his report, the literature, or his opinion without reading directly from his notes or being supplied the answers by counsel through leading questions or displayed exhibits”).

To the extent that Zhang did address the substantive issues described above, her

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<sup>6</sup> It's possible to characterize the problems discussed in this section as issues of “fit” rather than reliability. *See Daubert v. Merrell Dow Pharmaceuticals, Inc. (Daubert II)*, 43 F.3d 1311, 1315 (9th Cir. 1995); *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579, 597 (1993). However they're understood, they require exclusion.

responses were inadequate. Generally speaking, Zhang defended the paper by saying that its methods had been used in other meta-analyses, that its methodological choices were all made clear in the paper, that certain limitations were a function of the small body of epidemiological evidence, and that the paper’s sensitivity analyses supported its headline “meta-risk ratio” finding.<sup>7</sup> But none of Zhang’s answers responded directly to the question of why, as a substantive matter, these issues shouldn’t shake confidence in the paper’s methods. *See, e.g.*, Hearing Tr. at 65:11–66:23; 71:7–72:8; 82:22–84:22. For example, the fact that the paper clearly states its selection criteria doesn’t mean that applying them to slice up the epidemiological data makes for a reliable analysis. In short, Zhang wasn’t able to defend her own study’s methods, let alone explain why it could serve as an independent analysis of the epidemiological evidence.

#### D

In his supplemental response, Bulone argues that Monsanto is asking the Court to impermissibly substitute its judgment about the quality of the meta-analysis for the judgment of the scientific community. He argues that the methods underlying the meta-analysis (including most of practices discussed above, like mixing adjusted and unadjusted data) are common in epidemiological meta-analyses. *See* Plaintiff’s Response to Monsanto’s Supplemental Brief (Dkt. No. 18351) at 12–20; *see also* Zhang Declaration (Dkt. No. 18351-2). He says that studies

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<sup>7</sup> A word on the sensitivity analyses. Pointing to them was the closest that Zhang came to substantively defending the study’s methods. But in crucial places, the sensitivity analyses end up reproducing the problems with Zhang’s method rather than resolving them. Consider the sensitivity analysis that examined only the three studies that stratified data by exposure level. *See* Zhang Meta-Analysis, Table 6, Row: “High level”. Necessarily, that analysis still mixes unadjusted data from Eriksson and McDuffie with adjusted data from Andreotti, and it still leaves out subjects from Andreotti that likely had as much exposure as subjects from McDuffie. Or consider the analysis that purportedly examined only the studies with adjusted data. The paper says that it considered four such studies. *See id.*, Table 6, Row: “Adjusted”. But only three of the studies—De Roos (2003), De Roos (2005), and Hardell—reported adjusted, stratified data. The fourth study included must have been Eriksson, as Zhang acknowledged. *See* Hearing Tr. at 100:25–101:1. But that means that either the study authors used the *unadjusted* high-exposure data from Eriksson in this meta-analysis (which would make it completely bogus) or they used Eriksson’s ever/never data (which seems unlikely, because that would be inconsistent with the paper’s method of selecting the high-exposure groups where available). Either way, that sensitivity analysis doesn’t do what it claims to do. Zhang was unable to explain this discrepancy and did not know which data was used in that sensitivity analysis. *See id.* at 100:11–102:19. The paper itself doesn’t resolve the confusion, either. *See* Zhang Meta-Analysis, Table 6, n.7.

employing such methods are frequently published in peer-reviewed journals, including prestigious ones. *See id.* And he argues that Zhang’s meta-analysis has all the standard indicia of reliability under *Daubert*: it was published in a peer-reviewed journal, it was produced independently of litigation, Zhang has been invited to present the paper at various scientific societies, and the paper has been cited many times. *See id.* at 8–12.

These points can’t make the study’s glaring methodological flaws disappear. It’s true that the meta-analysis was published in a peer-reviewed journal and prepared before Zhang got personally involved in any Roundup cases (although the paper seems so results-driven that one could be forgiven for doubting that its authors were really thinking “independently” of the nationwide litigation). But while those facts are entitled to consideration, they don’t mean that blind deference to Zhang is appropriate. There are a vast number of peer-reviewed journals out there. Pre-publication editorial peer review, just by itself, is far from a guarantee of scientific reliability. *See Valentine v. Pioneer Chlor Alkali Co.*, 921 F. Supp. 666, 674–76 (D. Nev. 1996) (distinguishing between “editorial peer review” and “true peer review,” and arguing that the latter—which includes the scientific reception of an article after publication, efforts to replicate its findings, etc.—is what’s really important under *Daubert*).<sup>8</sup> Plus, part of the point of centralizing cases like these in an MDL is that the Court, over many years, can develop a fluency in the relevant scientific literature. Where that fluency helps identify serious problems in an expert opinion, it doesn’t make sense for the Court to ignore them.

Second, the other meta-analyses that Zhang cites, which also use an “*a priori* hypothesis” to isolate high-exposure groups in epidemiological studies, don’t help her as much as she would like. These studies may share some of the basic features of Zhang’s paper, but that isn’t enough to save a study so riddled with problems. The other papers also aren’t methodologically

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<sup>8</sup> *See also* Effie Chan, Note, *The Brave New World of Daubert: True Peer Review, Editorial Peer Review, and Scientific Validity*, 70 N.Y.U. Law Review 100 (1995); Smith, *Peer Review: A Flawed Process at the Heart of Science and Journals*, 99 Journal of the Royal Society of Medicine 178 (2006) (arguing that there are many shortcomings of pre-publication peer review, including that it is not a good system for catching errors, is prone to publication bias, and often operates inconsistently).

comparable to Zhang's in important ways. For one thing, all of the cited meta-analyses examined at least twice as many epidemiological studies as Zhang's glyphosate meta-analysis, and often many more. Perhaps if Zhang had a lot more studies to feed into her meta-analysis, she *might* have a defensible claim to be roughly capturing "high-exposure" data points. As it is, her analysis does no such thing.


Finally, Bulone's arguments do nothing to address the problems with using Zhang's meta-analysis as a standalone analysis of the epidemiological evidence. One can't assume that peer reviewers were vetting a study's ability to play a certain role in an expert opinion, and there's no reason to think that was the case here. In short, simply intoning that a paper was peer-reviewed and that it was (apparently) produced before the author was thinking about getting involved in litigation isn't enough to compensate for methodological problems as glaring as those described here. And it certainly isn't enough to show that Zhang's paper can support a reliable general causation opinion.

### III

Monsanto filed a motion for summary judgment in connection with its motion to exclude Dr. Braunstein, Bulone's specific causation expert. *See* Dkt. No. 17598. That motion mentioned the necessity of summary judgment in the absence of a specific causation expert. *Id.* at 9–10. The absence of an admissible general causation opinion requires the same result, as Bulone's counsel conceded. Hearing Tr. at 87:14–25. Accordingly, summary judgment is granted for Monsanto on the grounds that Bulone lacks any admissible evidence of general causation.

**IT IS SO ORDERED.**

Dated: June 20, 2024

  
VINCE CHHABRIA  
United States District Judge