IN THE SUPERIOR COURT OF THE DISTRICT OF COLUMBIA
CIVIL DIVISION

Michael Patrick Murray, *et al.*,	)	
	)	
Plaintiffs,	)	
v.	)	Case No. 2001 CA 008479 B
	)	Judge Alfred S. Irving, Jr.
Motorola, Inc., *et al.*,	)	
	)	
Defendants.	)	
	)	
Dino Schofield,	)	
	)	
Plaintiff,	)	
	)	
v.	)	Case No. 2002 CA 001371 A
	)	
Motorola, Inc., *et al.*,	)	
	)	
Defendants.	)	
	)	
Pamela Cochran, *et al.*,	)	
	)	
Plaintiffs,	)	
	)	
v.	)	Case No. 2002 CA 001369 A
	)	
Audiovox Communications Corp., *et al.*,	)	
	)	
Defendants.	)	
	)	
David Keller, *et al.*,	)	
	)	
Plaintiffs,	)	
	)	
v.	)	Case No. 2002 CA 001372 A
	)	
Nokia, Inc., *et al.*,	)	
	)	
Defendants.	)	
	)	
	)	
	)	
	)	
	)	

Richard Schwamb, *et al.*,	)	
	)	
Plaintiffs,	)	
	)	
v.	)	Case No. 2002 CA 001370 A
	)	
Qualcomm Inc., *et al.*,	)	
	)	
Defendants.	)	
	)	
Baldassare Agro, *et al.*,	)	
	)	
Plaintiffs,	)	
	)	
v.	)	Case No. 2002 CA 001368 A
	)	
Motorola, Inc., *et al.*,	)	
	)	
Defendants.	)	
	)	
Alan Marks, *et al.*,	)	
	)	
Plaintiffs,	)	
	)	
v.	)	Case No. 2010 CA 003206 B
	)	
Motorola, Inc., *et al.*,	)	
	)	
Defendants.	)	
	)	
Shawn Kidd, *et al.*,	)	
	)	
Plaintiffs,	)	
	)	
v.	)	Case No. 2010 CA 007995 B
	)	
Motorola, Inc. *et al.*,	)	
	)	
Defendants.	)	
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Cristin Prischman, as Personal Representative of the Estate of Paul G. Prischman Plaintiff, v. Motorola Inc., *et al.*, Defendants.	)	Case No. 2011 CA 002113 B
Bret Kenyon Bocook and Laura Lynn Bocook, Plaintiffs, v. Motorola, Inc., *et al.*, Defendants.	)	Case No. 2011 CA 002453 B
Mindy S. Kemp Brown, individually and as Special Administrator of the Estate of Daniel Todd Brown, Plaintiffs, v. Nokia, Inc., *et al.*, Defendants.	)	Case No. 2011 CA 006710 B
Monique Solomon, individually and as Special Administrator of the Estate of Andrew J. Solomon, Plaintiffs, v. Motorola, Inc., *et al.*, Defendants.	)	Case No. 2011 CA 008472 B

Robert P. Noroski, individually, and as Personal Representative of the Estate of Heather Lynn Noroski, Plaintiffs, v. Samsung Telecomm America, LLC, *et al.*, Defendants.	)	Case No. 2011 CA 008854 B

ORDER

Before the Court is Defendants' July 19, 2019 *Motion to Exclude Plaintiffs' Expert Testimony*. On September 9, 2019, Plaintiffs filed an *Answer to Defendants' Motion to Exclude Plaintiffs' Expert Testimony*. On October 9, 2019, Defendants filed a Reply. Unfortunately, the COVID-19 pandemic stymied the Court's efforts in setting a date for an Evidentiary Hearing on the pleadings. The Court ultimately set the hearing date for September 12, 2022, when all Parties, their witnesses and the Court were available. The desire was to hold a fully in-person proceeding in view of the complexity of the issues and the number of Exhibits and Witnesses.

The Court was surprised to learn on the eve of the start of the evidentiary hearing that certain of Plaintiffs' witnesses would nevertheless be appearing remotely because they had not met the immunization criteria for entry into the United States. No matter, the Court heard testimony and arguments across 11 days, from September 12, 2022, to September 29, 2022. The endeavor was to aid the Court in deciding whether to admit the testimony and opinions of Plaintiffs' expert witnesses. Notwithstanding the briefing, the evidentiary hearing was never intended to address the admissibility of any of Defendants' witnesses, whose role for purposes of the instant proceeding was simply to provide rebuttal testimony to Plaintiffs' proffered experts' opinions.

At the conclusion of the hearing, the Court directed each side of the litigation to file one brief, not to exceed 100 pages, and only after having exchanged their briefs, to afford each side an opportunity to address within the 100-page limit the other's response. Further, as the Court admonished throughout the proceeding and before, the Parties' presentations must comply with rulings of the predecessor judges, the Hon. Frederick H. Weisberg and the Hon. Anita Josey-Herring. The Parties each filed their post-hearing briefs on December 2, 2022.

In reaching its decision, the Court considered the record, the laws of this jurisdiction, the testimonial and documentary evidence presented during the evidentiary hearing, including arguments of counsel, and the post evidentiary briefs. For the reasons set forth below, the Court agrees with Defendants and will exclude the testimony of Plaintiffs' expert witnesses.

I. PROCEDURAL HISTORY

A. Judge Weisberg's August 8, 2014 Order

Plaintiffs are litigants in thirteen separate cases that were consolidated for purposes of a *Frye/Dyas*[1] hearing. *See Michael Patrick Murray, et al. v. Motorola Inc., et al.*, No. 2001 CA 008479 B, at 5 (D.C. Super. Ct. Aug. 8, 2014) (memorandum opinion and order on expert witness admissibility) [hereinafter "Judge Weisberg's August 8, 2014 Order"]. Each Plaintiff is an individual suffering from a brain tumor or an estate suing upon behalf of someone who died of brain cancer, allegedly caused by long-term exposure to cell phone radiation. *Id.* The first of these cases was filed in 2001.[2] *Id.* The Hon. A. Franklin Burgess, Jr., bifurcated the litigation in two phases for judicial economy: general causation and specific causation. *Id.* He determined

[1] *Dyas v. United States*, 376 A.2d 827 (D.C. 1977), *cert. denied*, 434 U.S. 973 (1977); *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923)

[2] Although this matter involves 13 consolidated cases, there are 67 non-consolidated cases, with six such cases having been filed as recently as 2020. The Parties in the 67 non-consolidated cases are awaiting the Court's decision on general causation in the instant case.

that, if a court determined Plaintiffs' evidence was sufficient to survive the general causation phase of the litigation, the Parties would then be postured to proceed to phase two, during which each Plaintiff would present specific causation evidence on a case-by-case basis. *Id.* at 6. As to the first phase of the litigation, Judge Burgess determined that "[t]o survive summary judgment on general causation, plaintiffs must present sufficient admissible expert testimony to place in dispute a genuine issue of material fact as to whether radiation from cell phones can cause two kinds of brain tumors, glioma and acoustic neuroma." *Id.*

On August 8, 2014, Judge Weisberg issued an order ruling upon the admissibility of Plaintiffs' expert witnesses. Judge Weisberg began the Order with a question: "Can cell phones cause brain cancer?" *Id.* at 4. He continued:

> If that were the question confronting the court at this phase of the case, the answer would be relatively clear. Although there are a few isolated strands of data pointing in the direction of causation, the court could not conclude, based on the present record, that there is enough evidence for *any* scientist to answer the question 'yes' with the requisite degree of scientific certainty.

Id. (emphasis in original). Thus, the question before Judge Weisberg, and similarly before this Court, is not whether cell phones can cause brain cancer, but whether Plaintiffs' expert witnesses "have expressed the opinion 'to a reasonable degree of scientific certainty' that cell phones more likely than not cause or promote certain brain tumors [and therefore] should be permitted to testify to those opinions before the jury." *Id.* at 5.

Judge Weisberg noted that the questions the instant cases presented for the Court required application of the test set forth in *Dyas v. United States*, 376 A.2d 827 (D.C. 1977), *cert. denied*, 434 U.S. 973 (1977), and *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923), as opposed to the test articulated in *Daubert v. Merrill Dow Pharms. Inc.*, 509 U.S. 579 (1993), and Federal Rule of Evidence 702, as amended in 2000 ("Rule 702"). Judge Weisberg's August 8, 2014 Order at

5. Judge Weisberg acknowledged that, under the *Frye/Dyas* test, expert testimony is presumptively admissible "if the subject is beyond the ken of an average layperson, the expert is qualified to offer an opinion on the subject, the expert uses a methodology that is generally accepted in the relevant scientific community to arrive at his opinion and the probative value of the expert's testimony is not substantially outweighed by the risk of undue prejudice." *Id*. In December 2013 and January 2014, Judge Weisberg conducted a four-week evidentiary hearing, receiving testimony from Plaintiffs' eight experts and Defendants' four rebuttal experts, and reviewed hundreds of pages of legal briefing both before and after the hearing. *Id.* at 6.

Judge Weisberg observed, as follows:

> The opinions offered in this case that may be admissible under the District's "methodology only" application of *Frye* would almost certainly be excluded under *Daubert* because the carcinogenicity of cell phones, *vel non,* is such an unsettled science . . . . *Daubert* jurisdictions typically "scrutinize reliability more carefully and appl[y] stricter standards." The *Frye* test tends to make it easier for causation experts to get before the jury, even when they are in the minority and underlying science on causation is still quite controversial.

Id. at 26 (internal citations omitted) (citing Lloyd Dixon & Brian Gill, *Changes in the Standards for Admitting Expert Evidence in Federal Civil Cases Since the Daubert Decision*, RAND INST. FOR CIV. JUST., xiv-xx (2001); Margaret A. Berger, *What Has a Decade of Daubert Wrought?*, 95 AM. J. PUB. HEALTH S59-S65 (Jul. 27, 2004)). In other words, "if a reliable, but not yet generally accepted methodology produces 'good science,' *Daubert* will let it in, and if an accepted methodology produces 'bad science,' *Daubert* will keep it out[.]" *Id.* On the other hand, under *Frye*, "even if a new methodology produces 'good science,' it will usually be excluded, but if an accepted methodology produces 'bad science,' it is likely to be admitted." *Id.*

The general causation question presented is "whether the non-ionizing radiation from cell phones has a non-thermal effect that causes, promotes, or accelerates the growth of brain tumors,

specifically gliomas and acoustic neuromas." *Id.* at 9. Judge Weisberg noted that, at the time of writing of his order, "virtually all world-wide governmental health agencies that have studied the question have concluded that there is some, but not nearly enough scientific evidence to conclude that cell phone radiation can cause or promote brain cancer." *Id.* Judge Weisberg cited to the World Health Organization's International Agency for Research on Cancer ("IARC") when so concluding. *Id.* Judge Weisberg noted:

> Although "positive associations have been observed between exposure to radiofrequency radiation from wireless phones and glioma, and acoustic neuroma," the epidemiological evidence remains "mixed." The [IARC] Working Group dismissed several early case-control and cohort studies as being "largely uninformative" due to methodological shortcomings.

Id. at 10-11 (footnotes and original modifications omitted) (quoting IARC Monograph, Pls.' Ex. PX0062 at 419). The primary sources of the epidemiological evidence were two case-control studies: (1) INTERPHONE studies; and (2) Hardell studies. *Id.* at 11-14. IARC concluded that both the INTERPHONE and Hardell studies "suffer from flawed study designs that do not fully control for bias, confounding, and chance, a view that is widely shared by most other organizations that have studied the subject." *Id.* at 11-16 (citing to IARC Monograph, Pls.' Ex. PX0062 at 192-99, 203-16, 218-21, 233-34, 413-417, 419).

Judge Weisberg then considered whether to admit any of the opinions of Plaintiffs' experts. Judge Weisberg excluded the testimony of Dr. Shari Kramer, an epidemiologist. *See* Judge Weisberg's August 8, 2014 Order at 29. He reasoned that, although Dr. Kramer testified she employed a weight-of-the-evidence analysis of the cancer risk from cell phones, she picked out the pieces of data she preferred and found convenient reasons to ignore the rest of the data, which is contrary to the generally accepted method of conducting a weight-of-the-evidence analysis. *Id.* at 34-35 (contrasting Dr. Kramer's methods with Environmental Protection Agency

and IARC methods for conducting weight-of-the-evidence analysis). Further, Judge Weisberg excluded Dr. Kramer under Federal Rule of Evidence 403 ("Rule 403") because (1) she relied almost entirely upon the results of the INTERPHONE and Hardell studies, which have been criticized for their methodological flaws; (2) she chose data that would best support her opinion and disregarded other data without explanation; and (3) she presented quotes out of context. *Id.* at 36-39.

Judge Weisberg excluded the testimony of Dr. "Vini" Gautam Khurana, a neurosurgeon and associate professor of neurosurgery at the Australian National University in Canberra. *Id.* at 46. He excluded the testimony on Rule 403 grounds because (1) Dr. Khurana appeared to cherry-pick certain studies that supported his predetermined position; (2) some studies he chose suffered from methodological flaws and were criticized by various authorities; and (3) Dr. Khurana admitted that he was not familiar with the tools of the trade of epidemiology, such as the calculation of odds ratios. *Id.* at 50-52.

Finally, Judge Weisberg excluded the testimony of Dr. Dimitris Panagopoulos, a biophysicist with research focusing on non-ionizing radiation. *Id.* at 64. Judge Weisberg excluded Dr. Panagopoulos because his opinions were primarily derived from exposing fruit flies to cell phone radiation, a novel technique, and not a generally accepted methodology under the *Frye/Dyas* test. *Id.* at 67-68.

Applying the *Frye/Dyas* test, Judge Weisberg concluded the expert opinions of Drs. Michael Kundi, Igor Belyaev, Wilhelm Mosgoeller, and Abraham Liboff on general causation passed muster. *Id.* at 39-46 (Dr. Kundi); *id.* at 52-58 (Dr. Belyaev); *id.* at 58-64 (Dr. Mosgoeller); *id.* at 69-72 (Dr. Liboff). In addition, Judge Weisberg ruled that Dr. Laura Plunkett's proffered expert testimony on the general acceptance of predicting health effects in

humans from *in vitro* studies of human and mammalian cells passed muster under *Frye/Dyas*, but he found otherwise with respect to her other opinions and excluded them. *Id.* at 72-75.

On October 1, 2014, Judge Weisberg issued an order amending his August 8, 2014 order, acknowledging that his ruling involved a controlling question of law "as to which there is substantial ground for a difference of opinion and that an immediate appeal from the ruling or order may materially advance the ultimate termination of the litigation or case[.]" *See Michael Patrick Murray, et al. v. Motorola Inc., et al.*, Case No. 2001 CA 008479 B, at 2 (D.C. Super. Ct. Oct. 1, 2014) (order amending Aug. 8, 2014 memorandum opinion and including certification for interlocutory appeal) (quoting D.C. Code § 11-721(d)) [hereinafter "Judge Weisberg's October 1, 2014 Order"]. This, he concluded, would "permit Defendants, pursuant to D.C. Code § 11-721(d), to seek interlocutory review of the question of whether the District of Columbia should adopt Federal Rule of Evidence 702 (or a revised *Frye* standard) for the admissibility of expert evidence[.]" *Id.* at 5. On October 15, 2014, Defendants filed their notice of appeal.

B. District of Columbia Court of Appeals' Decision

On October 20, 2016, the District of Columbia Court of Appeals, sitting *en banc*, issued its decision on whether to change the legal standard that governs the admission of expert testimony from the *Frye/Dyas* test in favor of the standards embodied in Rule 702 of the Federal Rules of Evidence. *See Motorola Inc. v. Murray*, 147 A.3d 751, 752 (D.C. 2016) [hereinafter "*Motorola Inc.*"].

The Parties and *amici* recommended three options to the Court of Appeals: "(1) retain the *Dyas/Frye* test, by which we currently abide; (2) adopt Federal Rule 702, as amended to reflect the *Daubert* trilogy; or (3) craft a revised version of the *Dyas/Frye* test." *Id.* at 756. The Court of Appeals decided to adopt Rule 702, explaining, as follows:

> Like the "general acceptance" test, Rule 702 is concerned with the reliability of the "principles and methods" applied by the expert. Fed. R. Evid. 702 (c). But Rule 702 (d) goes further and expressly requires the court to determine whether "the expert has reliably applied the principles and methods to the facts of the case." We conclude that Rule 702, with its expanded focus on whether reliable principles and methods have been reliably applied, states a rule that is preferable to the *Dyas/Frye* test. The ability to focus on the reliability of principles and methods, and their application, is a decided advantage that will lead to better decision-making by juries and trial judges alike.
>
> We have considered revising the *Frye* test, as some jurisdictions have done, but there are substantial benefits to be gained from adopting a test that is widely used. *See Johnson v. United States*, 683 A.2d 1087, 1100 (D.C. 1996) (en banc) (noting "the advantage that uniformity with the federal rule and the vast majority of the state rules affords for interpretation and application"). We can learn from the decisions of other courts which apply Rule 702 or its state counterparts. Nevertheless, we are not proceeding with any illusions that the cases are uniform or even consistent. Nor will the transition be easy. But we are not the first jurisdiction to make this change, and the Advisory Committee Notes to Rule 702 provide helpful guidance for applying the rule. Echoing sentiments from *Daubert*, 509 U.S. at 593, we are confident that judges of the Superior Court, like their Article III counterparts, are fully capable of performing the gatekeeping function.

Id. at 756-57 (footnotes omitted). Accordingly, the Court of Appeals remanded the instant cases for further proceedings consistent with its opinion. *Id.* at 758-59.

C. Judge Weisberg's Post-Appeal Discovery Order

On March 16, 2017, Judge Weisberg issued an order establishing the scope of additional discovery consistent with the Court of Appeals' decision. Judge Weisberg observed that, since 2012, the question presented as set forth in the trial court's case management orders remain unchanged: "do Plaintiffs have admissible expert testimony on the general causation issue in these cases—*i.e.*, whether radiation from cell phones can cause the types of brain tumors Plaintiffs have alleged?" *See Michael Patrick Murray, et al. v. Motorola Inc., et al.*, Case No. 2001 CA 008479 B, at 3 (D.C. Super. Ct. Mar. 16, 2017) (order denying Plaintiffs' motion for

additional discovery) [hereinafter "Judge Weisberg's March 16, 2017 Order"]. Judge Weisberg reiterated the purpose of the phased discovery requirement was to avoid expensive and time-consuming litigation if Plaintiffs could not meet the general causation hurdle. He further acknowledged that "no American court had ever allowed such a claim to get to a jury, all concluding that the wide consensus in the scientific community would not support it." *Id.* Judge Weisberg reminded the Parties that the case management orders "were intended to determine whether the science had changed during the intervening years and whether the ruling on admissibility of expert testimony should change with it." *Id.* He explained:

> If Plaintiffs cannot qualify an expert on general causation based on existing science, and if summary judgment were to follow from that failure, it would *not* be because, based on *admissible* expert testimony, Plaintiffs have failed to raise a genuine issue of material fact in dispute as to whether cell phones can cause the alleged injuries. It would be because on the issue of general causation—which is a threshold issue the Plaintiffs are required to prove and one which cannot be proven without an expert—Plaintiffs have failed to proffer and qualify *any* expert after having been given a full and fair opportunity to do so.

Id. at 6 (emphasis in original).

As such, Judge Weisberg limited Plaintiffs to the experts they had already named consistent with the court's initial case management order for the first phase of discovery. *Id.* at 5-6. Judge Weisberg noted that Plaintiffs were required to produce all of their experts on general causation, which experts he concluded would have been produced, were the Court at the time operating under Rule 702 and not *Frye/Dyas*:

> The point of Phase I discovery was to test whether Plaintiffs had the science to back up their experts' opinions on general causation. The science does not change, except for new science. Plaintiffs' experts must base their opinions—before and after the change in the admissibility standard—on reliable scientific principles and methods that are reliably applied to the facts of the case. While the inquiry has changed from an exclusive focus on general acceptance of the methodology to a broader focus on the reliability of the

> methodology and its application, the science that determines both acceptance and reliability remains the same.

Id. at 5. For example, "[b]oth before and after the change in the legal standard for evaluating admissibility, the science is based on validated and replicated experiments, case studies, and peer reviewed publications." *Id.*

In consideration of the new admissibility standard and the age of the case, however, Judge Weisberg identified two instances where the record would potentially be unable to answer the question whether Plaintiffs had admissible expert testimony on the general causation issue in the instant cases:

> (1) there may be scientific studies done after the experts submitted their reports for the Phase I litigation, which may support or undermine the opinions of Plaintiffs' experts under the new standard, and the experts should be permitted to supplement their opinions accordingly; and (2) Plaintiffs' experts rendered their initial opinions in the *Dyas/Frye* regime; and, although their opinions would not change simply because the legal standard for admissibility has changed, it is at least conceivable that some might articulate their opinions differently if they were called upon to address reliability of scientific principles and methods reliably applied to the facts of these cases, as required by Rule 702, and not merely the general acceptance of their respective methodologies.

Id. at 3-4. Therefore, Judge Weisberg directed the Parties' experts to produce supplemental reports to address "any relevant studies or peer reviewed publications that have been added to the scientific literature since February 2013[.]" *Id.* at 7. In addition, he permitted the experts to produce supplemental reports "revising the way they express opinions to account for the change in the evidentiary standard from *Dyas/Frye* to Federal Rule 702, provided they explain why the change in the evidentiary standard necessitates a change in the way they articulate their opinion[.]" *Id.*

D. Chief Judge Josey-Herring's Superseding Amended Order

On August 28, 2018, the Hon. Anita Josey-Herring, having succeeded Judge Weisberg as the Calendar Judge, issued a Superseding Amended Order ruling upon *Defendants' Motion to Strike Unauthorized Portions of Supplemental Expert Reports*. *See Michael Patrick Murray, et al. v. Motorola Inc., et al.*, Case No. 2001 CA 008479 B, at 1 (D.C. Super. Ct. Aug. 8, 2018) (superseding amended order granting in part and denying in part Defendants' motion to strike) [hereinafter "Chief Judge Josey-Herring's August 28, 2018 Order"].[3] Defendants argued that Plaintiffs had violated Judge Weisberg's March 16, 2017 order by: "(1) relying heavily on pre-2013 studies that they could have but failed to rely on in their original reports; and (2) revising how they express their original methodologies and opinions without even attempting to explain why the new Rule 702 admissibility standard requires such revision." *Id.* Chief Judge Josey-Herring ordered Plaintiffs to file supplemental briefing to identify: (1) which experts' reports were added since February 2013; (2) how each report was relevant and fell within the scope of the expert's original report; and (3) why each of Plaintiffs' six experts needed to revise the way in which they previously expressed their opinions in their original reports to meet the new standard under Rule 702. *Id.* at 1-2. Chief Judge Josey-Herring explained that:

> Judge Weisberg's March 16, 2017 Order did not authorize, nor did this Court authorize, a re-do of expert discovery in this case. Although the March 16, 2017 Order permitted limited supplementation to address the change in the evidentiary standard from *Dyas/Frye* to *Daubert*, the Court did not seek to give the parties an unfair opportunity to counter the Court's previous evidentiary findings after the fact.

Id. at 2.

[3] At the time of issuance of her Superseding Amended Order, the Hon. Anita Josey-Herring was an Associate Judge of the Superior Court. She became the current Chief Judge of the Superior Court in 2020. The Court will refer to her rulings and orders with the "Chief Judge" title.

On February 6, 2018, Plaintiffs submitted their supplemental brief and, on March 22, 2018, Defendants submitted their opposition. *Id.* After considering the filings, Chief Judge Josey-Herring noted, as a preliminary matter that, although Plaintiffs were required to "provide the Court with a detailed explanation for why each of the Plaintiffs['] experts seeking to revise their opinion(s) needed to do so based on the change in the evidentiary standard from *Dyas/Frye* to Rule 702, Plaintiffs failed to do so." *Id.* Chief Judge Josey-Herring addressed each of the submissions, in turn, as follows.

1. Dr. Laura Plunkett

As to Dr. Plunkett, Chief Judge Josey-Herring granted Defendants' request to strike as it pertained to the general causation opinions included in Dr. Plunkett's supplemental report because they were not opinions offered in her original report. *Id.* at 3-4. Chief Judge Josey-Herring precluded Dr. Plunkett from citing to or referencing certain studies for the purpose of supporting her general causation opinion. *Id.* at 4-5. Chief Judge Josey-Herring, however, permitted Dr. Plunkett to refer to the studies for the limited purpose of opining that they are the types of studies that may be used or analyzed by experts when rendering their causation opinions. *Id.* at 5.

2. Dr. Abraham Liboff

Chief Judge Josey-Herring granted Defendants' request to strike ten studies in Dr. Liboff's supplemental report, which studies he relied upon to opine about the adverse health effects of cell phones because the studies do not relate to his opinion in his original report. *Id.* at 6-9. Chief Judge Josey-Herring granted Defendants' request to strike a new section entitled "Epidemiological Studies" because Dr. Liboff only made a cursory reference to an epidemiological study in his original report and the brief reference failed to justify the

supplementation of an entire section devoted to epidemiological studies. *Id.* at 9-11. Chief Judge Josey-Herring struck two studies included in a new section entitled "Is the Incidence of Glioblastoma Increasing?" in which, for the first time, he cited the two studies in opining that the incidence of glioblastoma has increased. *Id.* at 11-12. In addition, Chief Judge Josey-Herring struck four studies included in a new section entitled "Interfacial Water," in which Dr. Liboff opined, for the first time, that water is sensitive to weak electromagnetic fields. *Id.* at 13-14.

Chief Judge Josey-Herring, however, denied Defendants' request to strike a new section entitled "Reactive Oxygen Species," in which Dr. Liboff cited to a new study and opined that electromagnetic fields with frequencies ranging from 50 Hz to 1800 MHz increase reactive oxygen species. Chief Judge Josey-Herring found that the new section would adequately supplement page 15 of Dr. Liboff's original report, where he opines about the ability of extremely low frequency electromagnetic fields to have biological effects. *Id.* at 12.

3. Dr. Michael Kundi

As a general observation, Chief Judge Josey-Herring was impressed that, "Dr. Kundi's supplemental report, at 48 pages, is more than double the length of his 21-page original report. Moreover, in its briefing, Plaintiffs listed 46 studies published after February 2013 that Dr. Kundi cites or references in his supplemental report." *Id.* at 15. Because Defendants did not raise an objection to Dr. Kundi's inclusion of 26 such studies, Chief Judge Josey-Herring focused her attention upon the 20 remaining contested studies. *Id.*

Chief Judge Josey-Herring granted Defendants' request to strike six studies that Dr. Kundi cited in support of a new opinion on recall bias because he never discussed such in his original report. *Id.* at 15-16. Chief Judge Josey-Herring granted Defendants' request to strike six studies in which Dr. Kundi rendered a new meta-analysis opinion to the extent Dr. Kundi

relied upon them to conduct a meta-analysis; however, she allowed Dr. Kundi to supplement his "hazard assessment" and "methodological comparison" of the INTERPHONE and Hardell studies. *Id.* at 16-17. Chief Judge Josey-Herring denied Defendants' request to strike six studies related to an opinion regarding the quality of official cancer registries to the extent that Dr. Kundi uses the studies to state that the cancer registry data, relied upon by studies previously cited in his original report, have been called into question. *Id.* at 18. Chief Judge Josey-Herring struck four studies that Dr. Kundi used to render a new opinion regarding dose-response in epidemiology because the studies were not in the original report. *Id.* at 18-19.

Chief Judge Josey-Herring struck three studies Dr. Kundi used to render a new opinion regarding specificity because specificity was not cited in Dr. Kundi's original report; notwithstanding specificity is one of the Bradford Hill considerations made more relevant in light of the *Daubert* reliability requirement, Plaintiffs "failed to reference specificity in their brief outlining the reasoning for why Dr. Kundi needs to revise his report in light of the change in evidentiary standard." *Id.* at 19-20.

Defendants moved to strike five studies relied upon by Dr. Kundi to render a new opinion regarding selection bias because Plaintiffs failed "(1) to adequately specify which portions of Dr. Kundi's original report these studies were supplementing; and (2) to adequately tie Dr. Kundi's new selection bias opinion to anything in his original report." *Id.* at 20-21. Chief Judge Josey-Herring determined that selection bias was not included in the original report, and Dr. Kundi failed to explain why he utilized a "simplified procedure" previously but now needed to provide a "more complex understanding of the potential selection bias" in his supplemental report. *Id.* at 20. In addition, Chief Judge Josey-Herring opined that she was "seriously concerned about the reliability of Dr. Kundi's revised proposed testimony given his admission

that in his capacity as an expert he failed to fully and accurately render an opinion in this very important matter." *Id.* at 21.

Finally, Chief Judge Josey-Herring granted Defendants' request to strike the section of Dr. Kundi's supplemental report regarding cofounding because the section was not included in his original report. *Id.* at 21. In addition, she found that Plaintiffs failed to demonstrate how the change in the evidentiary standard necessitated the inclusion of Dr. Kundi's cofounding opinion when the section was supported by a single brief citation to a study from 1958, which preceded his original report. *Id.* at 21-22.

4. Dr. Igor Belyaev

Chief Judge Josey-Herring was impressed that Dr. Belyaev's supplemental report, at 257 pages, more than doubled the length of his 111-page original report and includes: "(1) his entire original report; (2) 280 new post-February 2013 studies; (3) 10 new sections that were not included in his original report; and (4) an additional 15.5 pages in a section relating to extremely low frequency ('ELF') fields that now includes 6 new subsections." *Id.* at 22. Chief Judge Josey-Herring granted Defendants' request to strike the original report from the supplemental report, given the supplemental report was intended to supplant the original report. *Id.* at 23-24. Chief Judge Josey-Herring granted Defendants' request to strike many other studies that supplement a blank line in Dr. Belyaev's original report. *Id.* at 24-25.

In addition, Chief Judge Josey-Herring granted Defendants' request to strike Dr. Belyaev's references to the Bradford Hill criteria because he did not refer to the method in his original report. *Id.* at 25-26. Chief Judge Josey-Herring also struck the section entitled "Brain cancer time trends" because "(1) Dr. Belyaev's original report did not analyze 'time

trends' or incidence data; and (2) Dr. Belyaev stated on the record at the December 4, 2013 hearing that his report did not include any analysis regarding time incidence data." *Id.* at 26.

5. Dr. Dimitris Panagopoulos

As to Dr. Panagopoulos, Chief Judge Josey-Herring granted Defendants' request to strike studies referenced within the section titled "Real Exposure Studies in Opposition to Studies with Simulated Exposures" because Dr. Panagopoulos never opined in his original report about the differences between the results of studies that used real cell phone exposures versus those studies that used simulated exposures. *Id.* at 28-32. She denied Defendants' request to strike studies regarding an opinion comparing effects from studies on radiofrequency and power-line frequency exposures to the extent the studies could properly supplement Dr. Panagopoulos' original report. *Id.* at 32-33. Chief Judge Josey-Herring granted Defendants' request to strike three studies Dr. Panagopoulos relied upon to render an opinion for the first time about the role that polarization plays in the bioactivity of all man-made electromagnetic fields. *Id.* at 33-35. Chief Judge Josey-Herring granted Defendants' request to strike studies that Dr. Panagopoulos relied upon to render a new opinion regarding positive versus negative studies because the studies were not within the scope of the original report, and she struck the entire section titled "Positive versus Negative Results" because the section was based on a single citation that was stricken to the extent that Dr. Panagopoulos relied on it to opine about positive versus negative results. *Id.* at 36-37.

Chief Judge Josey-Herring granted Defendants' request to strike studies upon which Dr. Panagopoulos relied to render a new opinion that "[t]umor promotion in mice after long-term [radiofrequency] exposure at levels below the current exposure limits is also repeatedly reported" to the extent that Dr. Panagopoulos relied upon the studies to opine about tumor promotion in

mice. *Id.* at 37-39 (quoting Panagopoulos 2017 Supp. Rep. at 30). Finally, Chief Judge Josey-Herring denied Defendants' request to strike Dr. Panagopoulos' opinion regarding actin cytoskeleton damage. *Id.* at 39-40.

6. Dr. Wilhelm Mosgoeller

Finally, as to Dr. Mosgoeller, Defendants requested that the court strike 24 post-2013 studies cited in his supplemental report because the studies were used to support three new opinions not in the original report. *Id.* at 41. Chief Judge Josey-Herring granted Defendants' request to strike studies used to support a new opinion regarding DNA repair induction by high frequency electromagnetic field ("HF-EMF") exposure. *Id.* at 42-45.

Defendants moved to strike studies that Dr. Mosgoeller relied upon to opine for the first time in section 4.1.5 of his supplemental report that: "(1) 'epidemiological studies provide evidence for an association of heavy exposure to mobile phone signals and a direct increase of brain tumors in humans;' and (2) 'epidemiological results can be reconciled with cellular mechanisms related to HF-EMF exposure and DNA genotoxicity.'" *Id.* at 45-48. Chief Judge Josey-Herring granted the request because the opinions were not included in the original report and "the change in the evidentiary standard does not necessitate that Dr. Mosgoeller include, for the first time, an opinion regarding human epidemiological studies." *Id.* For the same reasons articulated in excluding epidemiological studies, Chief Judge Josey-Herring granted Defendants' request to strike Dr. Mosgoeller's new opinion on co-carcinogenicity in Section 4.1.4.1. *Id.* at 48-50.

Defendants moved to strike Dr. Mosgoeller's new mechanism theory that HF-EMF exposure can induce oxidative DNA damages to biological structures. *Id.* at 50. Chief Judge Josey-Herring granted Defendants' request to strike without prejudice given that the theory was

available pre-2013 and was not included in the original report; however, Chief Judge Josey-Herring granted leave for Plaintiffs to file an additional brief explaining the unique features of: "(1) Dr. Mosgoeller's ATHEM-2 experiment; and/or (2) the Yakymento (2016) study that finally 'spurred' Dr. Mosgoeller to render his new opinions regarding how HF-EMF exposure can induce oxidative DNA damage." *Id.* at 51. On November 14, 2018, Chief Judge Josey-Herring, after receiving additional briefing on Dr. Mosgoeller's mechanism theory, ordered that her ruling would stand, granting Defendants' request to strike the following: "(1) Dr. Mosgoeller's new mechanism theory—listed as opinion number 6 and 7 on page 4 of Dr. Mosgoeller's supplemental report—that 'HF-EMF exposure can induce DNA damages to biological structures;' and (2) the 12 post-2013 studies that Dr. Mosgoeller relied on to render both of those opinions." *See Michael Patrick Murray, et al. v. Motorola Inc., et al.*, Case No. 2001 CA 008479 B, at 3 (D.C. Super. Ct. Nov. 14, 2018) (order denying Plaintiffs' motion for reconsideration) [hereinafter "Chief Judge Josey-Herring's November 14, 2018 Order"].

II. LEGAL STANDARD

Under District of Columbia law, admissibility of expert testimony is now governed by Rule 702 of the Federal Rules of Evidence, as amended after the U.S. Supreme Court's decision in *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 570 (1993). *Motorola Inc.*, 147 A.3d at 756-57 (D.C. 2016) (*en banc*) (explaining rationale for abandoning *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923), and *Dyas v. United States*, 376 A.2d 827 (D.C. 1977), and adopting Rule 702 as the test for admissibility of expert testimony). Rule 702 provides:

> A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if:
>
> (a) the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue;

(b) the testimony is based on sufficient facts or data;

(c) the testimony is the product of reliable principles and methods; and

(d) the expert has reliably applied the principles and methods to the facts of the case.

Fed. R. Evid. 702.

Trial judges are the gatekeepers of expert testimony. *Motorola Inc.*, 147 A.3d at 757. "'[T]he trial court's role as gatekeeper is not intended to serve as a replacement for the adversary system.'" *Id.* (quoting Fed. R. Evid. 702 advisory committee's notes to 2000 amendment). "[I]n practice,' however, 'a gatekeeping role for the judge, no matter how flexible, inevitably on occasion will prevent the jury from learning of authentic insights and innovations.'" *Id.* at 754 (quoting *Daubert*, 509 U.S. at 597). "[T]he trial court will have the discretion (informed by careful inquiry) to exclude some expert testimony." *Id.* at 757; *see also Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 146-47 (1997); *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 158 (1999).

"The goal is to deny admission to expert testimony that is not reliable, but to admit competing theories if they are derived from reliable principles that have been reliably applied." *Motorola Inc.*, 147 A.3d at 757; *see also Haidak v. Corso*, 841 A.2d 316, 327 (D.C. 2004) ("Expert testimony may be excluded when the expert is unable to show a reliable basis for their theory."). "[T]he trial judge must have considerable leeway in deciding in a particular case how to go about determining whether particular expert testimony is reliable." *Motorola Inc.*, 147 A.3d at 755 (quoting *Kumho Tire Co.*, 526 U.S. at 152). "The objective of the gatekeeping requirement 'is to make certain that an expert . . . employs in the courtroom the same level of intellectual rigor that characterizes the practice of an expert in the relevant field.'" *Id.*

The Court must first determine whether the expert's specialized knowledge will help the trier of fact to understand the evidence or determine a fact in issue. Fed. R. Evid. 702(a). In

Daubert, the Supreme Court of the United States found that the requirement that expert testimony "assist the trier of fact to understand the evidence or to determine a fact in issue" goes "primarily to relevance [because] '[e]xpert testimony which does not relate to any issue in the case is not relevant and, ergo, non-helpful.'" *Daubert*, 509 U.S. at 591. This consideration has been described as "fit[,]" which "is not always obvious, and scientific validity for one purpose is not necessarily scientific validity for other, unrelated purposes." *Id.* As an example, the Supreme Court explained:

> The study of the phases of the moon, for example, may provide valid scientific 'knowledge' about whether a certain night was dark, and if darkness is a fact in issue, the knowledge will assist the trier of fact. However (absent creditable grounds supporting such a link), evidence that the moon was full on a certain night will not assist the trier of fact in determining whether an individual was unusually likely to have behaved irrationally on that night. Rule 702's "helpfulness" standard requires a valid scientific connection to the pertinent inquiry as a precondition to admissibility.

Id. The Court "must ensure that the proposed expert testimony is 'relevant to the task at hand,' *i.e.*, that it logically advances a material aspect of the proposing party's case." *Daubert v. Merrell Dow Pharmaceuticals*, 43 F.3d 1311, 1315 (9th Cir. 1995) (internal citations omitted) [hereinafter "*Daubert II*"].

The advisory committee notes indicate that Rule 702 requires that: "(1) the expert be qualified; (2) the testimony address a subject matter on which the factfinder can be assisted by an expert; (3) the testimony be reliable; and (4) the testimony 'fit' the facts of the case." Fed. R. Evid. 702 advisory committee's notes to 2000 amendment.

"[T]he trial court must scrutinize not only the principles and methods used by the expert but also whether those principles and methods have been properly applied to the facts of the case." Fed. R. Evid. 702 advisory committee's notes to 2000 amendment. "'[A]ny step that renders the analysis unreliable . . . renders the expert's testimony inadmissible. This is true

whether the step completely changes a reliable methodology or merely misapplies that methodology.'" *Id.* (quoting *In re Paoli R.R. Yard PCB Litig.*, 35 F.3d 717, 745 (3d Cir. 1994)).

The Supreme Court supplied factors for consideration when determining if the reasoning or methodology underlying the testimony of an expert is scientifically valid and can be properly applied to the facts in issue, including whether an expert's theory or technique has been tested, whether it has been subject to peer review or publication, the technique's known or potential rate of error, and the existence and maintenance of standards controlling the technique's operation. *Motorola Inc.*, 147 A.3d at 754 (citing *Daubert*, 509 U.S. at 593-94).

Further, the advisory committee's notes to Rule 702 recognize that courts, both before and after *Daubert*, have found the following factors relevant in determining whether expert testimony is sufficiently reliable to be considered by the trier of fact: (1) "Whether experts are 'proposing to testify about matters growing naturally and directly out of research they have conducted independent of the litigation, or whether they have developed their opinions expressly for purposes of testifying[,]" *Daubert II*, 43 F.3d at 1317; (2) "Whether the expert has unjustifiably extrapolated from an accepted premise to an unfounded conclusion[,]" *see Joiner*, 522 U.S. at 146; (3) "Whether the expert has adequately accounted for obvious alternative explanations[,]" *see Claar v. Burlington N.R.R.*, 29 F.3d 499 (9th Cir. 1994); (4) "Whether the expert 'is being as careful as he would be in his regular professional work outside his paid litigation consulting,'" *see Sheehan v. Daily Racing Form, Inc.*, 104 F.3d 940, 942 (7th Cir. 1997); and (5) "Whether the field of expertise claimed by the expert is known to reach reliable results for the type of opinion the expert would give." *See Kumho Tire Co.*, 526 U.S. at 151.

The Supreme Court, after *Daubert*, refined its analysis in instructing that a trial court's focus must be solely upon principles and methodology, and not on the conclusions they generate,

and acknowledged that "conclusions and methodology are not entirely distinct from one another." *Motorola Inc.*, 147 A.3d at 755 (quoting *Joiner*, 522 U.S. at 146). However,

> Nothing in either *Daubert* or the Federal Rules of Evidence requires a district court to admit opinion evidence that is connected to existing data only by the *ipse dixit* of the expert. Thus, "[a] court may conclude that there is simply too great an analytical gap between the data and the opinion proffered."

Motorola Inc., 147 A.3d at 755 (internal citations omitted) (quoting *Joiner*, 522 U.S. at 146). In other words, an expert's opinion that rests on subjective beliefs and unsupported speculation must be excluded. *See Daubert*, 509 U.S. at 590 ("Similarly, the word 'knowledge' connotes more than subjective belief or unsupported speculation."); *cf. Perkins v. Hansen*, 79 A.3d 342, 345 (D.C. 2013) ("Implicit in [the requirement that the expert opinion will probably aid the trier in the search for truth] is that the expert have a 'reliable basis for his theory' steeped in 'fact or adequate data,' as opposed to offering 'a mere guess or conjecture.'" (quoting *Haidak*, 841 A.2d at 327; cleaned up)). "[T]o qualify as 'scientific knowledge,' an inference or assertion must be derived by the scientific method." *Daubert*, 509 U.S. at 589.

The Court of Appeals has noted that "[t]here is no 'grandfathering' provision in Rule 702. The Court of Appeals, however, observed that *Daubert* commented that:

> "general acceptance" can . . . have a bearing on the [reliability] inquiry. Widespread acceptance can be an important factor in ruling particular evidence admissible, and a known technique which has been able to attract only minimal support within the community may properly be viewed with skepticism.

Motorola Inc., 147 A.3d at 758 (internal citations and quotation marks omitted) (quoting *Daubert*, 509 U.S. at 594). "[T]he trial judge has the discretion 'both to avoid unnecessary 'reliability' proceeding in ordinary cases where the reliability of an expert's methods is properly taken for granted, and to require appropriate proceedings in the less usual or more complex cases where cause for questioning the expert's reliability arises.'" Fed. R. Evid. 702 advisory

committee's notes to 2000 amendment (quoting *Kumho Tire*, 526 U.S. at 152). Further, when experts on one side are in a distinct minority, that "may well raise a red flag, for '[w]hen a scientist claims to rely on a method practiced by most scientists, yet presents conclusions that are shared by no other scientist, the [trial] court should be wary that the method has not been faithfully applied.'" *Motorola Inc.*, 147 A.3d at 757-58 (quoting Fed. R. Evid. 702 advisory committee's notes to 2000 amendment).

Rule 702 "does not operate in isolation." *Motorola Inc.*, 147 A.3d at 754. This jurisdiction has adopted Federal Rules of Evidence 703 and 403.[4] *Id.* at 754 n.7 (citing *In re Melton*, 597 A.2d 892, 901 & n.10) (D.C. 1991) (*en banc*) (adopting Rule 703), and *Johnson v. United States*, 683 A.2d 1087, 1100 (D.C. 1996) (*en banc*) (adopting Rule 403)). Rule 703 provides that facts or data relied upon by an expert must be "of a type reasonably relied upon by experts in the particular field in forming opinions or inferences upon the subject[.]" *In re Melton*, 597 A.2d at 901-02. Rule 403 permits the exclusion of relevant evidence where "the danger of unfair or undue prejudice substantially outweighs probative value[.]" *Johnson*, 683 A.2d at 1099. The Court of Appeals has further instructed that, "[t]o perform the gatekeeping function, the trial court normally will apply Rule 104(a)." *Motorola*, 147 A.3d at 754; *see also Jenkins v. United States*, 80 A.3d 978, 991 (D.C. 2013) (noting Rule 104(a), while not formally adopted, "accurately states the rule of evidence" generally followed under District of Columbia

[4] Although Rule 702 does not operate in isolation, Rule 403 and *Daubert* address different aspects of evidence. "Rule 403 requires the court to balance the probative value of evidence against its potentially prejudicial impact on the jury's perception of the case. *Daubert*, on the other hand, establishes a standard by which the court must evaluate expert testimony for its reliability before admitting it into court." *United States v. Ramirez-Robles*, 386 F.3d 1234, 1245-46 (9th Cir. 2004). The Court, therefore, will consider Plaintiffs' experts within the ambit of Rule 702 for admissibility of their testimony unless allowing the expert to testify requires the Court to balance the probative value of their testimony against its potential prejudicial impact.

law). Rule 104(a) requires the court to decide preliminary questions about whether a witness is qualified or evidence is admissible.

Finally, "[t]he burden is on the proponent of the testimony to establish its admissibility by a preponderance of proof." *United States v. Libby*, 461 F. Supp. 2d 3, 6 (D.D.C. 2006) (internal quotations omitted); *see also United States v. Tibbs*, Case No. 2016 CF1 19431, 2019 D.C. Super. LEXIS 9, at *14 (D.C. Super. Ct. Sept. 5, 2019) (citing *Daubert*, 509 U.S. at 592 n.10). "The abuse of discretion standard of review applies regardless of whether the trial court decided 'to admit or exclude scientific evidence.'" *Motorola Inc.*, 147 A.3d at 755 (quoting *Joiner*, 522 U.S. at 146).

III. DISCUSSION[5]

A. Admissibility of Dr. Michael Kundi's Expert Testimony

1. Dr. Kundi's Qualifications and Relevance under Rule 702(a)

Dr. Kundi represents that he is a retired professor of epidemiology and occupational health at the Medical University of Vienna. *See* Supp. Expert Report of Michael Kundi, Ph.D., at 4 [hereinafter "Dr. Kundi Supp. Exp. Rpt."]. In 1979, Dr. Kundi received his Ph.D. in psychology and mathematics at the University of Vienna. *See* Curriculum vitae Michael Kundi. In 1989, Dr. Kundi received his medical habilitation degree in epidemiology and occupational health at the Medical University of Vienna. *Id.* In 1996, Dr. Kundi became the head of the Department for Occupational and Social Hygiene at the Medical University of Vienna. Dr. Kundi Supp. Exp. Rpt., at 4. In 2004, Dr. Kundi was appointed head of the Institute of

[5] Because of the breadth of the record and the lengthy procedural history of the case, the Court will address each experts' admissibility under each prong of Rule 702 even if the expert would not pass muster under any single one of them. The Court notes that failure to meet a particular prong would disqualify the expert under Rule 702. *See* Fed. R. Evid. 702 (requiring an expert witness to meet all four prongs for admissibility).

Environmental Health at the Medical University of Vienna until his retirement in October 2015. *Id.* Dr. Kundi remains the coordinator of the Ph.D. program for public health at the Medical University of Vienna. *Id.* He has taught courses in methods of occupational health and epidemiology, hygiene, microbiology and preventive medicine, environmental and occupational medicine, environmental aspects in public health, biostatistics, epidemiological research methods, and qualitative research methods. *Id.* Dr. Kundi's research, training, and experience have been in the areas of epidemiology, microbiology, statistics, and occupational and environmental medicine. *Id.*

Dr. Kundi was the deputy head of the Austrian Standards Committee for Electromagnetic Fields until 2015. *Id.* at 5. He is the head of the toxicology working group at the Austrian Ministry for the Environment, and a member of the electromagnetic fields working group, of the nutrition and vaccination committees of the Highest Health Council at the Ministry of Health. *Id.* Dr. Kundi has been invited to the World Health Organization as a member of the advisory board for defining research agenda in the area of electromagnetic fields. *Id.* Dr. Kundi represents that he has authored and co-authored more than 400 peer-reviewed articles, which include biomedical research studies, epidemiological studies, meta-analyses, review articles, editorials, and research letters. *Id.* He indicates that he has also "written extensively on the biological and health relevant effects of electric, magnetic, and electromagnetic fields and on mobile phones and the risk of cancer, and has authored more than 30 articles relevant to these subjects." *Id.*

Dr. Kundi offers an opinion that, to a reasonable degree of scientific certainty, "there is a relationship between [mobile phone] use and glioma as well as acoustic neuroma and this relationship is one that must be causally interpreted given the evidence available so far." *Id.* at

48. Dr. Kundi opines that "exposure to radiofrequency radiation from mobile phones causes an increased risk of brain tumors, which arises more likely as tumor growth *promotor* as opposed to an *initiator*." Pl.'s Daubert/R. 702 Post-Hearing Brief, at 25 (emphasis in original); Dr. Kundi Supp. Exp. Rpt., at 46-48.

Defendants have not objected to Dr. Kundi's qualifications. Indeed, the Court finds that Dr. Kundi's scientific knowledge would "help the trier of fact to understand the evidence or to determine a fact in issue[,]" under Rule 702(a). *See also* Fed. R. Evid. 702 advisory committee's notes to 2000 Amendment; *Daubert*, 509 U.S. at 591; *Daubert II*, 43 F.3d at 1315.

2. Dr. Kundi's Testimony Under Rule 702(b)-(d)

Under Rule 702(b)-(d), Dr. Kundi's testimony must (1) be based in sufficient facts or data; (2) be the product of reliable principles and methods; and (3) reliably apply the principles and methods to the facts of this case. *See* Fed. R. Evid. R. 702(b)-(d).

Dr. Kundi explains that he uses the "Pragmatic Dialogue Approach." *See* Dr. Kundi Supp. Exp. Rpt., at 25. This approach consists of three steps:

> In the first step[,] epidemiologic evidence is scrutinized to assess whether there is an association between an agent (in this case [mobile phone] use) and a disease (in this case brain tumors and in particular glioma and acoustic neuroma). In the second step, environmental and population equivalence is assessed. This means that sources of bias and potential confounding are evaluated that could have affected the estimates of association between the agent and the disease. In the third step, a dialogue between arguments in favor or against a causal relationship between the agent and the disease is set up that follows and applies the concepts of Sir Austin Bradford Hill.

Id.

Plaintiffs assert that Dr. Kundi's opinions are well-founded upon his "(1) extensive literature search of all lines of evidence during which he considered each and every available peer reviewed scientific study related to electromagnetic fields and primary brain tumors,

assessing the reliability of the evidence and meticulously comparing methodology and outcomes"; and "(2) conducting many peer reviewed scientific studies specially pertaining to electromagnetic fields which are published in over 60 scientific journals." Pls.' Daubert/R. 702 Post-Hr'g Br., at 28.

The Court must exclude Dr. Kundi's testimony. First, under Dr. Kundi's methodology, he scrutinized evidence to assess whether there is an association between mobile phone use and glioma and acoustic neuromas. *See* Dr. Kundi Supp. Exp. Rpt., at 25. Dr. Kundi, however, fails to explain, through specific studies and data, why incidence data of glioma and acoustic neuromas have not increased over time, given that the increased usage of cell phones would ostensibly demonstrate a relationship between the agent of interest (*i.e.*, radiation emitted by cell phones) and the disease. Indeed, his opinion in his 2013 Expert Report indicated that, to a reasonable degree of scientific certainty, exposure to radiofrequency radiation from mobile phones causes an increased risk of brain tumors. Pls.' Daubert/R. 702 Post-Hr'g Brief, at 25; Expert Report of Michael Kundi, at 2-3. Dr. Kundi restated this opinion in his supplemental expert report on the grounds that further evidence "became available that supports and corroborates [his] conclusions" that "there is a relationship between [mobile phone] use and glioma as well as acoustic neuroma . . . ." Dr. Kundi Supp. Exp. Rpt., at 46-48. However, Dr. Kundi's promotion theory—namely, that radiofrequency *promotes*, rather than *initiates*, tumors, and therefore would not cause increases in gliomas and acoustic neuromas, and their reported incidence data, as quickly as opposed to a theory hypothesizing that radiofrequency initiates tumors—is not supported in Dr. Kundi's Supplemental Report or his testimony. Def.'s Post-Hearing Brief, at 33; Hr'g Tr. 57:8-59:12.

Dr. Kundi proffers another theory for why the incidence rates of glioma and acoustic neuroma did not increase under his promotion theory. Specifically, Dr. Kundi explains that the increase in the incidence data was not as anticipated because the technology of cellphones and duration and amount of exposure did not remain constant. Pls.' Post-Hearing Brief, at 31; Defs.' Post-Hearing Brief, at 34. Interestingly, Dr. Kundi did not present this theory in his supplemental report. Instead, he expressed this theory seemingly for the first time during his testimony and with insufficient support from empirical studies.

Dr. Kundi could not point to epidemiological studies that demonstrated that tumor promotion occurs under his theory. He testified that he has "no evidence of promotion, let me add—let me add[,] from epidemiology." Hr'g Tr. 09/15/22 a.m., 74:14-75:12; *see also* Hr'g Tr. 09/14/22 p.m. at 31. Further, Dr. Kundi indicated that evidence from animal and *in vitro* studies was limited, and he was unaware of any animal study showing the exposure to radiofrequency promotes gliomas or acoustic neuromas. *See* Hr'g Tr. 9/15/22 a.m., at 58:22-59:12, 63:4-64:6.

Dr. Kundi, therefore, fails to provide sufficient facts and data to support his opinions. He also provided alternative explanations during the 2022 evidentiary hearing, which explanations he failed to include in his supplemental report. As the Court of Appeals instructs, "'[n]othing in either *Daubert* or the Federal Rules of Evidence requires a district court to admit opinion evidence that is connected to existing data only by the *ipse dixit* of the expert.'" *Motorola Inc.*, 147 A.3d at 755 (quoting *Joiner*, 522 U.S. at 146). "Thus, '[a] court may conclude that there is simply too great an analytical gap between the data and the opinion proffered.'" *Id.* That is the fatal flaw with Dr. Kundi's opinion, here.

In the second step of his methodology, Dr. Kundi explained that he must account for bias and potential confounding that could affect the estimates of association between the agent and

the disease. *See* Dr. Kundi Supp. Exp. Rpt., at 25. Counsel for Plaintiffs and Dr. Kundi had the following exchange about the method Dr. Kundi employed:

> Q. Tell the Court what you do as a scientist to reach the conclusion that you reached in this case, that radiation is causally connected to these diseases?
>
> A. I did it like in every other case, when it comes to a decision about environmental factor or occupational factor and health outcome.
>
> You take the totality of the evidence, and then you look into the human evidence and first place. This means practical epidemiological evidence, and you consider the association that might be there in the light of bias, confounding and chance. And you first rule out the chance, bias or confounding is responsible for the association, and you should then come to the conclusion that the reason the association. And you can rule out bias and confounding and chance with reasonable scientific certainty, then this is sufficient evidence from epidemiology.
>
> But since I mentioned before we cannot rule out completely with scientific certainty, bias and confounding, there remains some responsibility, although with low likelihood that bias and confounding can be responsible. And this is how you proceed.
>
> And then you start looking into other evidence and from epidemiology. You look into animal experiment and you look at *in vitro* studies, mechanistic studies if you want like that. This can increase or decrease your confidence. But the basis is the human evidence.

Hr'g Tr. 9/13/22 p.m., at 73:10-74:11.

In forming his causation opinion, however, Dr. Kundi relies upon studies that suffer from bias, without explaining how he ruled out that bias, before proceeding with the methodological steps he discussed in his testimony above. Specifically, Dr. Kundi relies upon Dr. Hardell's studies and the INTERPHONE studies. *See* Dr. Kundi Supp. Exp. Rpt., at 7-10,13, 20-26; Hr'g Tr. 9/14/22 a.m., at 56:15-18. After reviewing the IARC Monograph, which all Parties and Judge Weisberg found to be highly reliable and authoritative, Judge Weisberg correctly observed

that IARC found that "both the Interphone and Hardell studies suffer from flawed study designs that do not fully control for bias, confounding, and chance a view that is widely shared by most other organizations that have studied the subject." Judge Weisberg's August 8, 2014 Order at 10-13; Ex. GX1524, IARC Monograph at 203-216, 218-21, 233-34.

During the evidentiary hearing, counsel for Defendants and Dr. Kundi had the following exchange regarding the bias in the Hardell studies:

> Q. Okay. Dr. Kundi, you've now agreed that in Dr. Hardell's studies some of the risk estimates are spuriously elevated, true?
>
> A. I think we can make it short. I agree that there are some unknown sources of bias that spuriously increases some risk estimates especially at low intensity and low duration of exposure.
>
> Q. You agree that for periods of less than ten years of phone use in particular . . . Dr. Hardell's studies produced results that are biologically implausible, correct?
>
> A. Correct.
>
> Q. You've concluded that at least of periods of ten years or less there are biases in Dr. Hardell's data that cannot be ruled out as an explanation for the reported associations, right?
>
> A. I have commented about that, and I said that there are very few situations where you can find an increased risk. It's such short periods of time and it's such low intensities.
>
> Q. And so you've concluded that there are biases in Dr. Hardell's data that cannot be ruled out as an explanation for the reported associations, true?
>
> A. Yes, biases cannot be ruled out.
>
> Q. And the bias in Dr. Hardell's data impacts both his glioma data and his acoustic neuroma data, true?
>
> A. That's right.
>
> . . .
>
> Q. You told the Court yesterday that you can't rule out bias completely with scientific certainty. Do you recall that?

A. I recall that.

Q. Right?

A. I stated that.

Q. But as to these risks in Dr. Hardell's studies, you've actually ruled in the existence of bias, right? We've agreed that those results are biased and biologically implausible, true?

A. Therefore, I'm not completely sure that the association cannot be interpreted as possibly bias or due to confounding. That's what I said.

Q. Are you agreeing with my question?

A. I agree the association could be bias.

. . .

Q. Now, the next column over, Dr. Kundi, is the greater-than-ten-year latency column, right?

A. Right.

Q. Okay. And you continue to rely on those risks in the greater-than-ten-year latency column. You believe that those are . . . accurate, right?

A. They—if my hypothesis about the source of bias is correct, then it gets more reliable as longer the latency.

Q. But you don't know?

A. I don't know, yeah.

Q. Okay. So it's possible that those greater-than-ten-year data are also unreliable?

A. It's possible.

Hr'g Tr. 9/15/22 a.m., at 39:8-40:9, 41:4-18, 45:12-25. Indeed, it appears that the Hardell study suffers generally from critical methodological flaws. Dr. Kundi's reliance on data drawn from the ten-year latency period set of observations in the Hardell study to arrive at his opinion, without accounting for the significant possibility of bias (or other confounding factors) as the

driver of the data and results in the Hardell study, fails to answer the overarching challenge to the Hardell study: It suffers from bias that is untreated.

In addition, Dr. Kundi failed to address bias as to the incidence of glioma rates, as evidenced by his election not to address contrary studies. When Dr. Kundi was asked whether he considered the incidence data in his report, he explained: "I included also incidence data, and I also wrote in my report those that have been published since my first report, and I cited them and discussed them." Hr' Tr. 9/14/22 p.m., at 9:24-10:2. To the contrary, Dr. Kundi failed to address multiple published studies. For example, two published studies[6] indicated that Dr. Hardell's incidence data results would have shown the incidence of glioma to have risen significantly over time, while the actual incidence data betrayed that assessment. Hr'g Tr. 9/15/22 a.m., at 12:12-29:10; *see also* admitted Exs. 1757, 1189, 1096. Further, although Dr. Kundi testified that he used his own calculation of the expected incidence rate in view of Dr. Hardell's data, he did not include such a calculation or account for issues with Dr. Hardell's data in making his calculation in either his original or supplemental report. Hr'g Tr. 9/15/22 a.m., at 30:18-31:1.

The method that Dr. Kundi uses to treat and explain bias in the epidemiological studies is, as well, inconsistent. Dr. Kundi discussed selection bias in the INTERPHONE studies extensively where the bias was away from an association of causation; however, in cohort studies where the bias was away from an association, Dr. Kundi dismissed the results as biased and uninformative without explaining why one study was more useful from another other than

[6] Isabelle Deltour et al., *Mobile Phone Use and Incidence of Glioma in the Nordic Countries 1979-2008: Consistency Check*, 23 EPIDEMIOLOGY, no. 2, at 301-307 (2012); Simon Chapman et al., *Has the Incidence of Brain Cancer Risen in Australia Since the Introduction of Mobile Phones 29 Years Ago?*, 42 CANCER EPIDEMIOLOGY, June 2016, at 199-205.

stating that cohort studies were not as reliable as controlled studies. Hr'g Tr. 9/14/22 a.m.; 50:4-51:16; Hr'g Tr. 9/15/22 a.m., at 36:13-21, 40-41; Hr'g Tr. 09/21/22 p.m. at 64, 69-70.

As noted *supra*, *see supra* Part II, the Court must consider "[w]hether the expert has unjustifiably extrapolated from an accepted premise to an unfounded conclusion" and "[w]hether the expert has adequately accounted for obvious alternative explanations." *Joiner*, 522 U.S. at 146; *Claar*, 29 F.3d at 500-03. Here, Dr. Kundi has not properly accounted for the bias underlying certain studies and he has failed to put forth a consistent method he employs when evaluating the studies upon which he chose to rely. *See In re Lipitor (Atorvastatin Calcium) Mktg., Sales Practices & Prds. Liab. Litig. (No. II) MDL 2502*, 892 F.3d 624, 634 (4th Cir. 2018) ("Result-driven analysis, or cherry-picking, undermines principles of the scientific method and is a quintessential example of applying methodologies (valid or otherwise) in an unreliable fashion.")

Finally, in the third step of his methodology, Dr. Kundi applies the concepts propounded by Sir Austin Bradford Hill. As Judge Weisberg opined,

> Proving causation depends—first and foremost—on epidemiology, which is largely an inductive, not deductive science. Epidemiology depends on drawing inferences from observed conditions, both in nature and in the laboratory . . . . Although they go by different names, most accepted methodologies rely heavily on, and share much in common with, Sir Austin Bradford Hill's famous nine causation factors.

Judge Weisberg's August 8, 2014 Order, at 27. The Bradford Hill factors assist in determining whether "there [is] any other way of explaining the set of facts before us, is there any other answer equally, or more, likely than cause and effect?" *See* Sir Austin Bradford Hill, *The Environment and Disease: Association or Causation?*, Jan. 14, 1965, GX1461, at 5 [hereinafter "Bradford Hill"]. In other words, the Bradford Hill factors help to decide whether there is a true cause-effect relationship between exposure and the disease rather than merely an association.

See In re Deepwater Horizon Belo Cases, 2022 U.S. Dist. LEXIS 225619, at *16 (N.D. Fla. Dec. 15, 2022); *Daniels-Feasel v. Forest Pharms., Inc.*, 2021 U.S. Dist. LEXIS 168292, at *8-10 (S.D.N.Y. Sept. 3, 2021). As such, "an expert must do more than just state that she is applying a respected methodology; she must follow through with it." *Brown v. Burlington N. Santa Fe Ry.*, 765 F.3d 765, 773 (7th Cir. 2014).

The nine Bradford Hill factors are: "Strength, Consistency, Specificity, Temporality, Biological Gradient, Plausibility, Coherence, Experiment, and Analogy." *Id.* at 27 n.35; *see generally* Bradford Hill.

"Strength" speaks to the association between the agent and the disease. The stronger the association, the more likely it is to be causal. On the flip side, the smaller the association, the more likely that there are other underlying contributors, such as bias or confounding. *See* Bradford Hill, at 1-2. As has been observed and discussed, the quarrel with Dr. Kundi's methodology is that he has failed to control for bias or confounding in the studies he chose to support his opinion. *See supra* Part III-A-2, at 31-35. Moreover, Chief Judge Josey-Herring struck portions and studies of meta-analysis, recall bias, selection bias, and confounding which he used to support his conclusion. As such, Dr. Kundi does not provide sufficient data to support his opinion on the strength of association. *See supra* Part I-D-3, at 15-17.

"Consistency" speaks to whether the observed association has been repeatedly observed by different persons in different places, circumstances, and time. *See* Bradford Hill, at 2. As to this factor, Dr. Kundi opined that, "[e]specially after correcting for selection bias, studies were consistent concerning risk of long-term and heavy [mobile phone] use for glioma and acoustic neuroma. This consistency extends to studies from different regions and time periods." Dr. Kundi Supp. Exp. Rpt., at 47. He further opined that, "[c]onsistency with respect to brain

tumor time-trends cannot be claimed for all regions, but problems inherent in descriptive epidemiologic studies relying on cancer registries prohibit far reaching conclusions." *Id.* Chief Judge Josey-Herring, however, struck Dr. Kundi's selection-bias opinion because it did not appear in his original report. *See supra* Part I-D-3., at 15-17. In addition, the epidemiological studies did not demonstrate a consistent association between mobile phone use and brain tumors consistent with the findings in the Hardell and INTERPHONE studies. Hr'g Tr. 9/14/22 p.m., at 47:6-47:20; 9/15/22 a.m. 47:7-18.

The third factor, "specificity," means that the associations are more likely to be causal when they are specific, such as when exposure to an agent causes the disease. *See* Bradford Hill, at 3. Dr. Kundi opined that, "[t]here is evidence that risk is specifically high for tumors close to the antenna of a [mobile phone] when used close to the head. It seems that the risk is restricted to glioma and acoustic neuroma while meningiomas are (still) unaffected. These types of specificity can be claimed based on current evidence." Dr. Kundi Supp. Exp. Rpt., at 47. Chief Judge Josey-Herring, however, struck the three studies relied upon by Dr. Kundi to render a new opinion regarding specificity because it was not cited in his original report. *See supra* Part I-D-3., at 15-17.

The fourth factor, "temporality," refers to the temporal relationship of the association. *See* Bradford Hill, at 3-4. In other words, there should be a temporal progression between the agent and the disease. *Id.* Dr. Kundi opines that, "[a]lthough brain tumors have long latencies and [mobile phone] use commenced in cases studied so far vary likely when the tumor already covertly existed, evidence indicates that [mobile phone] use has an impact on tumor growth such that tumors are diagnosed earlier or tumors that would never become clinically symptomatic during the life-time of the individual." Dr. Kundi Supp. Exp. Rpt., at 46. Dr. Kundi explains

that, "[a]s discussed for acoustic neuroma[,] early symptoms may lead to an impact on [mobile phone] use (reverse causation bias), but either assessing cases with serviceable hearing or long latencies removes such bias and leads to the conclusion that [mobile phone] use increases the risk of diagnosis with such a tumor." *Id.* As the Court previously noted, the incidence data has not shown an increase as expected, and Dr. Kundi fails to address adequately the bias in the studies he relies upon and fails to argue alternative explanations in his supplemental report that is supported by sufficient data and facts. *See supra* Part III-A-2, at 31-35.

The fifth factor is "biological gradient," also referred to as "dose-response curve," which is premised on the principle that increased exposure results in an increase of incidence of disease, thus supporting a causal association between the agent and disease. *See* Bradford Hill, at 4. Dr. Kundi opines that, "[a] significant relationship between indicators of the duration and intensity of exposure to [mobile phone] frequencies has been found for glioma and acoustic neuroma in all studies included in this assessment." Dr. Kundi Supp. Exp. Rpt., at 47. Chief Judge Josey-Herring, however, struck the four studies upon which Dr. Kundi relied to render a new opinion regarding dose-response because the new opinion was not cited or discussed in his original report. *See* Supra Part I-D-3, at 15-17.

The sixth factor, "plausibility," refers to the extent to which the association can be plausibly explained by known scientific principles. *See* Bradford Hill, at 4. Sir Bradford Hill opined, however, that this factor cannot be demanded because "[w]hat is biologically plausible depends upon the biological knowledge of the day." *Id.* Dr. Kundi opines that, "[w]hile there is ample evidence that low-dose non-thermal effects exist, a single interaction mechanism between an external [radiofrequency electromagnetic field] and cells, tissue[,] and the organism has not been established." Dr. Kundi Supp. Exp. Rpt., at 47. This factor was also touched upon when

Dr. Kundi failed to provide sufficient facts or data to support his opinion under epidemiology, and the facts and data were limited for animal studies and *in vitro* studies. Hr'g Tr. 9/15/22 a.m., at 58:22-59:10, 63:16-64:6, 74:14-75:12.

The seventh factor is "coherence," which is that the cause and effect should comport with the available generally known facts of the natural history and biology of the disease. *See* Bradford Hill, at 4. Dr. Kundi opines that, putting together knowledge from animal studies, *in vitro* studies, and epidemiology, "the observed association between [mobile phone] use and brain tumors does not contradict what is known about the natural history of the disease." Dr. Kundi Supp. Exp. Rpt., at 47. As the Court has observed, the incidence data has not shown an increase as expected of glioma and acoustic neuroma, and Dr. Kundi fails to treat the bias in the studies he relies upon and fails to argue alternative explanations in his supplemental report supported by sufficient data and facts. *See supra* Part III-A-2, at 31-35.

The eighth factor, "experiment," is premised on experimental manipulation producing evidence that may lead to a stronger support for a causal inference. *See* Bradford Hill, at 4-5. Dr. Kundi opines that, "[a]ctual experiments manipulating the way or type of [mobile phone] use are not available; however, analysis of users of car phones or headsets indicate that these groups have no increased glioma risk in contrast to those using the [mobile phone] close to the head." Dr. Kundi Supp. Exp. Rpt., at 47. The ninth factor, "analogy," is that a similar exposure and outcome could be translatable to an unexplored causal investigation. *See* Bradford Hill, at 5. Dr. Kundi opined that "there is some evidence from earlier epidemiologic studies on the relationship between [radiofrequency electromagnetic fields] other than those emitted by [mobile phones], indicating a moderately increased risk from such exposures for brain tumors." Dr. Kundi Supp. Exp. Rpt., at 47. At bottom, the facts and data simply do not support

Dr. Kundi's attempt to apply these last two Bradford Hill factors. Moreover, Dr. Kundi previously testified that both experiment and analogy could not be assessed in this case. Hr'g Tr. 9/15/22 a.m., at 59:13-62:17.

The Court, therefore, finds that Dr. Kundi's opinion in his supplemental report is not supported when considering it in view of the nine Bradford Hill factors. In other words, Dr. Kundi provides insufficient facts or data to support his opinion that a cause-effect relationship exists between mobile phone use and acoustic neuromas and gliomas. *See* Fed. R. Evid. 702 (b)-(d); *In re Deepwater Horizon Belo Cases*, 2022 U.S. Dist. LEXIS 225619, at *16; *Daniels-Feasel*, 2021 U.S. Dist. LEXIS 168292, at *8-10; see also *Claar*, 29 F.3d 499 (9th Cir. 1994) (finding that an expert must adequately account for obvious alternative explanations). And, as noted herein, Chief Judge Josey-Herring struck major portions of Dr. Kundi's opinion that pertained to a Bradford Hill analysis because Dr. Kundi did not include such opinions in his original report. Further, it is worth noting here that Judge Weisberg's March 16, 2017 Order admonished against a re-do of expert discovery or a revision of opinions to counter previous evidentiary findings after the fact. *See* Chief Judge Josey-Herring's August 28, 2018 Order, at 2, 15-22; *Brown*, 765 F.3d at 773 (finding that an expert must do more than stating he has applied a respected methodology, but must also follow through with applying it).

Finally, the Court does not find the cases Plaintiffs cite, *Cook v. Rockwell Int'l Corp.* and *Milward v. Acuity Specialty Products Group, Inc.*, to be availing. The Court must exclude Dr. Kundi because his opinions simply do not satisfy Rule 702, and not because part of his opinions rely upon a review of the available literature. *See Cook v. Rockwell Int'l Corp.*, 580 F. Supp. 2d 1071, 1106-07 (D. Colo. 2006). Even though Dr. Kundi represents that he followed the Bradford Hill method and based his opinion on sufficient facts and data, such statement does not

mean he actually did so and thus satisfied Rule 702. *See Milward v. Acuity Specialty Prods. Grp., Inc.*, 639 F.3d 11, 14 (1st Cir. 2011).

B. Admissibility of Dr. Igor Belyaev's Expert Testimony

1. Dr. Belyaev's Qualifications and Relevance under Rule 702(a).

Dr. Belyaev is the Head Research Scientist and the Head of the Radiobiological Laboratory for the Cancer Research Institute, Biomedical Research Center, Slovak Academy of Science. *See* Supplemental Expert Report of Igor Belyaev, Ph.D., D.Sc., at 1 [hereinafter "Dr. Belyaev Supp. Exp. Rpt."]. He is "a cancer research scientist with a focus on the biophysical effects and molecular mechanisms of non-ionizing and ionizing radiations." *Id.*

In 1981, Dr. Belyaev received a master's degree in Radiation Physics and Dosimetry from the Moscow Engineering Physics Institute. *Id.* In 1986, he received a Ph.D. in radiobiology from the Institute of Biophysics at the Academy of Sciences of the Soviet Union.[7] *Id.* In addition, in 1994, he received a D.Sc. in genetics from St. Petersburg State University. *Id.* From 1981 to 2004, Dr. Belyaev was an Associate Professor and held the following positions at the Department of Biophysics, Radiation Physics, and Ecology at the Moscow Engineering Physics Institute: "Junior Research Scientist, Senior Research Scientist, Head of the Laboratory, Head Research Scientist." *Id.* From 1994 to 2006, he taught, conducted research, and directed research teams at the Departments of Radiobiology, Molecular Genome Research, Genetic and Cellular Toxicology, Genetics, Toxicology, and Microbiology of Stockholm University. *Id.*

Dr. Belyaev was one of the members of the Working Group for the Evaluation of Radiofrequency Carcinogenicity of the International Agency on Research in Cancer, which

[7] The Academy of Sciences of the Soviet Union was succeeded by the Russian Academy of Sciences after the collapse of the Soviet Union.

classified the carcinogenicity of cell phone radiation and produced the IARC Monograph cited throughout this Order. *Id.*; Judge Weisberg's August 9, 2014 Order, at 53. He has worked on the Editorial Board for the following international journals: *Electromagnetic Biology and Medicine*; *Radiation Biology and Radioecology of the Russian Academy of Science*; and *ISRN Biophysics*. *Id.*

Dr. Belyaev offers seven opinions, all to a reasonable degree of scientific certainty:

(1) "the electromagnetic radiation emitted by cellphones has biological effects independent of heating created by the cellphone or non-thermal [microwave] effects. These depend upon a variety of physical parameters and biological variables";

(2) "the non-thermal biological effects of cellphone [microwave] radiation are caused by known physical mechanisms";

(3) "the specific absorption rate (SAR) or power density (PD) multiplied by the time duration of exposure defines the effect of and corresponding risk related to cellphone electromagnetic radiation";

(4) "the dependence of the biological effects of cellphone radiation on a variety of genetic and physiological variables produces significant variety in individual responses to cellphone radiation and results in increased sensitivity in some groups such as young people";

(5) "the electromagnetic [microwave] radiation emitted by cellphones induces molecular pathways and cellular mechanisms that produces carcinogenesis (the creation of cancer) in human brain cells and that the electromagnetic [microwave] radiation emitted by cellphones causes brain cancer";

(6) "the extremely low frequency (ELF) electromagnetic radiation emitted by cellphones induces biological effects dependent upon a number of physical parameters and biological variables similar to [microwave] effects, induces similar molecular pathways and cellular mechanisms that produce carcinogenesis (the creation of cancer) in human brain cells, and may cause cancer under prolonged chronic exposure"; and

(7) "that cellphone radiation, including ELF and [microwave] components, causes and/or significantly increases the risk of certain malignant and non-malignant head and brain tumors in humans and is therefore a substantial contributing factor in cancer causation."

Id. at 7-8.

Although Dr. Belyaev's qualifications are not disputed, the issue before the Court is whether his scientific knowledge and general causation opinion would help the trier of fact to understand the evidence or determine a fact in issue under Rule 702(a). Dr. Belyaev provides that "cellphone radiation causes and/or significantly increases the risk of *certain* malignant and non-malignant head and brain tumors in humans . . . ." Dr. Belyaev Supp. Exp. Rpt., at 8 (emphasis added). Even though acoustic neuroma and glioma may fall within the categories of malignant and non-malignant brain tumors, Dr. Belyaev does not specify or define the "*certain* malignant and non-malignant head and brain tumors" that develop from cellphone radiation and whether the tumors include acoustic neuroma and glioma. *Id.* Further, Dr. Belyaev concedes that he is not an expert on acoustic neuroma and glioma. During the evidentiary hearing, Dr. Belyaev and Defendants' counsel engaged in the following exchange:

> Q. Okay. So, Dr. Belyaev, I want to talk a little bit about, first of all[,] about some of your qualifications. Now, you are not a medical doctor, correct?
>
> A. Yes, correct.

Q. And you are not an expert in the diagnoses or treatment of brain tumors?

A. No, I'm not an expert.

. . .

Q. Dr. Belyaev, you have not done any research into the causes of acoustic neuroma, correct?

A. I have not done any research in the causes of acoustic neuroma. Mr. Dee, may I ask a question? You have shown report from which deposition, 2013 or 2017?

Q. That was 2013.

A. Thank you.

Q. And Dr. Belyaev, like with acoustic neuroma, you're not an expert in the causes of glioma, are you?

A. I'm not an expert in all causes of glioma.

Q. Alright. And you have not done any research into the cause specifically of gliomas, correct?

A. Well, recently I have not such one study with glioblastoma cells.

Q. Okay. But you have not done any research into the cause specifically of glioma?

A. I have not done such research.

Q. And Dr. Belyaev, you understand the differences between initiation of cancer and promotion of cancer, right?

A. Yes.

Q. And you are not offering an opinion on whether [radiofrequency] emissions from cell phones initiate glioma, correct?

A. No, I don't offer such an opinion.

Q. In other words, you cannot say to a reasonable degree of scientific certainty that [radiofrequency] from cell phones initiates glioma, correct?

A. Correct.

Q. Likewise, you're not offering an opinion on whether [radiofrequency] emissions from cellphones promote glioma, correct?

A. Correct. I don't offer such an opinion.

Q. Yes. You cannot say to a reasonable degree of scientific certainty that [radiofrequency] from cell phones promote gliomas, correct?

A. I don't offer such an opinion, correct.

Q. You are not offering an opinion that the emissions from cell phones initiate acoustic neuroma, correct?

A. Correct.

Q. You also cannot say to a reasonable degree of scientific certainty that cell phone use promotes acoustic neuroma, correct?

A. Correct.

Hr'g Tr. 9/29/22 a.m., at 63:22-64:3, 68:11-70:2.

Even though Dr. Belyaev considers himself an expert in radiofrequency radiation and the possible causation of acoustic neuroma, his testimony and expert report indicate otherwise, as he fails to provide a causation opinion as to acoustic neuroma and glioma to a reasonable degree of scientific certainty. Hr'g Tr. 9/29/22 a.m., at 63:22-64:3, 64:17-22, 68:11-70:2; *see also In re Roundup Prod. Liab. Litig.*, 390 F. Supp. 3d 1102, 1115 (N.D. Cal. 2018) ("Moreover, it is not enough for the evidence in this case to go merely to the causal relationship between glyphosate and cancer in general; it must go to the relationship between glyphosate and [non-Hodgkin's lymphoma] in particular."); *Warner/Elektra/Atl. Corp. v. Cnty. of DuPage*, 762 F. Supp. 784, 789 (N.D. Ill. 1991) ("The only limitation upon evidence in this regard is that expert opinion upon causation must be expressed to a reasonable degree of scientific certainty."). While the Court finds that Dr. Belyaev's testimony may assist the factfinder in understanding some of the

evidence, he does not provide a causation opinion that fits this case. Fed. R. Evid. 702 advisory committee's notes to 2000 amendment; *Daubert*, 509 U.S. at 591; *Daubert II*, 43 F.3d at 1315.

2. Dr. Belyaev's Testimony under Rule 702(b)-(d).

Dr. Belyaev asserts that, in forming his opinions and conclusions, he used a "generally accepted methodology for assessment of carcinogenicity adopted by IARC (IARC 2013)." Dr. Belyaev Supp. Exp. Rpt., at 3. He asserts that his opinions are based on all available studies and that he used IARC's "methodology in assessment of the [electromagnetic field] carcinogenicity, consisting of: exposure assessment; human carcinogenicity data, which include epidemiology studies and cancer incidence data; animal carcinogenicity data; other relevant data judged to be relevant to an evaluation of carcinogenicity (IARC 2013)." *Id.* "With regard to epidemiological studies, cancer bioassays, and mechanistic and other relevant data, only reports that have been published or accepted for publication in the openly available scientific literature are reviewed by IARC[,]" and in forming his opinion, he incorporated and relied on "only peer-reviewed original studies and reviews, which included descriptions of accepted scientific methodology." *Id.* at 4-5. Dr. Belyaev also indicates that he relied on the Bradford Hill criteria because IARC adopted them to show causality. *Id*. at 4. Dr. Belyaev also relied on his own experiments, and he correlated the results of his "experiments with published data and literature available within those same subject areas. Furthermore, these are experiments which can be and have been replicated." *Id.* at 2-5.

The Court will first discuss IARC methodology to determine if Dr. Belyaev applied such a methodology to the facts of the case. IARC's methodology for assessing the carcinogenicity of a particular agent is set forth in the IARC Monograph, which subdivides the assessment of an agent's carcinogenicity into the following assessment categories: exposure data; studies of

cancer in humans (pertinent epidemiological studies); studies of cancer in experimental animals; mechanistic and other relevant data; summary; and evaluation and rationale. Ex. GX1524, IARC Monograph 2013, at 14-31. "Evaluations of the strength of the evidence for carcinogenicity arising from human and experimental animal data are made, using standard terms" such as: (1) "sufficient evidence of carcinogenicity"; (2) "limited evidence of carcinogenicity"; (3) "inadequate evidence of carcinogenicity"; or (4) "evidence suggesting lack of carcinogenicity." *Id.* at 27-28. Under an "overall evaluation" of the carcinogenicity of agents to humans, an evaluation can be made for a group of agents that have been evaluated by the Working Group. *Id.* at 29. "The agent is described according to the working of the following categories, and the designated group is given." *Id.* The following group categories are:

(1) Group 1: The agent is carcinogenic to humans;

(2) Group 2A: The agent is probably carcinogenic to humans;

(3) Group 2B: The agent is possibly carcinogenic to humans;

(4) Group 3: The agent is not classifiable as to its carcinogenicity to humans; and

(5) Group 4: The agent is probably not carcinogenic to humans.

Id. at 29-31. The Court notes that although Dr. Belyaev was a member of the Working Group and opines that radiofrequency is harmful to humans, the Working Group as a whole categorized radiofrequency radiation in Group 2B because "[t]here is *limited evidence* in humans for the carcinogenicity of radiofrequency radiation" and "[t]here is *limited evidence* in experimental animals for the carcinogenicity of radiofrequency radiation." *Id.* at 419 (emphasis added).

Dr. Belyaev must have reliably applied the IARC methodology to the facts of the case for his opinion to be admissible. However, it is unclear whether he used the IARC methodology in his original report because he merely asserts that he used the process of the IARC methodology

to come to his conclusion without elaboration. Hr'g Tr. 9/29/22 a.m. at 77:14-80:25; *see also* GX0978, Expert Report of Igor Y. Belyaev, PhD, D.Sc. Further, Dr. Belyaev's supplemental expert report does not follow the sections and descriptions provided above evaluating the data to exposure, epidemiology, animal studies, or mechanic studies and the strength of evidence. Hr'g Tr. 9/29/22 a.m., at 91:18-104:1-15 (describing the IARC methodology and Dr. Belyaev's understanding of IARC methodology through Dr. Belyaev's testimony). Indeed, Dr. Belyaev opined that it is important to classify the studies used for each category, with the strength of evidence being important to the overall evaluation. Hr'g Tr. 9/29/22 a.m., at 104:1-15.

In addition, it does not appear that Dr. Belyaev reliably applied the IARC methodology because he failed to analyze the epidemiology, which he appreciated was the "main component that drives the general causation conclusion[.]" Hr'g Tr. 09/29/22 p.m. at 7:3-8:6. Specifically, he did no analysis of bias, confounding, or chance, and did not perform a dose-response analysis of the epidemiological data. Hr'g Tr. 9/29/22 p.m., at 8:7-11:18, 45:7-17. What must be noted is that Chief Judge Josey-Herring struck Dr. Belyaev's references to the Bradford Hill criteria in his supplemental report and "Brain cancer time trends" because he did not refer to the Bradford Hill criteria or incidence rates in his original report. Chief Judge Josey-Herring's August 28, 2018 Order, at 25-26. Therefore, Dr. Belyaev is unable to demonstrate a cause-effect relationship between the agent and the disease, *i.e.*, the relationship is not merely an association. *See In re Deepwater Horizon Belo Cases*, 2022 U.S. Dist. LEXIS 225619, at *16; *Daniels-Feasel*, 2021 U.S. Dist. LEXIS 168292, at *8-10. Further, there was no analysis of the carcinogenicity of the animal studies as they relate to glioma or acoustic neuroma as the data was also limited. Hr'g Tr. 9/29/22 a.m., at 61:7-14; Hr'g Tr. 9/29/22 p.m., at 19:16-28:22.
Dr. Belyaev must do more than simply state he followed the IARC methodology; he must

actually show how he reliably applied the methodology to reach his opinion. Fed. R. Evid. 702(d); *Brown*, 765 F.3d at 773.

Finally, Dr. Belyaev relied on some of his own laboratory research, which used a technique called Anomalous Viscosity Time Dependence ("AVTD"). Dr. Belyaev Supp. Exp. Rpt., at 2. Under Rule 702(c), Dr. Belyaev's testimony must be the product of reliable principles and methods. Under the *Frye/Dyas* test, Judge Weisberg found that "while AVTD may be a reliable method, there is no evidence in the record that anyone outside of Dr. Belyaev's laboratory uses it, even though the technique is now more than twenty-five years old[,]" and "some publications have characterized AVTD as being an unorthodox technique." Judge Weisberg's August 8, 2014 Order, at 55-56. In his supplemental report, Dr. Belyaev cites to two studies, authored by a Tatyana Kuchma,[8] for the proposition that AVTD has been used outside of Russia by a researcher in Canada, and that it is thus a generally accepted and a reliable method. Dr. Belyaev Supp. Exp. Rpt., at 2. However, in his 2018 deposition, Dr. Belyaev represents that, although Ms. Kuchma is affiliated with McGill University in Canada, she conducted her AVTD studies in Russia. Defs.' Post-Hr'g Brief Ex. A, at 821:4-825:5.

Under Rule 702(b)-(c), Dr. Belyaev's testimony must be based upon sufficient facts or data and must be the product of reliable principles and methods. Here, Dr. Belyaev indicates that he uses replicated studies to reach his opinion. Hr'g Tr. 09/29/22 a.m. at 73:3-74:5. The following exchange between Defendants' counsel and Dr. Belyaev illustrates his methodology toward replication studies, as follows:

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[8] T. Kuchma, *Modification of Bactericidal Effects of Microwave Heating and Hyperthermia by Hydrogen Peroxide*, 32 J. MICROWAVE POWER & ELECTROMAGNETIC ENERGY, no. 4, at 205-14 (1997); T. Kuchma, *Synergistic Effect of Microwave Heating and Hydrogen Peroxide on Inactivation of Microorganisms*, 33 J. MICROWAVE POWER & ELECTROMAGNETIC ENERGY, no. 2, at 77-87 (1998).

Q. I completely understand. It's fair to say that researchers in the biologic and physical sciences expect results to be replicated by independent data, analytical data, laboratories and instruments before they rely on them to draw causal inferences?

A. Yes . . . . It's fair to say.

Q. And you agree that replication is important because replicability provides assurance that the effect is not due to chance alone correct?

A. Yes, I agree.

Q. And it's fair to say that confirmation of results and conclusions from one study obtained independently by other investigators is a scientific gold standard, correct?

A. Yes, I agree.

Q. And you yourself do not reach scientific conclusions based on studies that have not been replicated independently by other scientists, correct?

A. Correct.

Q. You agree that . . . it would not be appropriate to rely on results and studies that are not statistically significant, correct?

A. Yes, correct.

Q. And that's because of results are not statistically significant, the results could be due to chance alone, correct?

A. Yes.

. . .

[Q.] Let's pull up the March 20th, 2013 deposition transcript of page 376 Lines 6 through 20 . . . . Let me read it for the record

Question. "Okay, would you agree that any scientific methodology for reaching the causal conclusion about [radiofrequency] emissions and cancer must include an explanation for the data that are inconsistent with the conclusions?"

Answer. "So my opinion is based on all data, those which are consistent and those which are inconsistent. So I am

based all evidence, which I have comprised in my report from different points of view, including consistent and inconsistent data."

Question. "But in reaching that conclusion wouldn't you agree that any scientific methodology must include an explanation for data that are inconsistent with that conclusion."

Answer. "Yes, I agree."

Did I ask you those questions and did you give those answers?

A. Yes, I agree.

Hr'g Tr 9/29/22 a.m., at. 73:3-77:6. Dr. Belyaev, however, relied upon studies that were either not replicated or failed to be replicated to support his opinion. Hr'g Tr. 9/28/22 p.m., at 57:15-61:19; Hr'g Tr. 9/29/22 p.m., at 54:3-18; Hr'g Tr. 9/29/22 p.m., at 56:2-23. Further, Chief Judge Josey-Herring precluded him from relying upon the replication results of studies that she had stricken. *See* Chief Judge Josey-Herring's July 3, 2019 Order, at 3.

Thus, the Court finds that Dr. Belyaev's opinion is not supported by sufficient facts and data and he failed to apply reliable principles and methods to the facts of this case. *See* Fed. R. Evid. 702 (b)-(d); *In re Deepwater Horizon Belo Cases*, 2022 U.S. Dist. LEXIS 225619, at *16; *Daniels-Feasel*, 2021 U.S. Dist. LEXIS 168292, at *8-10; see also *Claar*, 29 F.3d 499 (9th Cir. 1994). The Court, therefore, will exclude Dr. Belyaev's opinion for the aforementioned reasons.

C. Admissibility of Dr. Wilhelm Mosgoeller's Expert Testimony

1. Dr. Mosgoeller's Qualifications and Relevance under Rule 702(a).

Dr. Mosgoeller is a histologist and cell biologist. *See* Supplemental Expert Report of Wilhelm Mosgoeller, M.D., at 2 [hereinafter, "Dr. Mosgoeller Supp. Exp. Rpt."]. In 1987, Dr. Mosgoeller graduated with a medical degree from the University of Vienna. *Id.* In 1995, he was appointed to be the head of the Cell and Tissue Culture Laboratory at the University of Vienna's Institute of Histology and Embryology. *Id.* Since 1999, Dr. Mosgoeller has been

employed as an associate professor and medical doctor at the University of Vienna Medical School's Institute of Cancer Research. *Id.* Dr. Mosgoeller is a senior histologist, cell biologist and a principal clinical investigator with SCIgenia Science Support GmbH, Ltd., a biomedical consultancy in Vienna, Austria. *Id.* Dr. Mosgoeller has been a member of scientific societies related to cellular biology and regulatory affairs, including the Austrian Standards Institute for Electromagnetic Safety Standards, and committees within the Austrian Health Ministry. *Id.*

From 2002 to 2008, Dr. Mosgoeller was appointed by the Austrian Government's Workers' Compensation Board to investigate the non-thermal biological effects of weak electromagnetic fields and radiation. *Id.* This research program was titled "Athermal Effects of Radiofrequent Electromagnetic Fields," which is referred to by Dr. Mosgoeller as "ATHEM-1." *Id.* From 2008 to 2016, Dr. Mosgoeller coordinated another study titled "Athermal Effects of Radiofrequent Electromagnetic Fields (Gene-Toxicity)" known as "ATHEM-2." *Id.* The new research program considered genotoxic effects of exposure to radiofrequency radiation. *Id.*

Dr. Mosgoeller explains that he bases his opinions upon the review of peer-reviewed work, the Bradford Hill considerations, and his own research. *Id.* at 1. Dr. Mosgoeller offers the following opinions to a reasonable degree of scientific certainty:

> 1. Non-thermal radiation as emitted from mobile telephones causes biological effects in some human systems and cells.
>
> 2. In principle, these biological effects can be either beneficial, neutral, or adverse.
>
> 3. "Non-thermal" radiation from mobile telephones causes an increase in DNA breakage in certain types of human cells resulting in an increased risk of cancer.
>
> 4. Some cells (*e.g.*, metabolically active cells) respond most strongly to non-thermal [electromagnetic fields], a finding which is particularly concerning for children and youth, who have a greater percentage of metabolically active "growing" tissues.

> 5. Because of what we know about a-thermal effects it is not possible to define new safety regulations based on the currently available data. Therefore, the recommendations for risk minimizing strategies focus on the "principle of prudent avoidance," *i.e.*, avoid the lower exposure whenever reasonably achievable.

Dr. Mosgoeller Supp. Exp. Rpt., at 3-4. Dr. Mosgoeller provided two additional opinions in his supplemental report (opinions 6 and 7); however, Chief Judge Josey-Herring struck the opinions because he failed to reference them in his original report. *See* Chief Judge Josey-Herring's November 14, 2018 Order, at 2-3.

As to Dr. Mosgoeller, the Court must first determine whether his specialized knowledge will help the trier of fact to understand the evidence or determine a fact in issue. Fed. R. Evid. 702(a). Although Dr. Mosgoeller may be qualified to testify on matters specific to his field of research, his opinion does not fit the issues in this case. Indeed, Judge Weisberg concluded that "Dr. Mosgoeller is not able to say that exposure to cell phone radiation causes an increased risk of glioma or acoustic neuroma specifically. His opinion is therefore limited to biological plausibility and constitutes only a building block for plaintiffs' overall causation theory." Judge Weisberg's August 8, 2014 Order, at 59 (internal citation omitted). Judge Weisberg concluded that, "[b]ecause cellular biology, histology, and in vitro studies on cell phone radiation are relevant to the general causation issues presented in this case, Dr. Mosgoeller's expertise and opinions probably aid the factfinder." *Id.* at 60.

During the evidentiary hearing, Dr. Mosgoeller and counsel for Defendants engaged in the following exchange over Dr. Mosgoeller's opinions:

> Q. You could turn to line 8 of the deposition—8 through 11 is what we're going to focus on. Do you see that?
>
> . . .

> Question: "You're not—offering the opinion in this case that cell phones—[electromagnetic fields] from cell phones cause glioma specifically, correct?
>
> Answer: "Correct. Yes."
>
> Did I ask you that question and did you give me that answer?
>
> A. Of course, yes. Technically speaking it's correct.
>
> Q. Dr. Mosgoeller, you're also not offering the opinion that [electromagnetic] fields from cell phones cause acoustic neuroma, correct?
>
> A. Not specifically—oh, yes. It's here. Not specifically acoustic neuroma. We investigated the principle, and whether it causes something or not depends on the exposure.
>
> Q. Okay.
>
> A. Within exposed neurons and within exposed acoustic neurons; therefore, the answer is, technically speaking, yes or you're right, yes. My laboratory work does not specifically relate to it. But in real life, when you transfer the doctor to real life conditions, which I haven't done, the answer would have been different.
>
> Q. Dr. Mosgoeller, I understand. I just want to make it clear, that in this case, in these proceedings—I'm not talking about your lab studies. In these proceedings, you are not offering the opinion that [electromagnetic fields] from cell phones cause acoustic neuroma, correct?
>
> A. That's correct. Provided that—no, let's leave it there. That's correct, yes.

Hr'g Tr. 9/13/22 a.m., at 58:11-61:7. And, as the Parties are aware, because Dr. Mosgoeller failed to discuss epidemiology in his original report, Chief Judge Josey-Herring struck opinions six and seven, which discuss how electromagnetic fields may cause brain tumors. *See* Chief Judge Josey-Herring's November 4, 2018 Order, at 41-51. With the aforementioned assessments, this Court finds that Dr. Mosgoeller's opinions should also be limited to biological plausibility and would only be a building block for Plaintiffs' overall causation theory. In other words, Dr. Mosgoeller's opinions could help the trier of fact understand certain of the evidence;

however, there would be an analytical gap, unsupported by facts and data, between Dr. Mosgoeller's opinion on causation and the issue in this case whether cell phone radiation specifically causes acoustic neuromas and gliomas. Fed. R. Evid. 702(a); Fed. R. Evid. 702 advisory committee's notes to 2000 amendment; *Motorola Inc.*, 147 A.3d at 755; *Joiner*, 522 U.S. at 146; *Daubert*, 509 U.S. at 591; *Daubert II*, 43 F.3d at 1315.

2. Dr. Mosgoeller's Testimony under Rule 702(b)-(d).

Under Rule 702(b)-(d), Dr. Mosgoeller's testimony must be based on sufficient facts or data, the product of reliable principles and methods, and Dr. Mosgoeller must reliably apply the principles and methods to the facts of this case. *See* Fed. R. Evid. R. 702(b)-(d).

As the Court of Appeals has recognized in deciding the appeal in this case, "general acceptance can . . . have a bearing on the [reliability] inquiry." *Motorola Inc.*, 147 A.3d at 758 (quoting *Daubert*, 509 U.S. at 594). "Widespread acceptance can be an important factor in ruling particular evidence admissible, and a known technique which has been able to attract only minimal support within the community may properly be viewed with skepticism." *Id.* (quoting *Daubert*, 509 U.S. at 594). When experts on one side are in a distinct minority, that "may well raise a red flag, for '[w]hen a scientist claims to rely on a method practiced by most scientists, yet presents conclusions that are shared by no other scientist, the [trial] court should be wary that the method has not been faithfully applied.'" *Motorola Inc.*, 147 A.3d at 757-58 (quoting *Lust v. Merrell Dow Pharms., Inc.*, 89 F.3d 594, 598 (9th Cir. 1996)).

Here, Dr. Mosgoeller acknowledged that it is not generally accepted within the scientific community that electromagnetic fields from cell phones are a cause of cancer in humans. Hr'g Tr. 9/13/22 a.m., at 62:21-63:4. Dr. Mosgoeller, likewise, testified that he was not aware that any international health and safety organization, as of 2018, had taken the position that radio

frequency emissions or electromagnetic fields from cell phones are a cause of cancer in humans. *Id.* at 64:10-16. Dr. Mosgoeller was specifically asked: "As of 2018, you were not aware of any government or regulatory body that has taken the position that [electromagnetic fields] from cell phones are a cause of cancer in humans, yes or no, correct?" *Id.* at 64:17-64:20. Dr. Mosgoeller responded, "[y]es, within the understanding that they ask for proof and effects." *Id.* at 64:21-22. Dr. Mosgoeller was then asked, "[a]s of 2018, you were not aware of any standard setting organization that has taken the position that [radiofrequency] emissions from cell phones are a cause of cancer in humans, yes or no?" *Id.* at 64:23-65:1. Dr. Mosgoeller responded, "No. Of course there [are] no institutions; again, because they are looking for proof beyond any doubt, and as long as it's not there, the answer is no." *Id.* at 65:2-4. Dr. Mosgoeller's opinions, therefore, are not generally accepted in the scientific community and are in the distinct minority, which raises a red flag whether he faithfully applied a reliable method. *See Motorola Inc.*, 147 A.3d at 757-58.

Dr. Mosgoeller's opinion also suffers from analytical gaps. Specifically, he could not connect his theory of DNA breaks to cancer because whether a DNA break or mis-repair is either health relevant or completely harmless is highly dependent on whether *particular* genes are irradiated and damaged or broken. Hr'g Tr. 9/12/22 p.m., at 62:12-18, 64:21-65:6. Dr. Mosgoeller, however, provides no support or causal link between an increase in DNA breaks from cell phone use to the heritable mutations that can lead to acoustic neuromas or gliomas. *See* Hr'g Tr. 9/27/22 a.m., at 45:1-50:10, 58:9, 59:7. In addition, Dr. Mosgoeller fails to quantify the risk of cancer from cell phone use from either an initiation or promotion standpoint, provides no support that DNA breaks indicate an elevated risk or predictor of cancer, and does not provide

the studies he relied upon to form his opinions, such as the toxicology textbooks he referenced during his testimony. Hr'g Tr. 9/12/22 p.m., at 62:4-62:17; Hr'g Tr. 9/13/22 a.m., at 66:10-67:9.

The Court does not find that Dr. Mosgoeller reliably applied the weight-of-the-evidence methodology to his literature review. As a federal district court explained:

> Courts have recognized that it is imperative that experts who apply multi-criteria methodologies such as "weight of the evidence" must "rigorously explain how they have weighted the criteria. Otherwise, such methodologies are virtually standardless and their application to a particular problem can prove unacceptably manipulable. Rather than advancing the search for truth, these flexible methodologies may serve as vehicles to support a desired conclusion."

In re Incretin-Based Therapies, 524 F. Supp. 3d 1007, 1043-44 (S.D. Cal. 2021) (quoting *In re Mirena Ius Levonorgestrel-Related Prod. Liab. Litig. (No. II)*, 341 F. Supp. 3d 213, 247 (S.D.N.Y. 2018)). Indeed, "the assessment or weighing of the evidence must not be arbitrary, but must itself be based on methods of science." *Magistrini v. One Hour Martinizing Dry Cleaning*, 180 F. Supp. 2d 584, 602 (D.N.J. 2002). An expert must explain his scientific method for weighing the evidence. *Id.* at 607.

Dr. Mosgoeller indicates he uses a weight-of-evidence approach. Hr'g Tr. 9/12/22 p.m., at 22:22-25. He explained that the "[w]eight of evidence describes how much—how reliable information is. If it's only one paper, the evidence is rather low or small." *Id.* at 23:1-23:6. He further explained

> If five papers show the same pinpoint and the same effect, the evidence is pretty good. If the decision or the scientific pinpoint you discuss is held from one paper where you think, okay, this is not really a strong paper, they investigate it only six animals and not 500. Then the study with six animals does have a lower weight of evidence than the same decision based on 500 you investigated.

Id. at 23:7-23:12 (paragraph break omitted).

Dr. Mosgoeller described his literature review to Defendants' counsel, as follows:

> Q. That's fine. Did you at some point, Dr. Mosgoeller, begin to maintain your own personal library of peer reviewed articles, literature addressing these issues of electromagnetic fields, mobile phones, tumors, DNA breaks, cancer?
>
> A. Of course, this is my—this a basis of all my job.
>
> Q. And when did you begin to collect articles, literature, research that you placed in your own personal library under this topic?
>
> A. 1995, 1996, something like this. I'm not sure about the exact date.
>
> Q. Have you continued to do the things necessary to maintain and update that library over the years?
>
> A. You will find it in my original report or the supplementary. I do—it's a computer and I given the passwords was keywords [*sic*]. And I do research on the National Institute of Health Library. And I get the record every week or so.
>
> Q. So you actually seek out articles by using search terms, going to available libraries like the National Institute of Health?
>
> A. I [get] a suggestion—I [get] an e-mail with a suggestion of hundred, two hundred papers that match my research criteria. And then I review those hundred. And typically, I would select four or five, up to nine or ten from one information e-mail.
>
> Q. What causes an article to make it into your library? Do you just take the ones that you like?
>
> A. No, of course not. Like I don't—I like it—no, like is not on the—
>
> Q. What is the basis for getting it into your library.
>
> A. The basis is to deal with electromagnetic fields interaction with biological material. I think I can put it like this. I pull out—I do not take publications where they describe a new method using mobile phones to bring the patients to the hospital to be sure they are complying with their treatment.
>
> There are many studies and papers like this medical doctors like to use mobile phones. They even try to combine sugar

measurements. If you're diabet[ic], you measure your sugar and you send an estimate to a central computer and a medical doctor has—so, this is organizational issues that I'm not interested in. I'm not a doctor treating patients with diabetes.

Q. I see, I see. So your search terms sometimes turn up articles or produce articles for you that are not within the boundaries or the context of your research interest?

A. I have my keywords and they are wide—they cover wide range, but at the end I read the title in abstract to decide whether it's interesting for my work. And to be interesting for my research and my work, it meets a test—the research question must be around [electromagnetic field] exposure at the low—at low dose, non-thermal intensity and biological effects.

Q. Okay. And you were showing us with your hands like three, three and a half feet apart, it's a broad search term?

A. I [start] broad and narrow it down to be sure I get what I need or want.

Q. Okay. And what you need or want would be articles on point on this topic?

A. Yes.

Q. Do you accept some into your library and reject other based on the conclusion?

A. Of course not.

Q. Why not?

A. The conclusion is interesting, but not important. Important is the data.

Q. The data?

A. The data. The data and the methodology how this author achieved the data. To give you one example, this bottle is half full or half empty. Some people would conclude it's half empty, other people would conclude it's half full. So the conclusion is something very personal. But this bottle contains about 100-200 milliliters of water. We can measure this objectively. If I rely on the conclusion, half empty, half full, I have a contradicting result—

> Q. But if you rely on the data, you know how much waters in the—
>
> A. That's correct. This bottle contains 20 [milliliters] of water, that's a fact.

Hr' Tr. 9/12/22 a.m., at 87:21-91:5. In other words, Dr. Mosgoeller first defines his search field as "biological impact of electromagnetic field exposure of biologic materials." He then searches those key terms on libraries like the National Institute of Health and evaluates the search results by the title of the publication. He marks the title of the publications that he wants to read before investigating the publication to determine whether it is relevant to the subject of his research. Publications then become part of a list of papers in his personal library that are sorted into different groupings based on the search terms. Thereafter, he reads the publications he has saved in his library and examines the methodology used in the publication before compiling lists of the papers and flagging certain data from each study to indicate particular information, such as if the study had positive or negative results. Ultimately, he incorporates the Bradford Hill criteria to evaluate a publication's findings and whether they are consistent, replicated, or could be explained by an alternative means. *See* Hr' Tr. 9/12/22 p.m., at 14:8-22:15.

The Court does not find this to be a systematic review of literature that can be replicated by another scientist for the following reasons: (1) it is not clear what scientific method Dr. Mosgoeller chose when describing the key terms in his search; (2) it is not clear how Dr. Mosgoeller used a scientific method to evaluate the titles of certain papers to be included in his personal library; (3) he does not indicate how he weighed positive studies against negative studies, (4) he does not provide an explanation of how he analyzed the studies to consider their strengths and weaknesses; and (5) he does not identify contrary studies and attempt to reconcile his opinion with contrary evidence, such as those in the scientific community. *See generally* Dr. Mosgoeller Supp. Exp. Rpt.; *In re Incretin-Based Therapies,* 524 F. Supp. 3d at 1043-44

(excluding the expert's report because, *inter alia*, the expert failed to independently analyze relevant epidemiological data, did not conduct an independent evaluation of evidence prior to relying on other's opinions, failed to apply his stated methodology of considering and weighting all relevant information, and offered no rigorous explanation so his analysis can be verified or replicated); *Lust v. Merrell Dow Pharms.*, 89 F.3d at 596 (finding that an expert could not "'pick and choose' from the scientific landscape and present the Court with what he believes the final picture looks like"); *Magistrini*, 180 F. Supp. 2d at 602.

In addition, Dr. Mosgoeller relies upon his ATHEM-1 and ATHEM-2 research; however, he failed to: (1) follow his own method of using replicated studies; (2) indicate failed replications of studies he relied upon for ATHEM-2 research and explain the failed replications; (3) explain studies that evaluated the ATHEM-2 research and found issues with the research on micronuclei formation and contrary results; and (4) provide evidence that studies he relied on for his DNA breaks opinion in ATHEM-1 have been replicated or explain any failed replication of such studies. *See* Hr'g Tr. 9/13/22 a.m., at 67:10-71:18, 79:25-80:4, 88:3-12; Hr'g Tr. 9/13/22 p.m., at 6:24-10:14.

For the aforementioned reasons, Dr. Mosgoeller's testimony is not based on sufficient facts and data, the product of reliable principles and methods, and he has not reliably applied the principles and methods to the facts of this case. Fed. R. Evid. 702(b)-(d); *See Motorola Inc.*, 147 A.3d at 755; *Joiner*, 522 U.S. at 146; *Brown*, 765 F.3d at 773. The Court, therefore, will exclude his testimony.

D. Admissibility of Dr. Abraham Liboff's Expert Testimony[9]

1. Dr. Liboff's Qualifications and Relevance under Rule 702(a).

Dr. Liboff is physicist and molecular biologist. *See* Supplemental Expert Report of Abraham R. Liboff, B.S., M.S., Ph.D., [herein after Dr. Liboff Supp. Exp. Rpt.], *Appendix A: Curriculum Vitae*. In 1964, Dr. Liboff received his Ph.D. from New York University. *Id.* From 1965 to 1972, Dr. Liboff was a senior researcher and associate professor in the New York University Department of Physics. *Id.* From 1972 to 2002, Dr. Liboff was a physics professor at Oakland University in Rochester, Michigan, where he served as Chair of the Physics Department and Director of the Doctoral Program in Medical Physics. *Id.* From 2004 to 2010, he was a research professor in the Center for Molecular Biology and Biotechnology at Florida Atlantic University. *Id.* Dr. Liboff is currently a Professor Emeritus of Physics at the Oakland University in Rochester, Michigan. *Id.*

Dr. Liboff served as an Editor for Electromagnetic Biology and Medicine and has, throughout his career, served as a peer reviewer for many scientific journals. *See* GX 2588, Liboff *De Bene Esse* Dep., at 46:16-24, 55:14-56:9. Dr. Liboff has been awarded 43 United States and foreign patents in the area of electromagnetic therapy, and published more than 100 peer review articles, book chapters, and reviews on electromagnetic fields and interaction with living systems. GX 2587, Liboff C.V.; GX 2588, Liboff *De Bene Esse* Dep., 33:13-18, 61:12-62:22; 70:7-17. Dr. Liboff holds the patent for devices that use Ion Cyclotron Resonance, a theory he developed and introduced in 1984 at a North Atlantic Treaty Organization conference,

[9] The Court understands that Dr. Liboff died on January 9, 2023. *See* Ora Hirsch Pescovitz, *Bereavement Notice: Abraham Liboff – January 9, 2023*, OAKLAND UNIV.: OU OFFICIAL NEWSLETTER (Jan. 17, 2023), https://www.oakland.edu/newsletters/in-memoriam/2023/abraham-liboff-january-9-2023; Joseph R. Salvatore & Henry Lai, *In Memorium*, 42 ELECTROMAGNETIC BIOLOGY & MEDICINE 1, 1-2 (2023).

and was selected by the WHO to serve as a member of the IARC Working Group in 2002 tasked with classifying the carcinogenicity of ELF electromagnetic fields. *See* GX 2588, Liboff *De Bene Esse* Dep., 64:17-65:16, 83:22-85:5; Liboff *De Bene Esse* Dep., 65:17-66:5 (Nov. 20, 2013). Judge Weisberg found Dr. Liboff qualified to testify as an expert on matters relating to biophysics, electromagnetics, and the biological effects of cell phone radiation. *See* Judge Weisberg's August 8, 2014 Order, at 71.

Dr. Liboff opines, to a reasonable degree of scientific certainty, that radiofrequency and ELF radiation from cell phones can cause non-thermal biological changes. *See* GX 2589, Liboff *De Bene Esse* Dep., 335:10-335:16; Judge Weisberg's August 8, 2014 Order, at 69. As Judge Weisberg observed, "Dr. Liboff does not offer an opinion on whether cell phones cause or promote glioma, acoustic neuroma, or any other type of tumor. Rather, his opinion is limited to biological plausibility, based on his belief that the radiofrequency and ELF radiation emitted by cell phones are 'biologically interactive' and have produced various effects in cells and animals." *See* Judge Weisberg's August 8, 2014 Order, at 69.

This Court does not find that Dr. Liboff's biological plausibility opinion is relevant to the general causation question whether cell phone radiation causes acoustic neuromas and gliomas. Dr. Liboff suggests two pathways by which electromagnetic fields from cell phones cause biological effects: (1) ELF modulation; and (2) radical pair excitation. GX2589, Liboff *De Bene Esse* Dep. Tr., at 214:10-217:14. Dr. Liboff offers that the only ELF-modulation effect he is aware of is electroencephalogram ("EEG") effects, while the only effect of radical pair excitation in humans he is aware of is chronodisruption. Dr. Liboff provides no evidence, however, that either pathway causes or leads to acoustic neuroma or glioma in humans. In contrast, IARC research notes that (1) there is no research data linking EEG effects to cancer; and (2) radical-

pair mechanisms in biological processes at field strengths below 500 microteslas is still lacking. *Id.* at 219:15-219:19, 225:23-261:25, 274:2-274:9, 275:22-276:25; GX1524.0373, IARC Monograph, at 363 (2013); GX1522.0101, IARC Monographs on the Evaluation of Carcinogenic Risks to Humans Volume 80, *Non-Ionizing Radiation Part 1: Static and Extremely Low-Frequency (ELF) Electric and Magnetic Fields*, at 90 (2002). Therefore, Plaintiffs fail to connect how Dr. Liboff's testimony on biological plausibility is relevant to whether cell phone radiation causes acoustic neuromas and gliomas, and how his testimony could be relevant to helping a factfinder understand general principles at issue in this case. *See* Fed. R. Evid. 702(a); Fed. R. Evid. 702 advisory committee's notes to 2000 amendment; *Daubert*, 509 U.S. at 591; *Daubert II*, 43 F.3d at 1315.

2. Dr. Liboff's Testimony under Rule 702(b)-(d).

Notwithstanding the Court's conclusion *supra* that Dr. Liboff's testimony would be unhelpful to the trier of fact, Fed. R. Evid. 702(a), under Rule 702(b)-(d), Dr. Liboff's testimony must be based on sufficient facts or data and the product of reliable principles and methods, and he must reliably apply the principles and methods to the facts of this case. *See* Fed. R. Evid. 702(b)-(d).

Dr. Liboff indicates that his opinions rely upon his own experiments, experiments of other scientists, discussions with other scientists at meetings and presentations, and a literature search. *See* GX2588, Liboff *De Bene Esse* Dep. Tr., at 90:5-90:23. Dr. Liboff engaged in the following exchange with Defendants' counsel about the methodology for his literature review:

> Q. So you would agree that the publication process of scientific research is a major part of the scientific method?
>
> A. Yes, it is.
>
> Q. And you would agree that the publication process helps establish a consensus within the scientific community, correct?

A. Yes.

Q. You would agree that an important part of methodology for reviewing and determining whether experimental studies should be relied upon in reaching an opinion is whether the study has been independently verified by other scientists or laboratories?

A. Correct.

Q. You would agree that independent verification of a study is referred to as "replication," correct?

A. Correct.

Q. The traditional approach in science requires that publications of an – experimental studies be greeted with some skepticism, correct?

A. Correct.

Q. In terms of the validity of a study, it should be replicated externally by an independent lab, correct?

A. Correct.

Q. It's important to know, also, whether attempted replications of studies have shown contrary results, correct?

A. Correct.

Q. Now, as part of a generally accepted methodology, it is important to consider all relevant literature, including positive and negative studies, correct?

A. Correct.

Q. We can agree that its inappropriate to cherry-pick just those studies that agree with your own opinion and exclude those studies that are inconsistent with your opinion, correct?

A. Correct.

GX2589, Liboff *De Bene Esse* Dep. Tr., at 249:3-251:2. Although Dr. Liboff testified that he followed such standards in implementing his methodology for literature review, he fails to provide specifics regarding the times a study is replicated, address failed replications of studies

cited in his expert report, or explain why his opinions are not shared by others in the scientific community. *Id.* at 263:14-20, 268:18-22, 271:5-272:13, and 331:15-332:8. Indeed, Dr. Liboff reasons that addressing contrary literature would have made the report unreadable and "required far more effort than I was prepared to put forth." GX2588, Liboff *De Bene Esse* Dep. Tr., at 120:21-121:2.

When asked to explain how he knows he has used a generally accepted methodology in the scientific community when he arrives at an opinion, Dr. Liboff responded that he knows when there is a "lack of criticism." *Id.* at 91:10-14. He elaborated: "Others have not criticized me for doing so, so it's been correct. Plus, the fact I'm at a point where I basically know how to approach these matters without thinking about them too much." *Id.* at 91:14-20. When asked whether the methodology he employed is a reliable methodology, and why he thought it was a reliable methodology, Dr. Liboff explained: "[b]ecause, first of all, they were not criticized, but more important than that, they adhered unconsciously as they may have done to accepted principles that I've outlined elsewhere in terms of reproducing experiments trying to obtain the same experiment but by varying one other parameter to see what happens." *Id.* at 94:13-95:14. Dr. Liboff explained that his methodology was acceptable and for a senior scientist, this is "not a matter that ordinarily comes up. It's very importantly legally, I understand, and it's part of what's driving this particular discussion, but from the standpoint of the working scientist, that person really, really would say I am adhering to a procedure that is acceptable. You do it without thinking." *Id.* at 95:2-14.

The Court appreciates that Dr. Liboff has enjoyed a long scientific career; however, under Rule 702, the Court must be able to discern whether he used sufficient facts or data and whether he used reliable principles or methodologies, and whether Dr. Liboff applied the reliable

principles and methods to the facts of the case. Fed. R. Evid. 702(b)-(d). These requirements cannot be satisfied by an expert indicating he reliably applied an accepted methodology without describing what methods he used and how he applied them. *Brown*, 765 F.3d at 773. In other words, the analytical gap between the data he used and his proffered opinion is too great. Impressively, here, Dr. Liboff appears not to have followed his own methodology. *Motorola Inc.*, 147 A.3d at 755 (citing *Joiner*, 522 U.S. at 146). Instead, it appears that Plaintiffs rely to their detriment upon the *ipse dixit* of their expert. *Id.* The Court, therefore, finds that Dr. Liboff's expert testimony must be excluded.

E. Admissibility of Dr. Dimitris J. Panagopoulos's Expert Testimony

1. Dr. Panagopoulos' Qualifications and Relevance under Rule 702(a).

Dr. Panagopoulos is a biophysicist who has a background and expertise in non-ionizing radiation and electromagnetic fields. *See* Supplemental Expert Report of Dimitris J. Panagopoulos, Ph.D., at 4 [hereinafter "Dr. Panagopoulos Supp. Exp. Rpt."]. In 2001, he completed his Ph.D. in Biology at the University of Athens. *Id.* Since 2002, he has worked in the Department of Biology at the University of Athens as a researcher and lecturer. *Id.* Since 2014, Dr. Panagopoulos has worked at the National Center for Scientific Research "Demokritos," Laboratory of Health Physics, Radiobiology & Cytogenetics. *Id.*

Dr. Panagopoulos is a peer reviewer for several international scientific journals. *Id.* The journal *Mutation Research* named him a "Top 10 cited Author in 2007 & 2008" for his article titled *Cell Death induced by GSM 900 MHz and DCS 1800 MHz Mobile Telephone Radiation*. *Id.* Dr. Panagopoulos has been invited to testify on the health effects of cell phone radiation before the Greek Parliament and the Canadian Parliament. *Id.* He was also a member of the organizing committee of the first and second International Workshops on Biological Effects of Electromagnetic Fields in Greece. *Id.* at 5.

Dr. Panagopoulos' opinion is that "it is more probable than not that cell phone radiation causes adverse health effects in humans." *Id.* at 10. His opinion arises out of his *in vivo* experimental research involving exposing *Drosophila melanogaster*, the common fruit fly, to cell phone radiation and analyzing the DNA of their eggs for fragmentation. *Id.* at 8-10. Dr. Panagopoulos notes that fruit flies are a well-studied organism, with cellular and gene similarities to mammals, but experience a higher resistance to radiation than mammals. *Id.* at 9. Cellular functions in fruit flies are identical to those in mammalian cells and substantial gene similarities exist between fruit flies and mammals, such as the same type of cell membranes, "free ions like calcium (Ca^{+2}), potassium (K^{+}), sodium (Na^{+}), initiating and accompanying all cellular events, and . . . the same intracellular organelles like mitochondria, ribosomes, endoplasmic reticulum, and nucleus containing the cell's genomic DNA." *Id.* Dr. Panagopoulos explains that. because of these similarities, it is his "opinion that similar severe DNA damage can be expected to occur in humans when exposed to radiation from cell phones." *Id.* at 10. Dr. Panagopoulos explains that severe DNA damage recorded in his "experiments (DNA fragmentation) cannot be repaired by the organism's defense mechanisms, and it is the main cause of either cancer when occurring in somatic cells other than neural [cells], neurogenerative diseases when occurring in neural cells, and reproductive declines or even heritable mutations when occurring in the gametes (reproductive cells)." *Id.*

The Court finds that Dr. Panagopoulos' opinion is simply not relevant or does not fit the general causation question whether cell phone radiation causes acoustic neuromas and gliomas. As to Dr. Panagopoulos, Judge Weisberg observed that he "is not offering an opinion that cell phone radiation causes glioma or acoustic neuroma. Like Dr. Mosgoeller, his opinion is a building block in plaintiffs' general causation theory." Judge Weisberg's August 8, 2014 Order,

at 64. Furthermore, Dr. Panagopoulos concedes that he does not speak to brain cancer in this expert report. *See* Hr'g Tr. 9/21/22 a.m., at 24:20-21. To be sure, Dr. Panagopoulos and Defendants' counsel engaged in the following exchange:

> Q. In your expert reports, Dr. Panagopoulos, and that includes your supplemental 2017 report, you do not state an opinion that cell phones cause glioma in humans, correct?
>
> A. No, I don't sir. Yes, correct.
>
> Q. And in your expert report, including your supplemental report of 2017, you do not state an opinion that cell phones cause acoustic neuroma. Is that correct?
>
> A. Correct.

Hr'g Tr. 9/21/22 a.m., at 25:15-22. In addition, Dr. Panagopoulos has testified that: (1) he is neither a medical doctor nor an oncologist; (2) he does not conduct research on the cause of cancer in humans; (3) he is not an expert in human cancer; (4) he is not an expert in general methodologies for determining whether an exposure causes cancer in humans; (5) he does not conduct cancer research on animals; (6) he is not an expert in the molecular genetics of cancer; and (7) he does not conduct epidemiologic research on cancer or have a degree in epidemiology. *Id.* at 15:13-21:11. The Court does not find Dr. Panagopoulos' testimony to be relevant to the question whether cell phone radiation causes gliomas or acoustic neuromas. Nor does the Court find Dr. Panagopoulos' expertise would help the factfinder understand an issue in the case or general principles at issue in this case. *See* Fed. R. Evid. 702(a); Fed. R. Evid. 702 advisory committees' notes to 2000 Amendment; *Daubert*, 509 U.S. at 591; *Daubert II*, 43 F.3d at 1315.

2. Dr. Panagopoulos' Testimony under Rule 702(b)-(d).

Under Rule 702(b)-(d), Dr. Panagopoulos' testimony must be based on sufficient facts or data, the product of reliable principles and methods, and Dr. Panagopoulos must reliably apply the principles and methods to the facts of this case. *See* Fed. R. Evid. R. 702(b)-(d).

Dr. Panagopoulos does not apply a reliable principle and method. As the Parties are keenly aware, Judge Weisberg excluded Dr. Panagopoulos under the *Frye/Dyas* test because his method was not commonly accepted in the scientific community. *See* Judge Weisberg's August 8, 2014 Order, at 69. Judge Weisberg found that "Dr. Panagopoulos' exposure methodology is central to his laboratory experiments and to the causation opinions for which plaintiffs have proffered him as an expert. Because he did not use a generally accepted methodology, Dr. Panagopoulos does not satisfy the third requirement of *Dyas*, and his testimony must be excluded." *Id.* at 69. Judge Weisberg described the methodology, which is the same methodology before this, as follows:

> Dr. Panagopoulos' opinions are derived principally from his own laboratory experiments exposing fruit flies to cell phone radiation. In these experiments, Dr. Panagopoulos (or another member of his research team) placed adult fruit flies, separated by gender, into test tubes, which contained standard fly food in the bottom and were sealed with cotton plugs to allow the flies to breathe but not escape. The researchers then positioned a commercially available cell phone against the test tube so that the antenna of the phone was touching and parallel to the tube. Dr. Panagopoulos testified that the researchers used a typical consumer cell phone for the experiments in order "to test the effects of the real thing." The vials of flies were then exposed or sham-exposed to cell phone radiation. Exposure consisted of a researcher reading a script into the phone during a phone call. For the sham-exposed group, the researcher read the same script, but the phone was turned off. Each exposure constituted a "dose," and the vials were dosed multiple times over the course of the experiment. After 48 hours, the male and female flies were combined into one vial to allow them to mate while exposures and sham-exposures continued for another 72 hours. The flies were then removed from the vials and the vials, containing developing embryos, were kept in a culture room for another six days without exposure to additional cell phone radiation. The researchers then counted the number of pupae in the exposed and sham-exposed samples to compare the reproductive capacity of each group. This count was blinded. The researchers also used the TUNEL assay and two other assays to analyze the ovaries of the exposed and sham-exposed female flies.

> Based on these experiments, Dr. Panagopoulos found that exposure to radiation from cell phones cause severe DNA damage, impairing the flies' reproductive capacity. Based on his knowledge of the literature and genetic similarities between fruit flies and humans, Dr. Panagopoulos concluded that cell phone radiation more likely than not causes adverse health effects in humans. His opinion is that cell phone radiation can damage DNA in humans the same way it does in fruit flies, because the relevant cellular genetic structures of humans and flies are similar.

Id. at 66-67 (internal citation omitted). Again, Dr. Panagopoulos relies upon this methodology to form his opinion in his Supplemental Report.

Unfortunately, Dr. Panagopoulos is unable to explain why the Court should find the methodology to be reliable. Fed. R. Evid. 702(c); Hr'g Tr. 9/20/22 a.m., at 59:3-60:9. Plaintiffs attempt to rely upon stricken sections regarding the reliability of simulated signals versus more reliable real signals, even though Chief Judge Josey-Herring had already concluded that "Dr. Panagopoulos never used the word 'simulated' in his original report. Nor did[] Dr. Panagopoulos mention that studies and experiments were being conducted using real and/or simulated exposures." Chief Judge Josey-Herring's August 28, 2018 Order, at 28. In addition, tellingly, no one outside the University of Athens uses Dr. Panagopoulos' fruit-fly exposure method. His exposure methodology has not been generally accepted in the scientific community. What is perhaps more, Dr. Panagopoulos' methodology has been criticized or received negative comments from IARC, the British Health Protection Agency, and the International Commission on Non-Ionizing Radiation Protection. *See* 9/21/22 a.m. Hr'g Tr., at 38:14-43:21, 65:15-67:9; Judge Weisberg's August 8, 2014 Order, at 67-69; GX1524.301, IARC Monograph, at 291. In short, there is no widespread acceptance of the methodology Dr. Panagopoulos employs. This continues to raise a red flag as to the reliability of the method. *Motorola Inc.*, 147 A.3d at 757-58; *Lust*, 89 F.3d at 598; Fed. R. Evid. 702.

Dr. Panagopoulos also failed to follow his own methodological principles. *See* Dr. Panagopoulos Supp. Exp. Rpt., at 10-11; *In re Rezulin Prods. Liab. Litig.*, 309 F. Supp. 2d 531, 564 (S.D.N.Y. 2004) (finding that an expert's "selectivity in defining the universe of relevant evidence thus violated his own standard of proper methodology[,]" "which suggests that he does not apply the same rigor in the courtroom that he would apply to his [professional] endeavors"). Dr. Panagopoulos explained that, under his methodology, for experiments, it is important "to follow very specific protocol[s] and keep, as much as possible, all environmental parameters, if possible, identical so that you do not have too much variability in your results." Hr'g Tr. 9/20/22 a.m., at 45:4-9. However, Dr. Panagopoulos admitted that there are fluctuations with phone signals and variations in environmental parameters. Hr'g Tr. 9/20/22 a.m., at 61:5-62:9. Therefore, Dr. Panagopoulos could not account for the consistency—or lack thereof—he claims for his experiments. In addition, although Dr. Panagopoulos indicated that scientific replication is an important principle, there were no independent replications of his work. Further, Dr. Panagopoulos dismissed, without sound, thoughtful explanation, unfavorable independent replications as flawed. *See* 9/20/22 p.m. Hr'g r., at 11:19-12:7; Hr'g Tr. 9/21/22 a.m., at 37:6-54:6.

In addition, Dr. Panagopoulos' methodology of reviewing other studies is not reliable because he fails to explain how the studies assisted him and whether the studies are reliable. Hr'g Tr. 9/21/22 a.m., at 5:16-6:1. Indeed, Dr. Panagopoulos relied more on generalities in referencing studies that purportedly support his opinion. Hr'g Tr. 9/20/22 p.m., at 42:5-53:14. This is illustrated through the following exchange between Plaintiffs' counsel and Dr. Panagopoulos:

> Q. What I'm asking you is, when you review a study, how do you determine whether it's something you will rely upon or not?

> Where do you—what's your criteria, your methodology for analyzing the study?
>
> A. The criteria is more general criteria, whether the descriptions of their methods are well described, their methods—the description of the exposure system is described. If there are assays they used are negatively described, the results are clearly described. And if their conclusions are based really on the results. This is the general methodology.
>
> I have considered many studies both with positive and negative findings. In my report I mostly cited studies that are in agreement of my opinion, supported. And I would like to say that in my—in several papers of mine, several publications of mine, I have analyzed both positive and negative findings.
>
> I have analyzed several other studies with negative findings. I did that in my 2004 paper and I analyzed several findings of previous studies, most of them they were negative. And I even suggested what were their flaws. And I did the same in a 2013 study of mine, EMF magnetic field. I analyzed previous studies with several of them had negative findings and I analyzed several flaws I found in their methodology.
>
> I mean I have done this in several publications to analyze studies regarding their methodology.

Hr'g Tr. 9/20/22 p.m., at 56:3-57:4. It is unclear to the Court what methodology Dr. Panagopoulos used in reviewing studies, or how he weighted or addressed negative studies against positive studies. *In re Incretin-Based Therapies*, 524 F. Supp. 3d at 1043-44; *In re Mirena Ius Levonorgestrel-Related Prod. Liab. Litig. (No. II)*, 341 F. Supp. 3d at 247; *Magistrini*, 180 F. Supp. 2d at 602. He explains that he chose to cite more positive studies for his opinion. This answer suggests that Dr. Panagopoulos cherry-picked studies to support pre-determined results. *See* Hr'g Tr. 9/20/22 p.m., at 56:15-16; *In re Rezulin Prods. Liab. Litig.*, 309 F. Supp. 2d at 564. In addition, using general statements to indicate that methodologies were reliably applied does not satisfy the requirements of Fed. R. Evid. 702. *Motorola Inc.*, 147 A.3d at 755; *Joiner*, 522 U.S. at 146; *Brown*, 765 F.3d at 773.

Finally, Dr. Panagopoulos does not bridge the analytical gap of tying together existing data with his opinion. *See Motorola Inc.*, 147 A.3d at 755; *Joiner*, 522 U.S. at 146. Specifically, Dr. Panagopoulos fails to provide how his research and experiments on fruit flies can be directly extrapolated to humans and how the effects on the fruit flies tie to cancer generally or brain cancer, and specifically gliomas or acoustic neuromas in humans. Hr'g Tr. 9/20/22 a.m., at 38:7-39:15; Hr'g Tr. 9/21/22 a.m., at 33:17- 36:19, 71:25-72:3. Dr. Panagopoulos fails to satisfy the requirements of Rule 702; therefore, the Court must exclude his testimony.

F. Admissibility of Dr. Laura Plunkett's Expert Testimony

Dr. Plunkett is a pharmacologist, toxicologist, regulatory consultant, human health risk assessor, and principal of a consulting company. *See Supplemental Expert Report of Laura M. Plunkett, Ph.D., DABT* [hereinafter "Dr. Plunkett Supp. Exp. Rpt."], at 2. In 1984, Dr. Plunkett received her Ph.D. in pharmacology from the College of Pharmacy of the University of Georgia. *Id.* at 3. From 1984 to 1986, she was a Pharmacology Research Associate Training fellow at the National Institute of General Medical Sciences, located in Bethesda, Maryland. *Id.* From 1986 to 1989, Dr. Plunkett was an Assistant Professor of Pharmacology and Toxicology in the medical school at the University of Arkansas for Medical Sciences. *Id.* From 1989 to 1997, she worked for ENVIRON Corporation, where she consulted on regulatory matters before the United States Food and Drug Administration and U.S. Environmental Protection Agency. *Id.* In 2001, Dr. Plunkett became a consultant at Investigative Biostrategies, LLC. *Id.* at 2.

Judge Weisberg concluded as follows:

> Dr. Plunkett does not offer any opinions directed to the ultimate issue in this phase of the litigation, general causation of brain tumors, but instead she validates the methodologies of other experts and the inferences that can fairly be drawn from different lines of scientific evidence. She is essentially a support witness.

Judge Weisberg's August 8, 2014 Order, at 72. Judge Weisberg further noted that, in her 2013 report, Dr. Plunkett offered three opinions to a reasonable degree of scientific certainty, as follows: (1) "'Weight of Evidence' is a generally accepted methodology for inferring disease causation;" (2) "it is generally accepted to extrapolate results from fruit fly and other *in vivo* studies to predict health effects in humans;" and (3) "it is generally accepted to extrapolate findings from *in vitro* studies in human and mammalian cells to predict health effects in humans." *Id.* at 72-73.

In her supplemental report, Dr. Plunkett now opines:

> There are a variety of new peer-reviewed studies that provide additional scientific support for a biologically plausible mechanism for RFR-induced tumor formation, specifically brain tumors and acoustic neuromas in humans. It is my opinion to a reasonable degree of scientific certainty that the likely mechanism involves induction of oxidative stress and initiation of carcinogenesis through a series of non-genotoxic events that eventually lead to DNA damage and transition of cells to preneoplastic and then neoplastic phenotypes.

Dr. Plunkett Supp. Exp. Rpt., at 25.

Chief Judge Josey-Herring, however, struck much of Dr. Plunkett's supplemental expert report because her opinion and conclusion, along with the studies that she cited in support of her new and expanded conclusion, far surpassed the scope of her original report. Chief Judge Josey-Herring's August 28, 2018 Order, at 3-5. Specifically, she ruled, as follows:

> Dr. Plunkett never included this conclusion in her original expert report. Rather, in the statement of purpose section of her original expert report, Dr. Plunkett states that she would be testifying as to the "use" of standard methodology in the practice of toxicology and human health risk assessment with a particular emphasis on the use" of a weight of the evidence methodology. Nowhere in her original report, did Dr. Plunkett state that she would actually be utilizing a weight-of-the-evidence or other toxicology or human health risk assessment methodology to render an opinion about the issue of general causation. Moreover, Plaintiffs stated in their briefings that Dr. Plunkett "did not possess a general causation

> opinion" before submitting her original report. *See* Pl.'s Opp'n to Def.'s Mot. Strike at 11. However, to justify the inclusion of this new opinion by Dr. Plunkett, Plaintiffs submit that Dr. Plunkett's opinion has "evolved" since her last report, and therefore the instant conclusion is properly included in her supplemental report. *See* Pl.'s Opp'n to Def.'s Mot. Strike at 11-13.
>
> In Judge Weisberg's March 16, 2017 Order, the Court denied Plaintiffs' Motion for Additional Discovery and held that Plaintiffs were not entitled to a general causation do-over. This sentiment was also emphasized and reiterated in the Court's November 6, 2017 Order. *See* 11/06/2017 Order at 3 (Josey-Herring, J.). Therefore, Defendants' request to strike will be granted as it pertains to the general causation opinions included in Dr. Plunkett's supplemental report. As a result, the Court will strike any study or publication, regardless of its publication date, included in Dr. Plunkett's supplemental report that supports her opinion on general causation. Specifically, as numbered in the Defendants' response to Plaintiffs' Supplemental Briefing, Dr. Plunkett may not cite to and/or reference Study #2-4 and #6-16 for the purpose of supporting her general causation opinion. Notwithstanding, Dr. Plunkett will be able to refer to those studies for the limited purpose of opining that these are the type of studies that may be used or analyzed by experts when rendering their causation opinions . . . .

Chief Judge Josey-Herring's August 28, 2018 Order, at 4-5. Likewise, the Court must decline to consider Dr. Plunkett's new opinion.

The Court does not find Dr. Plunkett's remaining opinions as a support witness to be relevant now that the Court has excluded Plaintiffs' other experts. Dr. Plunkett, by herself, does not offer a general causation opinion that cell phone radiation causes glioma or acoustic neuroma. *See* Fed. R. Evid. 702(a); Fed. R. Evid. 702 advisory committee's notes to 2000 amendment; *Daubert*, 509 U.S. at 591; *Daubert II*, 43 F.3d at 1315.

Were the Court inclined to consider Dr. Plunkett's testimony, it would only do so in relation to Dr. Mosgoeller's opinions, based in part on the results of *in vitro* experiments, and Dr. Panagopoulos' opinions, based on extrapolating results from fruit flies.

As to *in vitro* studies, Defendants indicate that they do not dispute the possibility of non-human studies playing a part in a causation opinion. Such is evidenced by their decision not to cross-examine Dr. Plunkett in 2013. Thus, the point is not at issue. Defs' Post-Hr'g Brief, at 87; Judge Weisberg's August 8, 2014 Order, at 73. Moreover, it is unclear whether her testimony would help the trier of fact understand the evidence because she does not connect her testimony specifically to Dr. Mosgoeller or the methodologies he used in his supplemental report to arrive at his opinion. *See Kumho Tire*, 526 U.S. at 156; Dr. Plunkett Supp. Exp. Rpt., at 5-8.

As to the methodology concerning fruit flies, Dr. Plunkett does not connect her testimony about fruit flies to Dr. Panagopoulos' methodology and his cause-and-effect analysis, which does not connect fruit fly studies to cancer. Dr. Plunkett Supp. Exp. Rpt., at 10; Hr'g Tr. 12/13/13 p.m., at 1508:25-1509:22.

What is more, even were the Court to allow Dr. Plunkett's testimony, it would be cumulative. Plaintiffs' other experts are clearly capable of explaining comprehensively their methodologies and the studies upon which they base their opinions. *See* Fed. R. Evid. 403. And, had Plaintiffs expressed general causation opinions, Dr. Plunkett's testimony is not relevant because it would not help the trier of fact understand evidence or a fact in issue in this case. Fed. R. Evid. 702(a).

G. Plaintiffs' Request to Exclude the Testimony of Defendants' Experts

Plaintiffs request exclusion of the testimonies of Defendants' two experts, Dr. Meir J. Stampfer and Dr. John J. Laterra, who provided credible testimony challenging Plaintiffs' experts' opinions and methodologies.

Dr. Stampfer is a Professor of Medicine at Harvard Medical School and Professor of Epidemiology and Nutrition at the Harvard T.H. Chan School of Public Health. *See Supp.*

Report of Meir J. Stampfer, M.D., M.P.H., Dr.P.H., at 2. He has co-authored more than 1,100 scientific articles, many of which are related to cancer epidemiology. He is the Principal Investigator of the National Institutes of Health-funded T32 Cancer Epidemiology training award at Harvard. *Id.*

Dr. Stampfer's opinion was that the results from newer studies taken with the prior epidemiological evidence support the conclusion that there "is no positive association between the use of cellular telephones and the risk of brain cancer." He testified that his "opinion remains, and is even strengthened because of the high-quality cohort data and continued stable brain cancer incidence rates over time, the epidemiological data show no evidence of a causal association." *Id*. He further opines that "Dr. Kundi's opinions presented in his expert report and testimony are scientifically flawed[.]" *Id.*

Dr. Laterra is a clinical neuro-oncologist and molecular biologist whose primary focus is brain tumors. *See* Supp. Expert Report of John J. Laterra, M.D., Ph.D., at 1. He is a Professor of Neurology, Oncology, and Neuroscience and the Director of the Division of Neuro-Oncology in the Department of Neurology at Johns Hopkins University School of Medicine since 1994. *Id.* He sits on the Scientific Advisory Council of the American Brain Tumor Association and is a Scientific Advisor for the brain cancer portfolio of the James S. McDonnell Foundation. *Id.* He has also served as a member of the National Institute of Health's Brain Disorders and Clinical Neurosciences Study Section. *Id.* Dr. Laterra's opined that "'using the generally accepted Bradford Hill methodology for evaluating causation, there is no credible or generally accepted scientific evidence supporting a role for radiofrequency (RF) fields from wireless phones in the causation or subsequent behavior of brain tumors. (Laterra 2013 at 2).' The scientific literature published since 2013 confirms and strengthens that opinion[.]" *Id.* He bases his opinion on his

personal extensive review of scientific literature and "on the extensive body of newly emerging information elucidating the molecular basis of brain tumors and its impact on our understanding of brain cancer biology and its causation." *Id.*

Plaintiffs argue that the Court should exclude the experts under *Daubert*/Rule 702 and Rule 403 because (1) they have not conducted a study on cell phones or radiofrequency radiation; (2) they have not otherwise performed cursory reviews of the scientific body of research; (3) they have used no discernable or consistent methodology; and (4) they were tasked to "attack" Plaintiffs' experts. *See* Pl.'s Daubert/R. 702 Post-Hearing Brief, at 84-85.

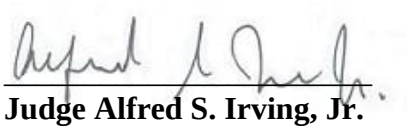
As an initial matter, Plaintiffs are permitted to attack the credibility of Defendants' experts' testimony and supplemental reports under *Daubert*/Rule 702 in making their argument that their own experts' methodology and opinions satisfy the requirements of Rule 702 and case law. The Court has considered Plaintiffs' evidence and arguments, as well as Defendants' evidence and arguments, in reaching a decision whether to admit Plaintiffs' experts. Plaintiffs' request to exclude Defendants' experts' testimony under Rule 702 is not before this Court.

As the Parties appreciate, the general causation inquiry was bifurcated, with the first phase designated to assess whether Plaintiffs' experts are admissible. *See* Judge Burgess' December 7, 2011 Order; Judge Weisberg's August 8, 2014 Order, at 5-6. During the November 15, 2011 hearing, Judge Burgess authorized Plaintiffs the latitude to challenge Defendants' experts in terms of undermining the experts' testimony; however, he ruled that Plaintiffs' request to exclude Defendants' experts would not be considered until the next phase of discovery. *See* Hr'g Tr. Nov. 15, 2011, at 74:5-76:17. What is more, likely aware that the request had no factual or legal basis, Plaintiffs have failed to show why Defendants' two experts should be excluded under Rule 702. That is, they fail to show that their testimony would not

help the trier of fact to understand the evidence or determine a fact in issue, their opinions lack a basis in sufficient facts or data, are not the product of reliable principles and methods, or fail to apply the principles and methods reliably to the facts of the case. *See* Fed. R. Evid. 702. Plaintiffs only generally attack the experts' qualifications. Pl.'s Daubert/R. 702 Post-Hearing Brief, at 84-87. The Court is not moved and will deny the request.

ACCORDINGLY, it is by the Court this 25th day of April 2023, hereby

ORDERED that Defendants' July 19, 2019 *Motion to Exclude Plaintiffs' Expert Testimony* is **GRANTED**.



Judge Alfred S. Irving, Jr.

Copies to:

Jeffrey B. Morganroth, Esq.
Mayer Morganroth, Esq.
Cherie Morganroth, Esq.
James G. Green, Esq.
Michelle Parfitt, Esq.
Victor H. Pribanic, Esq.
Matthew Doebler, Esq.
Hunter W. Lundy, Esq.
Rudie R. Soileau, Jr., Esq.
Kristie M. Hightower, Esq.
Steven R. Hickman, Esq.
Robert W. Rosen, Esq.
Counsel for Plaintiffs

Terrence J. Dee, Esq.
Jennifer Routh, Esq.
Counsel for Defendants Motorola Mobility LLC, Motorola Solutions, Inc. f/k/a Motorola Inc.

Kelley C. Barnaby, Esq.
Scott A. Elder, Esq.
David Venderbush, Esq.
Aaron K. Block
Counsel for Defendants Cellco Partnership d/b/a Verizon Wireless; Bell Atlantic Mobile, Inc; Verizon Wireless Inc.; Verizon Wireless Personal Communications LP f/k/a Primeco Personal Communications LP; Verizon Communications Inc., and Western Wireless LLC f/k/a Western Wireless Corporation

Thomas Watson, Esq.
Curtis S. Renner, Esq.
Seamus C. Duffy, Esq.
Counsel for Defendants AT&T Inc., AT&T Wireless Services Inc., Cingular Wireless LLC, and related entities

Paul Scrudato, Esq.
Thomas M. Crispi, Esq.
Counsel for Defendants Apple Inc.

Paul J. Malone, Esq.
Matthew D. Berkowitz, Esq.
Gabriela I. Chambi, Esq.
Counsel for Defendants Audiovox Communications Corporation

Howard D. Schur, Esq.
Andrew G. Hope, Esq.
Counsel for Defendants Cellular One Group

Michael D. McNeely, Esq.
Vicki L. Dexter, Esq.
Counsel for Defendants Cellular Telecommunications & Internet Association

Paul N. Farquharson, Esq.
Scott H. Phillips, Esq.
Counsel for Defendants Cricket Wireless LLC

Ralph A. Taylor, Jr., Esq.
Rosemarie Ring, Esq.
Counsel for HTC America, Inc. a defendant in related case No. 2012-CA-8533

Sean Reilly, Esq.
Counsel for Defendants LG Electronics MobileComm U.S.A., Inc.

Steven M. Zager, Esq.
Caitlin Olwell, Esq.
Anthony T. Pierce, Esq.
Stanley Woodward, Esq.
Richard W. Stimson, Esq.
Counsel for Defendants Microsoft Mobile Oy

Francis A. Citera, Esq.
Matthew A.C. Zapf, Esq.
Sarah M. Matthews, Esq.
Counsel for Defendants Qualcomm Inc and Sony Electronics Inc

John B. Isbister, Esq.
Jaime W. Luse, Esq.
Counsel for Defendants Samsung Electronics America, Inc., the successor by merger to Samsung Telecommunications America, LLC

J. Stan Sexton, Esq.
Patrick N. Fanning, Esq.
John A. Turner, III, Esq.
Counsel for Defendants Sprint Nextel Corporation f/k/a Nextel Communications and Sprint Spectrum, L.P. d/b/a Sprint PCS

Thomas T. Locke, Esq.
Ardelle M. Bahar, Esq.
Counsel for Defendants Telecommunications Industry Association

Steve Koh, Esq.

Michael Scoville, Esq.
Daniel Ridlon, Esq.
Mary Rose Hughes, Esq.
Counsel for Defendants T-Mobile USA, Inc.

Eugene A. Schoon, Esq.
Counsel for Defendants United States Cellular Corporation