IN THE UNITED STATES DISTRICT COURT FOR THE SOUTHERN DISTRICT OF IOWA CENTRAL DIVISION

RENE JUNK, as Parent and Next Best Friend of T.J., a minor,

Plaintiff,

No. 4:05-cv-0608-JAJ

vs.

TERMINIX INTERNATIONAL COMPANY LIMITED PARTNERSHIP; THE DOW CHEMICAL COMPANY; DOW AGROSCIENCES, LLC; and JIM BRENEMAN, an individual,

Defendants.

ORDER

This matter comes before the Court pursuant to Terminix International Company Limited Partnership's ("Terminix") May 12, 2008, Motion to Strike Plaintiff's Expert Witnesses and The Dow Chemical Company's and Dow AgroSciences LLC's (collectively "Dow AgroSciences") May 12, 2008, Motion in Limine to Exclude Expert Causation Testimony of Cynthia M. Bearer, M.D., Ph.D., and Mohamed Abou-Donia, Ph.D. and for Summary Judgment. [Dkt. Nos. 140, 143]. Plaintiff Rene Junk, as Parent and Next Best Friend of T.J., a minor ("Junk"), timely disclosed Dr. Abou-Donia as an expert witness. As to the specific opinions of Dr. Abou-Donia laid out below, Terminix's and Dow AgroSciences' motions are granted.

I. FACTUAL HISTORY¹

In February of 1992, Plaintiff Rene Junk became pregnant with her first child. During Rene Junk's pregnancy, Terminix applied the pesticide Dursban L.O. ("Dursban")

¹ The Factual Background is based on the facts alleged in the June 12, 2007, report of Dr. Mohamed Abou-Donia, Ph.D.

to cracks and crevices in the interior of the Junk home to treat spider infestation. Dursban, a trademark of Dow AgroSciences, contains the organophosphate chlorpyrifos. Following Tyler's birth on August 28, 1992, Terminix continued to regularly apply Dursban to the Junk home. The last application of Dursban to the Junk home occurred on September 15, 1994.

On June 25, 1992, doctors discovered a chorioangioma, or a large tumor, in Tyler Junk's umbilical cord. Throughout her pregnancy, Rene Junk suffered a number of symptoms, including nausea, vomiting, diarrhea, and skin rash. On August 25, 1992, three days prior to Tyler Junk's birth, doctors discovered that he suffered from an enlarged heart and tachycardia, or a rapid heart rate. On August 28, 1992, Rene Junk gave birth to Tyler Junk. Tyler Junk suffered from tachycardia and had an enlarged heart and liver at the time of birth. The birth was approximately two months premature. Following the birth of her son, Rene Junk was diagnosed with pulmonary edema.

Throughout the first months of his life, Tyler Junk suffered from fussiness, loss of appetite, difficulty with breathing, and a runny nose. From the time that Tyler Junk was approximately six months old, Rene Junk observed that he appeared to exhibit symptoms of developmental delay. Tyler Junk was later diagnosed with cerebral palsy, and currently suffers from significant developmental delay.

On October 3, 2005, Rene Junk, on behalf of her minor son, filed a lawsuit against Dow AgroSciences, Terminix, and other defendants in Iowa state court. [Dkt. 1]. Junk alleged that her son suffered physical, neurological, and psychological injuries as a result of exposure to chlorpyrifos, which is contained in Dursban. On November 4, 2005, Defendants filed a notice removing the lawsuit to the United States District Court for the Southern District of Iowa. [Dkt. 1].

II. PROCEDURAL HISTORY

On August 10, 2006, this Court issued the initial scheduling order and discovery plan in this matter. [Dkt. 56]. After granting an extension, the Court set Junk's initial expert disclosure deadline on June 18, 2007. [Dkt. 80]. Junk disclosed several expert witnesses, including Dr. Abou-Donia. Dr. Abou-Donia is a toxicologist who obtained his doctorate in agricultural chemistry from the University of California-Berkeley in 1967. [Junk App., p. 662]. He currently is a professor of pharmacology, cancer biology, and neurobiology at Duke University Medical Center. [Junk App., p. 662]. Dr. Abou-Donia teaches courses in toxicology to graduate and medical students. [Junk App., p. 674]. For more than 35 years, Dr. Abou-Donia has studied and researched chemically-induced neurological disorders in animals and humans. [Dr. Abou-Donia Rep., p. 1; Junk App., pp. 672-74]. His research is documented in more than 300 publications. [Junk App., pp. 680-94]. He has been appointed as a toxicology consultant to numerous government agencies and private organizations, including the Environmental Protection Agency and the National Academy of Sciences. [Junk App., pp. 663-64].

Dr. Abou-Donia submitted a report dated June 12, 2007. [Junk App., pp. 696-705]. In his report, Dr. Abou-Donia addressed Tyler and Rene Junk's exposure to chlorpyrifos; whether chlorpyrifos is capable of causing neurodevelopmental delay; and whether Tyler Junk was exposed to sufficient levels of chlorpyrifos to cause neurodevelopmental delay. [Dr. Abou-Donia Rep., p. 1]. Dr. Abou-Donia was deposed by Dow AgroSciences and Terminix on January 17, 2008.

On May 12, 2008, Terminix and Dow AgroSciences filed motions to exclude the expert causation testimony of Dr. Abou-Donia on the grounds that it did not meet the requirements of Federal Rule of Evidence 702. [Dkt. Nos. 140, 143]. Junk timely responded to these motions. [Dkt. Nos. 161, 164]. Dr. Abou-Donia executed a declaration dated May 23, 2008, that was included in Junk's appendix in support of her response to

Dow AgroSciences' and Terminix's motion to exclude the causation testimony of Dr. Abou-Donia. [Junk App., pp. 976-94]. On July 2, 2008, Dow AgroSciences timely replied. [Dkt. 201]. On July 7, 2008, this Court held a motion hearing in which the parties addressed Dow AgroSciences' and Terminix's motions regarding the exclusion of Dr. Abou-Donia's causation testimony. [Dkt. 203]. Counsel for Junk, Terminix, and Dow AgroSciences were present at the hearing. At the hearing, the Court reserved ruling on the motions.

III. STANDARD OF ADMISSIBILITY

Federal Rule of Evidence 702, along with the tenets of <u>Daubert v. Merrell Dow Pharms.</u>, Inc., 509 U.S. 579 (1993), govern the admissibility of expert testimony in federal court. Rule 702 states:

If scientific, technical, or otherwise specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise, if (1) the testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case.

FED. R. EVID. 702. "District courts must ensure that all scientific testimony is both reliable and relevant." Malmo v. Tyson Fresh Meats, Inc., 457 F.3d. 748, 757 (8th Cir. 2006) (citing Daubert, 509 U.S. at 580; Fed. R. Evid. 702). "To satisfy the reliability requirement, the proponent of the expert testimony must show by a preponderance of the evidence both that the expert is qualified to render the opinion and that the methodology underlying his conclusions is scientifically valid." Id. at 757-58 (citing Daubert, 509 U.S. at 589-90). The Daubert factors for reliability are:

(1) whether the expert's methodology has been tested;

- (2) whether the technique has been subjected to peer review and publication;
- whether the technique has a known or knowable rate of (3) error; and
- (4) whether the technique has been generally accepted in the proper scientific community.

Bonner v. ISP Tech., Inc., 259 F.3d 924, 929 n.3 (8th Cir. 2001) (quotation omitted).

In determining whether expert testimony should be admitted, the requirements of Daubert and its progeny direct district courts to concentrate on the second tenet listed in Rule 702 - the principles and methods utilized by the expert. "The focus, of course, must solely be on principles and methodology, not on conclusions they generate." Bonner, 259 F.3d at 929 (quoting Daubert, 509 U.S. at 594-95). "An expert opinion must be supported by appropriate validation – i.e., good grounds based on what is known." Glastetter v. Novartis Pharm. Corp., 252 F.3d 986, 988-89 (8th Cir. 2001) (quoting <u>Daubert</u>, 509 U.S. at 590). "[N]othing in . . . Daubert . . . requires a district court to admit opinion evidence that is connected to existing data only by the ipse dixit of the expert. A court may conclude that there is simply too great of an analytical gap between the data and the opinion proffered." Children's Broad. Corp. v. Walt Disney Co., 245 F.3d 1008, 1018 (8th Cir. 2001) (quotation omitted).

IV. ANALYSIS

To prove causation in a toxic tort case, Junk must show both that "the alleged toxin is capable of causing injuries like that suffered by the plaintiff in human beings subjected to the same level of exposure as the plaintiff, and that the toxin was the cause of the plaintiff's injury." Bonner, 259 F.3d at 928 (citing Wright v. Willamette Indus., Inc. 91 F.3d 1105, 1106 (8th Cir. 1996) ("We agree . . . that a plaintiff in a toxic tort case must prove the levels of exposure that are hazardous to human beings generally as well as the plaintiff's actual level of exposure to the defendant's toxic substance before he or she

may recover.")). "In other words, the plaintiff must put forth sufficient evidence for a jury to conclude that the product was capable of causing her injuries, and that it did." Bonner, 259 F.3d at 928. This is known as general causation and specific causation. See also, Knight v. Kirby Inland Marine, Inc., 482 F.3d 347, 351 (5th Cir. 2007) ("General causation is whether a substance is capable of causing a particular injury or condition in the general population and specific causation, while specific causation is whether a substance caused a particular individual's injury.") (quotation omitted).

The Eighth Circuit Court of Appeals has stated the requisite level of proof a plaintiff must produce regarding exposure and dosage in a toxic tort case. The Court of Appeals stated:

> To prove exposure levels, plaintiffs need not produce a mathematically precise table equating levels of exposure with levels of harm . . . Rather, a plaintiff need only make a threshold showing that he or she was exposed to toxic levels known to cause the type of injuries he or she suffered.

Mattis v. Carlon Elec. Prods., 295 F.3d 856, 860-61 (8th Cir. 2002) (quotation and citations omitted). The Court of Appeals further stated that "[i]t is sufficient for a plaintiff to prove that she was exposed to a quantity of the toxin that exceeded safe levels." Bonner, 259 F.3d at 931 (citation omitted). See also, Bednar v. Bassett Furniture Mfg. Co., Inc., 147 F.3d 737, 740 (8th Cir. 1998) ("The Bednars did not need to produce a 'mathematically precise table equating levels of exposure with levels of harm' in order to show Marian's level of exposure to gaseous formaldehyde, but only 'evidence from which a reasonable person could conclude that [the] defendant's emission has probably caused' the harm about which they complain.").

A. General Causation

To prove general causation, Junk offers Dr. Abou-Donia's opinion that "exposure to Dursban L.O. as a result of residential indoor applications has the capacity to cause neurologic harm in exposed humans, particularly the most vulnerable." [Dr. Abou-Donia Decl., ¶ 11]. To reach this conclusion, Dr. Abou-Donia applied the methodology of the Austin Bradford Hill Guidelines and performed a review of scientific literature. [Dr. Abou-Donia Rep., p.1; Dr. Abou-Donia Decl., ¶¶ 8, 21, 22]. Dr. Abou-Donia also cited an EPA-funded study that he conducted in 2006 regarding the effect of chlorpyrifos exposure on pregnant rats. [Dr. Abou-Donia Depo., pp. 54-58].

In this general causation analysis, "[t]he fundamental question underlying [Dr. Abou-Donia's] testimony . . . is whether the chemicals [Rene and Tyler Junk] were exposed to and the type of exposures they experienced cause [severe neurodevelopmental delay]." Knight, 482 F.3d at 351. When determining whether an expert opinion regarding general causation is admissible, a court must apply the four tenets established by <u>Daubert</u>. Dr. Abou-Donia provided eight published scientific articles regarding the effect of chloryprifos exposure on fetal neurodevelopment. [Dr. Abou-Donia's Decl. ¶¶ 21-22].

The Court finds that Dr. Abou-Donia is sufficiently well-qualified to testify to the issues of general causation. His opinion regarding the propensity of organophosphate pesticides, including chlorpyrifos-caused developmental neurotoxicity, is appropriately supported by peer reviewed and other literature. He has identified a manner in which chlorpyrifos act upon the development of brain tissue by citing both animal and human studies. He is further qualified by his research to testify regarding the particular vulnerability during prenatal and neonatal stages. Finally, his opinions regarding the mechanism of delivery are sufficiently reliable for <u>Daubert</u> purposes.

B. Specific Causation

To prove specific causation, Junk offers Dr. Abou-Donia's opinion that during her pregnancy, Rene Junk was exposed to a level of chlorpyrifos capable of causing Tyler Junk's neurodevelopmental delay. [Dr. Abou-Donia's Rep., p. 9; Dr. Abou-Donia Decl., ¶ 18]. In Dr. Abou-Donia's opinion, Tyler Junk's neurodevelopmental delay resulted mostly from Rene Junk's exposure to chlorpyrifos during pregnancy, and was exacerbated

by Tyler Junk's post-birth exposure to chlorpyrifos. [Dr. Abou-Donia Depo., p. 62]. Dr. Abou-Donia based his opinion on (1) the amount of chlorpyrifos applied to the Junk home, (2) the approximate amount of time Rene Junk spent in her home while pregnant, (3) the application method, (4) the timing of Tyler Junk's in utero exposure, (5) research regarding chlorpyrifos,² and (6) a temporal correlation between the Dursban applications and Rene and Tyler Junk's symptoms during Rene Junk's pregnancy. [Dr. Abou-Donia Decl., ¶18]. Dr. Abou-Donia stated that he "did not specifically quantify, and did not need to specifically quantify, the cumulative, aggregate amount of chlorpyrifos that Ms. Junk was exposed to through inhalation and other routes of exposure." [Dr. Abou-Donia Decl., ¶18]. Dr. Abou-Donia stated that he did not rely on the exposure analysis by Dr. Richard Fenske, Ph.D., in determining Rene and Tyler Junk's exposure to chlorpyrifos. [Dr. Abou-Donia Depo., p. 37].

Dr. Abou-Donia relied on a temporal correlation of the four Dursban applications and symptoms experienced by Rene Junk to determine Rene Junk's level of exposure during pregnancy. "The temporal relationship often will be only one of several factors, and the weight to be given to the temporal relationship 'will differ depending on the strength of that relationship." Bland v. Verizon Wireless L.L.C., No. 07-3010, 2008 WL 3474178, at *5 (8th Cir. August 14, 2008) (quoting <u>Heller v. Shaw Indus.</u>, Inc., 167 F.3d 145, 154 (3rd Cir. 1999)). "A temporal connection standing alone is entitled to little weight in determining causation." Curtis v. M&S Petroleum, Inc., 174 F.3d 661, 670 (5th Cir. 1999) (citing Moore v. Ashland Chem., Inc., 151 F.3d 269, 278 (5th Cir. 1998)). "However, a temporal connection is entitled to greater weight when there is an established scientific connection between exposure and illness or other circumstantial evidence support

² In his Declaration, Dr. Abou-Donia specifically cites the Eskanazi study.

Eskanazi, B, Bradman A, Castorina R. Exposures of children to organophosphate pesticides and their potential adverse health effects. Environ Health Perspect 1999; 107 (Suppl 3):409-419.

the causal link. <u>Id</u>. (citing <u>Cavallo v. Star Enter.</u>, 892 F. Supp. 756 (E.D. Va. 1995) *aff'd. in part*, 100 F.3d 1150 (4th Cir. 1996), *cert. denied*, 522 U.S. 1044 (1998)).

The Dursban applications to the Junk home during Rene Junk's pregnancy occurred on March 27, 1992, May 13, 1992, June 15, 1992, and July 9, 1992. The symptoms that Rene Junk experienced during her pregnancy that Dr. Abou-Donia attributed to the Dursban applications are:

- the presence of the chorioangioma at 24 weeks (detected approximately five weeks after May 13, 1992, application),
- diarrhea (occurred approximately one month after July 9, 1992, application),
- skin rash (occurred approximately six weeks after July 9, 1992, application),
- Tyler's enlarged heart (detected approximately six weeks after July 9, 1992, application), and
- Tyler's enlarged liver at time of birth (detected approximately six weeks after July 9, 1992 application)

[Dr. Abou-Donia Decl., ¶15(e)(g)(h)(i)(m)(n)]. The temporal relationship between the Dursban applications and Rene and Tyler Junk's symptoms is not scientifically reliable because there are other exceedingly plausible causes for Rene Junk's symptoms that Dr. Abou-Donia does not discredit. Dr. Abou-Donia testified that pregnancy or edema could have been the cause of Rene Junk's diarrhea. [Dr. Abou-Donia Depo., p. 12]. He testified that pregnancy could have been the cause of Rene Junk's skin rash. [Dr. Abou-Donia Depo., pp. 124-26]. Dr. Abou-Donia testified that the chorioangioama could have been the cause of Tyler Junk's enlarged heart. [Dr. Abou-Donia Depo., pp. 131-32]. Dr. Abou-Donia testified that he was unable to exclude any of these other conditions as plausible causes of Rene and Tyler Junk's symptoms during pregnancy. [Dr. Abou-Donia Depo., pp. 123; 126; 131-32].

Dr. Abou-Donia concluded that Rene Junk was exposed to "enough Dursban" to cause Tyler Junk's neurodevelopmental delay. [Dr. Abou-Donia Report, p. 9]. Dr. Abou-

Donia engaged in ipse dixit deemed inadmissible pursuant to <u>Daubert</u>. <u>See Malmo</u>, 457 F.3d at 758 ("[A] court should not admit opinion evidence that 'is connected to existing data only by the ipse dixit of the expert.") (quotation omitted). In his deposition, Dr. Abou-Donia explains his basis for stating that Tyler was exposed to sufficient levels of chlorpyrifos to cause his neurodevelopmental delay:

- Q: Going to page nine, you state that Tyler was exposed to sufficient levels of chlorpyrifos to cause his brain injury and neurological disorder, do you see that?
- A: Yes.
- All right. And that that opinion is based on the fact O: that he had these effects and in your opinion then the dose or exposure must have been sufficient enough to cause those effects?
- And because his mother also had symptoms consistent A: with organophosphate poisoning, exposure and my conclusion was they both were exposed to enough dose to cause damage to his brain.
- And so for both Tyler and Rene, your analysis is based Q: on the fact that they had these effects so the dose must have been sufficient enough?
- That's correct. A:

[Dr. Abou-Donia Depo., p. 148]. Here, Dr. Abou-Donia reasons from the end result -Rene and Tyler Junk's symptoms and Tyler's condition - to determine whether the levels of chlorpyrifos to which Rene and Tyler were exposed were dangerous. Dr. Abou-Donia opines that the connection between exposure and Rene Junk's symptoms is based on the known adverse effects of chlorpyrifos. However, the existence of other plausible causes of the symptoms, and Dr. Abou-Donia's inability to exclude those causes, renders the connection tenuous and not scientifically reliable. See Sorenson By and Through Dunbar v. Shaklee Corp., 31 F.3d 638, 649 (8th Cir. 1994) ("While it may be that this sort of reasoning could pass muster in some cases where the obvious result explains the etiology

. . . such reasoning cannot apply here where several possible causes could have produced one effect.").

Furthermore, Dr. Abou-Donia did not estimate or calculate the levels of chlorpyrifos Rene Junk inhaled, ingested, or absorbed through her skin during her pregnancy. [Dr. Abou-Donia Depo., p. 103]. Dr. Abou-Donia did not determine the number of days and nights Rene Junk was in the home during the relevant time period. [Dr. Abou-Donia Depo., pp. 102-03]. Dr. Abou-Donia did not know whether Rene Junk had a job that would place her outside of the home during the day. [Dr. Abou-Donia Depo., pp. 102-03].

"A court may conclude that there is simply too great an analytical gap between the data and the opinion proffered." General Elec. Co. v. Joiner, 522 U.S. 136, 146 (1997) (citation omitted). See also, Bland, 2008 WL 3474178, at *5 (affirming district court's exclusion of treating physician's opinion regarding medical causation of plaintiff's injury on the grounds that the physician lacked data to support opinion). "Guesses, even if educated, are insufficient to prove the level of exposure in a toxic tort case." Mitchell v. Gencorp, Inc., 165 F.3d 778, 781 (10th Cir. 1998) (citing Daubert, 509 U.S. at 589). The Court finds that there is "simply too great of an analytical gap" between the information relied upon by Dr. Abou-Donia and his proffered opinion regarding exposure. For that reason, Dr. Abou-Donia's opinion that Rene Junk was exposed to "enough" Dursban during her pregnancy to cause Tyler Junk's neurodevelopmental delay does not meet thre requirements of Daubert.

To prove specific causation, Junk also offers Dr. Abou-Donia's opinion that Rene Junk received a toxic dose of chlorpyrifos during her pregnancy and that Tyler Junk received a toxic dose in utero and as an infant. [Dr. Abou-Donia Decl. ¶ 19]. Dr. Abou-Donia based his opinion on (1) the amount of chlorpyrifos applied to the Junk home, (2)

the application method, and (3) the Byrne study.³ [Dr. Abou-Donia Decl., ¶ 19]. Because the Court finds Dr. Abou-Donia's opinion that Rene and Tyler Junk were exposed to levels of chlorpyrifos sufficient to cause Tyler Junk's neurodevelopmental delay inadmissible, his opinion that Rene and Tyler Junk absorbed unsafe doses likewise fails to meet the requirements of $\underline{Daubert}$.

Finally, Junk offers Dr. Abou-Donia's opinion that **Tyler** Junk's neurodevelopmental delay was caused mostly by his in utero exposure to chlorpyrifos.⁴ [Dr. Abou-Donia Rep., p. 9; Dr. Abou-Donia Decl., ¶¶ 43-44]. Dr. Abou-Donia is not qualified to give this medical opinion. See, e.g., Marmo, 457 F.3d. at 758 (8th Cir. 2006) (stating that while toxicologists have been permitted to offer opinion testimony regarding causation in toxic tort cases, there is no "blanket rule" that toxicologists can always render Furthermore, Dr. Abou-Donia's opinion that in utero chlorpyrifos exposure was the main cause of Tyler Junk's condition is based on his conclusion that Rene and Tyler Junk's exposure to chlorpyrifos was sufficient to cause neurologic harm to Tyler Junk. Because the Court finds Dr. Abou-Donia's opinions that Rene and Tyler Junk were exposed to levels of chlorpyrifos capable of causing Tyler Junk's neurodevelopmental delay are inadmissible, his opinion that in utero chlorpyrifos exposure was the main cause of Tyler Junk's condition likewise fails to meet the requirements of <u>Daubert</u>.

³Byrne SL, Shurdut BA, Saunders DB. Potential chlorpyrifos exposure to residents following standard crack and crevice treatment. Environ Health Perspect 1998 Nov; 106(11):725-731.

⁴ Throughout the discovery process, Junk has purported to offer Dr. Abou-Donia's testimony for purposes other than medical causation. In his deposition, Dr. Abou-Donia testified that he is not providing opinions regarding the medical causation of Tyler Junk's condition. [Dr. Abou-Donia Depo., p. 38]. Junk likely tried to limit the purposes of Dr. Abou-Donia's testimony because Dr. Abou-Donia is not a medical doctor. [Dr. Abou-Donia Depo., p. 38]. Despite representations to the contrary, Dr. Abou-Donia's opinion that Rene and Tyler Junk's exposure to chlorpyrifos caused Tyler to suffer neurodevelopmental delay contains a determination of medical causation.

V. CONCLUSION

For the reasons stated above, the Court, pursuant to Rule 702, excludes the following opinions of Dr. Abou-Donia:

- Rene Junk was exposed to a toxic amount of chlorpyrifos during her pregnancy. [Dr. Abou-Donia's Decl., ¶18].
- Rene Junk, during her pregnancy, and Tyler Junk, in utero and as an infant, received toxic doses of chlorpyrifos. [Dr. Abou-Donia Decl., ¶19].
- a causal link exists between Rene and Tyler Junk's exposure chlorpyrifos Tyler to and Junk's neurodevelopmental delay. [Dr. Abou-Donia's Decl., ¶¶43-44].
- Rene Junk's chorioangioma might have been caused by exposure to chlorpyrifos. [Dr. Abou-Donia Decl., [15(f)].

Accordingly, Terminix's Motion to Strike and Dow AgroSciences Motion in Limine are granted in part and in denied in part.

SOUTHERN DISTRICT OF IOWA

DATED this 11th day of September, 2008.