

HAS THE *DAUBERT* DECISION CREATED A NEW “PEST” FOR CALIFORNIA FARM WORKERS INVOLVED IN PESTICIDE POISONING LITIGATION?

I. INTRODUCTION

“How long shall we blunder along without the aid of unpartisan and authoritative scientific assistance in the administration of justice, no one knows; but all fair persons not conventionalized by provincial legal habits of mind ought, I should think, unite to effect some change.” Judge Learned Hand ¹

“Pesticide Exposure Linked to Asthma in Farmers.”² Pesticides may alter metabolism and cause diabetes.³ “Pesticides Trigger Parkinson’s Disease.”⁴ These headlines warn that pesticides may lead to various maladies, based on epidemiological studies performed in these areas.⁵ Studies indicating that pesticide exposure can lead to infirmities such as neurological disorders,⁶ and even more common maladies such as asthma,⁷ diabetes,⁸ obesity,⁹ and Parkinson’s disease,¹⁰ are certain to open the floodgates to litigation when these conditions are diagnosed and pesticide exposure is suspected. This is particularly true in California be-

¹ Parke-Davis Co. v. H.K. Mulford Co., 189 F. 95, 115 (C.C.S.D.N.Y. 1911).

² *Pesticide Exposure Linked to Asthma in Farmers*, <http://www.beyondpesticides.org/dailynewsblog/?p=188> (last visited July, 29, 2009) [hereinafter *Asthma in Farmers*].

³ Leon T. Lassiter et. al., *Exposure of Neonatal Rats to Parathion Elicits Sex-Selective Reprogramming of Metabolism and Alters the Response to a High-Fat Diet in Adulthood*, 116 ENVTL. HEALTH PERSP. 1456, 1456 (2008).

⁴ Kagan Owens, *Pesticides Trigger Parkinson’s Disease*, 28 PESTICIDES AND YOU 1, 1. (2008).

⁵ See *Asthma in Farmers*, *supra* note 2; Lassiter, *supra* note 3; Owens, *supra* note 4.

⁶ Kyle Steenland, PhD et al., *Chronic Neurological Sequelae to Organophosphate Pesticide Poisoning*, 84 AM. J. OF PUB. HEALTH 731. (1994).

⁷ *Asthma in Farmers*, *supra* note 2.

⁸ Lassiter, *supra* note 3, 1456.

⁹ *Id.*

¹⁰ Owens, *supra* note 4.

cause of the extent of the agricultural industry,¹¹ and the large amount of pesticides used in the agricultural industry.¹² However, the use of pesticides is necessary to maintain this industry.¹³ Moreover, pesticides have other beneficial uses such as controlling mosquitoes, and household pests.¹⁴

A “toxic tort”¹⁵ involving pesticide poisoning is the type of action where an expert witness would likely be used by the plaintiff to show causation.¹⁶ In other words, to demonstrate that the suspected pesticide caused the illness suffered. In 1993, the United States Supreme Court addressed concerns regarding the accuracy of expert witness testimony in *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579 (1993).¹⁷ The Court held that stricter standards would apply when courts were considering the admission of expert witness testimony.¹⁸ The *Daubert* decision overruled *Frye v. United States*, 293 F.1013 (D.C. Cir. 1923), which was prevailing case law since 1923.¹⁹ *Frye* stated the standard for the admission of expert testimony as being “general acceptance within the field of study from which expert opinion would be given.”²⁰ Fears resounded that the *Daubert* decision, in essence, violated the right to a jury trial.²¹ Others believe that the *Daubert* ruling leads to the exclusion of important evidence which seriously compromises justice.²² Dr. Janette Sherman, a leading plaintiff’s expert, states “the decision has created a defendant’s

¹¹ AGRICULTURAL RESOURCE DIRECTORY 2008-2009, http://www.cdffa.ca.gov/statistics/files/CDFA_Sec2.PDF (last visited July 29, 2009). According to U.C. Davis, the 2002 output total for California agriculture was \$97.7 billion. Agriculture accounted for \$36.9 billion or 3.8% of the state’s jobs and 2.9% of state labor and property values.

¹² CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY, STUDY NUMBER 211: MONITORING METHYL PARATHION AIR CONCENTRATION ADJACENT TO ORCHARD. (2002), at 2 [hereinafter CALIFORNIA E.P.A. STUDY 211].

¹³ U.S. Department of Agriculture Department Regulation 9500-002, *USDA Participation in a National Agricultural Pesticide Impact Assessment Program* (1983), available at <http://www.ocio.usda.gov/directives/doc/DR9500-002.htm>.

¹⁴ *See id.*

¹⁵ BLACK’S LAW DICTIONARY, 1527 (8th ed. 2004). A “toxic tort” is “a personal injury caused by exposure to a toxic substance, such as asbestos or hazardous waste.”

¹⁶ Keith Cunningham-Parameter, *A Poisoned Field: Farmworkers, Pesticide Exposure, and Tort Recovery in an Era of Regulatory Failure*, 28 N.Y.U. REV. L. & SOC. CHANGE 431, 493 (2004).

¹⁷ *See generally* *Daubert v. Merrell Dow Pharms. Inc.*, 509 U.S. 579 (1993).

¹⁸ *Id.*

¹⁹ *See generally* *Frye v. United States*, 293 F.1013 (D.C.Cir. 1923).

²⁰ *Id.*

²¹ Alan Kanner, *Daubert and the Disappearing Jury*, (Bepress Legal Series Paper 1851, 2006), at 2.

²² Bette Hileman, *Daubert Rules Challenge Courts*, CHEMICAL AND ENGINEERING NEWS, Jul. 7, 2003, at 1.

playing field in toxic tort actions."²³ Dr. Sherman believes any relevant expert testimony should be admitted and juries should decide the outcome based on the testimony.²⁴

Proponents of the *Daubert* decision believe that the Supreme Court's ruling prevents "junk science" from being presented to jurors.²⁵ *Daubert* prevents non-science from being presented to a jury under the guise of "novel science."²⁶ *Daubert* quells the fear that an expert will use an advanced degree to gain entry into the courtroom, then present evidence to a jury which is not based on any medical reasoning whatsoever.²⁷

This debate is especially important in California, where the courts follow the *Frye* standard and have rejected the *Daubert* standard.²⁸ However, a state court case may be removed to federal court by the defendant if diversity between the plaintiff and the defendant is demonstrated.²⁹ The federal courts follow the *Daubert* standard.³⁰ There is concern removal from state court to federal court will lead to different results in the same action.³¹

This Comment will demonstrate that courts, regardless of jurisdiction, are consistent in their admission of expert testimony in organophosphate poisoning cases, as well as other pesticide poisoning cases. The courts are neither taking away a plaintiff's right to a jury trial nor creating a playing field beneficial to defendants. The courts play the role of "gatekeeper" regardless of jurisdiction. Courts are responsible for ensuring only relevant evidence is presented to a jury, whether it is expert witness testimony or not. In a toxic tort action in California, a plaintiff's right to a jury trial is not diminished because the action could potentially be removed to federal court. The standard shift has not created a defendant-friendly arena of litigation. Instead, the courts have been consistent in

²³ Telephone Interview with Dr. Janette Sherman M.D., (Jul. 20, 2009). Dr. Sherman is an expert who testifies for plaintiffs only, to prove causation in toxic torts.

²⁴ *Id.*

²⁵ PETER W. HUBER, *GALILEO'S REVENGE* 2 (Basic Books ed., 1993). Junk science is a term coined by author Peter Huber and refers to expert testimony that has little or no scientific foundation.

²⁶ Brief for American Tort Reform Association as Amicus Curiae Supporting Respondent at 7, *Daubert v. Merrell Dow Pharms. Inc.*, 509 U.S. 579 (1993) (No. 92-102). "Novel science" is science which is new, but likely is not fully tested.

²⁷ *Id.* at 7-10.

²⁸ *People v. Leahy*, 882 P.2d 321, 324 (Cal. 1994).

²⁹ See generally 28 U.S.C. § 1441 (2003). The action in litigation may be removed by the defendant from the state court exercising original jurisdiction to Federal Court as long as the action could have been brought before the Federal Court originally, such as in a case of diversity.

³⁰ *Daubert v. Merrell Dow Pharms. Inc.*, 509 U.S. 579 (1993).

³¹ *Kanner*, *supra* note 21, at 2.

their rulings preventing "junk science" from being presented to unsuspecting juries, resulting in even-handed litigation.

In Part II, this Comment will discuss the differences between the *Daubert* and *Frye* standards regarding the admission of expert testimony. Part III will discuss the reality of potential organophosphate poisoning litigation in California, in particular the San Joaquin Valley because of the agricultural industry and widespread use of organophosphates. Part IV will discuss causation issues in toxic torts and the elements required to demonstrate causation. Part V is a sampling of cases in California and other jurisdictions in the United States to demonstrate causation issues and under what circumstances expert testimony was either admitted or excluded using the *Daubert* and *Frye* standards, and whether such difference really matters. Part VI discusses how California has enacted regulations requiring those that handle pesticides on a regular basis to participate in "base line" testing to determine if pesticides are actually harming them. This testing may be the best method for determining causation in toxic tort actions involving organophosphates and suspected neurological effects. This Comment concludes with a summary of the findings and arguments that the *Daubert* ruling has only a minimal effect on the evidentiary process in litigation, regardless of the venue.

II. DAUBERT AND FRYE

There has always been debate regarding the introduction of expert testimony in tort cases, as Judge Learned Hand articulated in 1901 that there is a need for effective expert testimony in tort cases.³² However, he further muddied the waters by asking how expert knowledge could best be presented to a jury.³³ Some believe "junk science" expert testimony is admitted all too often in tort cases and leads to unjustified verdicts for plaintiffs under the "let it all in" theory.³⁴ Author Peter Huber refers to a case where a psychic claimed a CAT scan caused her to lose her psychic powers and was awarded \$1 million in damages.³⁵ Others, like toxicology expert Janette Sherman, M.D., believe that all expert testimony should be allowed and that the jury should be allowed to make the decision as to the validity of the science presented.³⁶

³² Learned Hand, *Historical and Practical Considerations Regarding Expert Testimony*, 15 HARV. L. REV. 40, (1901).

³³ *Id.*

³⁴ HUBER, *supra* note 25, at 3-4.

³⁵ *Id.* at 4.

³⁶ Interview with Dr. Janette Sherman M.D., *supra* note 23. Sherman attempted to testify in *National Bank of Commerce v. Dow Chemical* 327 Ark. 504, 938 (Ark. 1997) a

The courts first addressed the admissibility of expert/scientific testimony in *Frye* in 1923, in the D.C. Circuit Court of Appeals.³⁷ In *Frye*, the Government attempted to introduce evidence of a lie detector test taken and failed by the defendant to show he was lying.³⁸ The Court ruled the lie detector results were inadmissible.³⁹ The Court stated the opinion of experts is admissible as a general rule, when it may assist the trier of fact.⁴⁰ Technical information may be difficult for a lay jury to understand and when it requires special experience or knowledge, expert opinion is admissible.⁴¹ The court stated that when the opinion "crosses the line between experimental and demonstrable stages is difficult to define."⁴² Because of this, expert testimony regarding such matters must be "generally accepted" in the field from which it came before it may be admitted as evidence.⁴³

Courts have been cautious about admitting novel expert testimony because it may tend to mislead the jury.⁴⁴ In *United States v. Williams*, 583 F.2d 1194 (7th Cir. 1978), the Court stated, "lay jurors are awed by an 'aura of mystic infallibility' surrounding 'scientific techniques,' 'experts,' and the 'fancy devices' employed."⁴⁵ The need for limiting novel expert testimony was also expressed in *United States v. Addison*, 498 F.2d 741 (D.C. Cir. 1974), "[s]ince scientific proof may in some instances assume a posture of mystic infallibility in the eyes of a jury of laymen"⁴⁶

In 1975, Rule 702 of the Federal Rules of Evidence was adopted and states expert witness testimony must assist the trier of fact; the witness must be qualified to be an expert; the opinion must be based on sufficient facts or data; the testimony must be based on sound and reliable principles and methods; and the witness must apply the methods reliably to the facts of the case.⁴⁷ Rule 702 was adopted and clarified in the case of

civil tort action involving Dursban and birth defects. Sherman's testimony was excluded by the District Court and this ruling was affirmed by the Arkansas Court of Appeals.

³⁷ *United States v. Frye*, 293 F.1013, (D.C. Cir. 1923).

³⁸ *Id.*, at 1013-1014.

³⁹ *Id.*

⁴⁰ *Id.*

⁴¹ *Id.*

⁴² *Id.*

⁴³ *Id.*

⁴⁴ *See, e.g.*, *United States v. Williams*, 583 F.2d 1194, 1199 (7th Cir.1978); *United States v. Addison*, 498 F.2d 741, 744 (D.C. Cir. 1974).

⁴⁵ *Williams*, 583 F.2d at 1199.

⁴⁶ *Addison*, 498 F.2d at 744.

⁴⁷ FED. R. EVID. 702.

Daubert in 1993.⁴⁸ In *Daubert*, the plaintiffs sued Merrell Dow Pharms., manufacturer of the drug Benedectin alleging their children were born with serious birth defects.⁴⁹ The plaintiffs argued ingestion of Benedectin during pregnancy caused the birth defects.⁵⁰ The plaintiffs attempted to proffer the testimony of eight expert witnesses to prove that Benedectin does cause birth defects including those presented by their own children.⁵¹ While the Court acknowledged the *Frye* “general acceptance test” had been the dominant standard for determining the admissibility of novel scientific evidence,⁵² the Court nonetheless found that the *Frye* standard had now been superseded by the adoption of the Federal Rules of Evidence.⁵³ The Court determined that nothing in the Federal Rules established a “general acceptance” theory as stated in *Frye*.⁵⁴ The Court concluded by saying the Rules give the trial judge the task of ensuring that expert testimony is relevant and reliable.⁵⁵ The reliability of the evidence is ensured by the soundness of the science.⁵⁶ The Court specifically ruled that certain factors should be taken into consideration in determining the relevance of scientific evidence including: whether the opinion “has or can be tested;”⁵⁷ “whether the theory or technique has been subjected to peer review and publication;”⁵⁸ “the known or potential rate of error;”⁵⁹ and “whether the theory or technique has gained general acceptance in the scientific community.”⁶⁰

The fear of mystifying and potentially confusing jurors with scientific evidence continued following the *Daubert* decision. The Court stated in *Daubert v. Merrell Dow Pharms. II*, 43 F.3d 1311 (D.C. Cir. 1995), “something doesn't become ‘scientific knowledge’ just because it's uttered by scientist; nor can an expert's self-serving assertion that his conclusions were ‘derived by the scientific method’ be deemed conclusive....”⁶¹ Under *Daubert II*, the court decides if the proffered testimony is relevant and admissible.

⁴⁸ *Daubert v. Merrell Dow Pharms. Inc.*, 509 U.S. 579 (1993).

⁴⁹ *Id.* at 582.

⁵⁰ *Id.*

⁵¹ *Id.* at 583.

⁵² *Id.* at 585.

⁵³ *Id.* at 587 The Court was referring to Federal Rules of Evidence § 702.

⁵⁴ *Id.* at 588.

⁵⁵ *Id.* at 589.

⁵⁶ *Id.*

⁵⁷ *Id.* at 593.

⁵⁸ *Id.* at 594.

⁵⁹ *Id.*

⁶⁰ *Id.*

⁶¹ *Daubert v. Merrell Dow Pharms. II*, 43 F.3d 1311, 1315-1316 (9th Cir. 1995).

A. California Rejects Daubert

The *Frye* standard of proof has remained the standard of review of scientific evidence in California.⁶² In *People v. Kelly*, 549 P.2d 1240 (Cal. 1976), the California Supreme Court stated the use of the *Frye* standard would result in more uniform decisions.⁶³ "Individual judges, whose particular conclusions may differ regarding the reliability of particular scientific evidence, may discover substantial agreement and consensus in the scientific community. . . ."⁶⁴

In *People v. Leahy*, 882 P.2d 321 (Cal. 1994), the Court furthered the *Kelly* analysis and emphatically rejected *Daubert*.⁶⁵ The Court stated that it would allow the *scientific community* to determine what constitutes valid science.⁶⁶ However, the Court did recognize there is a danger in allowing all types of scientific evidence by experts because lay jurors may give undue weight to expert testimony due to the "misleading aura of certainty" of expert witnesses.⁶⁷ Because of the perceived danger of juries giving undue weight to experts, the Court stated that courts must remain cautious in admitting "novel" scientific evidence.⁶⁸ Accordingly, the Court set rules for the admission of expert testimony requiring: general acceptance in the scientific community; reliability of the method demonstrated through expert testimony; and expert witnesses offering opinion testimony must be qualified in their field.⁶⁹

Leahy is supplemented by California Evidence Code section 801 which states an expert's opinion must be limited to the area in which he or she is an expert.⁷⁰ The opinion presented must be beyond the general knowledge of a lay-person,⁷¹ and the basis of the opinion must be based on evidence known to the expert and may reasonably be relied on by the expert to form the opinion.⁷² In applying California Evidence Code section 801 to a toxic tort, the Court in *Lockheed Litigation Cases*, 23 Cal.Rptr.3d 762 (Cal. Ct. App. 2005) held that a court determining whether there is a reasonable basis under Evidence Code section 801,

⁶² See, e.g. *People v. Leahy*, 882 P. 2d 321 (Cal. 1994); *People v. Kelly*, 549 P. 2d 1240 (Cal. 1976).

⁶³ *Kelly*, 549 P.2d., at 1244.

⁶⁴ *Id.*

⁶⁵ *Leahy*, 822 P. 2d, at 324.

⁶⁶ *Id.* at 330.

⁶⁷ *Id.* at 325.

⁶⁸ *Id.* at 330.

⁶⁹ *Kelly*, 549 P.2d, at 1244.

⁷⁰ CAL. EVID. CODE § 801.

⁷¹ CAL. EVID. CODE § 801(a)

⁷² CAL. EVID. CODE § 801(b).

subdivision (b), must examine the matter that the expert relied on in formulating his or her opinion.⁷³ The information relied on by the expert witness must “provide a reasonable basis for the opinion,” and not be created from “a leap of logic, conjecture or artifice.”⁷⁴ As long as the experts’ methods of arriving at their conclusion are not speculation or conjecture, their opinion testimony will be admitted.⁷⁵ Due to reliance on scientific evidence in attempting to prosecute a toxic tort, the potential differing standards for the admission of that evidence becomes a central focus of toxic tort litigation in California, particularly, the San Joaquin Valley.

III. PESTICIDES IN THE SAN JOAQUIN VALLEY OF CALIFORNIA

Agriculture is a large industry in the State of California, including the San Joaquin Valley.⁷⁶ Fresno and Tulare Counties’ economies account for a large percentage of California’s agricultural income and production as evidenced by their combined total of \$10.2 billion in agricultural revenue in 2007.⁷⁷

A. Pesticide Poisoning in the San Joaquin Valley

Allegations of pesticide poisoning are common in the San Joaquin Valley. According to a 2002 report, between 1997 and 2000, there were 648 cases of pesticide poisoning in Fresno and Tulare Counties.⁷⁸ More recently, the incidents of pesticide poisoning are increasing.⁷⁹ The number of reported pesticide poisoning cases rose from 700 in 2007 to nearly 1000 in 2008.⁸⁰ Hundreds, perhaps thousands, may have been exposed to chemicals which are known to cause illness, brain damage, and death.⁸¹

⁷³ *Lockheed Litigation Cases*, 23 Cal. Rptr. 3d 762, 771 (Cal. Ct. App. 2005).

⁷⁴ *Id.* at 772.

⁷⁵ *Id.* at 772.

⁷⁶ AGRICULTURAL RESOURCE DIRECTORY, *supra* note 11.

⁷⁷ *Id.*

⁷⁸ MARGARET REEVES, FIELDS OF POISON 2002 5 (2002), available at <http://www.pesticidereform.org/article.php?id=4>.

⁷⁹ Reed Fujii, *Incidents Grew in S.J. California in 2007*, *State Says* (March 28, 2009), available at www.Record.net.

⁸⁰ *Id.*

⁸¹ *Id.*

Organophosphates⁸² are believed to contribute to over half of all occupational poisonings and deaths in the world.⁸³

Parathion,⁸⁴ a pesticide belonging to the organophosphate family, was applied in agricultural settings in Fresno and Tulare Counties from 1996 to 2000 in greater quantities than anywhere else in the state.⁸⁵ A total of 86,288 pounds were applied to crops in Fresno County alone.⁸⁶ In Tulare County 136,176 pounds were applied.⁸⁷ Neighboring Kern County applied 32,759 pounds in comparison.⁸⁸ The use of Parathion has recently been restricted by the United States Environmental Protection Agency ("EPA") because it poses an unacceptable dietary risk to young people.⁸⁹

It does not appear that the use of pesticides is slowing. An article in the Fresno Bee on July 25, 2009, indicates that agricultural pesticide profits for Dow Chemical⁹⁰ have increased sixty-three percent despite the current economic crisis in California.⁹¹ The United States Department of Agriculture has stated, "[p]esticides are essential to meet the nation's need for food, natural fibers, and wood products, to protect human health and manage natural resources and carry out regulatory responsibilities."⁹²

The utility of pesticides was demonstrated following the recent discovery of the white striped fruit fly in California.⁹³ This agricultural pest, normally found in Asia, was discovered in early 2009, and now poses a major threat to the California agricultural industry.⁹⁴ The fly threatens over 250 California crops and an uncontrolled infestation could be devastating to Fresno County agriculture, both in crop damage and lost agricultural revenue.⁹⁵ The initial effort to control these pests will involve

⁸² Cunningham-Parameter, *supra* note 16, at 492. Organophosphates are chemical agents which attack the central nervous systems of living organisms and cause nervous system damage and death.

⁸³ *Id.*

⁸⁴ See CALIFORNIA E.P.A. STUDY 211, *supra* note 12, at 2.

⁸⁵ *Id.*

⁸⁶ *Id.*

⁸⁷ *Id.*

⁸⁸ *Id.*

⁸⁹ *Id.*

⁹⁰ Facts About Dow, <http://www.dow.com/about> (last visited August 10, 2009.) Dow Chemical manufactures a number of insecticides used in agricultural settings.

⁹¹ Ernest Scheyder, *Farming is a Fertile Field for Chemicals*, THE FRESNO BEE, Jul. 25, 2009, at A11.

⁹² U.S. Department of Agriculture Department Regulation 9500-002, *supra* note 13.

⁹³ Robert Rodriguez, *Bad Bugs*, THE FRESNO BEE, Aug. 1, 2009, at A9.

⁹⁴ *Id.*

⁹⁵ *Id.* (quoting Fresno County Agricultural Commissioner Carol Hafner.) Because this infestation is new, the exact amount of any damage caused by the white striped fruit fly cannot be calculated.

“traps” and quarantines.⁹⁶ However, if these efforts are unsuccessful, widespread use of the pesticide methyl bromide, an organophosphate will be necessary.⁹⁷ While using pesticides carries risks, they are necessary to the agricultural industry in California.

B. Organophosphate Studies

Organophosphates are used widely to control biting and stinging insects.⁹⁸ Poison control centers indicate there are approximately 10,000 cases of organophosphate poisoning annually in the United States.⁹⁹ Organophosphate poisoning can cause symptoms such as nausea, paralysis, depressed respiration, gastroenterological symptoms, as well as other symptoms.¹⁰⁰ Long term effects include neurological damage, especially those related to anxiety, tremors, seizures, coma, and, in some cases, death.¹⁰¹

Several studies on effects of organophosphate exposure in humans have been published in the last twenty years.¹⁰² The most extensive of these studies was performed and published by the American Journal of Public Health in 1994.¹⁰³ The test followed 128 males that were poisoned by various organophosphate pesticides, including parathion.¹⁰⁴ This study found that the poisoned males performed worse on neurobiological exams than males who were not poisoned.¹⁰⁵ However, the most telling statement made in the report was that the exams “*tend to support the hypothesis that the observed deficits may be causally related to the past poisonings.*”¹⁰⁶

A 1985 study of twenty-three California farm workers exposed to two organophosphates in Salinas stated the workers demonstrated some symptoms of poisoning.¹⁰⁷ However, their levels of cholinesterase¹⁰⁸

⁹⁶ *Id.*

⁹⁷ UNITED STATES DEPARTMENT OF AGRICULTURE, WHITE STRIPED FRUIT FLY COOPERATIVE ERADICATION PROGRAM 5 (Jul. 2009).

⁹⁸ CALIFORNIA EPA STUDY 211, *supra* note 12, at 1.

⁹⁹ Steenland, *supra* note 6, at 731.

¹⁰⁰ *Organophosphate Poisoning Symptoms*, <http://emedicine.medscape.com/article/167726-overview> (last visited July 29, 2009).

¹⁰¹ *Id.*

¹⁰² Steenland, *supra* note 6, at 731.

¹⁰³ *Id.*

¹⁰⁴ *Id.*

¹⁰⁵ *Id.* at 735. Neurological exams measure the response time of the nervous system in individuals to differing stimuli.

¹⁰⁶ *Id.* (Emphasis added).

¹⁰⁷ John E. Midtling, M.D. et al., *Clinical Management of Field Worker Organophosphate Poisoning*, 514 W. J. MED., (Apr. 1985).

were only tested *following* the exposure, thereby limiting the data which could be gleaned from the study.¹⁰⁹ Newer studies indicate that organophosphates may play a role in even more common medical conditions such as obesity,¹¹⁰ diabetes,¹¹¹ asthma,¹¹² and childhood cancer.¹¹³ These studies are important in this analysis because they could be used in future litigation to prove causation in pesticide poisoning litigation.¹¹⁴

IV. CAUSATION IN PESTICIDE POISONING CASES

A toxic tort is “[a] personal injury caused by exposure to a toxic substance, such as asbestos or hazardous waste.”¹¹⁵ As with all torts, causation must be demonstrated in that the pesticide in question caused the harm alleged.¹¹⁶ In litigation, epidemiological studies are relied upon and presented by experts to help determine whether an alleged harmful agent caused a disease.¹¹⁷ “Epidemiology is the branch of medicine that deals with the study of the causes, distribution, and control of disease in populations.”¹¹⁸ Epidemiology assumes that diseases do not occur randomly among populations and that certain subgroups within populations, who have been exposed to agents, are at an increased risk to contract some types of disease(s).¹¹⁹ Epidemiology focuses on what is known as general causation, as it is used to answer the question, “*can* the agent in question cause the disease in question?”¹²⁰

¹⁰⁸ *Id.* Cholinesterase is an enzyme present in the humans and insects necessary for the proper function of the nervous system. Organophosphates, kill insects by inhibiting the cholinesterase in the insects targeted. This occurs in humans as well as a result of exposure to organophosphates. A cholinesterase test outside the normal range is an indicator or present or future neurological damage.

¹⁰⁹ *Id.* at 516.

¹¹⁰ Lassiter, *supra* note 3, at 1456.

¹¹¹ *Id.*

¹¹² *Asthma in Farmers, supra* note 2, at 1.

¹¹³ Robert B. Gunier et. al., *Agricultural Pesticide Use in California: Pesticide Prioritization, Use Densities, and Population Distributions for a Childhood Cancer Study.* in 109 ENVTL. HEALTH PERSP. 10, (2001).

¹¹⁴ MICHAEL D. GREEN ET AL., REFERENCE GUIDE ON EPIDEMIOLOGY, REFERENCE MANUAL ON SCIENTIFIC EVIDENCE, FEDERAL JUDICIAL CENTER 335-336 (2000).

¹¹⁵ BLACK'S LAW DICTIONARY, *supra* note 15, at 822. A pesticide would fit this definition.

¹¹⁶ *Jones v. Ortho Pharm. Corp.*, 209 Cal. Rptr. 456, 470. (Cal. Ct. App. 1985).

¹¹⁷ GREEN, *supra* note 114, at 335.

¹¹⁸ Epidemiology Definition, <http://www.answers.com/topic/epidemiology>. (last visited July 29, 2009).

¹¹⁹ GREEN, *supra* note 114, at 335.

¹²⁰ *Id.* at 336.

The ultimate goal of an epidemiological study is to determine whether a causal connection exists between the substance studied and the disease believed to be caused by the substance.¹²¹ “An association between exposure to an agent and disease exists when they occur together more frequently than one would expect by chance.”¹²² After the study is completed the researchers determine what is known as the “relative risk” of the disease from exposure.¹²³ A relative risk of 1.0 indicates that the risk of disease in those exposed to the substance is the same as in those who have not been exposed to the substance.¹²⁴ A relative risk of 2.0 means the persons exposed to the agent are twice as likely to develop the disease as opposed to those who are not exposed.¹²⁵ The relative risk can increase beyond these figures as the risk of disease increases.¹²⁶

A. *The Difficulty of Proving Causation in a Toxic Tort*

In a toxic tort case, a plaintiff must show two different types of causation, general causation, “the capacity of a product to cause injury,” and specific causation, that the compound in question actually caused the injury in question.¹²⁷ “An association between exposure to an agent and disease exists when they occur together more frequently than they would by mere chance.”¹²⁸ However, merely because there is an association does not mean a cause and effect relationship exists.¹²⁹ Some suggest that causation can never be proven in a toxic tort action: “Epidemiological studies can never prove causation, . . . epidemiological evidence can only show that this risk factor is associated with a higher incidence of disease in the population exposed to that risk factor. The higher the correlation the more certain the association, but it cannot prove the causa-

¹²¹ *Id.* at 348.

¹²² *Id.*

¹²³ *Id.* at 349.

¹²⁴ *Id.*

¹²⁵ *See generally id.*

¹²⁶ *Id.*

¹²⁷ William O. Dillingham, et. al., *Blueprints for General Causation Analysis in Toxic Tort Litigation*, 54 FED’N. DEF. CORP. COUNS. Q. 21-22 (2003).

¹²⁸ GREEN, *supra* note 114, at 348.

¹²⁹ *Id.*

tion."¹³⁰ Genetics or other factors in the environment are just as likely to have caused the disease as the suspected agent.¹³¹

Experts testifying in toxic tort actions are most often physicians who have not performed the epidemiological studies themselves, but who rely on epidemiological studies combined with a plaintiff's medical history, questionnaires, and other sources of medical information to form their opinion whether the disease presented was caused by the agent suspected.¹³² In fact, one expert admitted in a deposition prior to litigation that she had never examined some of the plaintiffs.¹³³

B. Steps in Proving Causation in a Pesticide Poisoning Action

The plaintiffs must first prove they were exposed to the specific toxic substance in question, which may be difficult in an agricultural setting as farm workers are likely to be exposed to many different chemicals over the term of their employment.¹³⁴ Once exposure has been demonstrated, epidemiological studies addressing the *particular agent* must be introduced.¹³⁵ In *Sihraith v. Sandoz Pharm. Corp.*, 131 F.Supp.2d 1347 (N.D. Ga. 2001), two female plaintiffs suffered postpartum strokes after ingesting the drug Parlodel.¹³⁶ The Court found that the experts failed to study the incidents of stroke following the administration and *withdrawal* of the drug in question, severely limiting the relevance of the study and ultimately found the studies inadmissible.¹³⁷

Epidemiological studies must address the disease at issue in the litigation.¹³⁸ For example, in *Havner v. Merrell Dow Pharms. Inc.*, 953 S.W.2d 706 (Tex. 1994), Kelly Havner was born without fingers on her right hand.¹³⁹ The drug Benedectin had been ingested by Kelly's mother to suppress nausea during her pregnancy and was suspected to be the

¹³⁰ PESTICIDE INFORMATION PROJECT OF COOPERATIVE EXTENSION OFFICES OF CORNELL UNIVERSITY, MICHIGAN STATE UNIVERSITY, OREGON STATE UNIVERSITY, AND UNIVERSITY OF CALIFORNIA AT DAVIS, TOXICOLOGY INFORMATION BRIEF (1993), *available at* <http://pmep.cce.cornell.edu/profiles/extoxnet/TIB/epidemiology.html> . at 1 (last visited July 29, 2009).

¹³¹ *See, Id.* at 3.

¹³² GREEN, *supra* note 114, at 365.

¹³³ Brief for American Tort Reform Association as Amicus Curiae Supporting Respondent at 40, *Daubert v. Merrell Dow Pharms. Inc.* 509 U.S. 579 (1993) (No. 92-102).

¹³⁴ Cunningham-Parameter, *supra* note 16, at 491.

¹³⁵ Dillingham, *supra* note 127, at 27.

¹³⁶ *Sihraith v. Sandoz Pharm. Corp.*, 131 F.Supp.2d 1347, 1349-1350 (N.D. Ga. 2001).

¹³⁷ *Id.* at 1358 (emphasis added).

¹³⁸ Dillingham, *supra* note 127, at 25.

¹³⁹ *Havner v. Merrell Dow Pharms., Inc.* 953 S.W.2d 706, 708 (Tex. 1994).

cause of the birth defects.¹⁴⁰ The Court excluded the experts' testimony because the studies used relied on and included *other* deformities and diseases than those presented by Havner, thus the Court found that, "[t]hese studies cannot...support a finding that Benedectin causes limb reduction defects."¹⁴¹

The epidemiological study(s) must also be statistically significant.¹⁴² The authors of the *Blueprint for General Causation in Toxic Tort Cases*, leading authorities in toxic tort litigation defense, state that "[t]o establish a causal relationship, the plaintiffs' experts must be able to opine a causation factor of greater than 50-50."¹⁴³ This is demonstrated by *Jones v. Ortho Pharm. Corp.*, 209 Cal. Rptr. 456, 470 (Cal. Ct. App. 1985) which the California Court of Appeal required a relative risk of more than 50-50 and reasoned:

If experts cannot predict probability in these situations, it is difficult to see how courts can expect a jury of laymen to be able to do so...once the theory of causation leaves the realm of lay knowledge for esoteric scientific theories, the scientific theory must be more than a possibility to the scientists who created it.¹⁴⁴

This requirement was further clarified in the *Lockheed Litigation Cases*.¹⁴⁵ The *Lockheed* Court ruled that an epidemiological study with a relative risk of less than 2.0 will not necessarily be excluded from admission if the "expert relies on other factors to show the plaintiff's risk of injury was greater than that of the study subjects or relies on other matters to support the conclusion that causation was more likely than not."¹⁴⁶ The conditions which a scientific study must overcome to be deemed admissible are cumbersome. This burden makes the debate regarding the standard used to determine if the conditions have been in fact met a central focus of toxic tort litigation.

V. DOES THE DIFFERENCE BETWEEN THE *FRYE* STANDARD AND THE *DAUBERT* STANDARD MATTER IN PESTICIDE POISONING LITIGATION?

The *Daubert* decision triggered great discussion by analysts on both sides of the debate. This is evidenced by the response to the pending

¹⁴⁰ *Id.*

¹⁴¹ *Id.* at 725 (emphasis added).

¹⁴² Dillingham, *supra* note 127, at 32.

¹⁴³ *Id.*

¹⁴⁴ *Jones v. Ortho Pharm. Corp.*, 209 Cal. Rptr. 456, 470 (Cal. Ct. App. 1985)

¹⁴⁵ See generally, *Lockheed Litigation Cases*, 23 Cal. Rptr. 3d 762 (Cal. Ct. App. 2005).

¹⁴⁶ *Id.* at 773.

action in *Daubert* as fifteen briefs of amicus curiae were submitted on behalf of the respondent, seven briefs were submitted on behalf the petitioner, and two neutral briefs were submitted.¹⁴⁷ At issue was who should have the decision making ability regarding expert testimony, the judge or the jury?¹⁴⁸ In response to the decision itself, some stated the results were pro-defendant¹⁴⁹ and that the decision was influenced by, and assisted corporate entities.¹⁵⁰ Others went so far as to state that the decision took away the plaintiff's right to a jury trial.¹⁵¹ Author Alan Kanner stated this ruling was the end of the jury system as we have known it and placed the job of trier of fact in the hands of the Court.¹⁵² Both sides of the debate believe the differing standards will lead to different results if the defendant chooses to remove the action to federal court.

A. *Jurisdictional Issues Affect Removal from One Court to Another*

The *Daubert/Frye* standards become a key factor in the decision to remove a case from state court to federal court.¹⁵³ The United States Constitution provides the federal court's jurisdiction is extended to "Controversies...between Citizens of different states . . .," allowing a defendant to remove a case filed in state court to federal court, thus potentially changing the standard which will be used to determine the admission of scientific evidence.¹⁵⁴ This is codified in 28 U.S.C. § 1332.¹⁵⁵ Experts argue that removal of a toxic tort from a California state court, which follows the *Frye* standard,¹⁵⁶ to federal court, which follows the *Daubert* standard,¹⁵⁷ will lead to inconsistent results.¹⁵⁸ However, this argument is proven meritless after a review of recent studies.

¹⁴⁷ *Daubert v. Merrell Dow Pharms. Inc.*, 509 U.S. 579, 582 (1993). The petitioner was the original plaintiff *Daubert*, and the respondent was the original defendant, *Merrell Dow*.

¹⁴⁸ Edward K. Cheng, et.al., *Does Frye or Daubert Matter? A Study of Scientific Admissibility Standards*. 91VIR. L. REV. 471, 471.

¹⁴⁹ *Id.* at 473.

¹⁵⁰ Kanner, *supra* note 21, at 2.

¹⁵¹ *Id.* at 17.

¹⁵² *Id.* at 2.

¹⁵³ *See* U.S. Const. art III, § 2.

¹⁵⁴ *Id.*

¹⁵⁵ 28 U.S.C. § 1332(a)(1)(a) (2008). The district courts shall have original jurisdiction of all civil actions where the matter in controversy exceeds the sum or value of \$75,000, exclusive of interest and costs, and is between citizens of different States.

¹⁵⁶ *See* *People v. Leahy*, 882 P.2d 321, 324 (Cal. Ct. App. 1994).

¹⁵⁷ *See* *Daubert v. Merrell Dow Pharms. Inc.*, 509 U.S. 579, 582 (1993).

¹⁵⁸ *See* Kanner, *supra* note 21, at 1.

B. The Differences in the Daubert and Frye Standards do not Result in Different Outcomes in Toxic Tort Litigation

Researchers studying the effects of the *Daubert* decision relied almost fully on the frequency of removal from state to federal court believing that a change in standards, between *Daubert* and *Frye*, would have a significant effect on those removal rates.¹⁵⁹ The researchers, who studied removal rates in Connecticut, a *Daubert* jurisdiction, and in the Eastern District in New York, a *Frye* jurisdiction, found removal rates were unchanged following the *Daubert* decision.¹⁶⁰ The researchers concluded that the different standards had no effect on the perceived outcome of the litigation.¹⁶¹ However, this research must be taken with a grain of salt according to Martin S. Kaufman, Senior Vice President and General Counsel of the Atlantic Legal Foundation.¹⁶² Kaufman believes these statistics may be skewed because the courts may determine the chemical companies may have enough of a “presence” in a state to prevent removal from state court to federal court based on diversity jurisdiction.¹⁶³

Another indicator that the differing standards may not make a difference in toxic tort litigation is the language used by courts in these types of actions.¹⁶⁴ Under *Daubert*, the expert testimony must rest on a *reasonable foundation* and must be *relevant* to the task at hand.¹⁶⁵ As expressed in *Lockheed*, there must be a *rational basis* for the opinion, after examining the matter the expert relied on.¹⁶⁶ There appears to be little difference between the two standards. Yet experts continue to battle over the *perceived unfair result* to plaintiffs if a defendant is allowed to remove an action to federal court, insisting that *Daubert vs. Frye* will play a key role in creating inconsistent outcomes. An analysis of toxic tort cases in each jurisdiction shows these experts are mistaken.

¹⁵⁹ Cheng, *supra* note 148, at 483.

¹⁶⁰ *Id.* at 488.

¹⁶¹ *Id.*

¹⁶² Telephone interview with Martin S. Kaufman, Senior Vice President and General Counsel of the Atlantic Legal Foundation (Aug. 24, 2009).

¹⁶³ *Id.* If a business such as Dow has sufficient business presence in the state where the state court action is brought, diversity may not exist.

¹⁶⁴ Cheng, *supra* note 148, at 483. Most decisions regarding the admission of expert testimony were made at the lower court level and are not published causing this study to prove difficult.

¹⁶⁵ *Daubert v. Merrell Dow Pharms. Inc.*, 509 U.S. 579, 598 (1993) (emphasis added).

¹⁶⁶ *Lockheed Litigation Cases*, 23 Cal. Rptr. 3d 762, 771 (Cal. Ct. App. 2005). (emphasis added).

*C. There is Consistency Between Jurisdictions with the Same Experts
Presenting the Same Information Regarding Causation*

Minnesota is a jurisdiction which not only follows the *Frye* standard, but has rejected the *Daubert* standard outright.¹⁶⁷ In *Goeb v. Dow Chemical*, 165 N.W.2d 800 (Minn. 2000), a Minnesota toxic tort involving the neurological effects of Dursban, the Supreme Court of Minnesota stated, “[w]hen novel scientific evidence is offered, the district must determine whether it is generally accepted in the relevant scientific community.”¹⁶⁸ The Court went on to explain, “[f]oundational reliability requires the proffering expert to demonstrate the test used was reliable and the procedures used were reliable.”¹⁶⁹ In ruling proponents’ expert testimony inadmissible, the court stated:

[A]ppellants simply argued her credentials and referred the court to her affidavit. Appellants do not point to any independent validation of her methodology or otherwise bolster its reliability by addressing the particular concerns raised by Dow.¹⁷⁰

Regarding the testimony of Dr. Kilburn the court stated:

Kilburn stated in his affidavit and deposition that there could be no other cause of appellant’s illnesses based on his performance of a differential diagnosis. However, in contrast to his affidavit, he admitted at his deposition that he did not review appellant’s pre- or post-exposure medical records. Dr. Kilburn relied solely on questionnaires completed by the appellants¹⁷¹

The Court upheld the exclusion of the testimony of both doctors.¹⁷²

In the Arkansas case, *National Bank of Commerce of El Dorado v. Dow Chemical Co.*, 133 F.3d 1132 (8th Cir. 1997), Dr. Kilborn and Dr. Sherman were retained to prove causation in linking Dursban to birth defects.¹⁷³ The District Court stated that the plaintiff’s experts’ “testimony did not have valid scientific foundation, as required...in *Daubert*...because it was not based on scientific methodology for determining whether a chemical agent can cause birth defects in humans.”¹⁷⁴ While the Court of Appeals did not agree with the complete *Daubert*

¹⁶⁷ *Goeb vs. Dow Chemical Co.*, 615 N.W.2d. 800, 814 (Minn. 2000).

¹⁶⁸ *Id.*

¹⁶⁹ *Id.*

¹⁷⁰ *Id.* at 816.

¹⁷¹ *Id.*

¹⁷² *Id.*

¹⁷³ *National Bank of Commerce of Eldorado v. Dow Chemical Co.*, 133 F.3d 1132 (8th Cir. 1997).

¹⁷⁴ *Id.* at 1132.

analysis, it did not find anything rising to the level of abuse of discretion.¹⁷⁵ Arkansas follows the *Daubert* doctrine.¹⁷⁶

It appears that Dr. Sherman did not agree with the results in either case.¹⁷⁷ Dr. Sherman, in preparation for the *National Bank of Commerce of El Dorado* litigation, reviewed over 10,000 pages of documents and subsequently testified for four days, six hours a day.¹⁷⁸ Dr. Sherman blames the exclusion of her testimony on the *Daubert* standard, and what she terms a bias towards defendants, namely large chemical companies.¹⁷⁹ She believes any relevant expert testimony should be admitted, and juries should decide the outcome based on the testimony.¹⁸⁰ Dr. Sherman likens this type of testimony to a criminal trial, and because the plaintiff has the burden of proof, juries should be allowed to hear all the plaintiffs' evidence and make their decision based on that information.¹⁸¹ Support for Dr. Sherman's assertions can be found in the *National Bank of Commerce of El Dorado* litigation, where she was presented with eight children from different areas of the United States that all exhibited the same birth defects after the mothers were exposed to Dursban in the first trimester of pregnancy.¹⁸² All eight children possessed arched palettes; low set ears; absence of the corpus colostrums; wide set nipples; and all the children looked similar in their defects.¹⁸³ Dr. Sherman stated this information should have been presented to the jury to help them determine causation in these cases.¹⁸⁴

In 2000, the same year as the *National Bank of Commerce of El Dorado* litigation, the EPA, relying on studies performed by Dr. Sherman in 1996, 1997, and 1999, determined that there is no causal link between Dursban and birth defects.¹⁸⁵ Dr. Sherman insisted there was a link between exposure to Dursban and birth defects in the *National Bank of Commerce of El Dorado* litigation, however, the E.P.A., using Dr. Sherman's own studies, stated there was not enough of a correlation be-

¹⁷⁵ *Id.* at 1133.

¹⁷⁶ Martin S. Kaufman, *The Status of Daubert in State Courts*, ATLANTIC LEGAL FOUND. (2006), at 1.

¹⁷⁷ Telephone Interview with Dr. Janette Sherman M.D., *supra* note 23.

¹⁷⁸ *Id.*

¹⁷⁹ *Id.*

¹⁸⁰ *Id.*

¹⁸¹ *Id.*

¹⁸² *Id.*

¹⁸³ *Id.*

¹⁸⁴ *Id.*

¹⁸⁵ United States Environmental Protection Agency Internal Memorandum, Chlorpyrifos Incident Review Update, (April 20, 2000), at 19 [hereinafter EPA Memo], (on file with author).

tween the exposure and disease alleged to establish the link of causation.¹⁸⁶

*D. Frye and Daubert Jurisdictions Require a "Reasonable Nexus"
Between Exposure and Disease Alleged*

Courts in differing jurisdictions require a "reasonableness" fit between the information experts testify to and the causation asserted.¹⁸⁷ In California, a *Frye* jurisdiction,¹⁸⁸ the *Jones* Court stated, "[t]he law is well settled that in a personal injury action causation must be proven within a *reasonable* medical probability based on competent expert testimony."¹⁸⁹ In *Jones*, the plaintiff brought suit against the Ortho Pharmaceutical Corporation alleging Ortho Novum, a substance it manufactured caused the plaintiff to develop cervical cancer.¹⁹⁰ This line of "reasonableness" was affirmed by the *Lockheed Litigation Cases* Court, also in California, which stated that expert testimony, "is of a type that *reasonably* may be relied upon by an expert in forming an opinion upon the subject to which his testimony relates. . . ."¹⁹¹ Ruling on the admission of testimony in a toxic tort action in California, the *Cottle v. The Superior Court of Ventura County*, 5 Cal.Rptr.2d 882 (Cal. Ct. App. 1992) Court found "no evidence of causation to a degree of *reasonable* medical probability."¹⁹²

In Nebraska, a *Daubert* jurisdiction,¹⁹³ the *Amateis v. City of Bridgeport*, 2000 Neb. App. Lexis 194 11 (Neb. 2000) Court stated the following regarding causation in a toxic tort action, "the evidence must be sufficient to fairly and *reasonably* justify the conclusion that the defendant's negligence was the proximate cause of plaintiff's injury."¹⁹⁴ In Texas, also a *Daubert* jurisdiction,¹⁹⁵ the *Maritime Overseas Corp. v. Ellis*, Tex.

¹⁸⁶ *Id.*

¹⁸⁷ See e.g. *Jones v. Ortho Pharm. Corp.*, 209 Cal. Rptr. 456 (Cal. Ct. App. 1985); *Lockheed Litigation Cases*, 23 Cal. Rptr. 3d 762 (Cal. Ct. App. 2005); *Amateis v. City of Bridgeport*, 2000 Neb. App. Lexis 194 (Neb. 2000); *Cottle v. The Superior Court of Ventura County*, 5 Cal. Rptr. 2d 882 (Cal. Ct. App. 1992); *Maritime Overseas Corp. v. Ellis*, 1992 Tex. App. LEXIS 3227 (Tex. App. 1992); *Kannankeril v. Terminix Int.*, 128 F.3d 802 (8th Cir. 1997).

¹⁸⁸ California is a *Frye* jurisdiction. See generally, *People v. Leahy*, 882 P.2d 321 (Cal. Ct. App. 1994).

¹⁸⁹ *Jones v. Ortho Pharm. Corp.*, 209 Cal. Rptr. 456, at 470 (emphasis added).

¹⁹⁰ *Id.* at 458.

¹⁹¹ *Lockheed Litigation Cases*, 23 Cal. Rptr. 3d, at 785 (emphasis added).

¹⁹² *Cottle v. The Superior Court of Ventura County*, 5 Cal.Rptr.2d, at 893 (emphasis added).

¹⁹³ Kaufman, *supra* note 176, at 2.

¹⁹⁴ *Amateis v. City of Bridgeport*, 2000 Neb. App. Lexis 194 11, 38 (Neb. 2000).

¹⁹⁵ Kaufman, *supra* note 176, at 2.

App. LEXIS 3227, 23 (Tex. App. 1992) Court stated that causation in a toxic tort action, “must rest in *reasonable* probabilities . . . otherwise the inference that such actually occurred can be no more than speculation or conjecture.”¹⁹⁶ In New Jersey, a *Daubert* jurisdiction,¹⁹⁷ the Federal Court stated in *Kannankeril v. Terminix Int.*, 128 F.3d 802, 806 (3rd Cir. 1997), “[u]nder New Jersey law, medical expert testimony must be made with a *reasonable* degree of certainty.”¹⁹⁸

E. Daubert and Frye Jurisdictions Require That Causation Be Proven By More Than a Mere Possibility, and in to a Probability

Courts have also been consistent in requiring that proof of causation rise to the level of a reasonable *probability* and in some cases, assigning a numerical value to the probability.¹⁹⁹ For example in Texas, the *Maritime* Court stated, “[a]n expert’s testimony must be based upon a ‘reasonable medical *probability*’ as opposed to a mere possibility since anything is ‘possible’ in the field of medicine.”²⁰⁰ In California, the *Cottle* Court found that there was “no evidence of causation to a degree of reasonable medical *probability*.”²⁰¹

Continuing to show consistency with other jurisdictions, the California *Jones* Court ruled similarly to the *Maritime* court, “[a] possible cause only becomes a “probable” when...it becomes more likely than not that the injury was a result of its action.”²⁰² The Court excluded the expert’s testimony because he could not state a “reasonably probable” relationship between the exposure and the disease.²⁰³ This requirement was refined in the *Lockheed Litigation Cases*, where the Court stated that a relative risk less than 2.0 can be supplemented with the introduction of

¹⁹⁶ *Maritime Overseas Corp. v. Ellis*, 1992 Tex. App. LEXIS 3227, 2-3 (Tex. App. 1992) (citing *Insurance Co. of North America v. Myers*, 411 S.W.2d 710, 713. (Tex. 1966)).

¹⁹⁷ Kaufman, *supra* note 176, at 1.

¹⁹⁸ *Kannankeril v. Terminix Int.*, 128 F.3d 802, 806 (N.J. 2d 1997).

¹⁹⁹ See e.g. *Jones v. Ortho Pharm. Corp.*, 209 Cal. Rptr. 456, (Cal. Ct. App. 1985); *Lockheed Litigation Cases*, 23 Cal. Rptr. 3d 762, (Cal. Ct. App. 2005); *Amateis v. City of Bridgeport*, 2000 Neb. App. Lexis 194, 11 (Neb. 2000); *Cottle v. The Superior Court of Ventura County*, 5 Cal.Rptr.2d 882 (Cal. Ct. App. 1992); *Maritime Overseas Corp. v. Ellis*, 1992 Tex. App. LEXIS 3227, 23 (Tex. App. 1992); *Kannankeril v. Terminix Int.*, 128 F.3d 802, (8th Cir. 1997).

²⁰⁰ *Maritime Overseas Corp. v. Ellis*, 1992 Tex. App. LEXIS 3227, 28 citing *Duff V. Yelin*, 721 S.W.2d 265, 370. (Tex. App. 1986).

²⁰¹ *Cottle v. The Superior Court of Ventura County*, 5 Cal.Rptr.2d 882, 893 (Cal. Ct. App. 1992) (emphasis added).

²⁰² *Jones*, 209 Cal. Rptr. 456, 470.

²⁰³ *Id.*

additional evidence which supports the expert's theory.²⁰⁴ In *Lockheed*, the expert relied on epidemiological studies alone.²⁰⁵ The defense, citing *Jones*, argued that because the expert relied solely on epidemiological studies, the testimony should be excluded because the expert could not state a relative risk greater than 2.0.²⁰⁶ Even though the expert's testimony lacked reasonableness based on the material studied, the Court did state that the requirement of a relative risk greater than 2.0 articulated in *Jones* could be overcome by additional evidence supporting the conclusion opined.²⁰⁷

This same line of reasoning was followed in Nebraska in the *Amateis* litigation where the Court stated, "[t]he expert testimony, taken in conjunction with the temporal relationship between the exposure and Anthony's seizure is sufficient to allow a fact finder the Malathion and petroleum distillate mixture was the proximate cause of Anthony's seizure"²⁰⁸

F. California Courts, Commonly Viewed as a Frye Jurisdiction, have Relied on Daubert to Determine a "New" Type of Standard

The most telling evidence that the debate over *Daubert* and *Frye* may be irrelevant in a toxic tort action is the California Appellate Court's use of *Daubert II* in deciding the *Lockheed Litigation Cases*.²⁰⁹ In *Lockheed*, the appeal partially revolved around the lower court's refusal to allow plaintiffs' expert's testimony in regards to causation, because the expert could not state a relative risk greater than 2.0.²¹⁰ In issuing its ruling, the *Lockheed* court, relying on *Daubert II*, stated that while the California court case of *Jones*²¹¹ found there was a requirement of a relative risk above 2.0, "*Daubert II*...supports the proposition that an epidemiological study showing a relative risk of less than 2.0 can play a part in providing a reasonable basis for an opinion of causation when considered together with other matters."²¹² This leaves the question as to how causation in a toxic tort involving pesticide poisoning can be demonstrated.

²⁰⁴ *Lockheed Litigation Cases*, 23 Cal. Rptr. 3d 762, 777 (Cal. Ct. App. 2005).

²⁰⁵ *Id.* at 780.

²⁰⁶ *Id.* at 775.

²⁰⁷ *Id.* at 777.

²⁰⁸ *Amateis v. City of Bridgeport*, 2000 Neb. App. Lexis 194, 11 (Neb. 2000).

²⁰⁹ *See Lockheed Litigation Cases*, 23 Cal. Rptr. 3d 762, (Cal. Ct. App. 2005).

²¹⁰ *Id.* at 770.

²¹¹ *Lockheed Litigation Cases* 23 Cal. Rptr. 3d 762, 771 (Cal. Ct. App. 2005), citing *Jones v. Ortho Pharm. Corp.*, 209 Cal. Rptr. 456 (Cal. Ct. App. 1985).

²¹² *Lockheed Litigation Cases*, 126 Cal.App. 4th at 771.

VI. A SOLUTION TO THE PROBLEM WITH EPIDEMIOLOGICAL STUDIES
PROVING CAUSATION IN ORGANOPHOSPHATE POISONING CASES

In order to prevail in a toxic tort case, a plaintiff must prove "general"²¹³ and "specific"²¹⁴ causation.²¹⁵ This is best demonstrated in the *Jones* case.²¹⁶ In attempting to show causation, plaintiff presented two experts.²¹⁷ The first expert, Dr. Catlin, a specialist in pharmacology, stated there was a reasonable medical possibility that the drug contributed to the cancer, but this probability was less than fifty percent.²¹⁸ The second expert, Dr. Policar, a specialist in obstetrics and gynecology, stated it was possibly a contributing factor in plaintiff's condition.²¹⁹ Both experts relied on a study which revealed a statistically significant increase in the way this particular cancer developed in females who used the substance in question, but there was no other evidence presented to support this claim.²²⁰

In *Jones*, the Court ruled that "the *only* evidence relating to the causal connection between Ortho-Novum SQ and plaintiff's . . . condition---is the highly conjectural and ambiguous testimony of Drs. Catlin and Policar, who both stated, that the ingestion of the drug *may* have had some effect on the development or progression of the disease."²²¹ The Court stated further that "a possible only becomes a 'probable' when, in the absence of other reasonable causal explanations, it becomes more likely than not the injury was a result of its action."²²²

An epidemiological study was completed in 1990 and published in 1994 regarding organophosphate poisoning.²²³ This study was completed to determine if organophosphates caused neurological disorders several weeks after exposure.²²⁴ The methods used included reading mandatory doctor's reports of suspected poisoning, work histories of those poisoned and live studies.²²⁵ The report determined the specific pesticides believed

²¹³ Dillingham, *supra* note 127, at 21. The substance *could* have caused the condition.

²¹⁴ *Id.* The substance *did* cause the condition.

²¹⁵ *Id.* at 21-22.

²¹⁶ *Jones v. Ortho Pharm. Corp.*, 209 Cal. Rptr. 456 (Cal. Ct. App. 1985).

²¹⁷ *Id.* at 466.

²¹⁸ *Id.*

²¹⁹ *Id.*

²²⁰ *Id.*

²²¹ *Id.* at 467 (emphasis added).

²²² *Id.*

²²³ Steenland, *supra* note 6, at 731.

²²⁴ *Id.*

²²⁵ *Id.*

to be at issue in most cases.²²⁶ In total, 128 poisoned subjects were tested as well as ninety non-poisoned subjects.²²⁷ The results indicated the observed deficits on some of the neurobehavioral tests *may* be causally related to past poisonings.²²⁸

Applying the *Jones* standard to this study would likely find that the study could not be relied on alone to prove causation because "a possible only become a "probable" when, in the absence of other reasonable causal explanations, it becomes more likely than not the injury was a result of its action."²²⁹ As noted above, the authors of the study indicated the observed deficits *may* be related to past poisonings.²³⁰ Though this study alone may be deficient in proving causation, additional information such as cholinesterase testing, may assist in bridging the causation gap.

A. Cholinesterase Testing as a Supplement in Proving Causation in a Pesticide Poisoning Action

The *Lockheed Litigation Cases* Court stated if epidemiological studies indicate a relative risk below 2.0, additional information may be used by the expert to opine causation.²³¹ Cholinesterase testing may be the additional information needed to prove causation in pesticide poisoning cases where neurological disorders are at issue.

Cholinesterase is an enzyme present in humans and insects.²³² It is necessary for the proper function of the nervous system.²³³ Organophosphates kill insects by inhibiting the cholinesterase in the insects targeted.²³⁴ Organophosphates have the same effects on humans when they are exposed to them.²³⁵ Lowered cholinesterase levels in the human body can develop as a result of exposure to cholinesterase-affected pesticides and can result in neurological disorders.²³⁶ However, these levels can be monitored and analyzed through blood testing, especially *if a baseline*

²²⁶ *Id.*

²²⁷ *Id.* at 734.

²²⁸ *Id.* at 735. (emphasis added).

²²⁹ *Jones v. Ortho Pharm. Corp.*, 209 Cal. Rptr. 456, 467 (Cal. Ct. App. 1985).

²³⁰ Steenland, *supra* note 6, at 735.

²³¹ *Lockheed Litigation Cases*, 23 Cal. Rptr. 3d 762, 771 (Cal. Ct. App. 2005).

²³² *Cholinesterase Inhibition*, Exttoxnet, <http://exttoxnet.orst.edu/tibs/cholines.htm>. Pg. 1. (last visited July 29, 2009). [hereinafter *Cholinesterase Inhibition*].

²³³ *Id.*

²³⁴ *Id.*

²³⁵ *Id.*

²³⁶ *Id.* at 4.

*cholinesterase level is established prior to any pesticide exposure.*²³⁷ Subjects can also be tested over a period of time following exposure to determine if the exposure could lead to long term neurological deficiencies.²³⁸

California is one state which requires cholinesterase testing for those involved in pesticide application as a mixer, loader, or applicator, of organophosphate pesticides.²³⁹ The use of cholinesterase tests has been touched on by the courts, but only ever so slightly.²⁴⁰ In *Goeb*, the Court stated that because the experts could not explain why the plaintiff's demonstrated normal levels in cholinesterase in their blood, following alleged exposure to Dursban, that their testimony was unreliable.²⁴¹ The plaintiffs' experts stated that over-exposure to organophosphates *does* inhibit cholinesterase production in the human body.²⁴² But when confronted with the test performed on the plaintiffs, showing cholinesterase levels in the normal range, they could not explain these results.²⁴³ Despite these results, Dr. Kilburn and Dr. Sherman stated they believed the neurological deficits exhibited by the plaintiffs were attributable to Dursban exposure.²⁴⁴ The Court did not allow the testimony of the doctors in part because they could not explain the blood test results, indicating no cholinesterase inhibition.²⁴⁵

In *Kannankeril*, the Third District Court of Appeals, recognized that the cholinesterase test is "one of the most accepted test methods for determining exposure to Dursban."²⁴⁶ The Court reasoned because cholinesterase testing showed the plaintiff had normal levels of cholinesterase following Dursban exposure, the testimony of the plaintiffs' expert, who opined the exposure led to neurological disorders, despite the normal cholinesterase tests, should be excluded.²⁴⁷ However, the Court of Ap-

²³⁷ *Id.* at 4-5. (Emphasis added). A baseline test establishes the normal level of cholinesterase in a subject so future test can be compared for deviations from the established level.

²³⁸ *Id.* at 5.

²³⁹ *Cholinesterase Inhibition*, *supra* note 232, at 6. Five states, California, Ohio, Arizona, Colorado and Washington have cholinesterase testing requirements in place

²⁴⁰ A Lexis Nexis search including the terms "toxic tort" and "cholinesterase" revealed few cases, perhaps affirming the claim by Cheng that these decisions are made in the local courts, and rarely appealed. Cases located are cited below.

²⁴¹ *Goeb v. Dow Chemical Co.*, 615 N.W.2d. 800, 844 (Minn. 2000). The doctors testifying were Dr. Sherman and Dr. Kilburn.

²⁴² *Id.* at 845. (emphasis added).

²⁴³ *Id.* at 845.

²⁴⁴ *Id.* at 819.

²⁴⁵ *Id.* at 845.

²⁴⁶ *Kannankeril v. Terminix Int.*, 128 F.3d 802, 806 (N.J. 2d 1997).

²⁴⁷ *Id.* at 808.

peal stated, "it is for the jury to decide whether a cholinesterase test, yielding results within normal limits, outweighs the other factors relied upon by Dr. Gerson and undermines his opinion. This is an issue of credibility not admissibility."²⁴⁸

In the Texas *Maritime* case, the Appellate Court partially relied on cholinesterase testing to determine causation in the toxic tort action.²⁴⁹ The court found that the expert's reliance on epidemiological studies *only*, to form his conclusion of neurological disorders resulting from organophosphate exposure, did not form the required causal link between exposure and illness.²⁵⁰ The Court then referred to a cholinesterase test performed by the treating doctor on the date of the alleged injury.²⁵¹ The treating physician concluded that while the plaintiff did suffer organophosphate exposure, the results of the cholinesterase test did not indicate exposure serious enough to hospitalize plaintiff or administer antidote medications.²⁵² The use of cholinesterase testing *along with* epidemiological studies *can* be used to determine the causal link between exposure and potential neurological disorders.

VII. CONCLUSION

As Judge Learned Hand pointed out, there is a need for authoritative and unbiased scientific assistance in litigation.²⁵³ However, since the *Daubert* ruling in 1993, some have feared that the right to a jury has been taken away from the plaintiff, a playing field favoring the defendant has been created, and important evidence suggesting causation has been excluded from tort cases.²⁵⁴ This could not be further from the truth.

Courts are consistent in their admission of expert testimony in organophosphate poisoning cases, as well as other poisoning cases.²⁵⁵ The courts are neither taking away a plaintiff's right to a jury trial nor creat-

²⁴⁸ *Id.*

²⁴⁹ *Maritime Overseas Corp. v. Ellis*, 1992 Tex. App. LEXIS 3227, 2-3 (Tex. App. 1992).

²⁵⁰ *See generally id.*

²⁵¹ *Id.* at 2-3.

²⁵² *Id.* at 3.

²⁵³ *Parke-Davis and Co. v. H.K. Mulford Co.*, 189 F.95 (C.C.S.D. N.Y. 1911).

²⁵⁴ *See Kanner, supra* note 21, at 2; *Hileman, supra* note 22, at 1.

²⁵⁵ *See e.g. Jones v. Ortho Pharm. Corp.*, 209 Cal. Rptr. 456, (Cal. Ct. App. 1985); *Lockheed Litigation Cases*, 23 Cal. Rptr. 3d 762, (Cal. Ct. App. 2005); *Amateis v. City of Bridgeport*, 2000 Neb. App. Lexis 194, 11 (Neb. 2000); *Cottle v. The Superior Court of Ventura County*, 5 Cal.Rptr.2d 882 (Cal. Ct. App. 1992); *Maritime Overseas Corp. v. Ellis*, 1992 Tex. App. LEXIS 3227, 23 (Tex. App. 1992); *Kannankeril v. Terminix Int.*, 128 F.3d 802, (8th Cir. 1997).

ing a playing field beneficial to defendants. The courts are successfully carrying out their role of “gatekeeper” regardless of the jurisdiction, and are ensuring only relevant evidence is presented to a jury, particularly scientific expert testimony.

Studies have shown that removal rates for toxic torts, or any other cases for that matter, have not been affected by the *Daubert* ruling.²⁵⁶ In addition, the courts have been consistent, regardless of jurisdiction, in requiring a reasonable basis for causation be presented in expert testimony in toxic tort cases.²⁵⁷ Courts require more than a mere *possibility* and are consistent in requiring that epidemiological studies show that the population affected by the substance has a disease rate twice as high as the general population.²⁵⁸ If this rate cannot be shown, the courts will allow the experts to rely on other information to come to their conclusions.²⁵⁹

The debate over *Daubert* and *Frye* appears to be moot in the area of organophosphate poisoning litigation. In addition to epidemiological studies, medical histories, and other supporting evidence, plaintiffs may rely on cholinesterase testing to prove causation of neurological disorders.²⁶⁰ This is especially important in an agricultural community, such as the San Joaquin Valley, where farm workers most commonly exposed to these chemicals are required by California law to take “base line” blood tests which can be relied on later determining possible pesticide poisoning.²⁶¹

Cholinesterase testing has been used in other jurisdictions to establish that the testimony of experts the plaintiff was proffering was unreliable.²⁶² One of these cases involved Dr. Sherman and Dr. Kilburn who could not explain the “normal range” in the cholinesterase testing of the plaintiff.²⁶³ Their testimony was excluded in that case, as well as another case, on the same grounds, it was unreliable.²⁶⁴ One jurisdiction was

²⁵⁶ Cheng, *supra* note 148, at 483.

²⁵⁷ See e.g. Jones v. Ortho Pharm. Corp., 209 Cal. Rptr. 456, (Cal. Ct. App. 1985); Lockheed Litigation Cases, 23 Cal. Rptr. 3d 762, (Cal. Ct. App. 2005); Amateis v. City of Bridgeport, 2000 Neb. App. Lexis 194, 11 (Neb. 2000); Cottle v. The Superior Court of Ventura County, 5 Cal.Rptr.2d 882 (Cal. Ct. App. 1992); Maritime Overseas Corp. v. Ellis, 1992 Tex. App. LEXIS 3227, 23 (Tex. App. 1992); Kannankeril v. Terminix Int., 128 F.3d 802, (8th Cir. 1997).

²⁵⁸ See *Id.*

²⁵⁹ Lockheed Litigation Cases, 23 Cal. Rptr. 3d 762, 771 (Cal. Ct. App. 2005).

²⁶⁰ See *Cholinesterase Inhibition*, *supra* note 232, at 4-5.

²⁶¹ See *Id.* at 4-5.

²⁶² See generally Goeb vs. Dow Chemical Co., 615 N.W.2d. 800 (Neb. 2000).

²⁶³ *Id.* at 845.

²⁶⁴ *Id.* at 845.

Frye, the other *Daubert*.²⁶⁵ Interestingly, the same year the appellate court ruled the exclusion of the testimony was correct because it was unreliable, the E.P.A., *citing one of Dr. Sherman's own works*, stated that the chemical that Dr. Sherman was to testify about in both cases, did not appear to cause birth defects as originally asserted by Dr. Sherman.²⁶⁶ However, if Dr. Sherman would have been allowed to testify, would the jury's perceived infallibility of the expert along with the emotional aspect of deformed infants have resulted in an erroneous verdict for the plaintiffs?

The ruling in *Daubert* appears to have had minimal impact, if any at all, in the area of organophosphate poisoning. The primary effect of *Daubert* was that it opened the court's eyes to the need for the best science available in cases such as organophosphate poisoning actions. Epidemiological studies are often too unreliable to be admitted alone. However, when these studies are supplemented with cholinesterase testing, the plaintiff can provide the reasonable nexus between pesticide exposure and its potentially devastating effect. Reliable epidemiological studies, effective gate-keeping by the courts, and safeguards such as cholinesterase testing appear to be the best methods to ensure that a California farm worker who is truly injured will be justly compensated and the chemical industry can affordably provide its products which are vital to agricultural growth. In addition, if scientists develop a method for creating "base lines" for more common maladies such as asthma, diabetes, obesity, and Alzheimer's disease, causation in these diseases could be proven as well. This will ensure "junk science" is not presented to juries who may fall prey to inaccurate information, follow their emotions, and award verdicts which are not deserved.

RONALD R. WEBER, JR.

²⁶⁵ See generally *Goeb vs. Dow Chemical Co.*, 615 N.W.2d. 800, 845 (Neb. 2000); *Kannankeril v. Terminix Int.*, 128 F.3d 802, 806 (N.J. 2d 1997).

²⁶⁶ EPA Memo, *supra*, note 185.