

**United States Court of Appeals  
FOR THE EIGHTH CIRCUIT**

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No. 99-3431

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Delores F. Turner;	*	
Russell Turner,	*	
	*	
Plaintiffs - Appellants,	*	
	*	
v.	*	
	*	
Iowa Fire Equipment Company,	*	
an Iowa Corporation,	*	
	*	
Defendant - Appellee.	*	
	*	Appeal from the United States
	*	District Court for the Western
	*	District of Missouri
<hr/>		
Iowa Fire Equipment Company,	*	
	*	
Third Party Plaintiff -	*	
Appellee,	*	
	*	
v.	*	
	*	
Kidde-Fenwal, Inc.	*	
	*	
Third Party Defendant -	*	
Appellee.	*	

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Submitted: May 11, 2000

Filed: September 22, 2000

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Before RICHARD S. ARNOLD, HANSEN, and BYE, Circuit Judges.

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BYE, Circuit Judge.

Delores and Russell Turner appeal the adverse grant of summary judgment in their personal injury action<sup>1</sup> against Iowa Fire Equipment Company (Iowa Fire). The district court,<sup>2</sup> after excluding the causation opinion of Delores Turner's treating physician, granted summary judgment on all claims brought by the Turners. We affirm.

### **BACKGROUND**

Because this is an appeal from the grant of a summary judgment, we view the evidence in the light most favorable to the Turners. We also give the Turners the benefit of all reasonable inferences to be drawn from the evidence. See Lindsey v. Jewels by Park Lane, Inc., 205 F.3d 1087, 1091 (8th Cir. 2000).

Delores Turner worked in the deli area of the Hy-Vee Store in Trenton, Missouri. On January 6, 1995, Iowa Fire performed a routine inspection of the deli's fire suppression equipment, which included an extinguisher system located in the hood above the grill where Delores worked. Before the Iowa Fire employees left, the system accidentally activated. A white, powdery substance composed primarily of sodium bicarbonate (baking soda) discharged throughout the deli, covering Delores. She

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<sup>1</sup>Russell's sole claim is for loss of consortium as the result of injuries suffered by Delores, his wife.

<sup>2</sup>The Honorable Fernando J. Gaitan, Jr., United States District Judge for the Western District of Missouri.

attempted to wash the powder off her skin, then returned to work. The powder still lingered in the air.

Delores experienced shortness of breath, itchy skin, and a headache, which prompted her to call her family physician about an hour after the discharge. He recommended that she take Benadryl. She did. Delores then finished her shift, continuing to breathe in the substance for several more hours.

Delores developed a skin rash after the exposure. At various times during the ensuing month, Delores suffered from blisters in her mouth and nose, black discharges from her nose, head pain, and shortness of breath. She also spit up green mucus. Persistent nose bleeds, occurring as often as two or three times a day, started about a month later. Delores discussed these symptoms with her family physician on February 10, 1995, during a previously scheduled appointment on an unrelated matter. Her physician told her she should see a specialist, but did not refer her to another doctor.

Following the visit to her family physician, Delores requested her employer to provide her with a referral to a specialist. Her employer's workers' compensation carrier selected Dr. David Hof, a specialist in pulmonary diseases. Dr. Hof began treating Delores in March 1995. Dr. Hof diagnosed Delores as suffering from a

hyperreactive airway disorder, similar in nature to either reactive airways dysfunction syndrome (RADS)<sup>3</sup> or occupational asthma (OA)<sup>4</sup>.

Delores continued to suffer from respiratory problems, including shortness of breath and hypersensitivity to certain airborne agents, such as perfumes, smoke, and cleaning agents used at home and work. Dr. Hof felt that the condition was particularly aggravated by cleaning agents used at the deli, and ultimately recommended that Delores take some time off from work to allow her airways to heal.

In November 1997, Delores brought this personal injury action against Iowa Fire to recover for her lost wages and injuries, including her ongoing respiratory problems. Iowa Fire brought a third-party action against Kidde-Fenwal, Inc. (Kidde-Fenwal), the manufacturer of the fire extinguisher involved.

The parties deposed Dr. Hof, who proffered his opinion that Delores's reactive airways disorder was caused by her exposure to the chemicals from the fire

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<sup>3</sup>RADS is a reactive airways disease usually characterized by a single massive exposure to an inhaled irritant, with an immediate onset of intense respiratory difficulties. Dr. Hof explained that his diagnosis did not fit cleanly into the definition of RADS because Delores had a single massive exposure to an inhaled substance, but she experienced a somewhat delayed onset of significant respiratory difficulties.

<sup>4</sup>OA generally refers to any asthmatic condition caused by exposure to sensitizing agents in the workplace. Specifically, OA also describes the asthma caused by repeated micro-exposures to a workplace irritant over a variable period of time. Dr. Hof explained that his diagnosis did not fit cleanly into that definition of OA. Although Delores experienced a delayed onset of significant respiratory problems (typical of OA), her symptoms followed a single massive exposure rather than repeated micro-exposures. In addition, Delores did not respond to short-acting bronchodilators typically used to treat OA, but did respond to anti-inflammatory drugs typically used to treat RADS.

extinguisher discharge. Dr. Hof based his opinion in part upon the medical history he obtained from Delores (indicating that she had not suffered respiratory problems prior to the fire extinguisher incident), and in part upon the temporal relationship between the fire extinguisher incident and the onset of symptoms.

Dr. Hof acknowledged, however, that he had not determined whether any other factors may have caused or contributed to Delores's respiratory problems, such as repetitive exposure in the workplace to flour dust, or ammonia-based cleaning products (both shown to be responsible for causing OA), or repetitive exposure to fumes, chemicals, or cigarette smoke at home (Russell Turner smoked).

Dr. Hof also acknowledged that he had made no direct effort to determine what caused Delores's medical condition, or what specific ingredient in the extinguisher could have caused a reactive airway disorder:

Q. Is it a fair statement that as a treating provider you're not nearly as concerned as to what caused specifically the respiratory complaints to initiate, rather, you are in the role of someone who is trying to treat and limit or eliminate the complaints; is that right?

Hof: That's correct.

...

Q. And what you're telling us today is that you made no specific effort to look at, for example, the ingredients in the product to see which of those ingredients might have caused airway or respiratory irritation to De Turner, correct?

Hof: No, I did not.

. . .

Q. Is there some reason that you haven't . . . undertaken any kind of analysis to determine whether the ingredients in this product have ever been shown to produce OA or RADS?

Hof: That's not my job definition.

Q. And that's because you're the treating physician as opposed to someone who is charged with ascertaining the cause of the complaints; is that right?

Hof: You're very astute.

Not until his deposition (March 1999) did Dr. Hof proffer the opinion that baking soda could have caused the reactive airway disorder. Until then, Dr. Hof had only once identified a specific substance as the likely cause of Delores's condition. In an early (March 21, 1995) letter to the workers' compensation insurer, Dr. Hof stated that

I have reviewed your note of March 17, listing several of the agents to which [Delores] was exposed in January. The  $\text{NH}_4\text{H}_2\text{PO}_4$  appears to be the agent that would be most likely to injure her airways, releasing both a phosphorous acid and ammonia, which can be quite irritable to the lining of the airways, combining with the water of the lining, producing an acid burn topically, which could cause enough chronic inflammatory injury to result in her present problems.

Dr. Hof relied upon a Material Safety Data Sheet (MSDS) sent to him by the workers' compensation insurer. The MSDS applied to an extinguisher manufactured by Ansul Fire Protection, not the Kidde-Fenwal extinguisher involved here. Both Kidde-Fenwal and Ansul extinguishers are composed primarily of baking soda, and neither contains  $\text{NH}_4\text{H}_2\text{PO}_4$ . The Ansul MSDS listed  $\text{NH}_4\text{H}_2\text{PO}_4$  under "Physical Hazards" (agents that are incompatible with the fire extinguisher's ingredients). Dr. Hof

apparently misread the Ansul MSDS and concluded that  $\text{NH}_4\text{H}_2\text{PO}_4$  was an ingredient, rather than a hazardous combinant.

Only when Dr. Hof was confronted with the mistake during his deposition did he conclude that exposure to baking soda could cause respiratory problems:

The only other thing I could also think that I haven't said is that I would think common baking soda in a large enough concentration could probably combine with the airway water and produce carbonic acid that could be irritating to the surface.

Experts testifying on behalf of Iowa Fire and Kidde-Fenwal indicated that baking soda never becomes acidic when mixed with moisture (but rather weakly alkaline), and that baking soda would not burn or irritate tissue when mixed with moisture.

Iowa Fire and Kidde-Fenwal brought a joint motion to strike Dr. Hof's opinion that baking soda caused Delores Turner's reactive airway disorder. They contended that Dr. Hof's opinion was not scientifically reliable under the standards set forth in Daubert v. Merrell Dow Pharm., Inc., 509 U.S. 579, 593-94 (1993).

The Turners responded by contending that Daubert did not apply to Dr. Hof's causation opinion because he was a treating physician/fact witness. The Turners also argued that, even if Daubert applied, Dr. Hof's opinion was based on a differential diagnosis and therefore should be admitted. The Turners also presented literature that purportedly establishes a sufficient link between baking soda and respiratory problems, thereby rendering Dr. Hof's opinion scientifically reliable.

As the basis for the scientific link between baking soda and respiratory problems, the Turners offered a Poisonsdex reference for sodium bicarbonate stating that "[p]ulmonary irritation may occur following inhalation." The Turners also presented

an abstract of two case reports which suggested a link between RADS and exposures to high levels of "nonimmunogenic irritants." Finally, the Turners relied upon the MSDS for the Kidde-Fenwal fire extinguisher, which said "[b]reathing dust may irritate the nose [sic] and throat and cause coughing and chest discomfort." The MSDS also stated that "Respiratory Disease including Asthma and Emphysema" were medical conditions "generally aggravated by exposure." Dr. Hof did not rely upon any of those items to form his opinion that baking soda caused Delores Turner's reactive airway disorder.

The district court concluded that Dr. Hof's causation opinion did not satisfy Daubert's standards of scientific reliability, and granted the motion to strike the opinion. Having excluded Dr. Hof's causation opinion, the district court further concluded that no other evidence established a causal connection between the extinguisher exposure and Delores's injuries, and granted summary judgment dismissing all of the Turners' claims.

## DISCUSSION

### I. Exclusion of the Causation Opinion

We review the district court's exclusion of expert testimony for abuse of discretion. See Jaurequi v. Carter Mfg. Co., 173 F.3d 1076, 1081 (8th Cir. 1999).

The Turners contend that, because Dr. Hof testified as a treating physician, Daubert does not apply to his causation opinion. We disagree. Daubert ensures that all expert testimony is scientifically reliable before being submitted to the jury. A treating physician's expert opinion on causation is subject to the same standards of scientific reliability that govern the expert opinions of physicians hired solely for purposes of litigation. Cf. Kumho Tire Co., Ltd. v. Carmichael, 526 U.S. 137, 151

(1999) (holding that Daubert applies even when an expert's opinion relies on skill- or experience-based observation).

The Turners also contend that Dr. Hof performed a differential diagnosis which supports his causation opinion, and that a differential diagnosis is a scientific methodology or technique that satisfies Daubert. Daubert set forth four factors to guide district courts in resolving admissibility questions:

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

See Daubert, 509 U.S. at 593-94.

Most circuits have held that a reliable differential diagnosis satisfies Daubert and provides a valid foundation for admitting an expert opinion. The circuits reason that a differential diagnosis is a tested methodology, has been subjected to peer review/publication, does not frequently lead to incorrect results, and is generally accepted in the medical community. See Westberry v. Gislaved Gummi AB, 178 F.3d 257, 262-63 (4th Cir. 1999) (collecting cases); but see Moore v. Ashland Chem., Inc., 151 F.3d 269, 277-79 (5th Cir. 1998) (en banc), cert. denied, 526 U.S. 1064 (1999) (concluding that the district court did not abuse its discretion in excluding causation opinion based on differential diagnosis). We agree that a medical opinion about causation, based upon a proper differential diagnosis, is sufficiently reliable to satisfy Daubert.

In this case, however, Dr. Hof acknowledged that the differential diagnosis he performed was for the purpose of identifying Delores Turner's *condition*, not its *cause*. He admitted that he made no attempt to consider all the possible causes, or to exclude each potential cause until only one remained, or to consider which of two or more non-excludable causes was the more likely to have caused the condition.

As a treating physician, Dr. Hof wanted to identify Delores Turners' condition so he could treat it. Dr. Hof's diagnosis was, we believe, one which the medical community more properly identifies as "differential," see, e.g., Stedman's Medical Dictionary 474 (26th ed. 1995) (identifying differential diagnosis as a systematic comparison of symptoms to determine which of two or more *conditions* is the one from which a patient is suffering), rather than the type of *causal* diagnosis which the legal community calls "differential," see, e.g., Westberry, 178 F.3d at 262 (identifying differential diagnosis as a technique that identifies the cause of a medical condition by eliminating the likely causes until the most probable cause is isolated).

Unlike his diagnosis of condition, Dr. Hof's causation opinion was not based upon a methodology that had been tested, subjected to peer review, and generally accepted in the medical community. Significantly, Dr. Hof did not systematically rule out all other possible causes. He was clearly more concerned with identifying and treating Delores's condition than he was with identifying the specific substance that caused her condition. Dr. Hof arrived at his opinion about baking soda more as an afterthought, in an ad hoc manner, only after being informed that he had misidentified  $\text{NH}_4\text{H}_2\text{PO}_4$  as one of the extinguisher's ingredients. Therefore, although recognizing that a causation opinion based upon a proper differential diagnosis (one that systematically rules out other possible causes) satisfies Daubert, we conclude that the district court did not abuse its discretion in excluding Dr. Hof's particular causation opinion in this case.

The Turners next contend that Dr. Hof's causation opinion should be admitted because reliable, scientific literature establishes a causal link between baking soda and respiratory disease. The Turners rely on a Poisonsdex reference for sodium bicarbonate, a case report abstract, and the MSDS for the Kidde-Fenwal extinguisher.

We first note, as has the Third Circuit, that "we do not believe that a medical expert must always cite published studies on general causation in order to reliably conclude that a particular object caused a particular illness." Heller v. Shaw Indus., Inc., 167 F.3d 146, 155 (3rd Cir. 1999); see also Westberry, 178 F.3d at 262 (holding that a reliable differential diagnosis alone provides valid foundation for causation opinion, even when no epidemiological studies, peer-reviewed published studies, animal studies, or laboratory data are offered in support of the opinion). The first several victims of a new toxic tort should not be barred from having their day in court simply because the medical literature, which will eventually show the connection between the victims' condition and the toxic substance, has not yet been completed. If a properly qualified medical expert performs a reliable differential diagnosis through which, to a reasonable degree of medical certainty, all other possible causes of the victims' condition can be eliminated, leaving only the toxic substance as the cause, a causation opinion based on that differential diagnosis should be admitted.

In this case, the Turners relied upon a Poisonsdex reference that indicates "[p]ulmonary irritation may occur following inhalation [of baking soda]." However, Dr. Hof did not rely upon the Poisonsdex reference in formulating his opinion. Moreover, the Poisonsdex reference is not specific enough to establish a causal link between Delores Turner's hyperreactive airway disorder and baking soda.

The Turners also presented a case report abstract that suggests a link between RADS and exposures to high levels of "nonimmunogenic irritants." Again, Dr. Hof did not rely upon that case report abstract to form his opinion, and therefore did not discuss

what the abstract identifies as "nonimmunogenic irritants." The Turners presented no evidence demonstrating that baking soda could be considered a "nonimmunogenic irritant."<sup>5</sup>

The Turners also relied upon the MSDS for the Kidde-Fenwal extinguisher. The MSDS indicates that breathing dust may irritate the nose and throat, and that exposure to the extinguisher's contents may aggravate (not cause) respiratory diseases such as asthma and emphysema. Again, Dr. Hof did not rely upon the Kidde-Fenwal MSDS to formulate his opinion; nothing in the record demonstrates what scientific tests or information Kidde-Fenwal used to generate its MSDS. See Moore v. Ashland Chem., 151 F.3d at 278 (holding that an MSDS has limited scientific value when it is unknown what tests were conducted in generating the MSDS).

Even if we assumed that the Poindex reference, the case report abstract, and the MSDS, considered in combination, were sufficiently reliable to establish a causal link between baking soda and respiratory disease, those items would not save Dr. Hof's causation opinion from exclusion. Dr. Hof simply did not rely upon those items in formulating his opinion, and Dr. Hof did not scientifically eliminate other potential causes of Delores Turner's condition. In other words, while the literature relied upon by the Turners may "rule in" baking soda as a possible cause of respiratory disease, Dr. Hof failed to "rule out" all other possible causes. See National Bank of Commerce of El Dorado v. Associated Milk Producers, Inc., 22 F. Supp. 2d 942, 963 (E.D. Ark. 1998), aff'd, 191 F.3d 858 (8th Cir. 1999) (recognizing that an expert must "rule in" the suspected cause as well as "rule out" other possible causes).

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<sup>5</sup>Case reports are generally not considered reliable evidence of causation. See, e.g., Willert v. Otho Pharm. Corp., 995 F. Supp. 979, 981 (D. Minn. 1998); Casey v. Ohio Med. Prod., 877 F. Supp. 1380, 1385 (N.D. Cal. 1995); Schmaltz v. Norfolk & Western Ry. Co., 878 F. Supp. 1119, 1122 (N.D. Ill. 1995).

We conclude that the district court did not abuse its discretion by excluding Dr. Hof's opinion that Delores Turner's exposure to baking soda caused her hyperreactive airway disorder.

## II. Summary Judgment

We review the district court's grant of summary judgment de novo. Stuart v. General Motors Corp., 217 F.3d 621, 630 (8th Cir. 2000).

The district court concluded that, without Dr. Hof's causation opinion, the Turners could not prove their claims under Missouri law. See Chism v. W.R. Grace & Co., 158 F.3d 988, 991 (8th Cir. 1998) (explaining the causal requirements of Missouri law). We agree.

Under Missouri law, "a causal connection between an event and an injury may be inferred in cases in which a visible injury or a sudden onset of an injury occurs." Soper v. Bopp, 990 S.W.2d 147, 157 (Mo. Ct. App. 1999). However, when the injury is a "sophisticated" one, i.e., requiring surgical intervention or other highly scientific technique for diagnosis, proof of causation is not within the realm of lay understanding and must be established through expert testimony. See id.

The Turners' complaint sought recovery for the following injuries: asthma, reactive airways disease, airway hyperreactivity, and impaired function and damage to the respiratory system (nose, mouth, throat, lungs, and airway passages). Those injuries were all "sophisticated" ones, where any causal connection to the fire extinguisher exposure would be outside the realm of lay understanding. Without Dr. Hof's opinion that the fire extinguisher exposure caused the respiratory injuries, the Turners cannot prove causation.

The Turners also sought recovery for the "mental and emotional upset and anxiety and sleeplessness" that Delores allegedly suffered as a result of her respiratory injuries. Under Missouri law, emotional distress injuries are considered "sophisticated" ones, outside the realm of lay understanding. Those injuries must be established through expert testimony as well. See id.

Finally, the Turners claim that, even without Dr. Hof's opinion linking the fire extinguisher exposure to Delores's respiratory problems, they can nevertheless prove that Delores suffered a "physical assault" on her body when she was exposed to the extinguisher's contents. The Turners contend that they should at least be allowed to proceed to trial for the injuries caused by that "physical assault."

We agree. If Delores suffered "visible" injuries as a result of the exposure, her proof of causation does not necessarily depend on expert medical testimony. See id. The only "visible" injury that Delores suffered, however, was a skin rash. The Turners' complaint does not include a claim for skin rash, or any other injuries considered "visible" under Missouri law. All the injuries alleged in the Turners' complaint are considered "sophisticated," requiring expert testimony to prove causation.

We conclude that the district court did not err in granting summary judgment, and therefore affirm.

RICHARD S. ARNOLD, Circuit Judge, dissents.

A true copy.

Attest:

CLERK, U.S. COURT OF APPEALS, EIGHTH CIRCUIT.