

Court of Appeals of Texas, Texarkana.
Tara AUSTIN, et al., Appellants,
v.
KERR-McGEE REFINING CORP., et al., Appellees.
No. 06-99-00087-CV.

Submitted May 16, 2000.
Decided June 29, 2000.


Decedent's wife, individually and as executrix of his estate and as next friend of his parents and two minor children, brought a wrongful death action against manufacturers and distributors of mineral spirits to which decedent was exposed, alleging the spirits contained benzene that caused the chronic myelogenous leukemia (CML) that resulted in his death. The 276th Judicial District Court, Morris County, [William R. Porter, J.](#), entered summary judgment for manufacturers and distributors. Wife appealed. The Court of Appeals, [Cornelius, C.J.](#), held that: (1) plaintiffs' expert failed to establish his theory that all types of leukemia were related or interchangeable, and thus, his conclusion that exposure to benzene generally caused CML was not based on reliable foundation, and (2) expert who theorized that exposure to benzene caused decedent's CML did not affirmatively exclude with reasonable certainty other causes of the CML, and thus, expert's testimony was not sufficiently reliable.

Affirmed.

West Headnotes

[\[1\]](#) Evidence 157 99


[157](#) Evidence
[157IV](#) Admissibility in General
[157IV\(A\)](#) Facts in Issue and Relevant to Issues
[157k99](#) k. Relevancy in General. [Most Cited Cases](#)

Evidence 157 597

[157](#) Evidence
[157XIV](#) Weight and Sufficiency
[157k597](#) k. Sufficiency to Support Verdict or Finding. [Most Cited Cases](#)
Admissibility involves whether the evidence makes a fact more probable or less probable than it would be without the evidence, whereas legal sufficiency involves whether the evidence amounts to more than a scintilla.


[\[2\]](#) Evidence 157 508

[157](#) Evidence
[157XII](#) Opinion Evidence
[157XII\(B\)](#) Subjects of Expert Testimony
[157k508](#) k. Matters Involving Scientific or Other Special Knowledge in General. [Most Cited Cases](#)
To be relevant, proposed expert testimony is subject to the traditional analysis of relevancy under the evidentiary rules, and therefore it must be sufficiently tied to the facts of the case that it will aid the jury in resolving a factual dispute. [Rules of Evid., Rules 401, 402, 702.](#)

[\[3\]](#) Evidence 157 555.2

[157](#) Evidence
[157XII](#) Opinion Evidence
[157XII\(D\)](#) Examination of Experts
[157k555](#) Facts Forming Basis of Opinion
[157k555.2](#) k. Necessity and Sufficiency.

[Most Cited Cases](#)
To be reliable, the scientific techniques or principles underlying the expert's testimony must be well grounded in the methods and procedures of science. [Rules of Evid., Rule 702.](#)

[\[4\]](#) Evidence 157 555.2

[157](#) Evidence
[157XII](#) Opinion Evidence
[157XII\(D\)](#) Examination of Experts
[157k555](#) Facts Forming Basis of Opinion
[157k555.2](#) k. Necessity and Sufficiency.
[Most Cited Cases](#)

A determination of reliability is appropriate for both admissibility and legal sufficiency of expert's scientific opinion testimony. [Rules of Evid., Rule 702.](#)

[151](#) Appeal and Error 30 758.3(9)

[30](#) Appeal and Error

[30XII](#) Briefs

[30k758](#) Specification of Errors

[30k758.3](#) Requisites and Sufficiency

[30k758.3\(9\)](#) k. Verdict, Findings, or

Decision. [Most Cited Cases](#)

Appeal and Error 30 970(2)

[30](#) Appeal and Error

[30XVI](#) Review


[30XVI\(H\)](#) Discretion of Lower Court

[30k970](#) Reception of Evidence

[30k970\(2\)](#) k. Rulings on Admissibility of

Evidence in General. [Most Cited Cases](#)

If a defendant objects to the reliability of scientific evidence before or at trial, as he should to preserve a no-evidence objection, and the trial court excludes the evidence, the reviewing court views the trial court's decision by the lenient abuse of discretion standard, but if the trial court overrules the defendant's objection, the defendant may seek review of the trial court's decision in a sufficiency of the evidence point of error to an appellate court. [Rules of Evid., Rule 702.](#)

[161](#) Appeal and Error 30 1001(3)

[30](#) Appeal and Error

[30XVI](#) Review

[30XVI\(I\)](#) Questions of Fact, Verdicts, and Findings

[30XVI\(I\)2](#) Verdicts

[30k1001](#) Sufficiency of Evidence in


Support

[30k1001\(3\)](#) k. Total Failure of Proof.

[Most Cited Cases](#)

If scientific opinion testimony is admitted as reliable evidence, an appellate court may overturn the jury verdict, not on the ground that the trial court erred in admitting unreliable expert testimony, but on the ground that the evidence, under the same standard, is

unreliable for legal sufficiency purposes. [Rules of Evid., Rule 702.](#)

[171](#) Evidence 157 571(9)

[157](#) Evidence

[157XII](#) Opinion Evidence

[157XII\(F\)](#) Effect of Opinion Evidence


[157k569](#) Testimony of Experts

[157k571](#) Nature of Subject

[157k571\(9\)](#) k. Cause and Effect. [Most](#)

[Cited Cases](#)

If certain scientific evidence is admitted because wholesale exclusion of the evidence is inappropriate, the totality of causation evidence may nonetheless be legally insufficient to support a verdict. [Rules of Evid., Rule 702.](#)

[181](#) Negligence 272 404

[272](#) Negligence

[272XIII](#) Proximate Cause

[272k404](#) k. Dangerous Instrumentalities and Substances. [Most Cited Cases](#)

Products Liability 313A 15


[313A](#) Products Liability

[313AI](#) Scope in General

[313AI\(A\)](#) Products in General

[313Ak15](#) k. Proximate Cause and Foreseeable

Injury; Intended or Foreseeable Use. [Most Cited Cases](#)
In toxic tort cases, "general causation" is whether a substance is capable of causing a particular injury or condition in the general population, while "specific causation" is whether a substance caused a particular individual's injury.

[191](#) Evidence 157 555.2

[157](#) Evidence

[157XII](#) Opinion Evidence

[157XII\(D\)](#) Examination of Experts

[157k555](#) Facts Forming Basis of Opinion

[157k555.2](#) k. Necessity and Sufficiency.

[Most Cited Cases](#)

A trial court's determination of admissibility of

scientific evidence requires application of the *Robinson* factors for determining reliability of underlying techniques or theories as well as application of the *Havner* statistical-significance guidelines for evaluating reliability. [Rules of Evid., Rule 702.](#)

[10] Trial 388 ↪98

388 Trial

[388IV](#) Reception of Evidence

[388IV\(C\)](#) Objections, Motions to Strike Out, and Exceptions

[388k98](#) k. Ruling or Order. [Most Cited Cases](#)

Even assuming trial court's letter to parties in toxic tort case, stating that its decision to exclude plaintiffs' scientific evidence of causation indicated that the evidence satisfied the *Robinson* test for reliability, its final judgment, excluding the evidence on basis of both *Robinson* test and *Havner* statistical-significance guidelines, controlled.

[11] Judgment 228 ↪527

228 Judgment

[228XII](#) Construction and Operation in General

[228k527](#) k. Construction with Reference to

Decision or Findings. [Most Cited Cases](#)

A formal judgment, plain and unambiguous in its terms, speaks for itself and is not to be impeached by or interpreted in light of prior statements or acts of the court.

[12] Trial 388 ↪43

388 Trial

[388IV](#) Reception of Evidence

[388IV\(A\)](#) Introduction, Offer, and Admission of Evidence in General

[388k43](#) k. Admission of Evidence in General.

[Most Cited Cases](#)

The decision to admit evidence rests within the sound discretion of the trial court.

[13] Appeal and Error 30 ↪970(2)

30 Appeal and Error

[30XVI](#) Review

[30XVI\(H\)](#) Discretion of Lower Court

[30k970](#) Reception of Evidence

[30k970\(2\)](#) k. Rulings on Admissibility of

Evidence in General. [Most Cited Cases](#)

The trial court's decision to exclude evidence is reviewed under the lenient abuse of discretion standard.

[14] Appeal and Error 30 ↪946

30 Appeal and Error

[30XVI](#) Review

[30XVI\(H\)](#) Discretion of Lower Court

[30k944](#) Power to Review

[30k946](#) k. Abuse of Discretion. [Most Cited](#)

[Cases](#)

To determine whether a trial court abused its discretion, the reviewing court determines whether the trial court acted without reference to guiding rules or principles; in other words, it determines whether the act was arbitrary or unreasonable.

[15] Appeal and Error 30 ↪946

30 Appeal and Error

[30XVI](#) Review

[30XVI\(H\)](#) Discretion of Lower Court

[30k944](#) Power to Review

[30k946](#) k. Abuse of Discretion. [Most Cited](#)

[Cases](#)

The reviewing court will not conclude that the trial court abused its discretion merely because the reviewing court, in the same circumstances, would have ruled differently.

[16] Evidence 157 ↪555.2

157 Evidence

[157XII](#) Opinion Evidence

[157XII\(D\)](#) Examination of Experts


[157k555](#) Facts Forming Basis of Opinion

[157k555.2](#) k. Necessity and Sufficiency.

[Most Cited Cases](#)

In determining reliability, the trial court is not to determine the truth or falsity of the expert's opinion; rather, the trial court's role is to determine whether the expert's opinion is relevant and whether the methods and research underlying the opinion are reliable. [Rules](#)

[of Evid., Rule 702.](#)

[17] Evidence 157  **555.2**

[157 Evidence](#)

[157XII Opinion Evidence](#)


[157XII\(D\) Examination of Experts](#)

[157k555 Facts Forming Basis of Opinion](#)

[157k555.2 k. Necessity and Sufficiency.](#)

[Most Cited Cases](#)

If the foundational data underlying scientific opinion testimony are unreliable, an opinion drawn from that data is likewise unreliable. [Rules of Evid., Rule 702.](#)

[18] Evidence 157  **555.2**

[157 Evidence](#)

[157XII Opinion Evidence](#)


[157XII\(D\) Examination of Experts](#)

[157k555 Facts Forming Basis of Opinion](#)

[157k555.2 k. Necessity and Sufficiency.](#)

[Most Cited Cases](#)

Even when the underlying scientific data are sound, an expert's testimony is unreliable if the expert draws conclusions from that data based on flawed methodology; a flaw in the expert's reasoning from sound data may render reliance on a study unreasonable and render the inferences drawn therefrom dubious. [Rules of Evid., Rule 702.](#)

[19] Evidence 157  **555.2**

[157 Evidence](#)

[157XII Opinion Evidence](#)


[157XII\(D\) Examination of Experts](#)

[157k555 Facts Forming Basis of Opinion](#)

[157k555.2 k. Necessity and Sufficiency.](#)

[Most Cited Cases](#)

Rather than focus on the expert's conclusions, the trial court in determining whether to admit scientific opinion testimony should focus on the reliability of the principles, research, and methods underlying them, as well as on the expert's reasoning and methodology. [Rules of Evid., Rule 702.](#)

[20] Evidence 157  **555.10**

[157 Evidence](#)

[157XII Opinion Evidence](#)


[157XII\(D\) Examination of Experts](#)

[157k555 Facts Forming Basis of Opinion](#)

[157k555.10 k. Medical Testimony.](#) [Most](#)

[Cited Cases](#)

Plaintiffs' expert failed to establish his theory that all types of leukemia were related or interchangeable, and thus, his conclusion that exposure to benzene generally caused chronic myelogenous leukemia (CML) was not based on reliable foundation in toxic tort wrongful death action, where no study on which expert relied showed that benzene exposure caused CML specifically, and there was no evidence that expert's theory was tested or espoused by other scientists. [Rules of Evid., Rule 702.](#)

[21] Evidence 157  **555.10**

[157 Evidence](#)

[157XII Opinion Evidence](#)

[157XII\(D\) Examination of Experts](#)

[157k555 Facts Forming Basis of Opinion](#)

[157k555.10 k. Medical Testimony.](#) [Most](#)

[Cited Cases](#)

Plaintiffs' expert in wrongful death action who theorized that exposure to benzene caused decedent's chronic myelogenous leukemia (CML) did not affirmatively exclude with reasonable certainty other causes of the CML, and thus, expert's testimony was not sufficiently reliable; plaintiffs conceded that the mineral spirits to which decedent was exposed was never tested for benzene and that he was exposed to radiation, and record did not contain information as to amount of such radiation exposure or a full explanation for expert's decision to exclude radiation as a cause, despite his suggestion that it may have been an alternate cause. [Rules of Evid., Rule 702.](#)

[22] Negligence 272  **404**

[272 Negligence](#)

[272XIII Proximate Cause](#)

[272k404 k. Dangerous Instrumentalities and Substances.](#) [Most Cited Cases](#)

Products Liability 313A  **15**

[313A](#) Products Liability

[313AI](#) Scope in General

[313AI\(A\)](#) Products in General

[313Ak15](#) k. Proximate Cause and Foreseeable

Injury; Intended or Foreseeable Use. [Most Cited Cases](#)
Specific causation for purposes of a toxic tort case requires that a plaintiff show that the injured person is similar to those in the epidemiological studies, that he was exposed to the same substance, and that the exposure or dosage levels were comparable to or greater than those in the studies.

[\[23\]](#) Negligence 272  306

[272](#) Negligence

[272VIII](#) Dangerous Situations and Strict Liability

[272k306](#) k. Dangerous Substances. [Most Cited Cases](#)

Products Liability 313A  1

[313A](#) Products Liability

[313AI](#) Scope in General

[313AI\(A\)](#) Products in General

[313Ak1](#) k. Nature and Elements in General.

[Most Cited Cases](#)

It is fundamental that a plaintiff in a toxic tort case must prove the levels of exposure that are dangerous to humans generally, and must also prove the actual level of exposure of the injured party to the defendant's toxic substances.

[\[24\]](#) Negligence 272  1661

[272](#) Negligence

[272XVIII](#) Actions

[272XVIII\(C\)](#) Evidence

[272XVIII\(C\)5](#) Weight and Sufficiency

[272k1661](#) k. Dangerous Situations and Strict Liability. [Most Cited Cases](#)

Products Liability 313A  82.1

[313A](#) Products Liability

[313AII](#) Actions

[313Ak82](#) Weight and Sufficiency of Evidence

[313Ak82.1](#) k. In General. [Most Cited Cases](#)

Guesses, even if educated, are insufficient to prove the level of exposure in a toxic tort case. [Rules of Evid., Rule 702.](#)

*282 Steve R. Baughman, Baron & Budd, P.C., Dallas, for appellants.

James E. Essig, Locke, Liddell & Sapp, LLP, Houston, [John B. Hall](#), Houston, [James N. Haltom](#), Darby Doan, Patton, Haltom, Roberts, Texarkana, [F. Walter Conrad](#), [Ty Buthod](#), Sessa Kalapatapu, Baker & Botts, LLP, Houston, [Thomas B. Taylor](#), Taylor & Eggleston, Houston, for appellees.

Before [CORNELIUS](#), C.J., [GRANT](#) and [ROSS](#), JJ.

*283 o P I N I O N

Opinion by Chief Justice [CORNELIUS](#).

Tara Austin and other aligned parties appeal from the trial court's ruling excluding their experts' scientific evidence of medical causation. They contend that the trial court erred in applying [Merrell Dow Pharm., Inc. v. Havner, 953 S.W.2d 706 \(Tex.1997\)](#), in determining the admissibility of their causation evidence and, in the alternative, in excluding their causation evidence on the basis that it failed to satisfy the requirements of [Havner](#). After carefully reviewing the record, we conclude that the trial court did not abuse its discretion in excluding the evidence. Accordingly, we affirm the trial court's judgment.

From 1983 to 1991, Richard Alan Austin worked in the pipe inspection industry near Lone Star, Texas, readying pipes for use on oil rigs. From 1983 to 1985, Austin worked for Tuboscope Vetco, International, cleaning pipes for inspection. From 1985 to 1986, he worked for A.D. Surratt Pipe Inspection Company, where he also cleaned pipes. To clean the pipes, he placed them in a waist-high vat of cleaning solvents, generically called "mineral spirits." In 1986, Austin left Surratt and returned to Tuboscope where, in addition to cleaning pipes, he inspected pipes for imperfections by spraying them with mineral spirits and examining them under a florescent light in an enclosed inspection booth. In 1991, Austin left the pipe inspection industry to work elsewhere.

In 1994, Austin was diagnosed with chronic myelogenous leukemia (CML). He died from the disease within four months of the diagnosis. In 1996, Austin's wife, Tara Austin, individually and as executrix of Austin's estate, and as next friend of Austin's parents and two minor children (collectively, the Austins), brought a wrongful death action against Kerr-McGee Refining Corp., Irvin Enterprises, Inc., Basis Petroleum, Inc., and Delta Distributors, Inc. (collectively, Kerr-McGee), asserting claims of negligence, gross negligence, strict liability, and breach of implied warranties. The Austins alleged that the mineral spirits the defendants manufactured and distributed, to which Austin was exposed while working at Tuboscope and Surratt, contained benzene, a harmful chemical that caused Austin's CML and death.

In January 1999, Kerr-McGee moved to exclude the Austins' experts' scientific and medical testimony, contending that the testimony was unreliable under *E.I. du Pont de Nemours & Co. v. Robinson*, 923 S.W.2d 549 (Tex.1995), and *Havner*. The parties agreed that if the court granted the motion, Kerr-McGee would be deemed to have moved for summary judgment based on no evidence of medical causation. The Austins also agreed that if the court granted the motion, summary judgment would be appropriate because they would have no evidence of causation. The trial court held a lengthy hearing on the motion to exclude, during which the Austins' primary expert, Dr. Daniel Teitelbaum, offered the opinion that Austin's exposure to benzene caused him to develop CML. At the conclusion of the hearing, the court granted the motion on the basis of Rule 702 of the Texas Rules of Evidence and the Texas Supreme Court's decisions in both *Robinson* and *Havner*. Based on its decision to exclude the Austins' experts' testimony and on the parties' stipulation, the court granted summary judgment for Kerr-McGee.

The Austins first contend that the trial court properly relied on *Robinson* but abused its discretion in relying on *Havner* as a basis for excluding their experts' testimony. They contend that *Robinson* prescribes factors for evaluating the reliability of expert testimony for purposes of determining its *admissibility*, while

Havner prescribes additional "statistical-significance" requirements for evaluating reliability for purposes of determining its *legal sufficiency*. The Austins recognize that both *Robinson* and *Havner* require courts to evaluate the reliability of evidence, but *284 they argue that a determination of reliability for separate and distinct purposes calls for the application of separate and distinct standards. Because the evidence was excluded, the Austins contend that the trial court should have determined reliability based on the test for reliability as set out in *Robinson* only.

[1] Although overlapping, in that both types of analyses examine the reliability of the evidence, in theory the admissibility and sufficiency reviews are distinct because they involve the resolution of different issues: Admissibility involves whether the evidence makes a fact more probable or less probable than it would be without the evidence, whereas legal sufficiency involves whether the evidence amounts to more than a scintilla. However, *Havner* requires that both reviews be governed by the same test of reliability; therefore, the distinction between the two reviews has little practical effect.

Robinson and *Havner* are both toxic tort cases. In *Robinson*, the plaintiffs claimed that a fungicide damaged their pecan orchard; in *Havner*, the plaintiff claimed that her use of an anti-nausea drug during pregnancy caused her child's birth defects. The plaintiffs in both cases presented experts testifying that the chemical at issue caused injuries. See *Robinson*, 923 S.W.2d at 551; *Havner*, 953 S.W.2d at 708. In *Robinson*, the trial court excluded the expert testimony and granted a directed verdict for the defendants; in *Havner*, the trial court admitted the expert testimony. See *Robinson*, 923 S.W.2d at 558; *Havner*, 953 S.W.2d at 709. On appeal, the issue in *Robinson* was whether the court abused its discretion in excluding the testimony, while in *Havner* the issue was whether the admitted testimony was sufficient to show causation.

[2][3] In *Robinson*, the Texas Supreme Court addressed the proper standard for the admission of expert testimony under Texas Rule of Evidence 702. See *Robinson*, 923 S.W.2d at 556. Rule 702 provides, If scientific, technical, or other 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.

[Tex.R. Evid. 702](#). The court held that [Rule 702](#) requires the proponent to show not only that an expert is qualified, but also that the expert's testimony is relevant to the issues in the case and is based on a reliable foundation. [Robinson, 923 S.W.2d at 556](#). To be relevant, the proposed testimony is subject to the traditional analysis of relevancy under [Texas Rules of Evidence 401](#) and [402](#), and therefore it must be sufficiently tied to the facts of the case that it will aid the jury in resolving a factual dispute. To be reliable, the scientific techniques or principles underlying the expert's testimony must be well grounded in the methods and procedures of science. [Id. at 557](#). The court set out the following nonexhaustive list of factors a trial court may consider in determining the reliability of the underlying techniques or theories and thus the admissibility of an expert's testimony under [Rule 702](#): 1) the extent to which the theory has been or can be tested; 2) the extent to which the techniques rely on the subjective interpretation of the expert; 3) whether the theories have been subjected to peer review and/or publication; 4) the techniques' potential rate of error; 5) whether the underlying theories or techniques have been generally accepted as valid by the relevant scientific community; and 6) the nonjudicial uses which have been made of the theories or techniques.

In [Havner](#), the Texas Supreme Court addressed whether the evidence at issue in that case was legally sufficient, i.e., some evidence, to support the jury's finding of causation. See [Havner, 953 S.W.2d at 711](#). The evidence in [Havner](#), which the trial *285 court admitted, was scientific expert testimony. See [id.](#) The court noted that under a traditional legal sufficiency review, a reviewing court is to consider the evidence in the light most favorable to the verdict. The court said, however, that in conducting a legal sufficiency review, for a reviewing court to *not* look beyond the expert's testimony to determine reliability would be to engage in a “meaningless exercise of looking to see only what words appear in the transcript of the testimony, not

whether there is in fact some evidence.” [Id. at 712](#). Thus, the court held that when determining whether expert testimony is some evidence, the reviewing court must undertake an almost *de novo*-like review and, like the trial court, look beyond the expert's bare testimony to determine the *reliability* of the theory underlying it.

The court then undertook an examination of the reliability of the evidence on which Havner's experts relied. In determining reliability, the court stated, “While [Rule 702](#) deals with admissibility of evidence, it offers substantive guidelines in determining if the expert testimony is some evidence of probative value.” [Id.](#) Thus, the [Havner](#) court applied the same factors it had set out in [Robinson](#), stating that although the issue in [Robinson](#) was the admission of evidence, “the same factors may be applied in a no evidence review of scientific evidence.” [Id. at 714](#).

[4][5] We know from [Havner](#) that a determination of reliability is appropriate for both admissibility and legal sufficiency. See [Havner, 953 S.W.2d at 712](#). This Court has previously recognized [Havner](#) as having adopted the same test for the two inquiries. See [Minnesota Mining and Mfg. Co. v. Atterbury, 978 S.W.2d 183 \(Tex.App.-Texarkana 1998, pet. denied\)](#); see also Lucinda M. Finley, *Guarding the Gate to the Courthouse: How Trial Judges are Using Their Evidentiary Screening Role to Remake Tort Causation Rules*, [49 dePaul L. Rev. 335](#), 376 (Winter 1999) (recognizing this and other Texas courts as having interpreted [Daubert](#) as “eroding the distinction between the admissibility of evidence and the sufficiency of the evidence to prove causation”). We stated in [Atterbury](#) that under [Robinson](#) and [Havner](#), a defendant has “two bites” at the same “[Daubert](#) apple.” [Atterbury, 978 S.W.2d at 192](#). If the defendant objects to the reliability of the evidence before or at trial, as he should to preserve a no-evidence objection, and the trial court excludes the evidence, the reviewing court views the trial court's decision by the lenient abuse of discretion standard. If the trial court overrules the defendant's objection, the defendant may seek review of the trial court's decision in a sufficiency of the evidence point of error to an appellate court. [Id.](#)

[FN1. Daubert v. Merrell Dow Pharm., Inc.,](#)

[509 U.S. 579, 113 S.Ct. 2786, 125 L.Ed.2d 469 \(1993\).](#)

[6][7] The distinction between the legal sufficiency standard and the admissibility standard is blurred because both standards are governed by the same test for reliability. If the testimony is admitted as reliable evidence, an appellate court may overturn the jury verdict, not on the ground that the trial court erred in admitting unreliable expert testimony, but on the ground that the evidence, under the same standard, is unreliable for legal sufficiency purposes. Despite the overlap between these standards, if certain evidence is admitted because wholesale exclusion of the evidence is inappropriate, the totality of causation evidence may nonetheless be legally insufficient to support a verdict. [Havner, 953 S.W.2d at 713.](#) Expert evidence may be admissible but insufficient when a party uses multiple experts or relies on other proof to establish an element of a claim. See, e.g., [Daubert, 509 U.S. at 596, 113 S.Ct. 2786.](#) But [Havner](#) failed to explain how the same evidence could be admissible as reliable but still be insufficient, since courts are to apply the *286 same [Robinson](#) factors in evaluating reliability for both admissibility and sufficiency.

The debate primarily has been over whether the [Robinson](#) factors should apply in a legal sufficiency review. See, e.g., Jennifer Murray, Note, *Reformation of the Legal Sufficiency Standard for Expert Testimony: Expert Testimony Must be Reliable and Epidemiological Evidence Must Show Double the Risk: Merrell Dow Pharm., Inc. v. Havner*, 40 Tex. Sup.Ct. J. 251, 270 (July 9, 1997), 29 tex. Tech. L.Rev. 251 (1998). The argument is that the appellate court should not determine reliability, because the appropriate means to challenge the reliability of the evidence is through cross-examination. The Austins argue the reverse, that a trial court should not consider [Havner](#)'s statistical-significance requirements when determining whether evidence is admissible under [Robinson](#). Having carefully considered the facts and holdings of [Robinson](#) and [Havner](#), we are unable to conclude that [Havner](#) requires a standard separate and distinct from that in [Robinson](#) that a trial court must ignore in determining admissibility.

[FN2, 953 S.W.2d 706 \(Tex.1997\).](#)

[8] In [Havner](#), before applying the [Robinson](#) factors to the evidence, the court was concerned with “arm[ing] [itself] with some of the basic principles employed by the scientific community in conducting studies...” [Havner, 953 S.W.2d at 724.](#) The court noted that in toxic tort cases, causation is discussed in terms of general and specific causation. See [id. at 714.](#) General causation is whether a substance is capable of causing a particular injury or condition in the general population, while specific causation is whether a substance caused a particular individual's injury. The court explained that in the absence of direct scientifically-reliable proof of causation, claimants may show causation with epidemiological studies, studies that examine existing populations to determine whether an association exists between a disease or condition and a factor suspected of causing that disease or condition. See [id. at 715.](#) Based on the standards generally accepted among epidemiologists, the court advised that to be reliable, epidemiological evidence should have a relative risk of 2.0, meaning that the risk of an injury or condition in the exposed population should be more than double the risk in the unexposed or control population. See [id. at 717-18.](#) It also noted that the generally accepted significance level or confidence level in epidemiological studies is 95%, which means that if the study were repeated numerous times, the confidence interval would indicate the range of relative risk values that would result 95% of the time. See [id. at 724.](#) The court stated that it would be unwise to depart from this generally accepted confidence level. Importantly, the court did not hold that a relative risk of more than 2.0 is a litmus test or that a single epidemiological test equates with reliability for legal sufficiency. The court noted that an epidemiological study shows only an association and that there may in fact be no causal relationship even if the relative risk is high. See [id. at 718.](#)

The Austins contend that [Havner](#)'s statistical-significance requirements, the 2.0 relative risk requirement and the 95% confidence interval requirement, have nothing to do with admissibility in the [Robinson/Daubert](#) sense, yet on remand [Daubert](#), a case that concerned the admissibility of evidence,

preceded Havner in applying the 2.0 relative risk requirement as a standard for statistical significance. See Daubert v. Merrell Dow Pharms., Inc., 43 F.3d 1311, 1320 (9th Cir.1995). In discussing the 2.0 requirement, Havner in fact consulted the Daubert case. See Havner, 953 S.W.2d at 715-16.

[9] We cannot conclude, where the evidence the proponent seeks to have admitted is the proponent's only evidence of causation, that a court evaluating the reliability of the evidence for admissibility must *287 apply a different test than the court evaluating the reliability of the evidence for legal sufficiency. Instead, we conclude that a trial court could not properly review the reliability of scientific testimony based on epidemiological studies if it were required to ignore the basic principles articulated in Havner that the scientific community employs in conducting such studies. Thus, we conclude that a trial court's determination of admissibility requires application of the Robinson factors as well as application of Havner's statistical-significance guidelines. See Texas Workers' Compensation Ins. Fund v. Lopez, 21 S.W.3d 358, 366-67 (Tex.App.-San Antonio 2000, no pet. h.) (discussing Havner's statistical-significance requirements in determining the reliability and admissibility of causation evidence admitted at trial).

In the trial court's final judgment excluding the Austins' experts' testimony, the court stated that it was excluding the evidence on the basis of both Havner and Robinson. The Austins do not argue that the court erred in excluding the evidence on the basis of Robinson. Instead, they contend that the trial court necessarily determined that their evidence of causation satisfied the admissibility requirements of Robinson, in light of a letter the court wrote to the parties in which the court stated that its decision to exclude the evidence rested almost entirely on the lack of "Havner-shrouded epidemiology." The Austins argue that the trial court necessarily and properly concluded that the evidence satisfied Robinson, but erred only in reviewing the evidence against Havner's epidemiological, statistical-significance requirements.

[10][11] The Austins overlook the fact that the court's letter also stated that the motion to exclude would be

granted under the guidelines of both Havner and Robinson. But even if we assume the letter indicates the court found that the evidence satisfied Robinson's test for reliability, the court's final judgment controls because "a formal judgment, plain and unambiguous in its terms, speaks for itself and is not to be impeached by or interpreted in light of prior statements or acts of the court." Kates v. Smith, 556 S.W.2d 630, 632 (Tex.Civ.App.-Texarkana 1977, no writ). The final judgment excluded the evidence on the basis of both Havner and Robinson. The Austins contend that the trial court erred only in excluding their evidence of causation on the basis that it failed to satisfy the statistical-significance requirements of Havner.

[12][13][14][15] The decision to admit evidence rests within the sound discretion of the trial court. Robinson, 923 S.W.2d at 558; Atterbury, 978 S.W.2d at 192. We review the trial court's decision to exclude evidence under the lenient abuse of discretion standard. Robinson, 923 S.W.2d at 558; Atterbury, 978 S.W.2d at 192. To determine whether a trial court abused its discretion, we determine whether the trial court acted without reference to guiding rules or principles; in other words, we determine whether the act was arbitrary or unreasonable. Goode v. Shoukfeh, 943 S.W.2d 441, 446 (Tex.1997); Robinson, 923 S.W.2d at 558; Downer v. Aquamarine Operators, Inc., 701 S.W.2d 238, 241-42 (Tex.1985). We will not conclude that the trial court abused its discretion merely because we, in the same circumstances, would have ruled differently. Robinson, 923 S.W.2d at 558. The trial court, however, has no discretion to erroneously apply the law. In re Epic Holdings, Inc., 985 S.W.2d 41, 57 (Tex.1998); In re Perritt, 973 S.W.2d 776, 780 (Tex.App.-Texarkana 1998, no pet.)

FN3. The Austins ask that we apply the no-evidence standard because in excluding the evidence the trial court, they contend, relied only on Havner, a case that applied the no-evidence standard. The trial court relied on both Robinson and Havner, and because Havner involved a challenge to the legal sufficiency of admitted evidence, the no-evidence standard was appropriate in

Havner, but it is inappropriate here.

*288 [16][17][18][19] In determining reliability, the trial court is not to determine the truth or falsity of the expert's opinion. Rather, the trial court's role is to determine whether the expert's opinion is relevant and whether the methods and research underlying the opinion are reliable. Robinson, 923 S.W.2d at 557; Atterbury, 978 S.W.2d at 188. If the foundational data underlying opinion testimony are unreliable, an opinion drawn from that data is likewise unreliable. Even when the underlying data are sound, an expert's testimony is unreliable if the expert draws conclusions from that data based on flawed methodology. A flaw in the expert's reasoning from sound data may render reliance on a study unreasonable and render the inferences drawn therefrom dubious. Havner, 953 S.W.2d at 714; Atterbury, 978 S.W.2d at 188. Therefore, rather than focus on the expert's conclusions, the trial court should focus on the reliability of the principles, research, and methods underlying them, as well as on the expert's reasoning and methodology. Robinson, 923 S.W.2d at 557.

Teitelbaum's theory of general causation is that exposure to benzene increases the risk for the development of all types of leukemia; CML is a type of leukemia; therefore, exposure to benzene causes CML. In forming his opinion, Teitelbaum reviewed seven published epidemiological studies, six of which he testified show, to the level required for statistical significance under Havner, that exposure to benzene causes all types of leukemia. He said the seventh study shows that exposure to benzene causes a sub-category of leukemia, myeloid leukemia.

[20] Kerr-McGee contends that Teitelbaum's conclusion is based on a reliable foundation only if the epidemiological evidence shows a relationship between benzene exposure and CML specifically. We disagree.

Teitelbaum's conclusion may be reliable if it is supported by evidence that shows what Teitelbaum contends it shows, that there is an association between benzene exposure and the development of all types of leukemia generally. We believe, however, that there must be a sufficient link between benzene exposure and CML specifically, and thus that Teitelbaum must show

further that all types of leukemia are related or interchangeable. Teitelbaum attempts to accomplish this by showing that benzene's effect is to cause a bone marrow cell mutation that results in all types of leukemia equally, including CML.

In forming his opinion that exposure to benzene causes all types of leukemia, Teitelbaum first relied on the "Bond" study, which studied several hundred individuals who experienced potential occupational exposure to various levels of benzene. Of the individuals studied, four deaths attributable to leukemia were observed. Two of the leukemias were classified as acute myelogenous leukemia (AML), one as myelomonocytic leukemia, and the fourth was not classified. Teitelbaum interpreted the study as showing a statistically-significant relationship between benzene and myelogenous leukemia. The authors of the study did in fact state that while the four cases of leukemia observed did not represent a statistically-significant excess of total leukemia, those cases did represent a significant excess of mortality from myelogenous leukemia. However, in their conclusions, the authors stated even more specifically that the study provides support for the theory that benzene exposure is associated with *acute*, in contrast to chronic, myelogenous leukemia. Moreover, they warned that several factors, including the problem of a small number of events and competing exposures to other potentially hazardous materials, complicated reliance even on this narrow conclusion. They noted that three of the four individuals who died from leukemia may have been exposed to other materials present in their work areas; *289 thus, they concluded that some additional factor may have been important in the cause of those deaths. Finally, in the preface to the study, the authors reflected a need to associate benzene with specific types of leukemia, rather than with leukemia generally, stating, "[While] [t]here is a large amount of evidence to support the hypothesis that acute myelocytic leukaemia may be a latent effect of overexposure to benzene[,] [d]ata to support increased risks of *other types of leukaemia* or other cancers have been reported, but are in need of further evaluation." (Emphasis added.) Importantly, in the abstract preceding the study, the study was noted as having concluded, "Analyses by work area, duration of

exposure, and cumulative dose index did not show patterns suggestive of a causal association between exposure to benzene and any particular category of death.”

[FN4](#). G.G. Bond, et al., *An Update of Mortality Among Chemical Workers Exposed to Benzene*, *British Journal of Industrial Medicine* 685 (1986).

Teitelbaum also based his theory in part on the “Decoufle” study, a study conducted of 259 employees of a chemical plant where benzene was used. Four cancers of the lymphatic and hematopoietic tissues were observed, which showed a statistically significant excess of mortality in that category, which includes leukemia and other diseases. Of the four cases, three were charged to leukemia. The authors believed it was important to further investigate the specific types of leukemia and noted that of the three cases of leukemia, one was chronic lymphocytic, one was acute monocytic, and the other was myelomonocytic. Thus, none was CML. The study did not make clear whether the three observed cases of leukemia resulted in a statistically-significant excess of mortality from leukemia specifically. However, the authors did conclude that their findings were consistent with previous reports of leukemia following occupational exposure to benzene.

[FN5](#). Pierre Decoufle, et al., *Mortality Among Chemical Workers Exposed to Benzene and Other Agents*, 30 *Environmental Research* 16 (1983).

Teitelbaum also relied on the “Paxton” article, an update of an earlier study that reported a statistically-significant number of leukemias in workers occupationally exposed to benzene in the production of Pliofilm. The addition of five new deaths from leukemia as a result of the update again resulted in a statistically-significant excess of mortality from leukemia. The study did not assess the statistical significance of particular leukemias, so no statistically-significant excess of CML or any other

type of leukemia was noted. In the first study, nine types of leukemia were observed, one of which was CML. Of the new ones, two were attributed to AML, one to CML, and two were unspecified. The deaths occurred exclusively among individuals who commenced work in 1950 or earlier, which the author suggests could indicate a response to high levels of benzene exposure that occurred during the early years of the manufacturing process prior to an improvement in industrial hygiene and a decrease in benzene levels.

The author suggests this is consistent with the hypothesis that exposure in excess of fifty parts per million years is necessary for leukemogenesis. A part per million year is the number of parts per million per year multiplied by the number of years of exposure.

[FN6](#). Mary B. Paxton, et al., *Leukemia Risk Associated with Benzene Exposure in a Pliofilm Cohort: I. Mortality Update and Exposure Distribution*, 14 *Risk Analysis* 147 (1994).

The Travis study concluded there was a statistically-significant increase in all lymphohematopoietic disorders. Eighty-two patients with hematopoietic neoplasms and related disorders were identified. Thirty-two cases of AML and nine cases of chronic granulocytic leukemia (CGL), which Teitelbaum testified is a description previously used for CML, were observed. The others were nonleukemia.

The study *290 stated that preliminary analysis indicates that the age and sex-adjusted relative risk of all confirmed lymphohematopoietic disorders was statistically significant.

[FN7](#). Lois B. Travis, et al., *Hematopoietic Malignancies and Related Disorders Among Benzene-Exposed Workers in China*, 14 *Leukemia and Lymphoma* 91 (1994).

The Yin study identified excess mortality and incidence of lymphohematopoietic malignancies, which includes many malignancies including leukemia, and related disorders among workers exposed to benzene in a variety of occupations. It concluded that there were

statistically-significant excesses of leukemia generally and, more specifically, myelogenous leukemia in contrast to lymphocytic, and even more specifically, AML. The study showed, however, that the increase in lymphocytic leukemia and CML was not statistically significant.

[FN8](#). Song-Nian Yin, et al., *A Cohort Study of Cancer Among Benzene-Exposed Workers in China: Overall Results*, 29 *American Journal of Industrial Medicine* CINE 227 (1996).

The Austins also relied on two studies from Italy and France, whose findings were similar to the other studies.

Thus, no study on which Teitelbaum relies has recognized or posited that exposure to benzene causes CML specifically. Some find specific relationships between benzene and AML that reach the level of statistical significance. A few conclude that exposure to benzene causes leukemia generally.

As we stated, Teitelbaum must further show that all types of leukemia are related or interchangeable so that if exposure to benzene causes all types of leukemia generally, such exposure causes CML specifically. The Austins contend that biological evidence strongly corroborates the epidemiological findings that benzene causes all forms of leukemia by showing that benzene causes a mutation in the bone marrow stem cell, from which mutation all types of leukemia, including CML, derive.

The Austins point to the testimony of Teitelbaum, who testified that benzene causes genetic mutations in the pluripotential stem cell, the cell from which all bone marrow cells through division derive. Teitelbaum said that benzene causes the stem cell to mutate and when this cell divides, the new cells carry the mutation. He testified that when these mutated cells receive additional "hits" from exposure to carcinogens, such as from further exposure to benzene or exposure to radiation, the cells further mutate and eventually a leukemia can be recognized. Thus, he contends that all types of leukemia develop at least as a result of the

initial exposure to benzene.

As support for Teitelbaum's explanation, the Austins cite a flow chart they created for purposes of trial that illustrates the concept Teitelbaum described. They also point to a paper written by Dr. Philip Fialkow, on which Teitelbaum relied. They cite a passage in which Fialkow states the following:

CML and at least one form of AML develop clonally in stem cells that have multipotent differentiative expression.... [M]yeloid leukemogenesis is a multistep process during which a clone of cells acquires a succession of abnormalities that ultimately leads through subclonal evolution to overt leukemia.

Philip J. Fialkow, *Clonal Evolution of Human Myeloid Leukemias*, *Genes and Cancer* 215 (1984). With this language, Fialkow seems to recognize that AML has several forms and that only one form is like CML in developing clonally in stem cells. He also seems to suggest that myeloid, in contrast to lymphoid, leukemia undergoes a multistep process, thus recognizing several distinctions among various types of leukemia. We fail to read this passage as providing sufficient support for Teitelbaum's contention that all types of leukemia are so closely related in terms of how and why they develop that they can be treated interchangeably. The Austins have not indicated whether Teitelbaum's theory can be or has been tested and have not directed us to any location in the record where other scientists espouse this theory.

*291 The Austins cite the testimony of Kerr-McGee's toxicology expert, Dr. Gary Krieger, who testified that benzene can affect the pluripotential stem cell. However, Krieger testified that benzene can attack at a variety of places and that benzene-related leukemias have been recognized at slightly more differentiated cell levels. He testified that while benzene affects the pluripotential stem cell, it has never been shown to cause the lesion called the Philadelphia Chromosome, which he opined is what causes CML. Furthermore, to refute Kerr-McGee's theory that benzene does not cause the development of the Philadelphia Chromosome, the Austins point only to Fialkow's paper, in which Fialkow merely suggests that the initial hit or mutation occurs before the Philadelphia Chromosome develops. The

Austins give no further explanation regarding the possibility that the Philadelphia Chromosome may cause CML independently of other possible causes.

The Austins also contend that the epidemiological studies' authors' grouping choices demonstrate that the different leukemia cell-types are so closely related in terms of how and why they develop that they can be treated interchangeably. They cite Dr. Otto Wong's epidemiological study, in which Wong stated that based on the conclusion that transformation events occur at an early multipotent stem cell level, it was appropriate to combine lymphoma and leukemia in some of his analyses. But Wong's opinion is not so one-sided. Despite the similarity between lymphoma and leukemia that Wong recognized in his study, Wong testified at the [Robinson/Havner](#) hearing that leukemia consists of different types of diseases that have different patterns and different etiological agents. Simply because the authors group their findings under broad headings like "lymphatic and hematopoietic cancers" does not mean that the authors believe all leukemias are derived from the same source. In one study, the author, recognizing that very few studies reviewed medical records or histologic data to ensure correct categorization of diseases, expressed a need for more accurate categorization. Travis, *supra*, at 92.

[FN9](#). O. Wong, *An Industry-Wide Mortality Study of Chemical Workers Occupationally Exposed to Benzene*, 44 *British Journal of Industrial Medicine* CINE 365 (1987).

Additionally, we find persuasive the rulings on a similar issue in two cases tried in the federal courts. In the cases of [Mitchell v. Gencorp Inc.](#), 165 F.3d 778 (10th Cir.1999), and [Chambers v. Exxon Corp.](#), 81 F.Supp.2d 661 (M.D.La.2000), the plaintiffs sought to establish that the exposure of the deceased worker to benzene or chemicals defined as benzene derivatives caused him to contract CML. In both cases the courts excluded the plaintiffs' scientific evidence because it was not shown to be reliable. Although the scientific studies relied on in those cases are not the same as those relied on in our case, they all suffer from the same defects, inadequacies, and inconclusiveness. In those

cases the courts found that the experts' estimates and conclusions were little more than guesswork, and that the experts' assurances that the methodology and supporting data were reliable would not suffice. In fact, in [Chambers](#) the court pointed out that while no study found a statistically significant association between CML and exposure to benzene, to the contrary, there were several scientifically-significant studies that demonstrated no association between benzene exposure and the development of CML. [Chambers](#), 81 F.Supp.2d at 664-65.

The Austins concede that there is insufficient reliable data to establish an association between exposure to benzene and CML. In their brief to this Court, they state that CML is a relatively rare disease and "there simply are not enough cases of the disease for epidemiologists to generate a statistically-significant relative risk. [N]o benzene-exposed population is significantly large to generate the numbers ... required to create statistical significance."*292 A similar concession was made by the plaintiffs in [Chambers](#), 81 F.Supp.2d at 664 n. 3. The Austins also state, "Epidemiology as a science is ... handcuffed by the persistent problem of misclassification of disease, and that problem is particularly relevant in the context of CML." This lack of scientific evidence is unfortunate, but as stated by the Texas Supreme Court in [Havner](#), "Our legal system requires that claimants prove their cases by a preponderance of the evidence." [Havner](#), 953 S.W.2d at 728. The lack of reliable scientific evidence cannot be an excuse for imposing liability without proof of causation.

[\[21\]\[22\]\[23\]](#) Likewise, the Austins did not offer scientifically reliable evidence of specific causation, i.e., that Austin was exposed to benzene at all, or if he was, to what degree or level. Specific causation requires that a plaintiff show that the injured person is similar to those in the epidemiological studies, that he was exposed to the same substance, and that the exposure or dosage levels were comparable to or greater than those in the studies. [Havner](#), 953 S.W.2d at 720. The Austins concede that none of the actual mineral spirits used by Austin was ever tested for benzene. The Austins' experts only assumed that because most solvents contain benzene, the solvents

Austin used also contained benzene. But this is inadequate to show that there was any exposure, and certainly it is inadequate to show a level of exposure. It is fundamental that a plaintiff in a toxic tort case must prove the levels of exposure that are dangerous to humans generally, and must also prove the actual level of exposure of the injured party to the defendant's toxic substances. See *id.*; [Mitchell, 165 F.3d at 781](#).

The Austins must show that benzene probably, or more likely than not, caused Austin's CML. See [Havner, 953 S.W.2d at 720](#). In addition to showing general and specific causation, if there are other plausible alternative causes of CML that could be negated, the Austins must affirmatively exclude those causes with reasonable certainty. See *id.*; [Robinson, 923 S.W.2d at 558](#).

Before he worked at Tuboscope and Surratt, Austin held a job where he was a bystander to pipe inspection activities involving radiographic techniques. The job required that Austin wear a radiation badge that monitored the levels of radiation he received. Teitelbaum requested data regarding Austin's radiation exposure from his employee badge.

Teitelbaum suggested that radiation exposure could not have been an independent cause of Austin's CML, stating, “[T]he contributing cause [benzene exposure] stands whether we model it [radiation] or not.” However, he also suggested that radiation may have been an alternative cause. He stated that he did not find any alternative cause, “other than the radiation issue,” and he further testified, “Because radiation is always ... or potentially a ‘one-hit’ kind of experience, single ionization could cause a genetic change and remains a viable possibility....” Teitelbaum went on to opine that radiation exposure was unlikely or less likely than benzene to have caused Austin's CML because of the size of the dose of radiation that Austin received. However, like the Austins' treatment of the Philadelphia Chromosome as an alternative cause of Austin's CML, the record does not contain a full explanation of the dose-size or the duration of Austin's radiation exposure, or a full explanation of the reason for Teitelbaum's decision to exclude radiation as a cause. Teitelbaum stated that he received Austin's badge but did not have

data from which to model a radiation dose, suggesting at best that the dose of radiation was insignificant.

[24] We conclude that the Austins' scientific evidence does not adequately exclude exposure to radiation as a cause of CML. The Austins concede that exposure to radiation is a recognized cause of leukemia generally. Yet, their evidence only assumes that Austin, who admittedly *293 worked in an atmosphere that exposed him to radiation, did not receive sufficient exposure to cause him to develop leukemia. These assumptions, in turn, are based on “estimates” made by the Austins' experts. These estimates, however, are not based on scientifically reliable data. As noted in [Mitchell, 165 F.3d 778](#), absent supporting scientific data, estimates and assumptions are “little more than guesswork. Guesses, even if educated, are insufficient to prove the level of exposure in a toxic tort case.” *Id.* at 781.

After thorough and careful review of the Austins' contentions, as well as the record testimony and exhibits they cite, we conclude that the Austins have failed to demonstrate the reliability of their scientific evidence as to either general or specific causation. They also have failed to exclude other plausible causes with reasonable certainty. We conclude that the trial court acted within its discretion in excluding the Austins' causation evidence on the basis that it failed to satisfy the requirements of [Robinson](#) and [Havner](#). Accordingly, we affirm the judgment.

Tex.App.-Texarkana,2000.
Austin v. Kerr-McGee Refining Corp.
25 S.W.3d 280

END OF DOCUMENT