

118 S.Ct. 512

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(Cite as: 522 U.S. 136, 118 S.Ct. 512)

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Supreme Court of the United States

GENERAL ELECTRIC COMPANY, et al.,

Petitioners,

v.

Robert K. JOINER, et ux.

No. 96-188.

Argued Oct. 14, 1997.

Decided Dec. 15, 1997.

City's electrician, who suffered from lung cancer, brought state court action against manufacturer of polychlorinated biphenyls (PCBs) and manufacturers of electrical transformers and dielectric fluid, alleging strict liability, negligence, fraud, and battery. Manufacturers removed action to federal court. The United States District Court for the Northern District of Georgia, 864 F.Supp. 1310, Orinda D. Evans, J., excluded testimony of electrician's experts and granted defendants' motion for summary judgment. Electrician appealed. The Eleventh Circuit Court of Appeals, Barkett, Circuit Judge, 78 F.3d 524, reversed. Certiorari was granted. The Supreme Court, Chief Justice Rehnquist, held that: (1) "abuse of discretion" standard applied to District Court's decision to exclude scientific evidence; (2) District Court did not abuse its discretion in excluding expert testimony based on studies indicating that infant mice developed cancer after receiving massive doses of PCBs; and (3) District Court did not abuse its discretion in excluding expert testimony based on epidemiological studies.

Reversed and remanded.

Justice Breyer concurred and filed opinion.

Justice Stevens concurred in part, dissented in part, and filed opinion.

West Headnotes

[1] Federal Courts ⇨823

170Bk823

Abuse of discretion is the proper standard of review of district court's evidentiary rulings.

[2] Federal Civil Procedure ⇨2011

170Ak2011

[2] Federal Courts ⇨823

170Bk823

Cases arise where it is very much a matter of discretion with district court whether to receive or exclude evidence; but appellate court will not reverse in such case, unless the ruling is manifestly erroneous.

[3] Evidence ⇨508

157k508

[3] Evidence ⇨555.2

157k555.2

Fact that *Frye* test governing admission of expert scientific evidence was displaced by Rules of Evidence does not mean that Rules themselves place no limits on admissibility of purportedly scientific evidence; nor is trial judge disabled from screening such evidence. Fed.Rules Evid.Rule 702, 28 U.S.C.A.

[4] Evidence ⇨508

157k508

[4] Evidence ⇨555.2

157k555.2

Under Federal Rules of Evidence, trial judge must ensure that any and all scientific testimony or evidence admitted is not only relevant, but reliable. Fed.Rules Evid.Rule 702, 28 U.S.C.A.

[5] Evidence ⇨508

157k508

[5] Evidence ⇨555.2

157k555.2

While Federal Rules of Evidence allow district courts to admit a somewhat broader range of scientific testimony than would have been admissible under *Frye*, they leave in place the "gatekeeper" role of trial judge in screening such evidence. Fed.Rules Evid.Rule 702, 28 U.S.C.A.

[6] Federal Courts ⚖️823
170Bk823

In applying "abuse of discretion" review to rulings regarding admissibility of scientific testimony, court of appeals may not categorically distinguish between rulings allowing expert testimony and rulings which disallow it. Fed.Rules Evid.Rule 702, 28 U.S.C.A.

[7] Federal Courts ⚖️823
170Bk823

Alleged fact that grant of summary judgment on basis of inadmissibility of expert scientific testimony was "outcome determinative" as to products liability action did not compel finding that it should have been subjected to a more searching standard of review than "abuse of discretion" standard. Fed.Rules Civ.Proc.Rule 56, 28 U.S.C.A.; Fed.Rules Evid.Rule 702, 28 U.S.C.A.

[8] Federal Civil Procedure ⚖️2543
170Ak2543

On motion for summary judgment, disputed issues of fact are resolved against moving party. Fed.Rules Civ.Proc.Rule 56, 28 U.S.C.A.

[9] Federal Civil Procedure ⚖️2543
170Ak2543

Question of admissibility of expert testimony is not issue of fact that, when disputed, is resolved against moving party on motion for summary judgment. Fed.Rules Civ.Proc.Rule 56, 28 U.S.C.A.; Fed.Rules Evid.Rule 702, 28 U.S.C.A.

[10] Federal Courts ⚖️823
170Bk823

Question of admissibility of expert testimony is reviewable under "abuse of discretion" standard. Fed.Rules Evid.Rule 702, 28 U.S.C.A.

[11] Federal Courts ⚖️823
170Bk823

Court of Appeals applied wrong standard in reviewing grant of summary judgment in favor of manufacturers in products liability action, when Court applied "stringent" review based on its holding that rules governing admissibility of expert testimony displayed a preference for admissibility; such standard failed to give district court the deference that

is the hallmark of abuse of discretion review. Fed.Rules Civ.Proc.Rule 56, 28 U.S.C.A.; Fed.Rules Evid.Rule 702, 28 U.S.C.A.

[12] Evidence ⚖️555.10
157k555.10

[12] Evidence ⚖️557
157k557

District Court did not abuse its discretion in excluding expert scientific testimony, offered by electrician as evidence that his cancer resulted from exposure to polychlorinated biphenyls (PCBs), based on studies indicating that infant mice developed cancer after receiving massive doses of PCBs injected directly into their peritoneums or stomachs; electrician was adult human being with far less alleged exposure to PCBs, and he developed different type of cancer than that developed by mice. Fed.Rules Evid.Rule 702, 28 U.S.C.A.

[13] Evidence ⚖️555.10
157k555.10

[13] Evidence ⚖️557
157k557

District Court did not abuse its discretion in excluding expert scientific testimony, offered by electrician as evidence that his cancer resulted from exposure to polychlorinated biphenyls (PCBs), based on epidemiological study involving workers who had been exposed to PCBs; authors of study were unwilling to say that PCB exposure had caused workers' cancer. Fed.Rules Evid.Rule 702, 28 U.S.C.A.

[14] Evidence ⚖️555.10
157k555.10

[14] Evidence ⚖️557
157k557

District Court did not abuse its discretion in excluding expert scientific testimony, offered by electrician as evidence that his cancer resulted from exposure to polychlorinated biphenyls (PCBs), based on epidemiological study involving workers who had worked at PCB production plant; increase of incidence of cancer among workers was not statistically significant, and study did not suggest link between increase and exposure to PCBs. Fed.Rules Evid.Rule 702, 28 U.S.C.A.

[15] Evidence ⚡555.10
157k555.10

[15] Evidence ⚡557
157k557

District Court did not abuse its discretion in excluding expert scientific testimony, offered by electrician as evidence that his cancer resulted from exposure to polychlorinated biphenyls (PCBs), based on epidemiological study involving workers who had been exposed to mineral oil; study made no mention of PCBs. Fed.Rules Evid.Rule 702, 28 U.S.C.A.

[16] Evidence ⚡555.10
157k555.10

[16] Evidence ⚡557
157k557

District Court did not abuse its discretion in excluding expert scientific testimony, offered by electrician as evidence that his cancer resulted from exposure to polychlorinated biphenyls (PCBs), based on epidemiological study involving workers who had been exposed to PCBs and had seen statistically significant increase in lung cancer deaths; workers had been exposed to numerous potential carcinogens. Fed.Rules Evid.Rule 702, 28 U.S.C.A.

[17] Evidence ⚡555.4(1)
157k555.4(1)

District court is not required to admit opinion evidence which is connected to existing data only by ipse dixit of the expert; court may conclude that there is simply too great an analytical gap between the data and the opinion proffered. Fed.Rules Evid.Rule 702, 28 U.S.C.A.

****514 Syllabus [FN*]**

FN* The syllabus constitutes no part of the opinion of the Court but has been prepared by the Reporter of Decisions for the convenience of the reader. See *United States v. Detroit Timber & Lumber Co.*, 200 U.S. 321, 337, 26 S.Ct. 282, 287, 50 L.Ed. 499.

***136** After he was diagnosed with small-cell lung cancer, respondent Joiner and his wife (hereinafter jointly respondent) sued in Georgia state court, alleging, *inter alia*, that his disease was "promoted" by his workplace exposure to chemical "PCB's" and derivative "furans" and "dioxins" that were

manufactured by, or present in materials manufactured by, petitioners. Petitioners removed the case to federal court and moved for summary judgment. Joiner responded with the depositions of expert witnesses, who testified that PCB's, furans, and dioxins can promote cancer, and opined that Joiner's exposure to those chemicals was likely responsible for his cancer. The District Court ruled that there was a genuine issue of material fact as to whether Joiner had been exposed to PCB's, but granted summary judgment for petitioners because (1) there was no genuine issue as to whether he had been exposed to furans and dioxins, and (2) his experts' testimony had failed to show that there was a link between exposure to PCB's and small-cell lung cancer and was therefore inadmissible because it did not rise above "subjective belief or unsupported speculation." In reversing, the Eleventh Circuit applied "a particularly stringent standard of review" to hold that the District Court had erred in excluding the expert testimony.

Held:

1. Abuse of discretion--the standard ordinarily applicable to review of evidentiary rulings--is the proper standard by which to review a district court's decision to admit or exclude expert scientific evidence. Contrary to the Eleventh Circuit's suggestion, *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579, 113 S.Ct. 2786, 125 L.Ed.2d 469, did not somehow alter this general rule in the context of a district court's decision to exclude scientific evidence. *Daubert* did not address the appellate review standard for evidentiary rulings at all, but did indicate that, while the Federal Rules of Evidence allow district courts to admit a somewhat broader range of scientific testimony than did pre-existing law, they leave in place the trial judge's "gatekeeper" role of screening such evidence to ensure that it is not only relevant, but reliable. *Id.*, at 589, 113 S.Ct., at 2794-2795. A court of appeals applying "abuse-of-discretion" review to such rulings may not categorically distinguish between rulings allowing expert testimony and rulings which disallow it. Compare *Beech Aircraft Corp. v. Rainey*, 488 U.S. *137 153, 172, 109 S.Ct. 439, 451, 102 L.Ed.2d 445, with *United States v. Abel*, 469 U.S. 45, 54, 105 S.Ct. 465, 470, 83 L.Ed.2d 450. This Court rejects Joiner's argument that because the granting of summary judgment in this case was "outcome determinative," it should have been subjected to a more searching standard of review. On a summary

judgment motion, disputed issues of fact are resolved against the moving party--here, petitioners. But the question of admissibility of expert testimony is not such an issue of fact, and is reviewable under the abuse-of-discretion standard. In applying an overly "stringent" standard, the Eleventh Circuit failed to give the trial court the deference that is the hallmark of abuse-of-discretion review. P. 517.

2. A proper application of the correct standard of review indicates that the District Court did not err in excluding the expert testimony at issue. The animal studies cited by respondent's experts were so dissimilar to the facts presented here--*i.e.*, the studies involved infant mice that developed alveologenic adenomas after highly concentrated, massive doses of PCB's were injected directly into their peritoneums or stomachs, whereas Joiner was an adult human whose small-cell carcinomas allegedly resulted from exposure on a much smaller scale--that it was not an abuse of discretion for the District Court to have rejected the experts' reliance on those studies. Nor did the court abuse its discretion in concluding that the four epidemiological studies on which Joiner relied were not a sufficient basis for the experts' opinions, since the authors of two of those studies ultimately were unwilling to suggest a link between increases in lung cancer and PCB exposure among the workers they examined, the third study involved exposure to a particular type of mineral oil not necessarily relevant here, and the fourth involved exposure to numerous potential carcinogens in addition to PCB's. Nothing in either *Daubert* or the Federal Rules of Evidence requires a district court to admit opinion evidence that is connected to existing data only by the *ipse dixit* of the expert. Pp. 517-519.

3. These conclusions, however, do not dispose of the entire case. The Eleventh Circuit reversed the District Court's conclusion that Joiner had not been exposed to furans and dioxins. Because petitioners did not challenge that determination in their certiorari petition, the question whether exposure to furans and dioxins contributed to Joiner's cancer is still open. P. 519.

78 F.3d 524, reversed and remanded.

REHNQUIST, C. J., delivered the opinion for a unanimous Court with respect to Parts I and II, and the opinion of the Court with respect to Part III, in which O'CONNOR, SCALIA, KENNEDY, SOUTER, THOMAS, GINSBURG, AND BREYER

JJ., joined. BREYER, J., filed a concurring opinion, *138 *post*, p. 520. STEVENS, J., filed an opinion concurring in part and dissenting in part, *post*, p. 521.

Steven R. Kuney, Washington, DC, for petitioner.

Lawrence G. Wallace, Washington, DC, for United States as amicus curiae.

Michael H. Gottesman, for respondents.

For U.S. Supreme Court Briefs See:

1997 WL 304727 (Pet.Brief)

1997 WL 436250 (Resp.Brief)

1997 WL 536304 (Reply.Brief)

1997 WL 304740 (Amicus.Brief)

1997 WL 304743 (Amicus.Brief)

1997 WL 304754 (Amicus.Brief)

1997 WL 304759 (Amicus.Brief)

1997 WL 304765 (Amicus.Brief)

1997 WL 304772 (Amicus.Brief)

1997 WL 304776 (Amicus.Brief)

1997 WL 311460 (Amicus.Brief)

1997 WL 311475 (Amicus.Brief)

1997 WL 321154 (Amicus.Brief)

1997 WL 433325 (Amicus.Brief)

1997 WL 433329 (Amicus.Brief)

1997 WL 433333 (Amicus.Brief)

1997 WL 458813 (Amicus.Brief)

For Transcript of Oral Argument See:

1997 WL 634566 (U.S.Oral.Arg.)

Chief Justice REHNQUIST delivered the opinion of the Court.

We granted certiorari in this case to determine what standard an appellate court should apply in reviewing a trial *139 court's decision to admit or exclude expert testimony under *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579, 113 S.Ct. 2786, 125 L.Ed.2d 469 (1993). We hold that abuse of discretion is the appropriate standard. We apply this standard and conclude that the District Court in this case did not abuse its discretion when it excluded certain proffered expert testimony.

I

Respondent Robert Joiner began work as an electrician in the Water & Light Department of Thomasville, Georgia (City), in 1973. This job required him to work with and around the City's electrical transformers, which used a mineral- oil-based dielectric fluid **516 as a coolant. Joiner often had to stick his hands and arms into the fluid to make repairs. The fluid would sometimes splash onto him, occasionally getting into his eyes and mouth. In 1983 the City discovered that the fluid in some of the transformers was contaminated with polychlorinated biphenyls (PCB's). PCB's are widely considered to be hazardous to human health. Congress, with limited exceptions, banned the production and sale of PCB's in 1978. See 90 Stat.2020, 15 U.S.C. § 2605(e)(2)(A).

Joiner was diagnosed with small-cell lung cancer in 1991. He [FN1] sued petitioners in Georgia state court the following year. Petitioner Monsanto manufactured PCB's from 1935 to 1977; petitioners General Electric and Westinghouse Electric manufactured transformers and dielectric fluid. In his complaint Joiner linked his development of cancer to his exposure to PCB's and their derivatives, polychlorinated dibenzofurans (furans) and polychlorinated dibenzodioxins (dioxins). Joiner had been a smoker for approximately eight years, his parents had both been smokers, and there was a history of lung cancer in his family. He was thus perhaps already at a heightened risk of developing lung cancer eventually. The suit alleged that his exposure to PCB's "promoted" *140 his cancer; had it not been for his exposure to these substances, his cancer would not have developed for many years, if at all.

FN1. Joiner's wife was also a plaintiff in the suit and is a respondent here. For convenience, we refer to respondent in the singular.

Petitioners removed the case to federal court. Once there, they moved for summary judgment. They contended that (1) there was no evidence that Joiner suffered significant exposure to PCB's, furans, or dioxins, and (2) there was no admissible scientific evidence that PCB's promoted Joiner's cancer. Joiner responded that there were numerous disputed factual issues that required resolution by a jury. He relied largely on the testimony of expert witnesses. In depositions, his experts had testified that PCB's alone can promote cancer and that furans and dioxins can also promote cancer. They opined that since Joiner had been exposed to PCB's, furans, and dioxins, such exposure was likely responsible for Joiner's cancer.

The District Court ruled that there was a genuine issue of material fact as to whether Joiner had been exposed to PCB's. But it nevertheless granted summary judgment for petitioners because (1) there was no genuine issue as to whether Joiner had been exposed to furans and dioxins, and (2) the testimony of Joiner's experts had failed to show that there was a link between exposure to PCB's and small-cell lung cancer. The court believed that the testimony of respondent's experts to the contrary did not rise above "subjective belief or unsupported speculation." 864 F.Supp. 1310, 1326 (N.D.Ga.1994). Their testimony was therefore inadmissible.

The Court of Appeals for the Eleventh Circuit reversed. 78 F.3d 524 (1996). It held that "[b]ecause the Federal Rules of Evidence governing expert testimony display a preference for admissibility, we apply a particularly stringent standard of review to the trial judge's exclusion of expert testimony." *Id.*, at 529. Applying that standard, the Court of Appeals held that the District Court had erred in excluding the testimony of Joiner's expert witnesses. The *141 District Court had made two fundamental errors. First, it excluded the experts' testimony because it "drew different conclusions from the research than did each of the experts." The Court of Appeals opined that a district court should limit its role to determining the "legal reliability of proffered expert testimony, leaving the jury to decide the correctness of competing expert opinions." *Id.* at 533. Second, the District Court had held that there was no genuine issue of material fact as to whether Joiner had been exposed to furans and dioxins. This was also incorrect, said the Court of Appeals, because testimony in the record supported the proposition that there had been such exposure.

We granted petitioners' petition for a writ of certiorari, 520 U.S. 1114, 117 S.Ct. 1243, 137 L.Ed.2d 325 (1997), and we now reverse.

****517 II**

Petitioners challenge the standard applied by the Court of Appeals in reviewing the District Court's decision to exclude respondent's experts' proffered testimony. They argue that that court should have applied traditional "abuse-of-discretion" review. Respondent agrees that abuse of discretion is the correct standard of review. He contends, however, that the Court of Appeals applied an abuse-of-discretion standard in this case. As he reads it, the phrase "particularly stringent" announced no new standard of review. It was simply an acknowledgment that an appellate court can and will devote more resources to analyzing district court decisions that are dispositive of the entire litigation. All evidentiary decisions are reviewed under an abuse-of-discretion standard. He argues, however, that it is perfectly reasonable for appellate courts to give particular attention to those decisions that are outcome determinative.

[1][2][3][4] We have held that abuse of discretion is the proper standard of review of a district court's evidentiary rulings. *Old Chief v. United States*, 519 U.S. 172, 174 n. 1, 117 S.Ct. 644, 647 n. 1, 136 L.Ed.2d 574 (1997); *United States v. Abel*, 469 U.S. 45, 54, 105 S.Ct. 465, 470, 83 L.Ed.2d 450 (1984). Indeed, our cases on *142 the subject go back as far as *Spring Co. v. Edgar*, 99 U.S. 645, 658, 25 L.Ed. 487 (1879), where we said that "[c]ases arise where it is very much a matter of discretion with the court whether to receive or exclude the evidence; but the appellate court will not reverse in such a case, unless the ruling is manifestly erroneous." The Court of Appeals suggested that *Daubert* somehow altered this general rule in the context of a district court's decision to exclude scientific evidence. But *Daubert* did not address the standard of appellate review for evidentiary rulings at all. It did hold that the "austere" *Frye* standard of "general acceptance" had not been carried over into the Federal Rules of Evidence. But the opinion also said:

"That the *Frye* test was displaced by the Rules of Evidence does not mean, however, that the Rules themselves place no limits on the admissibility of purportedly scientific evidence. Nor is the trial judge disabled from screening such evidence. To the contrary, under the Rules the trial judge must ensure that any and all scientific testimony or

evidence admitted is not only relevant, but reliable." 509 U.S., at 589, 113 S.Ct., at 2794-2795 (footnote omitted).

[5][6][7][8][9][10] Thus, while the Federal Rules of Evidence allow district courts to admit a somewhat broader range of scientific testimony than would have been admissible under *Frye*, they leave in place the "gatekeeper" role of the trial judge in screening such evidence. A court of appeals applying "abuse-of-discretion" review to such rulings may not categorically distinguish between rulings allowing expert testimony and rulings disallowing it. Compare *Beech Aircraft Corp. v. Rainey*, 488 U.S. 153, 172, 109 S.Ct. 439, 451, 102 L.Ed.2d 445 (1988) (applying abuse-of-discretion review to a lower court's decision to exclude evidence), with *United States v. Abel*, *supra*, at 54, 105 S.Ct., at 470 (applying abuse-of-discretion review to a lower court's decision to admit evidence). We likewise reject respondent's argument that because the granting of summary judgment in this case *143 was "outcome determinative," it should have been subjected to a more searching standard of review. On a motion for summary judgment, disputed issues of fact are resolved against the moving party—here, petitioners. But the question of admissibility of expert testimony is not such an issue of fact, and is reviewable under the abuse-of-discretion standard.

[11] We hold that the Court of Appeals erred in its review of the exclusion of Joiner's experts' testimony. In applying an overly "stringent" review to that ruling, it failed to give the trial court the deference that is the hallmark of abuse-of-discretion review. See, e.g., *Koon v. United States*, 518 U.S. 81, 98-99, 116 S.Ct. 2035, 2046-2047, 135 L.Ed.2d 392 (1996).

III

We believe that a proper application of the correct standard of review here indicates that the District Court did not abuse its **518 discretion. Joiner's theory of liability was that his exposure to PCB's and their derivatives "promoted" his development of small-cell lung cancer. In support of that theory he proffered the deposition testimony of expert witnesses. Dr. Arnold Schecter testified that he believed it "more likely than not that Mr. Joiner's lung cancer was causally linked to cigarette smoking and PCB exposure." App. 107. Dr. Daniel Teitelbaum testified that Joiner's "lung cancer was caused by or contributed to in a significant degree by

the materials with which he worked." *Id.*, at 140.

Petitioners contended that the statements of Joiner's experts regarding causation were nothing more than speculation. Petitioners criticized the testimony of the experts in that it was "not supported by epidemiological studies ... [and was] based exclusively on isolated studies of laboratory animals." 3 Record, Doc. No. 46 (Defendants' Joint Memorandum in Support of Summary Judgment 3). Joiner responded by claiming that his experts had identified "relevant animal studies which support their opinions." 4 Record, Doc. No. 53 (Plaintiffs' Brief in Opposition to Defendants' *144 Motion for Summary Judgment 47). He also directed the court's attention to four epidemiological studies [FN2] on which his experts had relied.

FN2. Epidemiological studies examine the pattern of disease in human populations.

[12] The District Court agreed with petitioners that the animal studies on which respondent's experts relied did not support his contention that exposure to PCB's had contributed to his cancer. The studies involved infant mice that had developed cancer after being exposed to PCB's. The infant mice in the studies had had massive doses of PCB's injected directly into their peritoneums [FN3] or stomachs. Joiner was an adult human being whose alleged exposure to PCB's was far less than the exposure in the animal studies. The PCB's were injected into the mice in a highly concentrated form. The fluid with which Joiner had come into contact generally had a much smaller PCB concentration of between 0-to-500 parts per million. The cancer that these mice developed was alveologenic adenomas; Joiner had developed small-cell carcinomas. No study demonstrated that adult mice developed cancer after being exposed to PCB's. One of the experts admitted that no study had demonstrated that PCB's lead to cancer in any other species.

FN3. The peritoneum is the lining of the abdominal cavity.

Respondent failed to reply to this criticism. Rather than explaining how and why the experts could have extrapolated their opinions from these seemingly far-removed animal studies, respondent chose "to proceed as if the only issue [was] whether animal studies can ever be a proper foundation for an expert's opinion." 864 F.Supp., at 1324. Of course, whether animal studies can ever be a proper

foundation for an expert's opinion was not the issue. The issue was whether *these* experts' opinions were sufficiently supported by the animal studies on which they purported to rely. The studies were so dissimilar to the facts presented in this litigation *145 that it was not an abuse of discretion for the District Court to have rejected the experts' reliance on them.

[13] The District Court also concluded that the four epidemiological studies on which respondent relied were not a sufficient basis for the experts' opinions. The first such study involved workers at an Italian capacitor [FN4] plant who had been exposed to PCBs. Bertazzi, Riboldi, Pesatori, Radice, & Zocchetti, Cancer Mortality of Capacitor Manufacturing Workers, 11 American Journal of Industrial Medicine 165 (1987). The authors noted that lung cancer deaths among ex-employees at the plant were higher than might have been expected, but concluded that "there were apparently no grounds for associating lung cancer deaths (although increased above expectations) and exposure in the plant." *Id.*, at 172. Given that Bertazzi et al. were unwilling to say that PCB exposure had caused cancer among the workers they examined, their study did not support the experts' conclusion that Joiner's exposure to PCB's caused his cancer.

FN4. A capacitor is an electrical component that stores an electric charge.

[14] The second study followed employees who had worked at Monsanto's PCB production plant. J. Zack & D. Musch, Mortality **519 of PCB Workers at the Monsanto Plant in Sauget, Illinois (Dec. 14, 1979)(unpublished report), 3 Record, Doc. No. 11. The authors of this study found that the incidence of lung cancer deaths among these workers was somewhat higher than would ordinarily be expected. The increase, however, was not statistically significant and the authors of the study did not suggest a link between the increase in lung cancer deaths and the exposure to PCB's.

[15][16] The third and fourth studies were likewise of no help. The third involved workers at a Norwegian cable manufacturing company who had been exposed to mineral oil. Ronneberg, Andersen, & Skyberg, Mortality and Incidence of Cancer Among Oil-Exposed Workers in a Norwegian Cable Manufacturing Company, 45 British Journal of Industrial *146 Medicine 595 (1988). A statistically significant increase in lung cancer deaths had been observed in these workers. The study, however, (1)

made no mention of PCB's and (2) was expressly limited to the type of mineral oil involved in that study, and thus did not support these experts' opinions. The fourth and final study involved a PCB-exposed group in Japan that had seen a statistically significant increase in lung cancer deaths. Kuratsune, Nakamura, Ikeda, & Hirohata, Analysis of Deaths Seen Among Patients with Yusho--A Preliminary Report, 16 Chemosphere, Nos. 8/9, p. 2085 (1987). The subjects of this study, however, had been exposed to numerous potential carcinogens, including toxic rice oil that they had ingested.

[17] Respondent points to *Daubert*'s language that the "focus, of course, must be solely on principles and methodology, not on the conclusions that they generate." 509 U.S., at 595, 113 S.Ct., at 2797. He claims that because the District Court's disagreement was with the conclusion that the experts drew from the studies, the District Court committed legal error and was properly reversed by the Court of Appeals. But conclusions and methodology are not entirely distinct from one another. Trained experts commonly extrapolate from existing data. But nothing in either *Daubert* or the Federal Rules of Evidence requires a district court to admit opinion evidence that is connected to existing data only by the *ipse dixit* of the expert. A court may conclude that there is simply too great an analytical gap between the data and the opinion proffered. See *Turpin v. Merrell Dow Pharmaceuticals, Inc.*, 959 F.2d 1349, 1360 (C.A.6), cert. denied, 506 U.S. 826, 113 S.Ct. 84, 121 L.Ed.2d 47 (1992). That is what the District Court did here, and we hold that it did not abuse its discretion in so doing.

We hold, therefore, that abuse of discretion is the proper standard by which to review a district court's decision to admit or exclude scientific evidence. We further hold that, because it was within the District Court's discretion to conclude that the studies upon which the experts relied were not *147 sufficient, whether individually or in combination, to support their conclusions that Joiner's exposure to PCB's contributed to his cancer, the District Court did not abuse its discretion in excluding their testimony. These conclusions, however, do not dispose of this entire case.

Respondent's original contention was that his exposure to PCB's, furans, and dioxins contributed to his cancer. The District Court ruled that there was a genuine issue of material fact as to whether Joiner had been exposed to PCB's, but concluded that there

was no genuine issue as to whether he had been exposed to furans and dioxins. The District Court accordingly never explicitly considered if there was admissible evidence on the question whether Joiner's alleged exposure to furans and dioxins contributed to his cancer. The Court of Appeals reversed the District Court's conclusion that there had been no exposure to furans and dioxins. Petitioners did not challenge this determination in their petition to this Court. Whether Joiner was exposed to furans and dioxins, and whether if there was such exposure, the opinions of Joiner's experts would then be admissible, remain open questions. We accordingly reverse the judgment of the Court of Appeals and remand this case for proceedings consistent with this opinion.

It is so ordered.

****520** Justice BREYER, concurring.

The Court's opinion, which I join, emphasizes *Daubert*'s statement that a trial judge, acting as "gatekeeper," must "ensure that any and all scientific testimony or evidence admitted is not only relevant, but reliable." *Ante*, at 517 (quoting *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579, 589, 113 S.Ct. 2786, 2795, 125 L.Ed.2d 469 (1993)). This requirement will sometimes ask judges to make subtle and sophisticated determinations about scientific methodology and its relation to the conclusions an expert witness seeks to offer--particularly when a case arises in an area where the science itself is tentative or *148 uncertain, or where testimony about general risk levels in human beings or animals is offered to prove individual causation. Yet, as *amici* have pointed out, judges are not scientists and do not have the scientific training that can facilitate the making of such decisions. See, e.g., Brief for Trial Lawyers for Public Justice as *Amicus Curiae* 15; Brief for New England Journal of Medicine et al. as *Amici Curiae* 2 ("Judges ... are generally not trained scientists").

Of course, neither the difficulty of the task nor any comparative lack of expertise can excuse the judge from exercising the "gatekeeper" duties that the Federal Rules of Evidence impose--determining, for example, whether particular expert testimony is reliable and "will assist the trier of fact," Fed. Rule Evid. 702, or whether the "probative value" of testimony is substantially outweighed by risks of prejudice, confusion or waste of time, Fed. Rule Evid. 403. To the contrary, when law and science

intersect, those duties often must be exercised with special care.

Today's toxic tort case provides an example. The plaintiff in today's case says that a chemical substance caused, or promoted, his lung cancer. His concern, and that of others, about the causes of cancer is understandable, for cancer kills over one in five Americans. See U.S. Dept. of Health and Human Services, National Center for Health Statistics, Health, United States 1996-97 and Injury Chartbook 117 (1997) (23.3% of all deaths in 1995). Moreover, scientific evidence implicates some chemicals as potential causes of some cancers. See, e.g., U.S. Dept. of Health and Human Services, Public Health Service, National Toxicology Program, 1 Seventh Annual Report on Carcinogens, pp. v-vi (1994). Yet modern life, including good health as well as economic well-being, depends upon the use of artificial or manufactured substances, such as chemicals. And it may, therefore, prove particularly important to see that judges fulfill their *Daubert* gatekeeping function, so that they help assure that the powerful engine of tort liability, which can generate *149 strong financial incentives to reduce, or to eliminate, production, points toward the right substances and does not destroy the wrong ones. It is, thus, essential in this science-related area that the courts administer the Federal Rules of Evidence in order to achieve the "end[s]" that the Rules themselves set forth, not only so that proceedings may be "justly determined," but also so "that the truth may be ascertained." Fed. Rule Evid. 102.

I therefore want specially to note that, as cases presenting significant science-related issues have increased in number, see Judicial Conference of the United States, Report of the Federal Courts Study Committee 97 (Apr. 2, 1990) ("Economic, statistical, technological, and natural and social scientific data are becoming increasingly important in both routine and complex litigation"), judges have increasingly found in the Rules of Evidence and Civil Procedure ways to help them overcome the inherent difficulty of making determinations about complicated scientific, or otherwise technical, evidence. Among these techniques are an increased use of Rule 16's pretrial conference authority to narrow the scientific issues in dispute, pretrial hearings where potential experts are subject to examination by the court, and the appointment of special masters and specially trained law clerks. See J. Cecil & T. Willging, Court-Appointed Experts: Defining the Role of Experts Appointed Under Federal Rule of Evidence 706, pp.

83-88 (1993); J. Weinstein, Individual Justice in Mass Tort Litigation 107-110 (1995); cf. Kaysen, In Memoriam: Charles E. Wyzanski, Jr., 100 Harv.L.Rev. 713, 713-715 (1987) (discussing a judge's use of an economist as a law clerk in *United States v. United Shoe Machinery Corp.*, 110 **521 F.Supp. 295 (Mass.1953), aff'd, 347 U.S. 521, 74 S.Ct. 699, 98 L.Ed. 910 (1954)).

In the present case, the New England Journal of Medicine has filed an *amici* brief "in support of neither petitioners nor respondents" in which the Journal writes:

"[A] judge could better fulfill this gatekeeper function if he or she had help from scientists. Judges should be *150 strongly encouraged to make greater use of their inherent authority ... to appoint experts Reputable experts could be recommended to courts by established scientific organizations, such as the National Academy of Sciences or the American Association for the Advancement of Science." Brief, *supra*, at 18-19.

Cf. Fed. Rule Evid. 706 (court may "on its own motion or on the motion of any party" appoint an expert to serve on behalf of the court, and this expert may be selected as "agreed upon by the parties" or chosen by the court); see also Weinstein, *supra*, at 116 (a court should sometimes "go beyond the experts proffered by the parties" and "utilize its powers to appoint independent experts under Rule 706 of the Federal Rules of Evidence"). Given this kind of offer of cooperative effort, from the scientific to the legal community, and given the various Rules-authorized methods for facilitating the courts' task, it seems to me that *Daubert*'s gatekeeping requirement will not prove inordinately difficult to implement, and that it will help secure the basic objectives of the Federal Rules of Evidence, which are, to repeat, the ascertainment of truth and the just determination of proceedings. Fed. Rule Evid. 102.

Justice STEVENS, concurring in part and dissenting in part.

The question that we granted certiorari to decide is whether the Court of Appeals applied the correct standard of review. That question is fully answered in Parts I and II of the Court's opinion. Part III answers the quite different question whether the District Court properly held that the testimony of plaintiff's expert witnesses was inadmissible. Because I am not sure that the parties have adequately briefed that question, or that the Court has adequately explained why the Court of Appeals' disposition was

erroneous, I do not join Part III. Moreover, because a proper answer to that question requires a study of the record that can be *151 performed more efficiently by the Court of Appeals than by the nine Members of this Court, I would remand the case to that court for application of the proper standard of review.

One aspect of the record will illustrate my concern. As the Court of Appeals pointed out, Joiner's experts relied on "the studies of at least thirteen different researchers, and referred to several reports of the World Health Organization that address the question of whether PCBs cause cancer." 78 F.3d 524, 533 (C.A.11 1996). Only one of those studies is in the record, and only six of them were discussed in the District Court opinion. Whether a fair appraisal of either the methodology or the conclusions of Joiner's experts can be made on the basis of such an incomplete record is a question that I do not feel prepared to answer.

It does seem clear, however, that the Court has not adequately explained why its holding is consistent with Federal Rule of Evidence 702, [FN1] as interpreted in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579, 113 S.Ct. 2786, 125 L.Ed.2d 469 (1993). [FN2] In general, scientific testimony that is both relevant and reliable must be admitted and testimony that is irrelevant or unreliable **522 must be excluded. *Id.*, at 597, 113 S.Ct., at 2798-2799. In this case, the District Court relied on both grounds for exclusion.

FN1. Rule 702 states: "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."

FN2. The specific question on which the Court granted certiorari in *Daubert* was whether the rule of *Frye v. United States*, 54 App.D.C. 46, 293 F. 1013 (1923), remained valid after the enactment of the Federal Rules of Evidence, but the Court went beyond that issue and set forth alternative requirements for admissibility in place of the *Frye* test. Even though the *Daubert* test was announced in dicta, see 509 U.S., at 598-601, 113 S.Ct., at 2799-2800 (REHNQUIST, C.J., concurring in part and dissenting in part), we should not simply ignore its analysis in reviewing the District Court's rulings.

The relevance ruling was straightforward. The District Court correctly reasoned that an expert opinion that exposure *152 to PCB's, "furans" and "dioxins" together may cause lung cancer would be irrelevant unless the plaintiff had been exposed to those substances. Having already found that there was no evidence of exposure to furans and dioxins, 864 F.Supp. 1310, 1318-1319 (N.D.Ga.1994), it necessarily followed that this expert opinion testimony was inadmissible. Correctly applying *Daubert*, the District Court explained that the experts' testimony "manifestly does not fit the facts of this case, and is therefore inadmissible." 864 F.Supp., at 1322. Of course, if the evidence raised a genuine issue of fact on the question of Joiner's exposure to furans and dioxins--as the Court of Appeals held that it did--then this basis for the ruling on admissibility was erroneous, but not because the District Judge either abused her discretion or misapplied the law. [FN3]

FN3. Petitioners do not challenge the Court of Appeals' straightforward review of the District Court's summary judgment ruling on exposure to furans and dioxins. As today's opinion indicate, *ante*, at 519, it remains an open question on remand whether the District Court should admit expert testimony that PCB's, furans, and dioxins *together* promoted Joiner's cancer.

The reliability ruling was more complex and arguably is not faithful to the statement in *Daubert* that "[t]he focus, of course, must be solely on principles and methodology, not on the conclusions that they generate." 509 U.S., at 595, 113 S.Ct., at 2797-2798. Joiner's experts used a "weight of the evidence" methodology to assess whether Joiner's exposure to transformer fluids promoted his lung cancer. [FN4] They did not suggest that any *153 one study provided adequate support for their conclusions, but instead relied on all the studies taken together (along with their interviews of Joiner and their review of his medical records). The District Court, however, examined the studies one by one and concluded that none was sufficient to show a link between PCB's and lung cancer. 864 F.Supp., at 1324-1326. The focus of the opinion was on the separate studies and the conclusions of the experts, not on the experts' methodology. *Id.*, at 1322 ("Defendants ... persuade the court that Plaintiffs' expert testimony would not be admissible ... by attacking the conclusions that Plaintiffs' experts draw

from the studies they cite").

FN4. Dr. Daniel Teitelbaum elaborated on that approach in his deposition testimony: "[A]s a toxicologist when I look at a study, I am going to require that that study meet the general criteria for methodology and statistical analysis, but that when all of that data is collected and you ask me as a patient, Doctor, have I got a risk of getting cancer from this? That those studies don't answer the question, that I have to put them all together in my mind and look at them in relation to everything I know about the substance and everything I know about the exposure and come to a conclusion. I think when I say, 'To a reasonable medical probability as a medical toxicologist, this substance was a contributing cause,' ... to his cancer, that that is a valid conclusion based on the totality of the evidence presented to me. And I think that that is an appropriate thing for a toxicologist to do, and it has been the basis of diagnosis for several hundred years, anyway." Supp.App. to Brief for Respondents 19.

Unlike the District Court, the Court of Appeals expressly decided that a "weight of the evidence" methodology was scientifically acceptable. [FN5] To this extent, the Court of Appeals' opinion is persuasive. It is not intrinsically "unscientific" for experienced professionals to arrive at a conclusion by weighing all available scientific evidence--this is not the sort of "junk science" with which *Daubert* was concerned. [FN6] After all, as Joiner points out, the Environmental Protection Agency (EPA) uses the same methodology to assess risks, albeit using a somewhat **523 different threshold than that required in a trial. Brief for Respondents 40-41 (quoting *154 EPA, Guidelines for Carcinogen Risk Assessment, 51 Fed.Reg. 33992, 33996 (1986)). Petitioners' own experts used the same scientific approach as well. [FN7] And using this methodology, it would seem that an expert could reasonably have concluded that the study of workers at an Italian capacitor plant, coupled with data from Monsanto's study and other studies, raises an inference that PCB's promote lung cancer. [FN8]

FN5. The court explained: "Opinions of any kind are derived from individual pieces of evidence, each of which by itself might not be conclusive, but when viewed in their entirety are the building blocks of a perfectly reasonable conclusion, one reliable enough to be submitted to a jury along with the tests and criticisms cross-examination and contrary evidence would supply." 78 F.3d 524, 532 (C.A.11 1996).

FN6. An example of "junk science" that should be

excluded under *Daubert* as too unreliable would be the testimony of a phrenologist who would purport to prove a defendant's future dangerousness based on the contours of the defendant's skull.

FN7. See, e.g., Deposition of Dr. William Charles Bailey, Supp. App. to Brief for Respondents 56 ("I've just reviewed a lot of literature and come to some conclusions...").

FN8. The Italian capacitor plant study found that workers exposed to PCB's had a higher-than-expected rate of lung cancer death, though " 'the numbers were small [and] the value of the risk estimate was not statistically significant.' " 864 F.Supp. 1310, 1324 (N.D.Ga.1994). The Monsanto study also found a correlation between PCB exposure and lung cancer death, but the results were not statistically significant. *Id.*, at 1325. Moreover, it should be noted that under Georgia law, which applies in this diversity suit, Joiner need only show that his exposure to PCB's " 'promoted' " his lung cancer, not that it was the sole cause of his cancer. Brief for Respondents 7, n. 16 (quoting Brief for Appellants in No. 94-9131 (C.A.11), pp. 7-10).

The Court of Appeals' discussion of admissibility is faithful to the dictum in *Daubert* that the reliability inquiry must focus on methodology, not conclusions. Thus, even though I fully agree with both the District Court's and this Court's explanation of why each of the studies on which the experts relied was by itself unpersuasive, a critical question remains unanswered: when qualified experts have reached relevant conclusions on the basis of an acceptable methodology, why are their opinions inadmissible?

Daubert quite clearly forbids trial judges to assess the validity or strength of an expert's scientific conclusions, which is a matter for the jury. [FN9] Because I am persuaded *155 that the difference between methodology and conclusions is just as categorical as the distinction between means and ends, I do not think the statement that "conclusions and methodology are not entirely distinct from one another," *ante*, at 519, is either accurate or helps us answer the difficult admissibility question presented by this record.

FN9. The Court stated in *Daubert*: "Vigorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof are the traditional and appropriate means of attacking shaky but admissible evidence.... Additionally, in the event

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the trial court concludes that the scintilla of evidence presented supporting a position is insufficient to allow a reasonable juror to conclude that the position more likely than not is true, the court remains free to direct a judgment, Fed. Rule Civ. Proc. 50(a), and likewise to grant summary judgment, Fed. Rule Civ. Proc. 56.... These conventional devices, rather than wholesale exclusion under an uncompromising general acceptance test, are the appropriate safeguards where the basis of scientific testimony meets the standards of Rule 702." 509 U.S., at 596, 113 S.Ct., at 2798.

In any event, it bears emphasis that the Court has not held that it would have been an abuse of discretion to

admit the expert testimony. The very point of today's holding is that the abuse-of-discretion standard of review applies whether the district judge has excluded or admitted evidence. *Ante*, at 517. And nothing in either *Daubert* or the Federal Rules of Evidence requires a district judge to reject an expert's conclusions and keep them from the jury when they fit the facts of the case and are based on reliable scientific methodology.

Accordingly, while I join Parts I and II of the Court's opinion, I do not concur in the judgment or in Part III of its opinion.

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