

The Knowledge Remedy

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This Article explains how common law judges can respond to situations in which a public good that is a necessary predicate for determining liability does not exist. To bring a products liability or environmental harm case, plaintiffs must prove that the product or chemical has a propensity to injure people and that it injured them. But studies demonstrating these facts are too costly for plaintiffs to fund. In many mass tort cases, it is in the defendant's interest not to conduct studies of the risks associated with chemicals or medical devices and, even when conducting such studies, it is in the defendant's interest to limit or manipulate research to avoid findings that their products pose a danger to consumers. Government would be the natural producer of such studies, but it does not fund or conduct enough of them. As a result, even if a plaintiff was injured by a toxin or product, where the defendant chose to hide its head in the sand rather than test, she cannot prove this was the case. She may lose even where there is evidence the defendant engaged in misconduct to prevent or hide research into its products. This Article proposes a second-best solution to this problem: a knowledge remedy which requires a defendant found to have engaged in misconduct to fund independent studies into what risks its products impose.

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Introduction

Around 1996, the animals around Earl Tennant’s farm started dying.¹ His once healthy herd came down with mysterious illnesses.² Cows’ and calves’ teeth turned black, they developed tumors, and lost significant amounts of weight although they were well fed.³ In a few years, the herd was depleted. It wasn’t just the cows. Woodland animals—deer and rabbits—were found dead on the property.⁴ He had a suspicion about what was causing all these deaths: the creek on his farm. The family had sold some land to DuPont years before. The company used that land, which abutted the farm, as a landfill.⁵ The creek foamed; Tennant suspected there was something in the water. As it turned out, the company was illegally dumping toxic waste, specifically what was then an obscure chemical called ammonium perfluorooctanoate (sometimes called APFO/PFOA or C8), into the landfill, and this toxin was getting into the water, running through the creek, and killing the cows, wildlife, and, as later became clear, people.⁶ Not only was the chemical deposited in Tennant’s landfill, it was being dumped into the Ohio River and silently poisoning thousands. But nobody knew this until it was unearthed as part of a lawsuit involving Earl Tennant’s cows.

1. ROBERT BILOTT WITH TOM SHRODER, *EXPOSURE: POISONED WATER, CORPORATE GREED, AND ONE LAWYER’S TWENTY-YEAR BATTLE AGAINST DUPONT 5* (2019).

2. *See id.* at 5, 40 (describing the inexplicable deaths of Tennant’s “top-shelf” herd).

3. *Id.* at 5, 27.

4. *Id.* at 5.

5. *Id.* at 6.

6. *Id.* at 50–51, 53.

Tennant filed his private nuisance suit against DuPont in 1999.⁷ At the time, he didn't know about C8. All he had was his own deduction that there was something wrong with the water coming out of the creek. He knew that it foamed,⁸ that the animals all drank from it,⁹ and that it abutted the landfill.¹⁰ And he knew that in the past the creek had not foamed, and the animals had been healthy.¹¹ It took many months of civil discovery for his lawyer to learn of the existence of C8, in part because of DuPont's delays and prevarications, which are sadly pretty typical in this type of litigation.¹²

A big part of DuPont's resistance to discovery was that while the suit was pending in 2000, the EPA was investigating the use of this chemical.¹³ The chemical's manufacturer, 3M, announced that it would cease making the chemical without explanation, but the reason appears to be EPA pressure.¹⁴ DuPont was engaged in damage control with the EPA around this chemical, which at that point was unregulated, while it defended the Tennant lawsuit.¹⁵ As Tennant's lawyer, Robert Bilott, explained:

With federal regulators already sniffing around about PFOS, the last thing DuPont needed was anyone giving EPA any reason to have concerns about PFOA. They certainly wouldn't want EPA to know that a landfill containing PFOA was suspected of making hundreds of cows—and maybe some humans—very, very sick.¹⁶

This was a classic case of regulatory failure. The EPA did not know about this toxin, did nothing to regulate it, and the company wanted to keep it that way.¹⁷ The chemical was useful and profitable.¹⁸ It was a surfactant that was used to make Teflon, one of DuPont's best-selling products.¹⁹ When personal injury cases were ultimately brought, people did find out about the toxin from the EPA, but only because an EPA official mailed them a letter from a lawyer describing the risks.²⁰ That lawyer was Robert Bilott.²¹

7. *Id.* at 29, 33–34.

8. *Id.* at 3–4.

9. *Id.* at 5.

10. *Id.* at 6.

11. *Id.* at 3–5.

12. *Id.* at 59–60, 66–67.

13. *Id.* at 54.

14. *Id.* at 52.

15. *Id.* at 54–55.

16. *Id.* at 54. PFOS is a chemical similar in composition to C8 and created by 3M. Because the two chemicals are similar, a regulatory problem for manufacturers using PFOS was likely to become a regulatory problem for those using C8 as well. *Id.* at 53.

17. *Id.* at 54.

18. *Id.*

19. *Id.* at 53–54.

20. *Id.* at 126–27.

21. *Id.*

The EPA itself had not studied the toxin. As the case progressed, it appears that the company was able to influence state regulators enough so they declared that there was no connection between the C8 in the water and disease and that the high amounts of C8 in the local drinking water were safe, although they were significantly higher than the level DuPont itself had suggested.²²

It is also an example of the judicial branch, through common law adjudication, filling in a hole left by regulators. Bilott filed personal injury cases following his discovery of the toxin in the water supply.²³ These were certified as a class action seeking clean water and a medical monitoring program.²⁴ In the end, the plaintiffs got something much better. Their lawyers obtained a settlement fund to filter the water and, as importantly, to conduct independent research on the health effects of C8.²⁵ They used the results of that independent analysis to bring personal injury suits that are being litigated as these words are written.²⁶ These neutral studies determined which types of cancer were reliably linked to C8 and which were not, allowing plaintiffs with personal injuries to prove general causation in their follow-on tort suits.²⁷

The story of Robert Bilott's discovery of DuPont's wrongdoing and his fight for justice for those injured has been published as a book and made into a movie.²⁸ The last part of the story, in which the plaintiffs received money from the defendant to conduct scientific studies, is what this Article is about. What Bilott negotiated is a knowledge remedy, a type of remedy that has not been recognized in legal scholarship but has played, and likely will continue to play, an important role in American law.

Because the United States does not adhere to the precautionary principle, many chemicals, toxins, and other products are introduced to the public with minimal study.²⁹ This is meant to spur innovation, but it also imposes costs on the people who end up being unwitting test subjects. If

22. *Id.* at 158–59, 163.

23. *Id.* at 137.

24. *See id.* at 144–47 (describing the plaintiffs' concern about the quality of the water and their interest in studies that would analyze the toxicity of the chemical).

25. *Id.* at 241–45.

26. *Id.* at 312–13.

27. *Id.* at 307, 331–33.

28. *See generally id.*; DARK WATERS (Focus Features 2019).

29. For an example of the precautionary principle applied in the context of environmental law, see U.N. Conference on Environment and Development, *Rio Declaration on Environment and Development*, U.N. Doc. A/CONF.151/26/Rev. 1 (Vol. I), annex I, at 6 (June 1992). The U.N. Conference on Environment and Development proclaimed that “[w]here there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.” *Id.*

studies were funded by the government, evidence might be produced that would show a product is harmful, and it would be regulated and pulled from the market. But public funding is decreasing. If the law required companies to test their products before use or even after introduction to the market, and this mandate was reliably enforced, harmful products would be fewer. But there is no such legal rule. Instead, people rely on the tort system to fill the gaps where regulation fails.

Where there is weak regulation and little public knowledge, the residual system for mitigating and compensating for harm is the tort system. But without government or privately funded studies, causation in complex cases like the one against DuPont is difficult, perhaps impossible, to prove. Yet studies are too expensive for individuals or even groups to fund. And they take too long, potentially waiting out a statute of limitations and leaving plaintiffs without a viable cause of action. If a causal connection cannot be proven, regulation is never put in place and people are exposed to dangerous substances and suffer illnesses and loss of productivity that could be avoided.

Where regulation is lax and there is insufficient funding for the government to study the toxic effects of the chemicals, products, and pharmaceuticals that permeate our daily lives, a knowledge remedy is appropriate. A knowledge remedy requires the defendant to pay for the production of knowledge about the harm it is alleged to have caused. This remedy is what Bilott obtained for his clients, although nobody called it that. Indeed, the knowledge remedy has never been recognized as such, although it has a long history. This Article describes that remedy and explains its importance in today's legal landscape: a decidedly second-best world where regulation is limited, public study is infrequent, and potentially harmful products are everywhere. The contribution here is twofold. First, this is the first time the knowledge remedy has been conceptualized as a kind of remedy in legal scholarship, although courts have previously recognized it without giving it a name. Second, the Article explains the conditions for awarding this remedy and evaluates its benefits and costs.

The Article begins by describing the knowledge remedy using two examples involving toxic torts in which it was used: the case of DuPont and C8 in West Virginia and the case of a polluting aluminum plant in Oregon. It also describes a current case that might be well suited to such a remedy: lawsuits involving Roundup, an herbicide alleged to cause cancer. Part II describes the antecedents of the knowledge remedy, the accounting and medical monitoring, and concludes that it is part of a recognized remedial tradition. Part III describes when a knowledge remedy is appropriate and how it ought to be administered in mass tort litigation, including how to distinguish the knowledge remedy from discovery orders and how it intersects with preclusion doctrine. Part IV considers normative arguments in favor of and against the knowledge remedy. The knowledge remedy is

admittedly a non-ideal solution. But so long as regulation is lax and government funding is limited, it is a necessary one.

I. The Knowledge Remedy

The knowledge remedy is a remedial order in which the court requires a wrongdoer to pay for the production of new information. This Part describes two past instances of the knowledge remedy and how they played out. It demonstrates that the knowledge remedy is a viable way for courts to address situations where there are both strong indicia of wrongdoing and genuine but preventable scientific uncertainties. In these two examples, as appears to be the situation often enough, the uncertainty is in part a product of a company's failure to study the effects of the pollutants or products that are alleged to cause injury.³⁰ In the last subpart, this Part considers the application of the knowledge remedy to a current case: the litigation against Monsanto alleging that the herbicide Roundup is carcinogenic.

A. *DuPont*

Having already introduced the DuPont story, this subpart considers what happened to create the innovative and useful knowledge remedy in that case. The reader will recall that an initial property (nuisance) suit against the company led to the discovery that DuPont was disposing of a toxic chemical known as C8. As it turned out, the chemical was not only being dumped into the landfill abutting Tennant's ranch, but also into the Ohio River, contaminating the drinking water.³¹

Discovery in the Tennant lawsuit led to information about the risks of C8, in particular that the company had become aware in the 1980s that C8 was a potential carcinogen.³² Among the evidence discovered was that 3M, which supplied C8 to the company, had warned of potential hazards and that the company had transferred pregnant women (or those who might become pregnant) out of work areas where they would be in contact with C8.³³ In

30. This is a form of preventable scientific uncertainty. Preventable scientific uncertainty is the problem that it may be in a defendant's interest not to test a product or chemical in order to avoid failure-to-warn claims later. See Wendy E. Wagner, *Choosing Ignorance in the Manufacture of Toxic Products*, 82 CORNELL L. REV. 773, 776, 780 (1997) (distinguishing between two types of scientific uncertainty, one of which, preventable uncertainty, is the result of a lack of reasonable investment).

31. BILOTT WITH SHRODER, *supra* note 1, at 67–68.

32. *Id.* at 80–81.

33. *Id.* at 228–29.

meetings, the company discussed the potential risks but decided not to study them further because C8 was so useful and lucrative.³⁴

These findings led to a second lawsuit, a class action filed in 2001 by residents of a neighboring town who claimed that C8 contaminated their drinking water.³⁵ The state court certified a class action of medical monitoring claims.³⁶ It also issued an injunctive order requiring DuPont to pay for blood testing to determine the levels of the chemical in class members' blood. This order was appealed and reversed on the grounds that it was an improper discovery order.³⁷ As this Article will show, that was a category error on the appellate court's part. What the district court initially ordered, which tracks substantially what the parties ultimately agreed to, was actually a kind of remedy.

The appellate court held that the company was not obligated to pay for the plaintiffs to prove their claims. It viewed the plaintiffs' request as asking "that the burden of the expense of gathering evidence, testing for the presence of C-8, be shifted to [D]uPont. In a creative manner, the plaintiffs are simply asking the circuit court to shift the costs of the discovery process"³⁸ This, the appellate court held, violated the general principle that each party pay for the costs of proving their own case. In other words, it rejected the knowledge remedy as nothing more than a misunderstanding about who pays for discovery.

The reason that the appellate court erred was that the appropriate category of plaintiff's request was not procedural but remedial. In the case before it, the plaintiffs had already demonstrated that the defendant had engaged in misconduct. The plaintiffs had shown evidence that DuPont had released C8 into the water and that C8 was linked to the death of Tennant's animals.³⁹ The question should have been whether a knowledge remedy was appropriate at that juncture in the litigation, not whether this was an attempt at cost-shifting. Later developments in the case proved how appropriate such a remedy would have been.

Thankfully, the appellate court's decision is not where the case ended. DuPont's regulatory situation worsened. The EPA began a more serious investigation and sued the company.⁴⁰ There were news reports of the danger

34. *Id.* at 189–92; Roy Shapira & Luigi Zingales, *Is Pollution Value Maximizing? The DuPont Case 7* (Nat'l Bureau of Econ. Research, Working Paper No. 23866, 2017), <https://www.nber.org/papers/w23866.pdf> [<https://perma.cc/RJ9U-ERYQ>].

35. Shapira & Zingales, *supra* note 34; Leach v. E.I. Du Pont de Nemours & Co., No. 01-C-608, 2002 WL 1270121, at *1 (Cir. Ct. W. Va. Apr. 10, 2002).

36. *Leach*, 2002 WL 1270121, at *8–18.

37. *State ex rel. E.I. Dupont De Nemours & Co. v. Hill*, 591 S.E.2d 318, 326–27 (W. Va. 2003).

38. *Id.*

39. BILOTT WITH SHRODER, *supra* note 1, at 110.

40. *Id.* at 231.

of Teflon, including a 20/20 segment featuring the son of a DuPont employee who had suffered significant and disfiguring birth defects, most likely as a result of exposure to C8 in the womb.⁴¹ Furthermore, the West Virginia courts permitted damning emails sent by DuPont's lawyers to be used by the plaintiffs in litigating the case because the company had waived the attorney-client privilege.⁴² In the emails, the lawyers lamented that DuPont was continuing to pollute the local water despite knowing that C8 was bio-persistent and risked injury to the community.⁴³ "Our story is not a good one," the lawyers had written in these internal emails, "we continued to increase our emissions into the river in spite of internal commitments to reduce or eliminate the release of this chemical into the community."⁴⁴ With the tide turning against it, DuPont settled the claims. That settlement included both remediation of the water supply and, importantly for our purposes, an independent study to determine the carcinogenicity of C8.⁴⁵ This agreement, approved by the court under the state equivalent of Federal Rule 23(e), is a knowledge remedy.⁴⁶

The settlement committed DuPont to spend \$107 million on a community study of the effects of C8.⁴⁷ The company agreed that if the study found a "probable link" between C8 and human disease, it would concede general causation in subsequent litigation.⁴⁸ It would also pay for medical monitoring.⁴⁹ If the study found no probable link between cancer and C8 exposure, then class members would release future tort claims.⁵⁰

The first step was the collection of blood samples and information from about 69,000 residents who might have been affected.⁵¹ A panel of independent researchers was appointed by the community and DuPont to

41. *Id.* at 218–19, 221–22.

42. *Id.* at 235.

43. *Id.*

44. *Id.*

45. *Id.* at 24.

46. Although this was a private settlement, it could also be characterized as a judicial order because it required judicial approval.

47. Laura Hall et al., *Litigating Toxic Risks Ahead of Regulation: Biomonitoring Science in the Courtroom*, 31 STAN. ENVTL. L.J. 3, 20 (2012).

48. Christine H. Kim, *Piercing the Veil of Toxic Ignorance: Judicial Creation of Scientific Research*, 15 N.Y.U. ENVTL. L.J. 540, 575 (2007) (citing Joint Motion for Preliminary Approval of Settlement at 5, *Leach v. E.I. DuPont de Nemours & Co.*, No. 01-C-608, at 5 (Cir. Ct. W. Va. Nov. 22, 2004)). This ended up being a significant source of controversy in subsequent litigation. See *In re E. I. Du Pont De Nemours & Co. C8 Pers. Injury Litig.*, No. 2:13-CV-170, 2016 WL 659112, at *4 (S.D. Ohio Feb. 17, 2016) (discussing the *Leach* settlement agreement).

49. Hall et al., *supra* note 47, at 21.

50. *In re E. I. Du Pont De Nemours & Co. C-8 Pers. Injury Litig.*, 2016 WL 659112, at *4.

51. *The Science Panel*, C8 SCIENCE PANEL, <http://www.c8sciencepanel.org/panel.html> [<https://perma.cc/T2YS-TBCW>].

determine the causal link between C8 and a list of cancers. They first collected existing studies and then conducted their own studies of the effects of C8.⁵² These scientists found a link for a subset of the listed diseases.⁵³ Approximately 3,500 personal injury lawsuits were filed by individuals, consolidated in the Southern District of Ohio, and bellwether trials were scheduled.⁵⁴ Some of these cases were tried, others settled.⁵⁵ As of this writing, jury trials are scheduled through 2020.⁵⁶

Without the studies, it would have been nearly impossible for the plaintiffs to prove their case. The studies they were able to conduct, involving perhaps a few hundred individuals, would likely be insufficient proof in a trial. The evidence that C8 caused birth defects came from a group of seven female workers exposed to the substance at DuPont, two of whose children suffered birth defects.⁵⁷ This was too small a sample to draw any conclusions about causation. Only a governmental study or one funded by the company could have provided the type of evidence needed to prove general causation, to spur cleaning the water and prevent further exposure of innocent people to this dangerous chemical.

A study such as the one ultimately obtained in the *DuPont* case is a public good.⁵⁸ Everyone is better off if a study is done, but no individual actor

52. *C8 Science Panel Studies*, C8 SCIENCE PANEL, <http://www.c8sciencepanel.org/study.html> [<https://perma.cc/YX48-L3FK>]. The panel went on to explain:

No single epidemiologic study is sufficient to determine whether C8 adversely affects health. The Science Panel designed a series of complementary studies to generate necessary data for its work in assessing the probable links between C8 and disease. These studies began in late 2006 and are completed, with results summarised in the Probable Link reports and presented in detail in scientific articles

Id. For a list of the published studies, see *C8 Study Publications*, C8 SCIENCE PANEL, <http://www.c8sciencepanel.org/publications.html> [<https://perma.cc/7PB7-STH4>].

53. For a list of the probable link evaluations of the C8 Panel, see *C8 Probable Link Reports*, C8 SCIENCE PANEL, http://www.c8sciencepanel.org/prob_link.html [<https://perma.cc/XFP7-4ZMF>].

54. See *In re E. I. Du Pont De Nemours & Co. C-8 Pers. Injury Litig.*, Case Management Order No. 20, 204 F. Supp. 3d 962, 965 (S.D. Ohio 2016) (describing the court's setting of the bellwether trials).

55. See, e.g., Kris Maher & Cameron McWhirter, *DuPont Settlement of Chemical Exposure Case Seen as 'Shot in the Arm' for Other Suits*, WALL ST. J. (Feb. 13, 2017), <https://www.wsj.com/articles/dupont-chemours-settle-teflon-chemical-exposure-case-for-671-million-1486987602> [<https://perma.cc/CH5S-MDT8>] (describing large-scale settlement of C8 suits); Jess Mancini, *DuPont Planning to Appeal \$50M Verdict in C8 Case*, PARKERSBURG NEWS & SENTINEL (Mar. 5, 2020), <https://www.newsandsentinel.com/news/local-news/2020/03/dupont-planning-to-appeal-50m-verdict-in-c8-case/> [<https://perma.cc/574K-LCQ6>] (describing verdict in C8 trial).

56. *In re E.I. Du Pont de Nemours & Co. C-8 Personal Injury Litigation*, Case Management Order No. 28, Case No. 13-md-2433 (S.D. Ohio Jan. 7, 2019).

57. BILOTT WITH SHRODER, *supra* note 1, at 177.

58. A public good in economics is defined as a good that is nonrivalrous and nonexcludable. The type of scientific information described here can be used by many without being consumed (as

has the incentive to create it. The reason everyone benefits is that if C8 is bio-persistent and harmful, DuPont can take steps (or be required to take steps) to prevent its release into the environment, saving people's lives, the cost of litigation, and the need to pay damages.⁵⁹ If C8 is not carcinogenic, DuPont will not be sued and thus save the cost of litigation, the cost of paying damages, and the cost of preventing its release into the environment. But DuPont had no incentive to conduct such a study because it calculated that it was better off hiding the potential carcinogenicity or hoping that C8 was not injurious.⁶⁰ The plaintiffs had an interest in conducting such a study but insufficient funding to conduct such a study before obtaining damages. Furthermore, they lacked access to the specific technology needed (the only laboratory able to test for C8 in the blood was controlled by DuPont). There is an open question as to whether they might have received financing based on the amount of money they were likely to obtain in damages. If they had, this would probably have depleted a significant amount, if not all, of their recovery. What this says about the tort system is that it relies on external sources of information to function. Damages compensate for the harm caused, but they may not be sufficient to pay for *proving* that harm.

B. *Harvey Aluminum*

In 1958, Harvey Aluminum opened a plant in Oregon. The plant was located in an agricultural community that grew stone fruit, mostly cherries.⁶¹ In the next couple of years, it became clear to the orchard owners that the smoke emitted from the plant was destroying their livelihood as the cherry crops decreased.⁶² The orchardists filed a lawsuit in federal court in 1961 seeking abatement of the emissions.⁶³ But like many toxic tort cases, they faced an uphill battle proving the Harvey plant's emissions were the cause of the problems with the harvests. There were no extant studies, for example, and the government was not going to fund any.⁶⁴ The orchardists were

is the nature of information) and people cannot be excluded from using it. At least once a court orders it released. As a matter of observation, it is not created by the market. Yet it promotes social welfare. The best producer of such information is the government. Because of regulatory failure and market failure, the courts are left with the problem articulated in this Article.

59. I am assuming here that if damages were correctly calculated, they would exceed the value of using C8 to produce Teflon.

60. See generally Shapira & Zingales, *supra* note 34 (concluding that pollution was value maximizing for DuPont in this case based on available data about its profits from use of C8 and the costs of regulatory fines and tort suits).

61. Douglas A. Kysar & Conor Dwyer Reynolds, *Of Coase and Cherries: Risk Regulation Among Neighbors in Wasco County*, at 2 (Apr. 23, 2019) (unpublished manuscript) (on file with author).

62. *Id.* at 11.

63. *Id.* at 21–22.

64. *Id.* at 23.

funding research themselves, through a league they had created, but with dwindling crop yield it was difficult to raise money for expensive research.⁶⁵ A trial was held in 1963, and cross-examination of the plant's experts revealed that they found new damage to the crops after the emissions began and that it was likely that the plant's emissions were causing injury to the crops.⁶⁶ It was in the remedial phase that the fight that is relevant to our inquiry occurred.

Harvey Aluminum's claim was that it was financially impossible, perhaps even technically impossible, for it to abate the emissions.⁶⁷ Plaintiffs' experts described other aluminum plants in the United States that had abatement systems in place.⁶⁸ The judge agreed with the plaintiffs, ordering the Harvey plant to install cell hoods and use electrostatic precipitators to limit emissions.⁶⁹ The company appealed and, on appeal, introduced new testing evidence indicating that it had abated some of the problem. As it turned out, this representation was false because the tests the company submitted were done during a one-month period when the plant was shut down.⁷⁰ The appellate court allowed a new trial and, in a rather unusual move, ordered that the defendant would pay for it.⁷¹

While the case was proceeding to trial on remand, the plaintiffs discovered that a different abatement system was in use in Germany, and this new technology was better at abating the chemical emissions that injured their crops than that available in the United States.⁷² The District Court ordered "advances" to the plaintiffs to pay for them to research state-of-the-art abatement systems in aluminum plants in various countries in Europe.⁷³

As in the DuPont litigation, the court styled the knowledge remedy as a discovery order. But, in fact, it was a knowledge remedy, one that was a predicate to determining what appropriate injunction the court should ultimately order. It was not a discovery order because it did not require the defendant to produce information already in its possession, but rather to pay for the creation of *new* information.⁷⁴ After five years of litigation and

65. *Id.* at 24.

66. *Id.* at 25, 32–33.

67. *Id.* at 33–34.

68. *Id.* at 35.

69. *Id.* at 36.

70. *Id.* at 47. The plaintiffs were ultimately able to prove this fraud on the court, but only after a second round of discovery.

71. *Id.* at 42.

72. *Id.* at 44–45.

73. *Id.* at 45–46.

74. There is a line-drawing problem between discovery and remedy in these examples, and indeed in knowledge remedies more generally. However, although there may be some overlap between these categories, as there is in much of law, at their core they are different from one another

scientific research, the company and the growers reached a consent decree that would create an independent body to set air quality standards with which the company would comply.⁷⁵

Also like the DuPont case, the company did not have an incentive before the suit to research pollution-mitigation options. The incentives seem to have run the other way, as the company first resisted claims that its emissions caused injury, then affirmatively tried to hide and misrepresent the extent of its emissions. In the face of this type of wrongdoing, a knowledge remedy that imposed on the defendant the cost of researching mitigation systems was appropriate. This is especially true if the court was loath to order closure of the plant, and the plant owners, counting on this fact, preferred to take the small risk that they would be shut down to perhaps obtain the greater benefit of having to make no or minimal investments in mitigation systems. The fact that the company was willing to misrepresent its emissions indicates that, like DuPont, it preferred to hide the problem and risk greater sanctions. The reason for this must be that it calculated the likelihood of sanctions as very low. Absent the court's discovery of this misconduct and subsequent remedial order, this evaluation was probably correct.

C. *Monsanto*

Dewayne “Lee” Johnson was a groundskeeper for a California school district. One of his tasks was to spray herbicide, probably to kill the poison oak that grows so well in that part of the country.⁷⁶ The herbicide he used was Roundup, one of the most powerful weed killers available and part of a modern miracle created by Monsanto, the agricultural giant. Using Monsanto's herbicide-resistant seeds, farmers can spray acres of land and only kill the weeds, leaving the crops standing. But Roundup isn't used only by farmers, but also by states, counties, towns, and even individuals in their backyards.

Lee Johnson got a cancer diagnosis of non-Hodgkin's lymphoma after a few years of working as a groundskeeper. He had been doused at least once in Roundup, and started experiencing skin problems, including painful lesions.⁷⁷ His claim at trial was that Roundup caused his cancer. There was

because the discovery order requires a party to produce information it already has, whereas a remedial order requires a party to do something in addition to what it has already done.

75. Kysar & Reynolds, *supra* note 61, at 48.

76. Sam Levin, *The Man Who Beat Monsanto*, *GUARDIAN* (Sept. 26, 2018), <https://www.theguardian.com/business/2018/sep/25/monsanto-dewayne-johnson-cancer-verdict> [<https://perma.cc/X3KW-YEJD>].

77. *Id.*

some evidence that glyphosate may be carcinogenic.⁷⁸ But non-Hodgkin's lymphoma can have any number of causes. And it is a relatively common cancer. More than 70,000 people received this diagnosis in the United States in 2019.⁷⁹

The studies on the relationship between glyphosate, the active ingredient in Roundup, and this cancer are incomplete. Some studies have shown an association, but these can be rebutted with others. The trouble is, Monsanto stood in the way of much of the possible research into the carcinogenicity of glyphosate. At trial, plaintiffs presented evidence of early animal studies, dating from 1983, which were indicative of carcinogenicity (although not at all definitive).⁸⁰ There was evidence of ghostwriting—where a company will assist in an author's work without being acknowledged, a practice which is considered unethical—as well as evidence of attempts to influence scientists.⁸¹ And there was evidence of regulatory capture. An EPA administrator told a Monsanto executive that he should “get a medal” for preventing further inquiry into the safety of the product.⁸²

Epidemiologists disagreed. There were studies on both sides. And ultimately the plaintiffs were able to overcome evidentiary hurdles and the dueling experts who testified at trial. Johnson won close to \$39 million in compensatory damages and \$250 million in punitive damages.⁸³

There have been many more lawsuits. In October 2019 Bayer AG, Monsanto's parent company, reported that more than 42,000 suits had been filed against it in connection with Roundup.⁸⁴ There have also been two more

78. The International Agency for Research on Cancer (IARC) published a report on March 20, 2015 classifying glyphosate as probably carcinogenic to humans. *Some Organophosphate Insecticides and Herbicides*, 112 IARC MONOGRAPHS ON THE EVALUATION OF CARCINOGENIC RISKS TO HUMANS, at 398 (2015), monographs.iarc.fr/ENG/Monographs/vol112/mono112-10.pdf [<https://perma.cc/T284-RFMV>].

79. *Lymphoma - Non-Hodgkin: Statistics*, CANCER.NET (Aug. 2019), <https://www.cancer.net/cancer-types/lymphoma-non-hodgkin/statistics> [<https://perma.cc/WPF9-BVVL>].

80. An internal EPA memo from 1985 stated: “Under such circumstances, a prudent person would reject the Monsanto assumption that Glyphosate dosing has no effect on kidney tumor production.” Memorandum by Herbert Lacayo to Reto Engler (Feb. 26, 1985) (on file with author).

81. Danny Hakim, *Monsanto Emails Raise Issue of Influencing Research on Roundup Weed Killer*, N.Y. TIMES (Aug. 1, 2017), <https://www.nytimes.com/2017/08/01/business/monsantos-way-over-research-is-seen-in-disclosed-emails.html> [<https://perma.cc/ATB9-AXXU>].

82. See Email from Daniel Jenkins, Monsanto, to William Heydens, Monsanto (Apr. 28, 2015, 9:33 AM) (on file with author) (quoting an EPA official who said that “[i]f I can kill this I should get a medal”).

83. Holly Yan, *Cancer Patient Who Was Awarded \$289 Million in Monsanto Trial Says He'll Take \$78 Million Instead*, CNN (Nov. 1, 2018, 11:51 AM), <https://www.cnn.com/2018/11/01/health/monsanto-plaintiff-accepts-lower-award/index.html> [<https://perma.cc/S474-NV8C>]. As noted in the article, the verdict was remitted to \$78 million, an outcome that Monsanto is currently appealing. *Id.*

84. Adrian Croft, *As Roundup Lawsuits Pile Up By the Thousands, Bayer Remains Defiant*, FORTUNE (Oct. 30, 2019, 11:24 AM), <https://fortune.com/2019/10/30/roundup-lawsuits-bayer-defiant/>.

verdicts, both multimillion losses for Monsanto.⁸⁵ In a second case in California state court, the jury awarded \$2 billion in punitive damages.⁸⁶ In the wake of these developments, Monsanto's parent company Bayer announced that it would spend \$5.6 billion to study the potential carcinogenicity of the herbicide Roundup.⁸⁷

In the meantime, Monsanto is appealing the verdict in Johnson's case. As part of that appeal, there has been an organized campaign to paint this case as one of "junk science." Amicus briefs were filed by California doctors and high-powered biotechnology companies like Genentech.⁸⁸ Even the Environmental Protection Agency filed briefs supporting the company in a related appeal.⁸⁹

The Roundup cases are not about junk science or juror misunderstanding of science. Rather, they are examples of preventable scientific uncertainty, and it appears from the punitive damages verdicts that the jury found this uncertainty was created by Monsanto itself. There are three ways to deal with this type of uncertainty. One is to place the burden of the costs of damages on the defendant, in light of conclusion that the absence of evidence was found to be the defendant's wrongdoing. Another is to place the costs of damages on the plaintiffs, in light of the continuing uncertainty. A third way is to impose a knowledge remedy, requiring independent studies of glyphosate to promote greater understanding. While there will never be perfect knowledge, given the ethical limitations on conducting double-blind clinical studies on the effects of exposure, studies could produce greater consensus in the epidemiologic community.

85. A second state court jury in *Pilloid v. Monsanto* awarded \$55 million in compensatory and \$2 billion in punitive damages. Both amounts were remitted by the judge. Tina Bellon, *In Roundup Case, U.S. Judge Cuts \$2 Billion Verdict Against Bayer to \$86 Million*, REUTERS (July 25, 2019, 8:25 PM), <https://www.reuters.com/article/us-bayer-glyphosate-lawsuit/in-roundup-case-u-s-judge-cuts-2-billion-verdict-against-bayer-to-86-million-idUSKCN1UL03G> [<https://perma.cc/M8CS-ABN4>].

86. *Id.*

87. Douglas Busvine & Ludwig Burger, *Bayer to Invest \$5.6 Billion in Weedkiller Research to Help Reputation*, REUTERS (June 14, 2019, 12:52 AM), <https://www.reuters.com/article/us-bayer-glyphosate/bayer-to-invest-5-billion-euros-in-weedkiller-research-idUSKCN1TF011> [<https://perma.cc/UH2F-ZCZY>].

88. Brief for Genentech, Inc. as Amici Curiae Supporting Defendant and Appellant, *Johnson v. Monsanto Co.*, No. A155940 & A156706 (Cal. Ct. App. Aug. 30, 2019); Brief for California Medical Association et al. as Amicus Curiae Supporting Neither Party, *Johnson v. Monsanto Co.*, No. A155940 & A156706 (Cal. Ct. App. Aug. 30, 2019); Brief for California Farm Bureau Federation as Amici Curiae Supporting Appellant, *Johnson v. Monsanto Co.*, No. A155940 & A156706 (Cal. Ct. App. Sept. 3, 2019).

89. An EPA brief was filed in the Ninth Circuit appeal. Jacob Bunge & Timothy Puko, *Trump Administration Backs Bayer in Weedkiller Court Fight*, WALL ST. J. (Dec. 20, 2019), <https://www.wsj.com/articles/epa-backs-bayer-in-weedkiller-court-fight-11576879555> [<https://perma.cc/CP28-AU4D>].

There surely will be more studies now that the litigation has made glyphosate and Roundup the subject of sustained media attention. But if the courts cut off liability, the results of that consensus will come too late for plaintiffs. And if the courts sustain liability, the results will be too late for Monsanto. One solution that could be respectful of the jurors' decision would be to impose an interim knowledge remedy. It cannot be denied that this outcome would impose significant costs on plaintiffs such as Johnson, who has already endured a trial and is dying but would be forced to wait to receive compensation. Nevertheless, such a knowledge remedy is a better alternative as compared with immunity from liability given the evidence of misconduct.

II. Historical Antecedents

This Part describes two historical antecedents of the knowledge remedy, demonstrating that the knowledge remedy is not a new judicial invention but has ancient roots. Its origins lie in difficulties of proof suffered by certain groups, usually as a result of information asymmetries. The difference between the original knowledge remedy, the accounting, and its twenty-first century use is that the accounting is a purely private remedy. It benefits only the individual before the court who has been cheated by a fiduciary. By contrast, the knowledge remedy produces a public good, one which benefits the entire community or even the nation.

A. *The Accounting*

The accounting is perhaps the oldest knowledge remedy.⁹⁰ A party who fears they have been cheated would first bring an action in equity as a bill for discovery and second, if the discovery showed a claim for money could lie, a follow-on suit for breach of contract, breach of fiduciary duty, or some other similar writ, as appropriate.⁹¹ It is hard to understand why this would have been so without recalling the basic structure of the court system in this early period. Under the regime when equity and law were separate jurisdictions, the request for discovery in cases that might otherwise have been brought at law were brought in equity as a bill for discovery.⁹² This is because at that time, exchange of information before trial was not available in actions at

90. See 1 JOSEPH STORY, COMMENTARIES ON EQUITY JURISPRUDENCE §§ 689–90 (9th ed. 1866) (discussing the bill of discovery); Christopher C. Langdell, *A Brief Survey of Equity Jurisdiction* (vol. 4), 2 HARV. L. REV. 241, 250–60 (1889) (discussing the equitable remedy of an accounting).

91. Langdell, *supra* note 90, at 243–51. Although Langdell claims that the action for an account is an action at law, *id.* at 251, according to Story, it is an action in equity. STORY, *supra* note 90. Story's explanation appears to be the correct one in light of the known history of equity.

92. STORY, *supra* note 90, at § 689; see also *id.* § 64*k* (discussing the concurrent jurisdiction of equity and law in actions for discovery); *id.* §§ 67, 69 (listing "account" as among potential equity claims).

law.⁹³ Yet the plaintiff might not be able to make her case without discovery, so the solution was to allow a separate bill for discovery under the cause of action known as an accounting.

The purpose of an accounting is to force the defendant to create information that will then be used to obtain compensation, if any is due. Over time, the accounting evolved into a cause of action that, after the merger of law and equity, may be brought in any court, even if discovery is otherwise available.

An illustrative example of a modern accounting arises in the context of a consignment agreement. In one modern case, Zaki Kulaibee Establishment (Zaki) entered into a contract with Airspares Network to sell a large shipment of aircraft parts on consignment.⁹⁴ The deal went sour, and Zaki alleged that Airspares “breached the contract by selling Zaki’s parts without properly accounting for the sales proceeds, charging Zaki for inflated storage expenses, and failing to return the parts after Zaki terminated the consignment agreement.”⁹⁵ During the course of conduct between the parties, Airspares provided only summary information to Zaki and refused to provide more detailed information about such things as how many and which parts were sold or proof of expenses.⁹⁶

The case initially proceeded as a breach-of-contract and consignment claim seeking money damages, but after over two years of discovery, the plaintiff was unable to obtain the information needed to make its case.⁹⁷ It was denied access to the warehouse to count inventory, and Airspares refused to provide the underlying documentation supporting its deduction of expenses from sales of the consigned parts.⁹⁸ Before trial, Airspares moved for summary judgment; Zaki responded that it should not have to take at face value the defendant’s claims that all the calculations of sales and expenses were accurate and that an accounting was necessary.⁹⁹ Without an accounting, it could not prove its breach-of-contract claim.¹⁰⁰

The district court held that Zaki was not entitled to an accounting because it had an adequate remedy at law through its breach of contract and

93. AMALIA KESSLER, *INVENTING AMERICAN EXCEPTIONALISM: THE ORIGINS OF AMERICAN ADVERSARIAL LEGAL CULTURE, 1800–1877*, 68–71 (2017) (describing forms of process for common law versus equity courts in New York).

94. *Zaki Kulaibee Establishment v. McFliker*, 771 F.3d 1301, 1302–03 (11th Cir. 2014).

95. *Id.* at 1303.

96. *Id.* at 1304.

97. *Id.* at 1306, 1308–09.

98. *Id.* at 1308–09.

99. *Id.* at 1309.

100. *Id.*

conversion claims.¹⁰¹ The Court of Appeals disagreed.¹⁰² It held that under Florida law, an accounting is available “in cases of especially complicated or mutual accounts, where a fiduciary relationship existed between the parties, and in cases where discovery was required.”¹⁰³ Discovery being available in all cases under the modern procedural rules, it explained, the two remaining grounds for an accounting were the relevant considerations.¹⁰⁴ The court held that Airspares had agreed to act as a fiduciary in taking on the consignment relationship and

because a consignee is not tasked with *holding* the property entrusted to him and returning the *same property* to the consignor at a later date, but rather with *disposing* of the property and returning *something else* (the fungible proceeds of the sales of the goods) to the consignor, the need to impose a fiduciary obligation to account becomes particularly apparent.¹⁰⁵

A core duty of the consignee is to provide a true and accurate account of its stewardship of the goods in question.¹⁰⁶ Because the company had admitted that it had not accounted for its stewardship of the goods, an accounting was an appropriate remedy.¹⁰⁷

The usual discovery mechanisms were not enough, the court explained, because “[d]iscovery simply could not provide the kind of close, consistent, and knowledgeable oversight necessary to procure that information from a sophisticated party who both possessed all the relevant details and had substantial motivation to frustrate the discovery process.”¹⁰⁸ Appointing a special master, armed with the coercive power of the court itself, was the appropriate remedy.¹⁰⁹

The accounting remedy teaches us four things. First, an accounting is a form of knowledge remedy aimed at obtaining information from the defendant to give to the plaintiff utilizing court oversight. Second, an accounting may be a preliminary remedy on the way to a monetary award. Third, it was considered equitable in the early history of American law. Fourth, as we saw in the DuPont and Harvey Aluminum examples, there is

101. *Id.*

102. *Id.* at 1316.

103. *Id.* at 1311.

104. *Id.*

105. *Id.* at 1312.

106. *Id.* at 1313.

107. *Id.*

108. *Id.* at 1315.

109. *Id.* at 1315–16; *see also* FED. R. CIV. P. 53(a)(1) (authorizing court to appoint a master to perform an account or resolve a difficult computation of damages); 9C CHARLES ALAN WRIGHT & ARTHUR R. MILLER, FEDERAL PRACTICE AND PROCEDURE § 2605 (3d ed. 2008) (describing the practice of referring matters of account to a master as a “very traditional and fairly frequent use of a master”).

an overlap between knowledge remedies and the discovery process, but still a knowledge remedy can be distinct from that process in the appropriate case.

B. Medical Monitoring

Medical monitoring was originally a prejudgment remedy aimed at maintaining the status quo ante in personal injury litigation when litigation was drawn out and the plaintiffs' condition was deteriorating. The case that first recognized what is now often referred to as "medical monitoring" was a D.C. Circuit decision by Judges Starr, Bork, and Mikva, *Friends for All Children, Inc. v. Lockheed Aircraft Corp.*¹¹⁰ The names are important because two of these judges are generally considered to be politically conservative. The case involved Vietnamese orphan children who were being airlifted to the United States. "Fifteen minutes after takeoff a locking system failed, causing the aft ramp and cargo doors to fall off the aircraft. The interior compartments of the plane thereupon suffered an explosive decompression and loss of oxygen."¹¹¹ The pilot turned the plane around and attempted a crash landing, "[b]ut on impact the aircraft shattered into four large pieces and countless fragments. Almost all the orphans and attendants in the cargo compartment of the aircraft were killed."¹¹² In the end, 149 children (mostly infants) "in the aircraft's troop compartment survived."¹¹³

The infants' representative sued the Lockheed Aircraft Corporation, the plane manufacturer. Over a period of years, there was significant procedural maneuvering, ending with a number of bellwether trials. In most of these, the plaintiffs won high six-figure verdicts.¹¹⁴ Still, it looked like there would be no global settlement. Ultimately it turned out that Lockheed and the United States Air Force had failed to produce evidence that had been requested in discovery, including photographs taken immediately after the crash.¹¹⁵ After this, most of the cases settled, leaving only seventy cases involving foreign plaintiffs. The litigation at that point had been ongoing for seven years and would likely take many more. The children were getting older. This group of plaintiffs sought what they called an "injunction pending litigation" to require

110. 746 F.2d 816 (D.C. Cir. 1984).

111. *Id.* at 819.

112. *Id.*

113. *Id.*

114. *Id.* at 820. The plaintiffs won three cases, resulting in verdicts of \$400,000, \$1,000,000, and \$500,000. *Id.* The defendants won once but the verdict was set aside by the district court. *Id.* That case was subsequently retried and resulted in plaintiffs' third win. *Id.* All in all, there were four trials for the three plaintiffs.

115. *Id.* at 821.

Lockheed to pay for diagnosis and treatment of the neurological development disorder they believed was caused by the crash.¹¹⁶

The district court granted a preliminary injunction requiring diagnostic testing of the children.¹¹⁷ The central reason was irreparable damage; as time passed, with a diagnosis lacking, the children's prognoses would be worse.¹¹⁸ The court ordered Lockheed to put money in a fund, which would be disbursed based on a voucher system that allowed the company to contest each award.¹¹⁹

On appeal, the company's main argument was that without proof of physical injury, there was no cause of action, and therefore the court ought not to have issued a preliminary injunction. The D.C. Circuit rejected this argument. It held that the provisional diagnostic remedy was consistent with the purposes of tort law: deterrence and compensation.¹²⁰ It distinguished this case from cases rejecting a cause of action for being put "at risk" of an injury because those cases involved speculative proof, whereas in this case, the defendant's negligence was not speculative.¹²¹ The only issue was whether that negligence *caused* an injury, which the diagnostic test could determine.¹²² The need for a diagnostic test, therefore, was proximately caused by the defendant's failure to take appropriate care in the maintenance of the plane.

The theory of medical monitoring is that the underlying wrong involves a failure on the defendant's part to take adequate care (negligence) or producing and marketing a defective product.¹²³ Often it is justified by a special relationship between the plaintiff and the defendant, such as that of privity from the purchase of a product.¹²⁴

116. *Id.* at 818–19.

117. *Id.* at 821–22.

118. *Id.* at 822–23.

119. *Id.* at 823.

120. *Id.* at 824–25.

121. *Id.* at 826 ("In the absence of physical symptoms, emotional distress caused by potential risk may also be thought too speculative to support recovery.")

122. *Id.* at 825–26. The court analogized this to a motorbike accident caused by a driver running a red light. The victim was required to undergo expensive diagnostic tests. The driver's action was clearly negligent; therefore, requiring the driver to pay for the testing was appropriate. *Id.* at 825.

123. As a side note, it is not clear that what is commonly referred to as strict liability for defective products can also be characterized as something more akin to negligence. That debate is beyond the scope of this Article. *See, e.g.*, Douglas A. Kysar, *The Expectations of Consumers*, 103 COLUM. L. REV. 1700, 1711 n.44 (2003) ("[T]he strict liability of product injury law never has been truly strict . . . [r]ather, in addition to duty, causation, and damages, products liability plaintiffs always have been required to make some showing of inadequacy with regard to the manufacturer's product, if not its conduct."); David G. Owen, *Defectiveness Restated: Exploding the "Strict" Products Liability Myth*, 1996 U. ILL. L. REV. 743, 744 (1996) (arguing that "the reasonableness standard . . . is simply negligence, wrapped in a strict liability shroud").

124. John C.P. Goldberg & Benjamin C. Zipursky, *Unrealized Torts*, 88 VA. L. REV. 1625, 1706 (2002).

The remedy for this breach is that the defendant will pay for periodic medical checkups for the plaintiff, and the greatest area of dispute about the propriety of this remedy seems to be that it is often requested when the plaintiff's injury has yet to materialize.¹²⁵ This fact makes medical monitoring somewhat controversial because of the proposition that traditionally tort law has required a physical injury for a claim to lie.¹²⁶ The reason for the request for medical monitoring absent physical injury is uncertainty with respect to the plaintiffs' injury. The question in this type of case is not preventable scientific uncertainty, but rather the factual uncertainty of disease development and the prevention of harm due to the delay in litigation outcomes. Some people will be unlucky and will develop a disease as a result of exposure; others will be lucky, but nobody knows before the fact in which group they will be.

John Goldberg and Benjamin Zipursky have argued that medical monitoring can be justified as a species of negligence based on breach of a "duty owed by one who has created a dangerous condition that renders another in peril and hence in need of affirmative aid."¹²⁷ Consider this in light of the Supreme Court's decision in *Metro-North Commuter Rail Co. v. Buckley*.¹²⁸ Buckley was a Metro North employee who sued Metro North claiming that he was exposed to asbestos during the course of his employment and sought damages for emotional distress and the cost of future medical checkups.¹²⁹ Notably, until that point, his medical checkups had not found any evidence of injury from asbestos exposure, although they might have in the future. The Supreme Court rejected the proposition that there was a negligence claim for emotional distress. It also rejected the claim for a lump sum payment for medical monitoring absent injury and remanded the suit, leaving open the possibility of periodic payments for medical monitoring.¹³⁰ The Court recognized that Buckley "has suffered wrong at the hands of a negligent employer."¹³¹ But it rejected the award of a lump sum for this

125. See Victor E. Schwartz et al., *Medical Monitoring—Should Tort Law Say Yes?*, 34 WAKE FOREST L. REV. 1057, 1058 (1999) ("Plaintiffs in such cases seek post-exposure, pre-symptom recovery for the expense of periodic medical examinations to detect the onset of physical harm.").

126. *Id.* at 1059 (citing WILLIAM L. PROSSER, HANDBOOK ON THE LAW OF TORTS § 54, at 330–33 (4th ed. 1971) for the proposition that it is a fundamental principle of tort law that "a plaintiff cannot recover without proof of a physical injury").

127. Goldberg & Zipursky, *supra* note 124, at 1710; see also Nicole Rosenkrantz, Note, *The Parent Trap: Using the Good Samaritan Doctrine to Hold Parent Corporations Directly Liable for Their Negligence*, 37 B.C. L. REV. 1061, 1065 (1996) (describing a ruling where the Court held one owes a duty of reasonable care to those who rely on the individual's actions).

128. 521 U.S. 424 (1997).

129. *Id.* at 427. Buckley sued under "FELA, a statute that permits a railroad worker to recover for an 'injury . . . resulting . . . from' his employer's 'negligence.'" *Id.*

130. *Id.* at 444.

131. *Id.* at 443.

purpose because it was concerned with the risk of enabling too much litigation, which would diminish recovery for those actually injured in favor of recovery for those, like Buckley, who were not yet injured.¹³²

The idea that instead medical monitoring is a form of affirmative aid, owed to Buckley by virtue of the fact that he was put in danger by his employer when it allowed him to be exposed to asbestos despite regulatory requirements that employees be protected explains why ongoing payments for medical monitoring might be appropriate while a lump sum would not.¹³³ It also explains why medical monitoring was a viable remedy in cases like *Friends for All Children*. There were good indicia that Lockheed had placed the children in danger as a result of a fault in its plane, and this danger would be harder and harder to mitigate as the litigation continued. Medical monitoring as an interim remedy would provide the aid needed as a result of the danger that Lockheed had created for the children.

Goldberg and Zipursky's reading that the medical monitoring cases require a special relationship different than that of a purchaser and seller is probably too narrow. Early cases demonstrate that a duty is owed in situations where a manufacturer puts a dangerous product in circulation that would harm unsuspecting consumers. This duty could give rise to a knowledge remedy, much as it could give rise to a compensatory remedy. In the 1852 case *Thomas v. Winchester*,¹³⁴ for example, the New York Court of Appeals held that a manufacturer of medicinal extracts who had mislabeled the poison Belladonna as dandelion extract had a duty to the patients who were prescribed the drug.¹³⁵ "Nothing but mischief like that which actually happened could have been expected from sending the poison falsely labeled into the market," stated the court, "and the defendant is justly responsible for the probable consequences of the act."¹³⁶

There remains some dispute about whether medical monitoring is a remedy or an independent cause of action. Some courts have recognized medical monitoring as an independent cause of action,¹³⁷ while others have

132. *Id.* at 443–44 The Court went on to say that they were more troubled than is JUSTICE GINSBURG by the potential systemic effects of creating a new, full-blown, tort law cause of action—for example, the effects upon interests of other potential plaintiffs who are not before the court and who depend on a tort system that can distinguish between reliable and serious claims on the one hand, and unreliable and relatively trivial claims on the other. *Id.*

133. Goldberg & Zipursky, *supra* note 124, at 1710.

134. 6 N.Y. 397 (1852).

135. *Id.* at 410.

136. *Id.*

137. *Wood v. Wyeth–Ayerst Labs.*, 82 S.W.3d 849, 855 (Ky. 2002) (stating medical monitoring requires showing of actual, physical injury).

treated it as a remedy.¹³⁸ There are plausible arguments both ways, just as there is an argument that an accounting in equity is an independent cause of action rather than a remedy for an action in contract.

The medical monitoring remedy is a knowledge remedy aimed at obtaining information that does not yet exist about plaintiffs' health. It can be a preliminary remedy that may come within or be followed by a personal injury suit. Like the accounting, it is understood as equitable in nature. Also like an accounting, it is preceded by a showing of some breach of duty to take care of another. Finally, the rationale that some have proposed for allowing this remedy, particularly that the defendant has been shown to increase the plaintiffs' risk of harm and therefore is responsible to aid him, echoes the events described in both the DuPont and Harvey Aluminum cases.

C. *Civil Rights Compliance*

A third, less controversial example of the knowledge remedy in action occurs in civil rights litigation. These tend to be cases of information asymmetry, like the accounting, where the plaintiffs cannot prove the wrong without access to information only available directly from the defendant. The collection of this information might be described as a public good, although not necessarily in the sense that economists use the term. Rather, it is a public good because government compliance with the law is necessary to the general common welfare.¹³⁹

In 1999, several black and Latino residents of the City of New York sued the City, alleging that in high crime areas, the police were stopping individuals without reasonable suspicion in violation of the Fourth Amendment.¹⁴⁰ They alleged that the police were racially profiling, stopping black and Latino men on the basis of their race and/or national origin rather

138. *Sadler v. PacificCare of Nev.*, 340 P.3d 1264, 1270 (Nev. 2014) (“[A] plaintiff may state a cause of action for negligence with medical monitoring as the remedy . . .”).

139. For a summary describing the philosophical concept of the common good, see generally Hussain Waheed, *The Common Good*, in *THE STANFORD ENCYCLOPEDIA OF PHILOSOPHY* (Edward N. Zalta ed., 2018), <https://plato.stanford.edu/archives/spr2018/entries/common-good/> [<https://perma.cc/J98J-84JH>]. See also JOHN LOCKE, *SECOND TREATISE ON GOVERNMENT* 6 (C. B. Macpherson ed., 1980) (stating that the political power to defend the laws is “to be directed to no other end, but the peace, safety, and public good of the people”). For more on problems with governmental compliance and an overview of compliance issues in the context of administrative agencies, see generally Nicholas R. Parrillo, *The Endgame of Administrative Law: Governmental Disobedience and the Judicial Contempt Power*, 131 HARV. L. REV. 685 (2018).

140. *Daniels v. City of New York*, 198 F.R.D. 409, 411 (S.D.N.Y. 2001). An earlier lawsuit on the same subject had been filed and dismissed on technical grounds. See *Nat’l Cong. for Puerto Rican Rights v. City of New York*, 75 F. Supp. 2d 154, 158 (S.D.N.Y. 1999), *on reconsideration in part*, 191 F.R.D. 52, 52–54 (S.D.N.Y. 1999) (denying motion to dismiss in part, granting as to organizational standing).

than on any articulable suspicion,¹⁴¹ a policy that was popularly referred to as stop-and-frisk. The Southern District of New York certified a class action for injunctive and declaratory relief in 2001.¹⁴²

The City entered into an agreement with the plaintiffs in 2003, which was approved by the judge under Federal Rule of Civil Procedure 23(e).¹⁴³ This agreement required the City to adopt a policy on racial profiling, to engage in quality control over stops consistent with that policy, and, importantly for our purposes, to collect data on stops and frisks on an ongoing basis.¹⁴⁴ For every stop the police officer was supposed to fill out a form, called a UF-250.

These forms were in use in the NYPD before the litigation, apparently as early as 1986, but the requirement to fill them out was not rigorously enforced until around 1997.¹⁴⁵ Even then, they were not routinely filled out.¹⁴⁶ As part of the agreement, the NYPD would make sure forms were filled out and the information contained in UF-250 forms would be digitized and collected in a database.¹⁴⁷ The NYPD would provide the plaintiffs' counsel with a quarterly report of the data, a report that was to be provided within six months of the end of each quarter.¹⁴⁸ The settlement did not explain how plaintiffs would use this information, did not impose any standards or goals for UF-250 data, and did not impose any penalties for trends and patterns revealed in the database.¹⁴⁹

Disputes over the reporting from the UF-250 database did not arise until 2007.¹⁵⁰ The exact parameters of the dispute are not so important here, except

141. *Daniels*, 198 F.R.D at 411.

142. *Id.* at 412, 422.

143. *Daniels v. City of New York (Daniels II)*, No. 99 Civ. 1695 (SAS), 2007 WL 2077150, at *1 (S.D.N.Y. July 16, 2007).

144. Stipulation of Settlement at 5–6, 8–9, *Daniels II*, No. 99 Civ. 1695(SAS), 2007 WL 2077150 (S.D.N.Y. July 16, 2007), <https://www.clearinghouse.net/chDocs/public/PN-NY-0010-0001.pdf> [<https://perma.cc/UBU2-9HMN>]; *Daniels II*, 2007 WL 2077150, at *1.

145. See N.Y. STATE OFFICE OF THE ATT'Y GEN., REPORT ON STOP AND FRISK 65 (2000), https://ag.ny.gov/sites/default/files/pdfs/bureaus/civil_rights/stp_frsk.pdf [<https://perma.cc/G63C-B2AW>] (“Completion of the UF-250 form has been required since 1986. In 1997, however, Commissioner Safir declared filing the UF-250’s ‘a priority’ that should be ‘rigorously enforced.’”).

146. *Id.* at 72.

147. *Daniels II*, at *1.

148. *Id.*

149. *Id.* The settlement did clarify that

[t]he Agreement, however, does not include any provisions regarding plaintiffs’ use or analysis of the UF-250 data. Nor does the Agreement contain any remedies or obligations regarding any trends or patterns reflected in the UF-250 database. Moreover, the Agreement does not require any specific outcomes and makes no specific assurances with respect to the supervision, monitoring and training of NYPD officers with regard to the Racial Profiling Policy.

Id.

150. *Id.* at *2.

insofar as the plaintiffs alleged that the defendants did not provide information on the court-ordered schedule, and the defendants responded both that the plaintiffs had not sought the information for several years and thus slept on their rights.¹⁵¹ It was also alleged that the decentralized approach to collecting the information and the need for manual data entry delayed the database.¹⁵² The court was charged with determining whether the City had failed to comply with the agreement that the parties had reached with respect to the data and what remedy should issue. Ultimately, the judge ordered specific performance of the information production on a schedule proposed by the plaintiffs.¹⁵³

The database information was ultimately released to the plaintiffs. This data was used by the New York Attorney General's office to produce a 2013 report on racial disparities in stops,¹⁵⁴ by the ACLU in periodic reports of racial disparities in New York City policing,¹⁵⁵ and by subsequent plaintiffs suing the NYPD for racial profiling.¹⁵⁶

The use of the knowledge remedy to ensure governmental compliance with constitutional mandates is similar to the knowledge remedy in the Harvey Aluminum case, although there the court order impacted a private rather than public actor. This use of the knowledge remedy further supports the position that the knowledge remedy can be a predicate to further litigation seeking an injunction or monetary award if damages can be proven, and a knowledge remedy may be issued based on allegations of wrongdoing rooted in the duty to comply with legal directives.

III. Applying the Knowledge Remedy

This Part lays out the predicates for applying the knowledge remedy. It describes how judges might apply the knowledge remedy equitably and how

151. *Id.*

152. *Id.*

153. *Id.* at *4.

154. N.Y. STATE OFFICE OF THE ATT'Y GEN., A REPORT ON ARRESTS ARISING FROM THE NEW YORK CITY POLICE DEPARTMENT'S STOP-AND-FRISK PRACTICES 5 (2013), https://ag.ny.gov/pdfs/OAG_REPORT_ON_SQF_PRACTICES_NOV_2013.pdf [<https://perma.cc/QP4R-XE54>]. Notably, it appears that this data was obtained directly from the NYPD, not through the *Daniels* plaintiffs or the ACLU. *See id.* at 2 (describing data but not mentioning the *Daniels* litigation).

155. The New York Civil Liberties Union put the quarterly reports provided by the NYPD online. To look at the reports, see NEW YORK CIVIL LIBERTIES UNION, *NYPD Quarterly Reports*, <https://www.nyclu.org/en/nypd-quarterly-reports> [<https://perma.cc/AZ8K-6SZN>]. In addition, they produced publications such as a "Stop and Frisk Fact Sheet." NEW YORK CIVIL LIBERTIES UNION, *Stop and Frisk: Report on 2011 Findings*, <https://www.nyclu.org/sites/default/files/stopandfrisk-factsheet.pdf> [<https://perma.cc/C5FA-7GX3>].

156. That lawsuit was filed in 2008. *Floyd v. City of New York*, No. 08 CIV. 1034(SAS), 2008 WL 4179210, at *1 (S.D.N.Y. Sept. 10, 2008). A Rule 37 motion for production of UF-250 data was granted. *Id.*

they ought to distinguish it from civil discovery. Finally, it considers the preclusive effect of the knowledge remedy.

A. Predicates for Imposing a Knowledge Remedy

The knowledge remedy is appropriate when the plaintiff has already shown indicia of harm at the defendant's hands and the inability to meet their burden of proof as a result of information asymmetries ordinarily (but not always) caused by the defendant's misconduct. In all the cases we have seen so far, evidence of some wrongdoing on the part of the defendant was presented to the court. Whether this evidence of wrongdoing was enough to trigger some kind of remedial action is the larger question, one that can only be resolved on a case-by-case basis. Further, in each of these cases, there were also problems of proof that were the result of information asymmetries. In at least some of them, production of these remedies was a public good—they were in no one's interest to produce but in society's interest to have.

These qualities dictate the two requirements of a knowledge remedy: (1) evidence of wrongdoing, such as creating a dangerous condition putting the plaintiff in need of aid, and (2) problems of proof that are usually the result of a combination of information asymmetry and the lack of incentives of any of the participants in the litigation to create such information although its production would be a public good.

B. Equitable Flexibility and Court Oversight

The knowledge remedy is an equitable remedy, similar to an injunction, and therefore has the flexibility to come in a variety of forms: a fund to pay for medical monitoring, independent epidemiologic research, research into new technologies, or the production of information by the defendant in-house where appropriate. This flexibility also permits the courts leeway in determining whether the information asymmetries or a public-goods problem, combined with the indicia of harm presented by plaintiffs, warrant this form of remedy.

Equitable remedies such as the knowledge remedy generally share three characteristics.¹⁵⁷ They require performance of an action (or omission) rather than direct payment of money, court management of the process by which the knowledge is produced, and flexibility in relation to the plaintiff's injury rather than providing a one-for-one response to that injury.

First, equitable remedies compel action or inaction by a party, in contradistinction to legal remedies that generally compel monetary compensation.¹⁵⁸ The knowledge remedy is not compensatory, in the sense

157. See Samuel L. Bray, *The System of Equitable Remedies*, 63 UCLA L. REV. 530, 551 (2016) (arguing that equity is a system).

158. *Id.* at 553 (describing the remedial aspects of equity and their role in the legal system).

that it is not a backward-looking attempt to make the plaintiff whole. But neither is it wholly like a traditional injunction, in the sense that it is not intended to prevent a defendant from taking a particular action or requiring the defendant to take such an action.

Often the knowledge remedy will require a payment, but that payment is aimed at the production of knowledge or information that did not previously exist and does not compensate the plaintiff for her injuries. For example, when a court orders an accounting, which is to say an inquiry into the defendant's handling of money or property, the idea is that in the end this information will be used to determine how much the defendant owes the plaintiff.¹⁵⁹ An order requiring the defendant to pay that amount follows. But that second order is a function of a different cause of action: breach of fiduciary duty.

In sum, a knowledge remedy requires the defendant to do something, but often this payment comes in the form of paying money to an independent entity for a specific work product rather than a compensatory payment to the plaintiff that is meant to capture their harm. For example, the defendant might pay doctors for medical monitoring, or pay an independent researcher to study whether a toxin is carcinogenic, or pay for research into alternative technologies available in other countries.

Second, equitable remedies require some management or oversight of the defendant's performance of the court's order. While legal remedies rarely present problems of compliance, equitable remedies ordinarily present problems of "specifying, measuring, and ensuring compliance."¹⁶⁰ For example, decades of litigation over compliance followed school desegregation orders in the 1970s.¹⁶¹ Knowledge remedies face similar problems of compliance in that the requirement can often be ongoing, produced over a period of years in the case of scientific studies; the parameters of a particular set of studies or agenda for research need to be set out in the initial order; and there will usually be a need for some kind of oversight, perhaps once the study is complete, or, depending on the disputes

159. *Id.* at 553–54 (citing *Wilde v. Wilde*, 576 F. Supp. 2d 595, 608 (S.D.N.Y. 2008) ("An equitable accounting requires two steps. First, upon a showing that an accounting is warranted, an interlocutory decree is issued requiring the fiduciary to make an accounting. Once the accounting is made, a second hearing is held to establish the final amounts owed to the principal.")).

160. *Id.* at 563.

161. See, e.g., Kimberly Jenkins Robinson, *Resurrecting the Promise of Brown: Understanding and Remediating How the Supreme Court Reconstitutionalized Segregated Schools*, 88 N.C. L. REV. 787, 802–04 (2010) (describing litigation to enforce desegregation); see also MICHAEL J. KLARMAN, FROM JIM CROW TO CIVIL RIGHTS: THE SUPREME COURT AND THE STRUGGLE FOR EQUALITY 6–7 (2004) (providing a pessimistic history of the developments after *Brown*); MARTHA MINOW, IN BROWN'S WAKE: LEGACIES OF AMERICA'S EDUCATIONAL LANDMARK 1–4 (2010) (providing a more optimistic history).

between the parties, as it is ongoing. Determining the scope of study, as well as compliance with such a directive, are decisions that require the oversight characteristic of an equitable remedy.

Third, equitable remedies are flexible and not necessarily limited to returning the plaintiff to her rightful position, or at least can define the rightful position in such a way as to provide greater opportunity for the court to craft a remedy to solve complex structural problems.¹⁶² There is a vigorous debate in the scholarship over whether judges overreached in the 1960s and '70s with remedies that were not aimed solely at the plaintiffs before them but rather at systemic institutional change. Some argue that the rightful position ideal is a limitation on judicial action.¹⁶³ Others dispute this claim, arguing that the proper approach to equitable remedies is a less constrained equitable discretion.¹⁶⁴ This latter argument is mostly made in the context of public law litigation. Because the knowledge remedy does not provide compensation for the plaintiff's physical injury, but instead remedies the plaintiff's lack of information caused by the defendant's wrongdoing, it is an equitable remedy in this sense. Rather than compensation, the knowledge remedy fills in holes created by the defendant's lack of care or the defendant's having put the plaintiff in danger.

While the knowledge remedy could be characterized as a form of injunction, there is one significant difference.¹⁶⁵ Unlike an injunction, the knowledge remedy does not require the defendant to do something to cure the harm that was caused to the plaintiff. Instead, it asks the defendant to pay to provide knowledge about how that harm might be cured, what has caused it, or what harm is occurring to the plaintiff on an ongoing basis. The costliness of the knowledge remedy, and its relative rarity, means that it is not a regularly available remedy like monetary remedies. Indeed, like an injunction, a knowledge remedy is exceptional.¹⁶⁶

162. Bray, *supra* note 157, at 570.

163. DOUGLAS LAYCOCK, *MODERN AMERICAN REMEDIES* 235–36 (3d ed. 2002) (discussing the dispute over the purpose of injunctive relief and whether it is intended to place the plaintiff in the “rightful position” where she would have been absent the defendant's misconduct); *cf.* Samuel L. Bray, *Multiple Chancellors: Reforming the National Injunction*, 131 *HARV. L. REV.* 417, 471 (2017) (arguing that injunctions should be limited to the parties before the court and not for the benefit of third parties). While a knowledge remedy would be consistent with Bray's position on national injunctions, it would still benefit the plaintiffs before the court and third parties.

164. For a classic expression of the broad judicial role, see Abram Chayes, *The Role of the Judge in Public Law Litigation*, 89 *HARV. L. REV.* 1281, 1282 (1976).

165. For purposes of the class action rule, the knowledge remedy should be characterized as an injunction because it more closely resembles injunctive relief as compared with monetary relief. *See* FED. R. CIV. P. 23(b)(2) (allowing a class action if final injunctive relief is appropriate to the whole class).

166. In this sense a knowledge remedy is like an injunction. *Cf.* Samuel L. Bray, *The Supreme Court and the New Equity*, 68 *VAND. L. REV.* 997, 1037 (2015) (discussing the longstanding idea that injunctions are exceptional).

C. *Relationship to Discovery*

Many of the examples of the knowledge remedy in action show the courts confusing a knowledge remedy with discovery. Recall that in the DuPont case, the appellate court in West Virginia denied a knowledge remedy on the grounds that it was shifting the costs of discovery to the defendant impermissibly.¹⁶⁷ Indeed, the best argument against imposing the knowledge remedy is that it violates the American tradition of requiring each party to pay for the costs of litigation on her own. The problem with this narrative, as we have seen, is that the legal system often depends on publicly produced information in order for the plaintiff to prove her claim. Epidemiologic studies conducted by the government or using government funds for research, Centers for Disease Control and Prevention data, and regulations requiring legal actors to track certain data all enable plaintiffs to prove their case. None of these sources of information are paid for by the plaintiffs individually; largely because they are so costly, they would make bringing suit economically impractical.

However, the civil process used to enforce the law overlaps with its substantive and remedial requirements so that it is easy to confuse a knowledge remedy with civil discovery.¹⁶⁸ One of the jobs of the court imposing a knowledge remedy is to make this distinction. Discovery is a “show-me” process.¹⁶⁹ By contrast, a knowledge remedy is a requirement that the party being ordered to remedy a wrong create information that did not previously exist. In the accounting context, that means creating (or recreating) the accounting books with respect to transactions. The plaintiff could ask for evidence of these transactions in discovery, but if the defendant did not create them, then that request is a futile exercise. In other cases, knowledge creation may require medical studies, monitoring, or surveys. This should be expected to be a more onerous proposition than producing already extant information.¹⁷⁰ This is at the core of the concept of a *remedy*: requiring the defendant to right a wrong by producing information that did not previously exist.

167. State *ex rel.* E.I. Dupont De Nemours & Co. v. Hill, 591 S.E.2d 318, 326–27 (W. Va. 2003).

168. This is an old problem. Justice Joseph Story mentions this problem while discussing the difficulty in maintaining the boundary of equity jurisdiction with respect to the bill for relief and the bill for discovery in his COMMENTARIES ON EQUITY JURISPRUDENCE, *supra* note 90, at § 70. While modern procedural rules are ordinarily understood to be transsubstantive, there have in fact grown up a large number of practices that are specific to certain subject matter.

169. With apologies to the state of Missouri.

170. Although, of course producing information in discovery is also expensive in some subset of cases. Alexandra D. Lahav, *A Proposal to End Discovery Abuse*, 71 VAND. L. REV. 2037, 2049 (2018).

As we have already seen in the discussion of the accounting, during the early period in American law, in both equity and law, procedure was intertwined with substance. The claim asserted dictated the court, the procedure, and the remedy available. Today, these categories of substantive claim and procedure are understood to be separate. This is the result of a political project begun with the Field Code.¹⁷¹ The project was to describe procedure as a kind of handmaiden of substance, a process that in itself did not dictate outcomes.¹⁷² The purpose of characterizing procedure this way was to obtain lawyer control over that process and dampen controversy by making the subject more technocratic. One of the results of the project that did affect substance was the expansion of civil discovery. Prior to the Field Code, civil discovery, such as it was, was only available in equity.¹⁷³ The project of incorporating civil discovery into legal claims was completed with the Federal Rules of Civil Procedure which specifically permit discovery in all claims.¹⁷⁴

In a regime where discovery is limited to certain types of claims in certain courts, it is easy to see how it is intertwined with the claim and the remedy available for that claim. The accounting is a perfect example. Recall that in *Zaki*, the court explained that an accounting was available “in cases of especially complicated or mutual accounts, where a fiduciary relationship existed between the parties, and in cases where discovery was required.”¹⁷⁵ Why, the defendant asks in that case, is an accounting necessary when civil discovery was already available to the plaintiff? The court’s answer is that even in light of the availability of civil discovery to all cases, the special circumstance of the fiduciary relationship in a consignment case requires an accounting.¹⁷⁶ Part of the thinking behind the rationale (that despite the availability of civil discovery an accounting is required) is the distinction between *creating* information and *showing* information.

To determine whether a knowledge remedy is appropriate, once the threshold showing that the plaintiff has been placed in danger by the defendant’s conduct, the court must inquire into whether there is informational asymmetry or a public goods problem. This inquiry will overlap with the question of whether this information gap can be cured with discovery of information the defendant already *has* or whether it requires the

171. See generally KESSLER, *supra* note 93, at 152–199 (describing political and economic forces that drove procedural change).

172. *Id.* at 147.

173. See Stephen N. Subrin, *How Equity Conquered Common Law: The Federal Rules of Civil Procedure in Historical Perspective*, 135 U. PA. L. REV. 909, 919 (1987) (describing the historical usage of equity discovery processes before the enactment of the *Federal Rules of Civil Procedure*).

174. See FED. R. CIV. P. 26 (permitting broad discovery).

175. *Zaki Kulaibee Establishment v. McFliker*, 771 F.3d 1301, 1311 (11th Cir. 2014).

176. *Id.* at 1312.

defendant to produce *new* information. This poses some difficulties around the edges. For example, in an accounting, is the information needed to account for the consigned goods already in the defendant's possession, therefore properly understood as discovery? Or is this information that can only be produced under supervision, as occurred in *Zaki*, in which case a remedial order is required? Or suppose a defendant failed to comply with a regulatory mandate to retain certain employment information such as employee time spent donning and doffing protective clothing.¹⁷⁷ The determination of the time spent donning and doffing could be characterized as part of discovery, usually paid for by the plaintiff. But because the absence of information was caused by the defendant's failure to comply with the law, it could also be characterized as a knowledge remedy for which the defendant must pay.

Although a knowledge remedy may sometimes overlap with discovery, in general the distinction between information that the defendant has and information the defendant must create should be sufficient in the run of cases to determine whether the order is remedial rather than procedural and therefore not subject to the American rule that each party bear the costs of proving her own case.

D. Preclusion

The timing problem in awarding knowledge remedies is a serious one because the knowledge remedy is often a preliminary remedy to a damages action. The result is that the defendant may face two lawsuits, one seeking a knowledge remedy and the second seeking damages. For example, in the case of the accounting, the accounting itself is a predicate to the award of damages for breach of fiduciary duty or contract. As discussed earlier, however, only if the accounting reveals that the defendant acted wrongfully, by converting the property or otherwise violating its duty to the plaintiff, does the defendant have to pay. Similarly, the diagnosis and monitoring remedy in *Friends of the Children* was a prejudgment remedy that anticipated a final monetary remedy at the end of the litigation.

Yet the knowledge remedy may also be final. For example, medical monitoring is sometimes a final remedy.¹⁷⁸ In general, the knowledge remedy will be final in cases where monitoring and knowledge-production are expected to produce compliance with the law in themselves, rather than as a

177. *Tyson Foods, Inc. v. Bouaphakeo*, 136 S. Ct. 1036, 1043–45 (2016) (discussing how the company failed to keep records that would have proven or disproven plaintiffs' claim, permitting plaintiffs to present statistical evidence).

178. *See, e.g.,* *Petito v. A.H. Robins Co.*, 750 So. 2d 103, 108 (Fla. Dist. Ct. App. 1999) (upholding medical monitoring as final remedy under Florida law).

predicate to later compensation. This latter case describes the *Daniels* situation, in which proof of racial profiling led to a remedy that included tracking for compliance purposes. When it was learned that the practice continued despite this remedy, a second lawsuit was brought.¹⁷⁹

May the plaintiff bring a second claim against the same defendant if the production of knowledge indicates that there is further liability? This is a concern because the general rule in civil litigation is that one must bring all claims arising out of the same transaction or occurrence at once.¹⁸⁰ To bring some claims and not others is called “claim splitting” and is frowned upon in nearly all jurisdictions.¹⁸¹

Knowledge remedies need not be preclusive of subsequent monetary remedies arising out of the information obtained in the first suit, even with the principle against claim splitting in place. For example, medical monitoring has been held not to preclude a subsequent claim for personal injury.¹⁸² This is often because the state will have adopted a discovery rule for the attachment of preclusive effect in tort. The plaintiff’s claim only becomes viable when they have discovered their injury. In some jurisdictions, the law goes further and states that the cause of action accrues only when “the victim is aware of the injury or disease and of the facts indicating that a third party is or may be responsible.”¹⁸³ In such jurisdictions, the medical monitoring case may be a precursor to subsequent personal injury litigations, as occurred in the DuPont case.

The DuPont case raises a second possibility, however. In jurisdictions where there is a discovery rule only, it may be that the plaintiff will not be able to file a subsequent suit if she knew of her injury but not the cause, even if that cause was discovered by a knowledge remedy. In the DuPont case, the parties’ agreement permitted follow-on litigation. It may be that, in some cases, the court would have to retain jurisdiction in order to allow recovery once the information produced by the knowledge remedy is available.

179. *See* *Floyd v. City of New York*, No. 08 Civ. 1034(SAS), 2008 WL 4179210, at *1–2 (S.D.N.Y. Sept. 10, 2008) (describing history of rulings for *Daniels* settlement that led to more litigation).

180. *See* RESTATEMENT (SECOND) OF JUDGMENTS § 24 (AM. LAW INST. 1982) (describing transactional test to determination of claim for preclusion purposes).

181. *See id.* § 25 (stating that the claim-splitting rule in § 24 extinguishes plaintiffs’ claims even if they are prepared for a second action).

182. *See* *Petito*, 750 So. 2d at 106 (holding “that plaintiffs in medical monitoring cases will not be precluded by the rule against splitting causes of action from bringing claims for whatever physical injuries they suffer if and when they arise”).

183. *Ayers v. Jackson TP.*, 525 A.2d 287, 300 (N.J. 1987). *But see* *Sinclair v. Merck & Co.*, 948 A.2d 587, 593 (N.J. 2008) (describing subsequent limitations on the holding in *Ayers* in product liability cases brought under New Jersey statutory law).

The provision against claim splitting also does not apply to subsequent events.¹⁸⁴ As a result, individuals harmed by a continuing practice, as occurred after the *Daniels* litigation, for example, may use the information obtained in the first litigation in their subsequent suit about ongoing events.

IV. Evaluating the Knowledge Remedy

This Part considers the normative arguments in favor of and against a knowledge remedy. There are four main arguments favoring knowledge production as a remedial tool. First, the knowledge remedy fills a regulatory gap in cases where, due to agency capture or other failures of oversight, untested products or toxins enter the market and are alleged to injure people. Second, the knowledge remedy promotes the creation of the public good of knowledge production about the effects of products on the populace, a form of knowledge which past conduct demonstrates is not in the interests of manufacturers to create. Third, the knowledge remedy can also increase legitimacy of the judicial branch by avoiding accusations that the results of cases are based on so-called junk science. Fourth, as a regulatory mechanism, it may be a way for companies to avoid bankruptcy from litigation based on what turn out to be erroneous understandings of causation on the one hand, and an administrative requirement of preapproval of products and toxins before they are marketed, on the other.

There are also four main arguments against the knowledge remedy. First, the knowledge remedy delays recovery for the set of plaintiffs who would have won their lawsuits despite uncertainty. Second, one might argue that the knowledge remedy is really a new duty to test in disguise. Third, the knowledge remedy may promote claim splitting, thereby increasing the amount of litigation. Finally, the knowledge remedy may be an improper expansion of the judicial role to what Lon Fuller would have called “polycentric” disputes better handled by regulatory bodies.¹⁸⁵

One additional set of arguments with respect to the knowledge remedy not addressed here involve its likely impact on primary conduct. That is, is the knowledge remedy socially optimal? I leave this question for another paper.

184. *Media Rights Techs., Inc. v. Microsoft Corp.*, 922 F.3d 1014, 1022 (9th Cir. 2019) (quoting *Stanton v. D.C. Court of Appeals*, 127 F.3d 72, 78 (D.C. Cir. 1997)) (“Federal law is clear that post-judgment *events* give rise to new claims, so that claim preclusion is no bar.” (emphasis added)).

185. Lon L. Fuller, *The Forms and Limits of Adjudication*, 92 HARV. L. REV. 353, 394–95 (1978).

A. *Arguments in Favor*

This subpart describes arguments in favor of the knowledge remedy.

1. *Filling a Regulatory Gap.*—As many of the cases described above illustrate, the knowledge remedy can fill a regulatory gap. In an ideal world, agencies would conduct studies on chemicals such as C8, would monitor emissions from plants such as the Harvey Aluminum plant in Oregon, and would maintain and review records of stops and frisks to make sure they were not conducted on a discriminatory basis. But as these cases illustrate, agencies can fall short in their oversight.

There are many reasons for such failure and it is beyond the scope of this Article to analyze them all. Sometimes, as in the DuPont case, the agency may simply be unaware of the existence of the chemical and does not consider testing it for that reason. Or as also occurred in the DuPont case, an agency may be influenced by the manufacturer to limit testing or announce the safety of a chemical about which it has little information. Other times the agency may be fooled by misconduct on the part of the company, as occurred when the Harvey Aluminum plant released testing data from a period when it was shut down to show lower emissions. Whatever the reason, the absence of regulatory oversight means that chemicals and products are not safety tested. The knowledge remedy fills this gap by requiring such testing.

The knowledge remedy is an incomplete gap-filler. It would apply where the company has acted wrongfully to endanger the plaintiffs, often by failing to test despite indicia of danger and exposing the population to the product, or by deliberately sowing scientific uncertainty in the face of emergent evidence of risk. But in cases where there are no indicia of danger, the company could not be required to pay for knowledge production. In such cases, only government testing or public funding of testing would be able to fill the gap.

2. *Promotes Public Goods Creation.*—A second benefit of the knowledge remedy is that it promotes the creation of a public good, which is to say it fosters information that benefits the public and which is not in the interest of those who can or would be expected to create it. For example, an analysis of the costs and benefits of the DuPont litigation from the company perspective showed that it was not in the interest of DuPont to study the carcinogenic effects of that chemical.¹⁸⁶ Indeed, given the benefits to the company of continuing to produce Teflon, and the costs of moving to a different chemical, it turns out that from a pure-profit point of view, the company decided not to conduct studies even after they had evidence of birth defects among female

186. Shapira & Zingales, *supra* note 34, at 14–20.

employees. That study concluded that it was value maximizing for DuPont to continue polluting because DuPont made more money over the period that it polluted than it ultimately paid out in liability.¹⁸⁷

In a first-best world, studies of risk exposure from chemicals and products would be publicly funded. As noted in the previous subpart, however, public agencies often do not test or provide funding to test products and chemicals which may cause harm. This can be the result of regulatory capture, insufficient funding, or any number of reasons. Reports also indicate that public funding for scientific studies is down in general.¹⁸⁸ Without the assistance of the National Science Foundation, for example, is it possible to count on third parties to adequately study drugs, medical devices, and chemicals to protect safety?

The knowledge remedy provides a backstop when funding for studies either before dissemination of a product or toxin, or after its dissemination, is not available. The drawback of the knowledge remedy, as compared to publicly funded research, is that it is an after-the-fact remedy because it is only available in cases where the plaintiff can show that the defendant has created a dangerous condition, even if the plaintiff does not have enough information to prove causation. Still, late is better than never in many of these cases. For example, how long would DuPont have continued to spill C8 into the local water in the absence of litigation?

3. *Legitimacy: Avoids “Junk Science” Accusation.*—One of the most powerful arguments against mass tort litigation in general is the allegation that juries rely on so-called junk science when they hold manufacturers accountable. This accusation erodes the legitimacy of the court system which is built on accuracy of decision-making and trial as a search for truth.

The poster child for the accusation of junk science in the courts was the silicone breast implants case involving Dow Corning.¹⁸⁹ That was in part a case of regulatory failure because the Food and Drug Administration (FDA) did not have the power to require testing of the product when it was first made available. That power was only statutorily granted many years after this type

187. *Id.* at 20.

188. David R. Johnson, *With Federal Funding for Science on the Decline, What's the Role of a Profit Motive in Research?*, CONVERSATION (June 5, 2018, 6:46 AM), <http://theconversation.com/with-federal-funding-for-science-on-the-decline-whats-the-role-of-a-profit-motive-in-research-93322> [<https://perma.cc/MT6C-X26J>] (describing the downward trend in federal funding for science). For underlying data, see Am. Ass'n for the Advancement of Sci., *Historical Trends in Federal R&D* (June 2019), <https://www.aaas.org/programs/r-d-budget-and-policy/historical-trends-federal-rd> [<https://perma.cc/968F-EF8U>].

189. See generally MARCIA ANGELL, *SCIENCE ON TRIAL: THE CLASH OF MEDICAL EVIDENCE AND THE LAW IN THE BREAST IMPLANT CASE* (1996) (recounting the controversy surrounding the case and the medical evidence presented therein).

of implant went on the market. There was evidence that the company hid information about leakage of silicone from its implants and some evidence that leaking silicone could be harmful.¹⁹⁰ Lawsuits were brought alleging that the leakage caused autoimmune disease.¹⁹¹ Studies conducted in the 1990s showed that the silicone leaks could not be linked to the disease but not before the company went bankrupt as a result of the litigation.¹⁹² Later studies showed an association between autoimmune disorders and breast implants, however, raising questions about the initial reaction to this litigation.¹⁹³

For a more recent example, consider the legal exposure of Bayer AG after purchasing the agricultural company Monsanto discussed earlier. With litigation around Monsanto's herbicide Roundup expanding, Bayer's market capitalization was slashed by roughly \$50 billion.¹⁹⁴ Yet evidence in these cases, especially evidence of causation, is highly contested. In the Roundup litigation, for example, there were dueling experts on both sides. The first trial resulted in a \$289 million verdict for the plaintiff.¹⁹⁵ On appeal, a group of doctors filed an amicus brief arguing that the juror's decision in the first Roundup trial was based on "emotional manipulation" rather than "accepted scientific evidence and rigorous scientific reasoning."¹⁹⁶

This was a case about which the jurors cared deeply enough to write to the judge defending their verdict as he considered a motion to remit the

190. Deborah R. Hensler & Mark A. Peterson, *Understanding Mass Personal Injury Litigation: A Socio-Legal Analysis*, 59 BROOK. L. REV. 961, 992–93 (1993). The FDA did not have the power to regulate medical devices when silicone implants entered the market. *Id.* When Congress passed legislation giving the FDA that authority, silicone implants stayed on the market while the FDA considered their safety. *Id.* Internal documents from Dow Corning eventually emerged stating the potential harmful effects of the implants. *Id.*

191. *Id.* at 996.

192. This is the traditional story. For a description, citing cases denying the admissibility of expert evidence of causation, see Michael D. Green & Joseph Sanders, *Admissibility Versus Sufficiency: Controlling the Quality of Expert Witness Testimony*, 50 WAKE FOREST L. REV. 1057, 1078 (2015).

193. Christopher Coroneos et al., *US FDA Breast Implant Postapproval Studies: Long-term Outcomes in 99,993 Patients*, 269 ANNALS OF SURGERY 30–36 (2019).

194. Ruth Bender, *Bayer's Roundup Problem Slashes Its Market Value*, WALL ST. J. (May 19, 2019, 6:11 PM), <https://www.wsj.com/articles/bayers-roundup-woes-send-investors-fleeing-11558266059> [<https://perma.cc/4UXF-M84V>] (stating that Bayer had lost 45% of its market capitalization due to concerns about liability from Roundup litigation).

195. Holly Yan, *Jurors Give \$289 Million to a Man They Say Got Cancer from Monsanto's Roundup Weedkiller*, CNN (Aug. 11, 2018, 9:28 PM), <https://www.cnn.com/2018/08/10/health/monsanto-johnson-trial-verdict/index.html> [<https://perma.cc/9SHF-WUSF>].

196. Amanda Bronstad, *California Physicians: Jury Disregarded Science in \$289M Roundup Verdict*, LAW.COM (Sept. 6, 2019, 4:13 PM), <https://www.law.com/therecorder/2019/09/06/california-physicians-jury-disregarded-science-in-289m-roundup-verdict/> [<https://perma.cc/C3KN-6MQZ>].

amount.¹⁹⁷ It is extremely rare for jurors to write such letters and demonstrates how important these cases are to the citizens who sit as adjudicators as well as the plaintiffs and defendants. The fact that these cases are important, that jurors listen carefully to the evidence and believe they are impartial, demonstrates how important to the sociological legitimacy of the system it is to avoid inaccurate accusations of junk science when, what in fact is at issue, is preventable scientific uncertainty. In situations such as that involving Roundup, the issue is not that some of the evidence relied on was quackery. Rather, it is that the studies remain inconclusive, and the company believes it should not be held liable based on such inconclusive studies. The result, unfortunately, is a full-frontal attack on the justice system itself rather than a debate about the quantum of evidence.

The knowledge remedy could mitigate such attacks by first ordering the production of adequately funded, independent research and only then trying liability. This would avoid situations such as the Dow Corning breast implant cases but also enable litigation in appropriate situations such as that involving DuPont's pollution with C8.

4. Avoids Bankruptcy on the One Hand and Preapproval on the Other.— Concerns over products and chemicals that are mass-produced could lead to two outcomes. The first is that the government will require preapproval, and the second is that litigation will result in bankruptcy. The knowledge remedy may provide a middle ground between these two choices, limiting exposure to bankruptcy while not requiring testing prior to market. Testing prior to market may be a better solution for avoiding harm to thousands and consequent litigation. For example, some have argued that the problem at the root of the breast implants litigation against Dow Corning was the defendant company's failure to test its products.¹⁹⁸ But for purposes of this paper, I assume that such a proposal would have difficulty being implemented due to industry objections. The knowledge remedy is a second-best option.

One possibility for avoiding mass tort litigation and potential bankruptcy is to require preapproval of products and chemicals before they can be sold, used, or released into the air and water. Too many products are never tested. For example, Dow Corning's breast implants were not tested

197. Tina Bellon, *Jurors Urge Judge to Uphold \$80 Million Roundup Verdict Against Bayer*, REUTERS (July 8, 2019, 1:12 PM), <https://www.reuters.com/article/us-bayer-glyphosate-lawsuit/juror-urges-us-judge-to-uphold-80-million-roundup-verdict-against-bayer-idUSKCN1U3263> [<https://perma.cc/9D55-CN86>].

198. See, e.g., Rebecca S. Dresser et al., *Breast Implants Revisited: Beyond Science on Trial*, 1997 WIS. L. REV. 705, 707 (“[T]he silicone gel breast implant controversy arose because manufacturers, physicians, and federal officials allowed the devices to be used without adequate safety data.”).

before being used on millions of women because the legal regime at that time did not require FDA approval for such medical devices. Had the implants been tested before being used on the population, they might not have been allowed to be sold because of their propensity to leak, or the regulators might have found that the leakage was not a cause for concern in terms of creating other health problems. In the absence of testing and indicia that signal a flaw on their face, the result is litigation.

Where there are indicia of wrongdoing or a cover-up, the likelihood of large verdicts (and therefore entity-threatening litigation) rises. Yet this threat is not sufficient to induce companies to test, as the stories above indicate. Accordingly, in the absence of reliable studies (which is to say, studies not captured by industry), the knowledge remedy is a solution that may prevent bankruptcy in cases like *Dow Corning* while avoiding preapproval.

B. Arguments Against

This subpart considers four arguments against the knowledge remedy.

1. Delays Plaintiffs' Recovery.—A significant objection to the knowledge remedy is that it delays plaintiffs' recovery, likely for years. This is because studies properly conducted take time. During that time, of course, the plaintiffs do not receive recompense even if they will ultimately be found entitled to it.

Further, in the condition of preventable scientific uncertainty, plaintiffs may benefit because the unpredictability of results may end up in their favor. The silicone breast implants cases are an example of this. In those cases, scientific uncertainty, combined with evidence of misconduct as to the leaking of the implants, resulted in payouts to plaintiffs. Plaintiffs ended up receiving a payment that they would not have received if a knowledge remedy had been awarded. In addition, if uncertainty falls in their favor and indeed their injuries were caused by the defendant, payment will be quicker than under a regime that imposes a knowledge remedy. At the same time, if the injury was caused by the defendant's product but the plaintiffs ultimately do not prevail at trial for lack of proof, then the knowledge remedy would lead to a better outcome for plaintiffs. From a systemic perspective, of course, it is preferable only to require a defendant to pay when there is causation and not when causation cannot be shown.

There is not much to say about this objection other than that delay is a significant cost of the knowledge remedy to injured plaintiffs whose injuries were in fact caused by the defendant and who would have won their suits under conditions of uncertainty. If the knowledge remedy produces greater sociological legitimacy and puts to rest allegations of "junk science" that plague the legal system, this trade-off is likely worth the potential benefits to plaintiffs of unpredictability resulting from preventable scientific

uncertainty. If it merely creates another front for making junk science accusations, however, the trade-off may not be worthwhile.

2. *Creates a New Duty to Test.*—So far, this Article has argued that the knowledge remedy is a remedy for violation of a duty to the plaintiff. One might argue, however, that the knowledge remedy bootstraps a duty to test. If the knowledge remedy imposes a testing regime and if the remedy is meant to fit the wrong, then the wrong is the failure to conduct that testing. My research reveals no court that has recognized a common law duty to test, only a duty to warn once information is available. Of course, regulators can require testing, and they do, but the number of lawsuits concerning chemicals and drugs that are proven to cause disease and never were tested indicates that there is underregulation.¹⁹⁹

Wendy Wagner has suggested a change to the common law standard: giving immunity to companies that test their products and find them to be safe and penalizing companies that fail to test their products.²⁰⁰ The penalty would work as follows.²⁰¹ The common law would recognize a duty to test with the threshold for minimal scientific testing to be established by either an independent panel or some judicially created threshold, such as two short-term laboratory studies. In suits involving chemicals or products that did not meet the threshold for minimal testing, the plaintiff would be entitled to a presumption that the product caused her harm if she could show such harm was a biologically plausible result of exposure. If the threshold was met, the traditional rules of tort law would apply. This would create an *ex ante* incentive to test, at least to the legally required threshold, in order to avoid liability and counteract the apparent preference for companies to bury their heads in the sand and hope that liability will be avoided by lack of knowledge and the plaintiff's inability to prove her case.

A knowledge remedy is similar to Wagner's proposal in the sense that the threshold for imposing the remedy would not be reached if the company were to test. In many of the cases discussed here, it is the failure to test despite evidence indicating a danger that triggers the knowledge remedy. If the company had tested the product, it would likely avoid the finding of wrongdoing in the creation of a dangerous condition for the plaintiff. Although this Article has argued that applying the duty to aid a plaintiff once

199. See Wendy Wagner, *When All Else Fails: Regulating Risky Products Through Tort Litigation*, 95 GEO. L.J. 693, 695, 714–16 (2007) (describing information limitations of regulators); Dresser et al., *supra* note 198, at 707 (“[T]he silicone gel breast implant controversy arose because manufacturers, physicians, and federal officials allowed the devices to be used without adequate safety data.”).

200. Wagner, *supra* note 30, at 833.

201. For details of the proposal I summarize next, see *id.* at 834–36.

the defendant has created a dangerous condition is a principle known in the common law, this is a new context for the application of that principle. Medical monitoring can provide a precedent, but courts have not explicitly adopted this rationale.²⁰²

In some ways, the knowledge remedy provides an illustration of how remedies and wrongs intermingle,²⁰³ just as it illustrates the overlap between procedure and the substantive law in its similarity to civil discovery. The underlying wrong that the knowledge remedy seeks to address is a violation of a duty to take care with respect to the design of products, the duty to warn if a product is dangerous, or the duty not to pollute a neighbor's land, for example. As we have seen, if the defendant has willfully ignored the potential harm caused by its product or toxin, then it may be impossible for the plaintiff to prove causation on her own, even though the adversarial system presumes that she can meet this requirement.

This remedy is appropriate under a theory analogous to the doctrine of unclean hands in equity. Unclean hands is an equitable defense.²⁰⁴ It was identified early on as a way to punish misconduct even when it could not be shown to be illegal. As Justice Story explained:

He who has acted in bad faith, resorted to trickery and deception, or been guilty of fraud, injustice, or unfairness will appeal in vain to a court of conscience, even though in his wrongdoing he may have kept himself strictly 'within the law.' . . . Under this maxim, any willful act in regard to the matter in litigation, which would be condemned and pronounced wrongful by honest and fair-minded men, will be sufficient to make the hands of the applicant unclean.²⁰⁵

While the unclean hands defense is a shield for a defendant, the knowledge remedy is a sword for the plaintiff. In this sense, unclean hands and the knowledge remedy are mirror images of one another. But they are linked by the general principles that fault shifts the cost of injury and of

202. Goldberg & Zipursky, *supra* note 124, at 1710, 1712.

203. See Daryl J. Levinson, *Rights Essentialism and Remedial Equilibration*, 99 COLUM. L. REV. 857, 931 (1999) (describing that in private law, such as torts, "the purposes of liability and remedy are the same, and the discourse used to describe both is singular"). Levinson further explained, "[w]e might say that in nonconstitutional law, rights and remedies are *commensurable*." *Id.*

204. See, e.g., EMILY SHERWIN & SAMUEL BRAY, AMES, CHAFFEE, AND RE ON REMEDIES: CASES AND MATERIALS 967 (2d ed. 2018) ("Certain defenses are 'equitable' in the sense that they preclude the plaintiff from requesting equitable relief but do not provide a complete defense against liability.").

205. STORY, *supra* note 90, at § 99; see also Precision Instrument Mfg. Co. v. Auto. Maint. Mach. Co., 324 U.S. 806, 814 (1945) ("The guiding doctrine in this case . . . is a self-imposed ordinance that closes the doors of a court of equity to one tainted with inequity or bad faith relative to the matter in which he seeks relief, however improper may have been the behavior of the defendant."); RESTATEMENT (SECOND) OF TORTS § 940 (AM. LAW INST. 1979) (restating the doctrine of unclean hands).

flexibility in equitable remedies. Both doctrines recognize that the adjustment of the remedies is warranted depending on the circumstances of both parties' conduct. In such instances, a court may consider both illegal conduct and conduct that raises the opprobrium of the court and of ordinary morality. This idea can thus include both a remedy of denying an injunction where one would otherwise be warranted (based on the other side's misconduct) and a remedy of requiring the production of information when it was due to one party's misconduct that the information is unavailable.²⁰⁶ This explains the award of a knowledge remedy in the accounting context. Lack of information and inability to obtain it, combined with an incentive on the part of the defendant not to create information, justify an equitable approach in the negligence or products liability context because the defendant's conduct placed the plaintiff in danger.

3. *Discourages Research.*—Awarding a knowledge remedy may have the perverse result of discouraging *ex ante* research and testing that may lead manufacturers to take safety precautions. This is because if defendants know that they will be ordered to test if their products are suspected to be injurious, they may calculate that it is better to wait until they are forced to test by a court and pay for testing at that point. Indeed, as in the current regime, the less companies know about the injuries caused by their products, the greater protection they have against liability. The knowledge remedy will also further delay any payments for injury that they might ultimately make, which inures to their benefit. If the goal is to encourage companies to test, a duty to test would be a more efficient way of encouraging companies to test their products and take needed precautions *ex ante*.

In a first-best world, the Wagner proposal discussed in section IV(B)(2) would be a better approach to the problem of dangerous products and preventable scientific uncertainty. In light of the fact that no duty to test has been recognized despite many instances of wrongful decisions to ignore signs of danger and to manufacture uncertainty as to the risks created by products, the second-best approach of the knowledge remedy is better than nothing.

4. *Oversteps the Judicial Role.*—A final objection to the knowledge remedy is that it departs from the traditional judicial role. Some may argue that the court usurps the legislative role when it orders an ongoing and complex remedy such as a knowledge remedy. Or some may argue that courts overstep their bounds by awarding a remedy that resembles something that an agency such as the FDA would order before allowing a drug to come to

206. For a general discussion of uncertainty in tort, see ARIEL PORAT & ALEX STEIN, TORT LIABILITY UNDER UNCERTAINTY (2001).

market. For example, the Supreme Court of Michigan, considering whether a negligence claim seeking medical monitoring may lie in the absence of physical injury has stated:

In the absence of such a requirement, it will be inevitable that judges, as in the instant case, will be required to answer questions that are more appropriate for a legislative than a judicial body: How far from the Tittabawassee River must a plaintiff live in order to have a cognizable claim? What evidence of exposure to dioxin will be required to support such a claim? What level of medical research is sufficient to support a claim that exposure to dioxin, in contrast to exposure to another chemical, will give rise to a cause of action?²⁰⁷

This line-drawing problem is ubiquitous in many areas of law and equity where there is an overlap between the judicial and legislative powers. To some extent, every imposition of liability ultimately regulates an industry by creating an incentive to change behavior. And in many cases, the court must determine where immunity ends and obligation begins. For example, consider asking the same questions as those asked by the Michigan court above about the standards of ordinary care or foreseeability in negligence law, or of when a fiduciary duty is owed in agency law.²⁰⁸ Each of these decisions requires a policy judgment that could be made by a legislature. We can rethink familiar negligence cases along these lines. Does the ordinary duty of care require a barge owner to have an attendant on the barge in case of emergency?²⁰⁹ It is generally agreed that the owner whose barge has been damaged may bring a suit and that the adjudicator will determine whether the failure to put an attendant on the barge breached the duty of ordinary care.²¹⁰ This does not mean, however, that one could not imagine the legislature imposing a duty on barge owners or immunizing them by statute.

Arguably, an order to produce knowledge is less complex and interferes less with legislative prerogatives than structural injunctions, which, although controversial, have been generally accepted in cases of violations of constitutional rights.²¹¹ Indeed, the knowledge remedy falls somewhere

207. *Henry v. Dow Chem. Co.*, 701 N.W.2d 684, 691 (Mich. 2005).

208. *See also Paz v. Brush Engineered Materials, Inc.*, 949 So. 2d 1, 8 (Miss. 2007) (“This is the type of case in which the Court has held that the common law is malleable, particularly so in the area of torts, and thus this Court can create and discontinue torts in common law.”).

209. These are the facts of *United States v. Carroll Towing Co.*, 159 F.2d 169, 170–71 (2d Cir. 1947).

210. *See id.* at 173 (describing an owner’s duty when mooring a boat as “a function of three variables: (1) The probability that she will break away; (2) the gravity of the resulting injury, if she does; (3) the burden of adequate precautions”).

211. *Compare* Owen M. Fiss, *Foreword: The Forms of Justice*, 93 HARV. L. REV. 1, 2 (1979) (arguing in favor of structural injunctions) *with* Douglas Laycock, *Injunctions and the Irreparable Injury Rule*, 57 TEXAS L. REV. 1065, 1074 (1979) (arguing in favor of a somewhat narrower approach).

between compensation remedies recognized in most cases at law and complex structural injunctions on the continuum of judicial intervention. The way to address the line-drawing problem is to look separately at each substantive area of law where a knowledge remedy is proposed rather than to make a general statement about knowledge remedies as exceeding or remaining within the courts' proper sphere of power.

In some cases, the knowledge remedy may be less intrusive than ordinary tort remedies of compensation. Consider again the case of Dow Corning's silicone breast implants. Recall there was evidence that the defendant hid information about leakage of silicone from its implants. Some studies showed that the silicone leaks could not be linked to the disease but not before the company went bankrupt. For some, this is evidence of the tort system gone wrong and of junk science.²¹² But others have argued that the problem at the root of the litigation was the defendant company's failure to test its products prior to putting them on the market.²¹³ What would have happened if the court had imposed a knowledge remedy based on the defendant's initial wrongdoing—the failure to warn of the risk of leaking silicone—and waited on or delayed products liability damages cases until the studies were in? Plaintiffs too would have had to wait until there was sufficient scientific evidence, and sometimes more than one study is necessary. But it might have been a remedy more consistent with the judicial role in equity because it was appropriate to the available information, the development of scientific knowledge, and the wrong alleged.

A final consideration is the competence of courts as an institution to award knowledge remedies. Because judges are generalists, they may not know what technology may be available, not appreciate the costs of conducting studies, and not appreciate the extent to which a single study is unlikely to produce a definitive answer. On the other hand, often mass torts occur because of regulatory failure by other institutions, such as a failure of the FDA to require adequate testing of products²¹⁴ or a failure of legislatures to be sufficiently aware of a problem to regulate it. There is a solution in the law to institutional-competence questions such as this, and that is preemption by regulatory agencies. Whether preemption is the optimal solution in light of regulatory failure is a question beyond the scope of this paper. As Catherine Sharkey has argued, regulation and litigation can complement one another,²¹⁵ so there remains much to explore.

212. See generally ANGELL, *supra* note 189 (considering the impact of tort law on American life and the role of science in the courtroom through the prism of the breast implant controversy).

213. Dresser et al., *supra* note 198, at 707.

214. See Wagner, *supra* note 199, at 714–16 (describing information limitations of regulators).

215. Catherine M. Sharkey, *The Administrative State and the Common Law: Regulatory Substitutes or Complements?*, 65 EMORY L. REV. 1705, 1706 (2016).

Examples of knowledge remedies in action illustrate that courts are capable of ordering and overseeing these remedies. Even in the most involved example, the C8 Science Panel, a thoughtful and serious scientific process was instituted with the court's approval. Furthermore, the combination of the decline of administrative oversight of chemicals and drugs, the inadequate and declining state and federal budgets for scientific study, and the increase in regulatory capture all militate against the view that the administrative state can be counted on to regulate *ex ante*.

Conclusion

In a society that is increasingly both complex and unwilling to fund research out of the public fisc,²¹⁶ a knowledge remedy is a supplement to inadequate administrative regulation, particularly in cases involving toxins or drug-and-device litigation, where tort suits are not preempted. Indeed, the role of civil discovery has been for some time understood as a complement to the administrative state.²¹⁷ The knowledge remedy likewise serves as a complement to regulation.

This beneficial externality of the knowledge remedy is also its Achilles' heel in the sense that it challenges the traditional view that remedies, especially remedies in the types of claims generally understood to constitute private law, are to be administered as between the parties themselves, not for the benefit of third parties.²¹⁸ Yet the tort system does impact third parties, even when it apparently applies only to the parties before the court, because actors observing the system change their behavior in response to it. They may decide that it is better not to test toxins, for example, because then they will be more likely to win failure to warn claims.²¹⁹ Or they may decide that it is better not to invest in researching better pollution-mitigating measures because if such measures exist, a court might include them in an injunction.

216. See *supra* note 188 and accompanying text.

217. See Stephen N. Subrin, *Fudge Points and Thin Ice in Discovery Reform and the Case for Selective Substance-Specific Procedure*, 46 FLA. L. REV. 27, 35 (1994) ("Clark marveled at how the new procedure would permit litigators to enter the New Deal and to amass the information relevant to policymakers."); see also Paul D. Carrington, *Renovating Discovery*, 49 ALA. L. REV. 51, 54 (1997) ("Every day, hundreds of American lawyers caution their clients that an unlawful course of conduct will be accompanied by serious risk of exposure at the hands of some hundreds of thousands of lawyers, each armed with a subpoena power by which misdeeds can be uncovered."); Alexandra D. Lahav, *The Roles of Litigation in American Democracy*, 65 EMORY L.J. 1657, 1690 (2016) (discussing "answerability and accountability" in the enforcement of law).

218. Cf. *Philip Morris USA v. Williams*, 549 U.S. 346, 349 (2007) (holding that a jury may not award punitive damages based on a defendant's conduct towards third parties).

219. Wagner, *supra* note 30, at 774–76 (discussing the incentive for companies not to research their own products, lest they discover defects that plaintiffs or third parties are unlikely to discover on their own).

This is why the line between judicial and legislative action is so difficult to draw; through every decision in the case before it, the court influences the decisions of many others who are not (yet) before the court.

The knowledge remedy has significant trade-offs. When a knowledge remedy is imposed, it may reveal that there is no causal link between a toxin and the alleged harm or between the product and the alleged harm. This means the company will not be required to pay many millions more in damages suits, even if it does mean the company has to invest in research. Where causation is ultimately found, it also means significant delay for plaintiffs as studies are conducted and consensus is reached. Nevertheless, it may be the best choice in a world of second-best choices and limited regulation.