

UNITED STATES COURT OF APPEALS

FOR THE SIXTH CIRCUIT

No. 01-4175

JOSEPH R. GRAHAM, et al.,
Plaintiffs-Appellants,

v.

AMERICAN CYANAMID
COMPANY,
Defendant-Appellee.

No. 01-4176

ROY LEE LUNDY, et al.,
Plaintiffs-Appellants,

v.

AMERICAN CYANAMID
COMPANY,
Defendant-Appellee.

Nos. 01-4175/4176

Appeal from the United States District Court
for the Southern District of Ohio at Columbus.
Nos. 94-00423; 94-00425—George C. Smith, District
Judge.

2 *Graham, et al. v. American* Nos. 01-4175/4176
Cyanamid Co.

Argued: August 1, 2003

Decided and Filed: December 3, 2003

Before: DAUGHTREY, MOORE, and SUTTON, Circuit
Judges.

COUNSEL

ARGUED: Marc S. Moller, KREINDLER & KREINDLER,
New York, New York, Stanley P. Kops, Bala Cynwyd,
Pennsylvania, for Appellants. David P. Donovan, WILMER,
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ON BRIEF: Marc S. Moller, KREINDLER &
KREINDLER, New York, New York, Stanley P. Kops, Bala
Cynwyd, Pennsylvania, E. Marianne Gabel, Delaware, Ohio,
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Appellants. David P. Donovan, WILMER, CUTLER &
PICKERING, McLean, Virginia, William G. Porter, II,
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Roger Yoerges, WILMER, CUTLER & PICKERING,
Washington, D.C., for Appellee.

OPINION

SUTTON, Circuit Judge. Joseph Graham and Roy Lee
Lundy, along with several members of their families,
challenge the district court's order granting summary
judgment to American Cyanamid Company on a series of
fraud and product liability claims. American Cyanamid
manufactures Orimune, which is an oral polio vaccine.
Plaintiffs allege that the use of Orimune in one instance and

the exposure to it in another caused a family member to contract polio.

Seeking compensation for these injuries, both sets of plaintiffs filed fraud claims against American Cyanamid, asserting that the company publicly represented Orimune as licensed, manufactured, tested and released in accordance with FDA regulations, when in fact the Orimune vaccines at issue (according to plaintiffs) did not comply with FDA standards. The Graham plaintiffs separately brought strict liability and negligent failure-to-warn claims against American Cyanamid. Both sets of plaintiffs also filed derivative claims for loss of consortium and punitive damages. The district court granted American Cyanamid's motion for summary judgment on all claims. We AFFIRM.

I. BACKGROUND

A. Polio and the Orimune Vaccine.

Poliomyelitis (or polio) is a disease of the central nervous system that causes illness, paralysis and in some instances death. It affected thousands of individuals in this country during the first half of the twentieth century. *See* Dorothy M. Horstmann, *Poliovirus (Poliomyelitis)*, in 2 *Textbook of Pediatric Infectious Diseases* 1186, 1189–90 (Ralph D. Feigin & James D. Cherry, eds., 1981). At its height between 1951 and 1955, polio led to 21,000 cases of paralysis per year in the United States. *See id.*

That this scourge did not continue through the second half of the twentieth century is a credit to the work of several scientists. In 1955, Dr. Jonas Salk developed the first widely successful vaccine against polio. Derived from a dead polio virus, the Salk vaccine is known as an inactivated polio vaccine (“IPV”) and was licensed for production and use in the United States in 1955. *See In re Sabin Oral Polio Vaccine Prods. Liab. Litig.*, 743 F. Supp. 410, 412 (D. Md.

1990) (“*Sabin I*”). The vaccine decreased the incidence of polio but did not eradicate it. Between 1958 and 1961, for example, nearly 19,000 cases of the disease were still reported in the United States. *Id.* Thirteen thousand people became paralyzed by the disease, and more than 1,000 people died from it during this period. *Id.*

At the same time that Dr. Salk was developing his vaccine, Dr. Albert Sabin began working on an oral polio vaccine (“OPV”) made from attenuated strains of the polio virus. The Sabin OPV, unlike the Salk IPV, is produced from a live polio virus that has been weakened but not killed. “Like all vaccines cultivated from live viruses,” such as those used for smallpox and yellow fever, “OPV creates immunity by inducing a mild infection in the recipient.” *United States v. St. Louis Univ.*, 336 F.3d 294, 295 (4th Cir. 2003) (quoting *Stuart v. Am. Cyanamid Co.*, 158 F.3d 622, 625 (2d Cir. 1998)).

OPV has several advantages over IPV. OPV is less expensive and requires only a single dosage, while IPV requires three inoculations and a follow-up booster shot. OPV is administered orally, commonly on a sugar cube, while IPV must be injected by a hypodermic needle. The interaction of the live virus in OPV with the immune system confers lifetime immunity, while IPV requires periodic re-administration. *See generally Sabin I*, 743 F. Supp. at 412. And OPV creates “herd immunity,” because an individual who has not received the vaccine can obtain immunity by contact with someone who has been vaccinated. *Id.* Individuals who have been immunized with IPV, by contrast, may still serve as carriers of the wild polio virus and may pass it on to others even though they themselves have been immunized. *Id.*

OPV, however, also has several inherent risks in view of the way it—and all vaccines developed from live viruses—work. The live but weakened viruses of OPV grow

Since 1977, American Cyanamid has been the sole supplier of OPV in the United States. The annual number of cases of polio in this country has steadily declined since the widespread use of OPV. By the 1980s, fewer than twenty-five vaccine-associated cases of paralytic polio in the United States were being reported yearly, a number that dropped to an average of ten per year in the 1990s. The ten-per-year figure represents one case for every 2.6 million doses of vaccine distributed. *Sabin I*, 743 F. Supp. at 412 n.3.

B. Federal Regulation of Polio Vaccine Production and Testing in the United States.

In view of the health and safety risks of polio vaccines, the Federal Government regulates the manufacture and distribution of them in a variety of ways. In 1961, the DBS adopted regulations governing the issuance of manufacturing licenses and the approval and release of OPV. *See* 21 C.F.R. §§ 630.10–.18 (1974) (formerly codified at 42 C.F.R. §§ 73.110–.118 (Supp. 1964)). To obtain a license authorizing manufacture from the Secretary of the Department of Health, Education and Welfare under these regulations, drug manufacturers must prove that their product conforms to regulations covering all phases of the manufacturing process—beginning with the original Sabin strains of vaccine (the only strains approved in the United States) and ending with the doses administered to patients. *See generally* 42 U.S.C. § 262.

Under these regulations, tests must be performed on the vaccine during various stages of production as a condition not only for licensing but also for the release of each monopool and the filling of the product. *See* Federal Food, Drug and Cosmetic Act, 21 U.S.C. §§ 301 *et seq.*; 21 C.F.R. §§ 200 *et seq.* (1977); Public Health Act, 42 U.S.C. § 262. Certain regulations are addressed solely to manufacturers of OPV. *See* 21 C.F.R. §§ 630.10–17; *Berkovitz ex rel. Berkovitz v. United States*, 486 U.S. 531, 541 (1988). Others are

addressed specifically to the Federal Government. *See, e.g.*, 21 C.F.R. §§ 600.3 *et seq.*, 630.17(e). To distribute any dose of Orimune, American Cyanamid thus had to obtain a license from the government and allow the government to test each batch of vaccine before releasing it for use.

The regulations in effect in the 1970s required that vaccine monopools be tested in monkeys for neurovirulence before they could be used for production of vaccine. *See* 21 C.F.R. § 630.16(b)(i)–(iii). “Neurovirulence is the capacity of an infectious agent to produce pathologic effects on the central nervous system.” *Berkovitz*, 486 U.S. at 543 n.9. In performing tests for neurovirulence, samples of each monopool are injected at different dilutions into the brain stems of thirty monkeys and into the spinal cords of at least fifteen other monkeys. After these injections, the monkeys are sacrificed and their spinal and brain tissues are microscopically examined by qualified pathologists who conduct a “comparative evaluation” of the monopool being tested relative to identical tests performed on samples of a “Reference Attenuated Poliovirus” provided by the FDA. *See* 21 C.F.R. § 630.16(b)(iii). The evaluation examines:

- (a) the number of animals showing lesions characteristic of poliovirus infection, (b) the number of animals showing lesions other than those characteristic of poliovirus infection, (c) the severity of the lesions, (d) the degree of dissemination of the lesions, and (e) the rate of occurrence of paralysis not attributable to the mechanical injury resulting from inoculation trauma.

Id. A given monopool passes the neurovirulence test “if a comparative analysis of the test results demonstrates that the neurovirulence of the test virus pool does not exceed that of the Reference Attenuated Poliovirus.” *Id.*

Among the FDA regulations governing these neurovirulence tests at this time were a “consistency of

C. Graham v. American Cyanamid Co.

Zachary Graham was born on May 2, 1984. On July 3, 1984, his mother, Lisa Graham, took him to one of the offices of Delaware Family Practice, P.C. to receive an Orimune polio vaccine. The vaccine dose came from lot 739-472, which was derived from seed 45B165. The type III component of this lot was manufactured from monopool 3-486.

The dose of Orimune that Zachary Graham received contained the following warning from American Cyanamid:

ADVERSE REACTIONS:

Paralytic disease following the ingesting of live poliovirus vaccines has been, on rare occasion, reported in individuals receiving the vaccine . . . and in persons who were in close contact with vaccinees. The vaccine viruses are shed in the vaccinee's stools for at least 6 to 8 weeks as well as via the pharyngeal route. Most reports of paralytic disease following ingestion of the vaccine or contact with a recent vaccinee are based on epidemiological analysis and temporal association between vaccination or contact and the onset of symptoms. Most authorities believe that a causal relationship exists.

The risk of vaccine-associated paralysis is extremely small for vaccinees, susceptible family members and other close personal contacts. However, prior to administration of the vaccine, the attending physician should warn or specifically direct personnel acting under his authority to convey the warnings to the vaccinee, parent, guardian, or other responsible person of the possibility of vaccine-associated paralysis. The Centers for Disease Control report that during the years 1969 through 1980 approximately 290 million doses of []OPV

were distributed in the United States. In the same 12 years, 25 "vaccine-associated" and 55 "contact vaccine-associated" paralytic cases were reported. Twelve other "vaccine-associated" cases have been reported in persons (recipients and contacts) with immune deficiency conditions. These statistics do not provide a satisfactory basis for estimating these risks on a per person basis.

When the attenuated vaccine strains are to be introduced into a household with adults who have not been adequately vaccinated or whose immune status cannot be determined, the risk of vaccine-associated paralysis can be minimized by giving these adults three doses of IPV a month apart before the children receive ORIMUNE. The CDC reports that no paralytic reactions to IPV are known to have occurred since the 1955 cluster of poliomyelitis cases caused by vaccine that contained live polioviruses that had escaped inactivation.

The Immunization Practices Advisory Committee of the U.S. Public Health Service states: "Because of the overriding importance of ensuring prompt and complete immunization of the child and the extreme rarity of OPV-associated disease in contacts, the Committee recommends the administration of OPV to a child regardless of the poliovirus-vaccine status of adult household contacts. This is the usual practice in the United States. The responsible adult should be informed of the small risk involved. An acceptable alternative, if there is strong assurance that ultimate, full immunization of the child will not be jeopardized or unduly delayed, is to immunize adults according to the schedule outlined above before giving OPV to the child."

In addition to this warning, Lisa Graham signed an "Important Information" consent form provided by the Ohio Department of Health. It stated that she understood the risks and benefits associated with OPV and had been given an

opportunity to ask questions about OPV that were answered to her satisfaction. The form also stated: “[O]nce in about every 4 million vaccinations, persons who have been vaccinated or who come in close contact with those who have recently been vaccinated are permanently crippled and may die. Even though these risks are low, they should be recognized.” And the form made known the availability of IPV as an alternative polio vaccine with “no known risk of causing paralysis.”

On July 26, 1984, Zachary Graham began experiencing fever, irritability, lethargy and general weakness. He was admitted to Grady Memorial Hospital in Delaware, Ohio, where he remained until July 29, 1984. The Centers for Disease Control in Atlanta diagnosed Zachary with Type III poliomyelitis caused by the Orimune vaccine that he had received earlier in the month. As a result of the illness, Zachary Graham became permanently disabled in his lower extremities.

The Grahams initially filed a petition in the United States Court of Federal Claims on September 27, 1990, seeking compensation under the “no fault” provisions of the National Vaccine Injury Compensation Act, 42 U.S.C. §§ 300aa-10 *et seq.* (Supp. 1990). Because his paralysis occurred before the Act’s effective date of October 1, 1988, however, it limited the amount of compensation Zachary could receive for his injuries to \$30,000. 42 U.S.C. § 300aa-15(b). Graham’s family thereafter filed a motion to dismiss their petition voluntarily, which the United States Court of Federal Claims granted on December 10, 1993.

On May 10, 1994, Zachary’s parents, Joseph and Lisa Graham, filed this action against American Cyanamid in the Southern District of Ohio (Eastern Division) on behalf of Zachary, who was then a minor. Their complaint sought compensatory and punitive relief under a variety of state-law theories: (1) strict products liability; (2) fraud; (3)

negligence; (4) breach of implied warranty of merchantability; (5) breach of implied warranty of fitness; and (6) breach of express warranty.

D. Lundy v. American Cyanamid Co.

On March 24, 1977, Janet Lundy took her young son, Jason, to an office of the Jackson County Combined General Health District for a routine check-up. There, Dr. Carl Greever gave Jason a dosage of Orimune for immunization from polio. On April 19, 1977, Jason’s father, Roy Lee Lundy, began experiencing fever, headaches, diarrhea, myalgia, malaise and general weakness. After a brief stay at Mercy Hospital in Portsmouth, Ohio, Roy’s doctors transferred him to The Ohio State University Hospital in Columbus. About a week later, he was diagnosed with type III poliomyelitis, which led to permanent paralysis.

Roy’s doctors advised him that the probable source of the disease was the Orimune vaccine given to Jason, which likely had been transmitted to him through close contact with his son. Jason Lundy’s vaccine came from lot 480-277 or lot 483-269. The type III component of Orimune in lot 480-277 was manufactured from a mixture of monopools 3-427 and 3-436. The type III component in lot 483-269 was manufactured from a single monopool—3-437. The evidence does not establish which lot was responsible for the Orimune vaccine that Jason ingested.

The Lundys allege that they did not suspect that American Cyanamid had acted wrongfully until they saw a television program on vaccine-induced cases of polio on September 27, 1985. After viewing this program, the family initially attempted to recover for their injuries in state court.

1. State Court Action

On March 13, 1987, Lisa and Roy Lee Lundy filed an action in the Franklin County Court of Common Pleas against (1) Lederle Laboratories, a Division of American Cyanamid, (2) the Board of Health of the Jackson Combined General Health District and (3) Dr. Carl Greever. *See Lundy v. Lederle Laboratories, Div. of Am. Cyanamid Co.*, 561 N.E.2d 1027 (Ohio Ct. App. 1988). Roy Lee Lundy sought compensatory and punitive relief under a variety of theories: (1) negligence; (2) failure to obtain informed consent from the plaintiffs; (3) failure to warn; (4) breach of implied warranties of merchantability and fitness; (5) strict liability; and (6) breach of express warranties. Janet Lundy separately filed a claim for loss of consortium.

The Franklin County Court of Common Pleas eventually granted motions to dismiss on behalf of all defendants. The Ohio Court of Appeals for the Tenth District affirmed these decisions.

In November 1990, the Lundy plaintiffs filed a petition in the United States Court of Federal Claims seeking compensation under the National Vaccine Injury Compensation Act, 42 U.S.C. §§ 300aa-10 *et seq.* On March 11, 1994, the Lundys voluntarily withdrew their petition in view of the limited size of the award authorized by the Act. *See* 42 U.S.C. § 300aa-15(b).

2. Federal Court Action

On May 10, 1994, Roy, Janet and Jason Lundy filed this action in federal court in the Southern District of Ohio (Eastern Division), naming American Cyanamid as the only defendant. They sought compensatory and punitive relief under the following state-law theories of liability: (1) strict products liability; (2) fraud; (3) negligence; (4) breach of implied warranty of merchantability; (5) breach of implied

warranty of fitness; and (6) breach of express warranty. Janet and Jason Lundy each filed independent loss-of-consortium claims. American Cyanamid filed a motion for judgment on the pleadings, arguing that all of the claims were barred by *res judicata* (due to the prior state-court action) and the statute of limitations. With the exception of Roy's fraud claim and Jason's loss-of-parental-consortium claim, the district court dismissed each of the other claims as barred by *res judicata* on September 29, 1995.

The two remaining Lundy claims were consolidated with the Graham plaintiffs' claims. On July 15, 1998, after considerable discovery, American Cyanamid filed separate motions for summary judgment against the Lundy plaintiffs and the Graham plaintiffs.

E. The District Court's Decision

On December 21, 2000, the district court granted American Cyanamid's motions for summary judgment against the Grahams and Lundys. As to the Lundys, the court held that they had failed to submit sufficient evidence to raise a triable issue that the alleged fraudulent representations made by American Cyanamid in the package insert regarding compliance were in fact false. It further concluded that the plaintiffs had failed to submit any admissible evidence that the alleged violations had any impact on the safety of the Orimune dose that Jason Lundy received.

As to the Grahams, the court concluded that they had abandoned their fraud claim by failing to respond to American Cyanamid's summary judgment motion on the claim. It dismissed the Grahams' strict liability claim, concluding that Orimune was unavoidably unsafe. And it dismissed the Grahams' negligent failure-to-warn claim, concluding that the Orimune warnings and "Important Information" sheet provided to Zachary Graham and his mother were adequate and reasonable as a matter of law. On

the basis of these rulings, the court held that the derivative nature of Jason Lundy’s consortium claim and each claim for punitive damages required these claims to be dismissed as a matter of law as well. (While the district court labeled the entry disposing of all of these claims a “final judgment,” neither the record nor the docket sheet reveals what happened to the three warranty claims filed by the Graham plaintiffs in their complaint. Because the Grahams do not address these claims on appeal and because the district court purported to dismiss all claims, we do not address them here.) The district court denied the Graham and Lundy plaintiffs’ motions for reconsideration, and these consolidated appeals followed.

II. DISCUSSION

The customary rules for reviewing a summary-judgment decision apply. We give *de novo* review to the district court’s decision. *Sperle v. Mich. Dep’t of Corr.*, 297 F.3d 483, 490 (6th Cir. 2002). A decision granting summary judgment is proper where no genuine issue of material fact exists and the moving party is entitled to judgment as a matter of law. Fed. R. Civ. P. 56(c). And in considering such motions, we give all reasonable factual inferences to the nonmoving party. *Matsushita Elec. Indus. Co. v. Zenith Radio Corp.*, 475 U.S. 574, 587 (1986).

Our jurisdiction over these state-law claims rests on the diversity of citizenship of the parties. All of the Graham and Lundy plaintiffs are residents of Ohio. American Cyanamid, incorporated in Maine, maintains its principal place of business in New Jersey. See 28 U.S.C. § 1332. In this setting, we sit in effect as another court of the forum state, in this case Ohio, and therefore must apply its choice-of-law rules. See *Muncie Power Prods., Inc. v. United Tech Auto., Inc.*, 328 F.2d 870, 873 (6th Cir. 2003). In this instance, the parties agree that those choice-of-law rules indicate that Ohio substantive law governs this claim.

All three of the tort claims in this case represent a variation on a common theme. Whether labeled fraud, strict liability, or negligent failure to warn, all three claims turn on the theory that there is a proximate connection between the alleged violations of the FDA’s neurovirulence rules and the safety of the Orimune vaccine. Because we conclude that plaintiffs have failed to establish a triable issue of fact on this central point and because we conclude that each of these tort claims otherwise fails as a matter of law, we agree with the District Court that the claims must be summarily dismissed.

A. FRAUD

We begin by addressing the one claim common to both sets of plaintiffs. The Grahams and Lundys each allege that American Cyanamid acted fraudulently by representing that Orimune was licensed, manufactured, tested and released in accordance with FDA regulations when in fact it did not comply with FDA standards. To establish a cognizable claim of fraud under Ohio law, a claimant must prove the following six elements: “(a) a representation or, where there is a duty to disclose, a concealment of fact, (b) which is material to the transaction at hand, (c) made falsely, with knowledge of its falsity, or with such utter disregard and recklessness as to whether it is true or false that knowledge may be inferred, (d) with the intent of misleading another into relying upon it, (e) justifiable reliance upon the representation or concealment, and (f) an injury proximately caused by the reliance.” *Russ v. TRW, Inc.*, 570 N.E.2d 1076, 1083 (Ohio 1991). The elements of the claim are conjunctive, and accordingly all of them must be shown. See *Schwartz v. Capital Sav. & Loan Co.*, 381 N.E.2d 957, 959 (Ohio 1978).

Both in the district court and here, the parties have vigorously contested many of these elements. Did the company in fact violate certain FDA regulations in manufacturing Orimune—specifically, the “tissue culture passage” and “consistency of manufacture” regulations?

Were American Cyanamid's regulatory representations inaccurate? Did plaintiffs justifiably rely upon any of these representations? Were the representations material to product safety? And, even if all of plaintiffs' allegations are true, did the alleged regulatory violations proximately cause these injuries? Because we conclude that the plaintiffs have failed as a matter of law to present admissible evidence of proximate cause, we address this issue and this issue (with one minor exception) alone.

Under Ohio law, plaintiffs bear the burden of establishing that American Cyanamid's alleged misrepresentation of Orimune's regulatory compliance proximately caused their injuries. See *Burr v. Bd. of County Comm'rs*, 491 N.E.2d 1101, 1105 (Ohio 1986); *Cohen v. Lamko, Inc.*, 462 N.E.2d 407, 409 (Ohio 1984). See also *Picklesimer v. Baltimore & O.R. Co.*, 84 N.E.2d 214 (Ohio 1949) (noting that ordinary element of proximate cause applies where plaintiff has alleged fraud); Restatement (Second) of Torts § 557A cmt. a (noting that ordinary rules of legal cause govern fraudulent misrepresentation cases involving physical harm). To show proximate cause, the Grahams and Lundys must demonstrate that the fact allegedly misrepresented—compliance with the FDA regulations—caused their harm. See *Gaines v. Preterm-Cleveland, Inc.*, 514 N.E.2d 709, 712 (Ohio 1987) (holding that misstatement by doctor could have caused plaintiff's physical injuries in action for fraud). That is to say, was the plaintiffs' contraction of polio a "natural and probable" (*i.e.* reasonably foreseeable) consequence of the alleged noncompliance with the regulations? See *Strothers v. Hutchinson*, 423 N.E.2d 467, 471 (Ohio 1981); *Pfirsch v. Hal-Omar Baking Co.*, 216 N.E.2d 626, 628 (Ohio Ct. App. 1966). In view of the technical and scientifically complex nature of this inquiry, only *Daubert*-qualifying expert testimony may satisfy it. See *Daubert v. Merrell Dow Pharms.*, 509 U.S. 579 (1993); *cf. Berdyck v. Shinde*, 613 N.E.2d 1014, 1022 (Ohio 1993).

The Fourth Circuit recently addressed the issue of proximate cause in a similar context in *American Cyanamid Co. v. St. Louis University*, 336 F.3d 307 (4th Cir. 2003). In that case, St. Louis University sued American Cyanamid, seeking contribution for a state-court judgment arising from vaccine-related injuries suffered by one of its patients. St. Louis University claimed that the Orimune vaccine violated the FDA "tissue culture passage" and "consistency of manufacture" neurovirulence regulations. In doing so, however, the university failed to produce expert testimony establishing that a polio vaccine violating these FDA regulations was any more likely to cause injury than a fully compliant vaccine. "[I]n analyzing the element of proximate cause in claims against Cyanamid," the district court initially explained, "the focus must be on whether the plaintiff can prove that it was a defect in the OPV that resulted in his injury, not simply . . . whether he had been exposed to OPV derived from a seed that had been improperly approved in violation of the regulatory process." *St. Louis Univ. v. United States*, 182 F. Supp. 2d 494, 500 (D. Md. 2002). Applying Missouri law, the district court held that a "violation of the OPV regulations is not sufficient to prove the element of proximate cause in a context . . . where a plaintiff must prove that it is more likely than not that it was excessive neurovirulence in a dose of vaccine that caused him to contract polio." *Id.* at 501. The Fourth Circuit affirmed, holding that St. Louis University "presented no expert testimony showing that [the patient] would not have contracted polio or would have contracted a less severe case of polio had he been given a vaccine complying with the neurovirulence regulations." 336 F.3d at 310.

Today's case parallels *St. Louis University* in many ways. It involves the same defendant, the same Orimune vaccine, the same FDA regulations, the same allegations of non-compliance and the testimony of two of the same experts—Drs. Almond and Steinman. A different state's law applies, to be sure—here Ohio law, there Missouri law.

St. Louis University of course comes from a different Circuit. And some differences in the evidence and apparently in the nature of the tort claims exist as well. But in the end we see the issue in much the same way *St. Louis University* did. Under Ohio law, as under Missouri law, plaintiffs must show that American Cyanamid's alleged misrepresentation of Orimune's regulatory compliance proximately caused their injuries. Because the Grahams and Lundys have not made out a tenable claim of proximate cause in this respect (and more specifically because they have not produced expert testimony that supports this claim), their claims must be dismissed as a matter of law.

As in *St. Louis University*, Drs. Almond and Steinman did not satisfy the proximate cause requirement in either a general or a specific manner. They did not show as a general matter that American Cyanamid's alleged regulatory noncompliance increased the risk that the Orimune vaccine would cause polio in recipients or those in close contact with recipients, beyond the inherent risk long known to be associated with OPV. Plaintiffs' statistician, Dr. Krieger, attempted to perform a statistical analysis to determine if one could "predict based on the [neurovirulence test] results of the lot whether somebody [i]s more likely or less likely to get polio from that particular lot, if it were released." Krieger Dep. at 18 (testifying in *Campagna v. Am. Cyanamid Co.*, 767 A.2d 1996 (N.J. Super. Ct. App. Div. 2001)). But he did not find a correlation or any study supporting the existence of such a correlation. *Id.*

Plaintiffs and their experts do not fare any better in discussing the alleged violation of specific neurovirulence regulations. They initially claim, for example, that the vaccines at issue violate the "tissue culture passage" regulation. At the time of manufacture, this regulation required the vaccines to be no more than five tissue culture passages from the Sabin original strain, *see* 21 C.F.R. § 630.13(a), on the theory that more than five tissue culture passages would increase monkey neurovirulence. The

Lundys cite a single article, published in 1961, to support their claim of a causal connection between monkey neurovirulence and the likelihood of vaccine-associated paralytic polio. *See* R. Murray, *Standardization, Licensing, and Availability of Live Polio Vaccine*, 175 J.A.M.A 843 (1961). While the article states that "[n]eurovirulence for monkeys . . . has some correlation with safety in man," it equivocates on the extent of that relationship, noting that "many strains exist which, while causing evidence of infection in monkeys, apparently cause no discernible disease in man." *Id.* at 845. In the end, the article fails to address whether a causal connection between monkey neurovirulence and paralytic polio exists and indeed never references tissue culture passage. No less importantly, the Lundys offer no studies, data or expert testimony establishing any such connection.

When questioned about compliance with the 1984 "tissue culture passage" regulation, it is true, Dr. Almond opined that Orimune exceeded the permissible tissue culture passage limits. At the same time, however, he called the regulation "daft" and in need of change, and did not opine that failure to comply with the regulation would lead to a more dangerous vaccine. More specifically, Dr. Almond testified as follows about the regulation:

A. [T]he move to Pfizer seed was a sensible development and a desirable development. But in light of that development and in light of the decision to do it, the maintaining of a regulation which said you couldn't be more than five passages away from [the original strain] was daft. It should have been changed.

Q. They should have amended the regulation?

A. They should have amended the regulation.

Q. Now, if they had amended the regulation –

A. Before giving it to Zachary?

Q. Yes.

A. That would have been fine.

Almond Dep., June 9, 1998, at 171–72.

Some seven months after this deposition and six months after American Cyanamid filed its motion for summary judgment, Dr. Almond executed a new affidavit to “explain” his previous references to the “daft” regulation. Almond Aff., Jan. 14, 1999, ¶ 7. In that affidavit, he claims that *American Cyanamid* was “daft” in not seeking to have the regulation amended before producing Orimune from the Pfizer seed. *Id.* As the district court noted, however, “a party cannot create a factual issue by filing an affidavit which contradicts earlier deposition testimony after a motion for summary judgment has been made. If an affidavit is untimely and inconsistent with prior discovery responses, it is inadmissible and should not be considered.” *Graham v. Am. Cyanamid Co.*, Nos. C-2-94-423, C-2-94-425, slip op. at 18 (S.D. Ohio Dec. 21, 2000). See *Hughes v. Vanderbilt Univ.*, 215 F.3d 543, 549 (6th Cir. 2000). No less importantly, Dr. Almond’s affidavit never contradicts his deposition testimony that the FDA should have changed its regulation.

In 1991, when the FDA did amend this regulation, it expressly recognized the absence of any correlation between observed monkey neurovirulence and the risk of vaccine-associated paralytic polio.

No single vaccine lot has been associated with an increased incidence of poliomyelitis. The lots that have been identified as associated with a case of paralytic poliomyelitis have had typically low scores when tested by FDA and the manufacturer for neurovirulence in monkeys.

56 Fed. Reg. at 21,420. With respect to the now-repealed “tissue culture passage” regulation, in short, plaintiffs have not established that this alleged regulatory noncompliance increased the risk that the Orimune vaccine would cause polio in recipients or those in close contact with recipients.

Plaintiffs also contend that the vaccines at issue, and more specifically the relevant monopools comprising Orimune’s type III component of the vaccine, did not meet the “consistency of manufacture” regulation. As noted, this regulation required manufacturers (at the time of production) to demonstrate the genetic stability of the seed and the regularity of its manufacturing processes through the production of five consecutively and properly manufactured monovalent pools. See 21 C.F.R. § 630.17(b) (“each monovalent pool . . . [must be] one of a series of five consecutive pools of the same type, each pool having been manufactured by the same procedures, and each having met the criteria of neurovirulence for monkeys. . .”).

Again, however, plaintiffs have not produced evidence showing that a monopool that failed to satisfy the 1984 “consistency of manufacture” regulation would be more likely to cause vaccine-associated polio than one that satisfied the requirement. When asked whether there was a scientific basis for concluding that the “consistency of manufacture” requirement was linked with product safety, Dr. Almond testified that “there is a scientific argument that you can make which would support such a conclusion . . . I am not saying that is the right conclusion.” Almond Dep., April 20, 1998, at 144–45. Almond added that he was not aware of any study supporting this theory. *Id.* This testimony does not suffice to create a material dispute of fact. An admissible expert’s opinion, it is clear, “must be supported by more than subjective belief and unsupported speculation . . .” *McLean v. 988011 Ontario Ltd.*, 224 F.3d 797, 800–01 (6th Cir. 2000) (quotations and citations omitted).

Nor did Dr. Steinman fill this gap. He testified that he was “not aware of any data one way or the other” showing that a violation of this regulation poses a higher risk of causing vaccine-associated paralytic polio than one satisfying the requirement. He testified:

MR. DONOVAN: Q: You understand and acknowledge that live oral polio vaccine poses a risk of vaccine-associated polio?

MR. KOPS: Objection.

THE WITNESS: Yes.

MR. DONOVAN: Q: Whether it complies with the regulations in your view or it does not comply?

THE WITNESS: A: Absolutely, yes.

Steinman Dep., June 23, 1998, at 113. The FDA’s view of the former “consistency of manufacture” regulation echoes this view. In 1991, it amended and expanded the regulation in an attempt to make it more applicable to product safety.

The former consistency requirements were based on the premise that the failure of a monovalent virus pool to meet neurovirulence requirements could be the result of a manufacturing deficiency. . . . [N]o criteria were provided to link the history of performance of monovalent virus pools with the continued qualification of the seed virus. Long experience has shown that the failure of a monovalent virus pool, produced from an acceptable seed virus, is usually unrelated to deficiencies in the manufacturing process, but is usually due instead to test variability. . . . The revised methodology is at least as stringent as the former consistency requirements in detecting neurovirulence problems related to manufacturing defects, while having the added benefit of

providing a statistical means for monitoring the continued qualification of a seed virus by evaluating its ability to consistently produce monovalent pools of acceptable neurovirulence. . . . [T]hese requirements provide assurances of consistency . . . while actually reducing the likelihood that a seed virus will be rejected on the basis of test variability unrelated to genetic stability.

56 Fed. Reg. at 21,430–31. On this record, plaintiffs have not shown a connection between this regulation and product safety.

Attempting to fill this evidentiary gap, the Grahams and Lundys make a series of arguments to the effect that the alleged violations of these regulations establish negligence *per se* and to the apparent effect that proximate cause on this fraud claim accordingly need not be shown. But the invocation of this tort doctrine by itself, whether in the context of a negligence claim or a fraud claim, does not excuse the claimant from showing that the regulation at issue has a tenable and provable connection to public safety. *See, e.g., Merchants Mutual Ins. Co. v. Baker*, 473 N.E.2d 827, 828 (Ohio 1984) (“Negligence *per se* does not equal liability *per se*. Simply because the law may presume negligence from a person’s violation of a statute or rule does not mean that the law presumes that such negligence was the proximate cause of the harm inflicted.”); *see also Chambers v. St. Mary’s School*, 697 N.E.2d 198, 201 (Ohio 1998) (noting that negligence *per se* requires a showing of proximate cause). In this instance, the alleged violations relate to regulations that no longer are in existence, that the FDA believes did not affect public safety and that plaintiffs’ experts have not been able to show affected public safety. Plaintiffs offer no example of a court (in Ohio or elsewhere) that has concluded that the invocation of “negligence *per se*” may fill this evidentiary gap. We doubt such a case exists, and at all events reject this argument as a matter of law.

Plaintiffs do not gain any more traction by turning to the 1991 *Sabin* case and other cases arising from challenges to the 1984 neurovirulence regulations. These decisions did not involve the liability of private manufacturers for regulatory violations, but rather concerned the actions of the FDA in interpreting and applying its regulations. *Sabin* itself, moreover, concludes that the regulatory violations did not affect product safety: “[T]he scientists who established and implemented the OPV program . . . consistently acted in the public interest as they reasonably perceived it to be. They made judgments on extremely difficult questions which, strictly from the standpoint of public health, appear to be entirely proper. . . . [M]y finding that regulatory violations occurred does not imply that the public health is or has been endangered in any respect.” *Sabin II*, 763 F. Supp. at 813. What is more, Judge Motz, who presided over *Sabin II*, presided over the recent case between St. Louis University and American Cyanamid. *See St. Louis Univ.*, 182 F. Supp. 2d at 494. There, Judge Motz concluded that the plaintiff’s failure to prove, via expert testimony, that a regulatory violation increased the risk of paralysis meant that it could not prove any such violation by American Cyanamid proximately caused the vaccinee’s paralysis. *See id.* at 500–03. A similar flaw exists here.

The Lundys further allege that expired and rejected materials were included in Jason’s vaccine. American Cyanamid’s experts confirmed that when a trivalent product’s potency is not sufficient to reach the FDA criteria for potency, it must be re-bulked. That is to say, the manufacturer combines vaccine that may not qualify for use by itself in order to reach FDA-regulated potency levels and must do so without violating another FDA regulation. The Lundy (and Graham) experts again did not offer a tenable basis for concluding that re-bulking vaccine potency with expired or rejected material negatively affects product safety.

In the end, as in *St. Louis University*, plaintiffs have not met their burden of proximately linking their allegations of regulatory non-compliance with these undisputed and indisputably-severe injuries. That evidentiary gap is particularly significant in this medical setting. All vaccines produced from live viruses, as this one is, carry the paradoxical risk of inducing the very disease that the vaccine strives to prevent. In the absence of expert testimony showing that these alleged regulatory violations made Orimune more unsafe than it otherwise would have been, a rational trier of fact could rule for plaintiffs only on the basis of conjecture, not a legitimate set of inferences drawn from admissible evidence. On this record, it remains unknowable whether plaintiffs’ injuries stemmed from an avoidable defect in the product or unavoidable bad luck. That the 1984 regulations upon which these claims rest have since been repealed and that the FDA has concluded that compliance with these regulations did not decrease the incidence of vaccine-associated paralytic polio cement this conclusion.

Unable to establish a connection between these regulations and product safety, plaintiffs also necessarily come up short in showing that the representations at issue were material. For if plaintiffs cannot show that the alleged misrepresentations affected product safety, they cannot show that they were material. All things considered, the fraud claims in both cases must be summarily dismissed.

B. STRICT LIABILITY

The Grahams separately claim that they have presented a triable issue of fact on their strict-liability claim. For many of the same reasons that their fraud claim fails, however, this claim fails as well. (The Lundys, recall, brought strict-liability and failure-to-warn claims in state court and lost; when they filed the same claims here, the district court rejected them on *res judicata* grounds; those decisions have not been appealed.)

Ohio has adopted § 402A of the Restatement (Second) of Torts (1965) as the standard for strict liability. *See Temple v. Wean United, Inc.*, 364 N.E.2d 267, 271 (1977). It says:

(1) One who sells any product in a defective condition unreasonably dangerous to the user or consumer or to his property is subject to liability for physical harm thereby caused to the ultimate user or consumer, or to his property, if

(a) the seller is engaged in the business of selling such a product, and

(b) it is expected to and does reach the user or consumer without substantial change in the condition in which it is sold.

(2) The rule stated in Subsection (1) applies although

(a) the seller has exercised all possible care in the preparation and sale of his product, and

(b) the user or consumer has not bought the product from or entered into any contractual relation with the seller.

Restatement (Second) of Torts § 402A. To establish strict liability under Ohio law, plaintiffs must produce expert testimony that the defect at issue “proximately caused the[ir] claimed injuries.” *State Farm Fire & Cas. Co. v. Chrysler Corp.*, 523 N.E.2d 489, 494 (Ohio 1988). *See Ohio Rev. Code Ann. § 2307.73(A)(2).*

Against this legal backdrop, the Grahams argue that American Cyanamid is strictly liable for Zachary’s injuries. Specifically, they claim that Orimune was defective because it violated several FDA regulations: (1) the “tissue culture test”; (2) the “consistency of manufacture test”; and (3) the FDA’s licensing requirements. They further argue that the

warning accompanying the Orimune dose Zachary received was inadequate.

The Grahams’ strict-liability claim fails for the same reason that their fraud claim fails and for the same reason that the Fourth Circuit recently rejected identical claims in *American Cyanamid Co. v. St. Louis University*, 336 F.3d at 307. They have not been able to show that the alleged regulatory violations—non-compliance with the “tissue passage culture” and “consistency of manufacture” regulations—proximately caused Zachary Graham’s illness. Just as the expert testimony relied upon by the Grahams and Lundys did not show proximate cause in support of their fraud claims, the same expert testimony fails to do so here. In the absence of admissible evidence of proximate cause, the Grahams’ product defect claim under the 1984 “tissue culture passage” and “consistency of manufacture” regulations fails as a matter of law.

The Grahams also claim that the Orimune vaccine Zachary received was defective because American Cyanamid was not properly licensed to manufacture it. While they question whether certain testing procedures necessary for licensing occurred, they offer no evidence that the company did not in fact have a valid license to manufacture Orimune. As with their other claims, they also offer no evidence that any anomalies in American Cyanamid’s license proximately caused Zachary’s injuries. In Ohio, the absence of a valid or properly issued license does not by itself establish the proximate cause of an injury. *Cf. Gulla v. Straus*, 93 N.E.2d 662, 664 (Ohio 1950).

Plaintiffs also argue that the defense under Ohio law for “unavoidably unsafe” drugs is not available to American Cyanamid because the company allegedly violated FDA regulations. *See White v. Wyeth Labs.*, 533 N.E.2d 748, 752 (Ohio 1988) (“a manufacturer of an unavoidably unsafe product may not be held strictly liable for injuries caused

thereby, provided that the product was ‘ . . . properly prepared, and accompanied by proper directions and warning . . . ’”) (quotation omitted); Restatement (Second) of Torts § 402A, cmt. k (recognizing that certain products exist that cannot be made completely safe for their intended use and, when properly prepared, and accompanied by proper directions and warnings, are not defective, nor unreasonably dangerous). The availability of this defense, however, does not come into play in this instance, because plaintiffs have failed to establish their affirmative case by showing a causal relationship between the asserted defect—alleged regulatory violations—and Zachary’s injury. *See St. Louis Univ.*, 336 F.3d at 311 n.4.

C. NEGLIGENT FAILURE TO WARN

The Grahams independently bring a negligent failure-to-warn claim. *See Crislip v. TCH Liquidating Co.*, 556 N.E.2d 1177, 1181–82 (Ohio 1990). The claim has three elements, each of which must be satisfied: (1) a duty to warn against reasonably foreseeable risks; (2) breach of this duty; and (3) an injury that is proximately caused by the breach. *See Briney v. Sears, Roebuck & Co.*, 782 F.2d 585, 587 (6th Cir. 1986). Under Ohio law, the manufacturer of a prescription drug discharges its duty to warn about risks regarding prescription drugs if the manufacturer adequately warns the patient’s doctor of those risks. *See Ohio Rev. Code Ann. § 2307.76(C)*. When a plaintiff alleges that the warning given to a prescribing physician is inadequate, the plaintiff must prove his claim through expert medical testimony. *See, e.g., Jones v. Roche Labs.*, 616 N.E.2d 545, 547 (Ohio Ct. App. 1987).

As with the Grahams’ other claims, this one too founders on the shoal of proximate cause. Even if we grant that the warning American Cyanamid offered was in some way inadequate, which appears not to be the case, *see supra* (reprinting warnings); *see also Kearn v. Lederle Labs.*, 172

Cal. App. 3d 812, 818–19, 834–36 1985) (holding that an “Important Information” statement identical to the one Lisa Graham signed adequately informed the plaintiff of the reasonably foreseeable risks associated with OPV as a matter of law), the Grahams have not shown that this inadequacy proximately caused Zachary’s injuries. *See Seley v. G.D. Searle & Co.*, 423 N.E.2d 831, 838 (Ohio 1981). To the extent plaintiffs complain that the warning failed to acknowledge the alleged regulatory violations, they again have not shown that regulatory non-compliance in this instance had a bearing on product safety.

To the extent plaintiffs mean to complain that the warning should have noted that IPV is the preferred polio vaccine, the record contradicts that claim. The scientific community agreed long ago that “IPV and OPV are both effective in preventing poliomyelitis, [but] OPV is the vaccine of choice for primary immunization of children in the United States when the benefits and risks for the entire population are considered.” *Recommendation of the Advisory Committee on Immunization Practices* 2 (1982). This was largely because of “its ease of administration (oral instead of injected), expected long lasting immunity, and the production of bowel immunity.” E.O. Nightingale, *Recommendations for a National Policy on Poliomyelitis Vaccination*, 287 N.E. J. Med. 249–53 (1977). *See also Report of Committee on Infectious Diseases* 208, 209 (1982); Institute of Medicine, *An Evaluation of Poliomyelitis Vaccine Policy Options* 28 (1988). Mass vaccination with IPV also has had little impact on polio outbreaks. In contrast, wide use of OPV brought an end to any cases of paralytic polio caused by naturally circulating polio virus in the United States in 1979 and in the Western Hemisphere in 1991. Centers for Disease Control, *Poliomyelitis Prevention in the United States: Updated Recommendations of the Advisory Committee on Immunization Practices (ACIP)*, Morbidity & Mortality Weekly Report, May 19, 2000, at 1, 5. In 1996, the FDA recognized the wide use of OPV as so successful that it

officially revoked OPV regulations on the express ground that they were now “obsolete or no longer necessary to achieve public health goals.” Revocation of Certain Regulations, Biological Products, 61 Fed. Reg. 40,153, 40,153 (Aug. 1, 1996).

D. DERIVATIVE CLAIMS

Jason Lundy’s claim for loss of parental consortium and the Grahams’ and Lundys’ claims for punitive damages are derivative in nature. A derivative cause of action may not provide greater relief than that available under the primary cause of action. *See Lynn v. Allied Corp.*, 536 N.E.2d 25, 36 (Ohio Ct. App. 1987). Having dismissed plaintiffs’ respective causes of action for fraud, strict liability, and negligent failure-to-warn as a matter of law, we must dismiss these derivative claims as well.

III. CONCLUSION

For the foregoing reasons, we AFFIRM.