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WAYNE BAGLEY ET AL. *v.* ADEL
WIGGINS GROUP ET AL.
(SC 19835)

Palmer, Eveleigh, McDonald, Espinosa and Robinson, Js.*

Syllabus

The plaintiff, the executrix of the estate of the decedent, sought to recover damages, pursuant to Connecticut's Product Liability Act (§ 52-572m et seq.) for, inter alia, the wrongful death of the decedent under theories of negligence and strict liability. The plaintiff alleged that the decedent was exposed during his employment with S Co. to an asbestos containing product manufactured by the defendant and that exposure contributed to his contraction of mesothelioma, a cancer that is caused by the inhalation of asbestos fibers. She further alleged that the defendant's actions in selling its product constituted violations of the act in that its product was unreasonably dangerous and that the defendant knew or should have known that its product was inherently dangerous and yet failed to use reasonable care by not testing the product to ascertain its danger or removing the product from the marketplace. At trial, one of the decedent's former coworkers testified that the defendant's product was subject to sanding and that the sanding process created visible dust to which the decedent would have been exposed. The plaintiff's expert witnesses testified about the history of the asbestos industry, asbestos related diseases, and how certain exposure to asbestos can cause mesothelioma. One expert, A, opined that a proximate cause of the decedent's mesothelioma was his exposure to the defendant's product at S Co. After the plaintiff rested her case, the trial court denied the defendant's motion for a directed verdict, concluding that the plaintiff had presented sufficient evidence to support her theories of liability. Thereafter, the jury returned a verdict for the plaintiff on her negligence and strict liability claims, and the trial court denied the defendant's motion to set aside the verdict and for judgment notwithstanding the verdict. From the judgment rendered in favor of the plaintiff, the defendant appealed. *Held* that the plaintiff failed to prove through expert testimony that respirable asbestos fibers in a quantity sufficient to cause mesothelioma were released from the defendant's product when it was used in the manner that it was at S Co. during the decedent's tenure there and, accordingly, she failed to prove her case: the defendant did not concede that its product, when sanded, emitted respirable asbestos fibers that the decedent could have inhaled, that was not a matter within the common knowledge of lay jurors, none of the plaintiff's witnesses had done any testing or examination of the defendant's product or a similar product to establish that such fibers are emitted when such a product is sanded, A did not possess any specialized knowledge about how adhesive products containing asbestos, such as the defendant's product, behave when they are utilized as the defendant's product was under the conditions at S Co., and, in light of these gaps in the evidentiary record, the trial court improperly denied the defendant's motion for a directed verdict and its motion to set aside the verdict and for judgment notwithstanding the verdict; moreover, the requirement of an expert witness to prove whether the defendant's product emitted respirable asbestos fibers when sanded, subject matter that was technical in nature and beyond the field of the ordinary knowledge of a lay juror, was required under well established law that existed at the time of trial and predated this court's recent product liability jurisprudence, *Bifolck v. Philip Morris, Inc.* (324 Conn. 402), and *Izzarelli v. R.J. Reynolds Tobacco Co.* (321 Conn. 172), and, therefore, the plaintiff was not entitled to a new trial.

Argued April 5—officially released November 7, 2017

Procedural History

Action to recover damages for personal injuries sustained as a result of an allegedly defective product

designed, manufactured or sold by the defendants, and for other relief, brought to the Superior Court in the judicial district of Fairfield, where the action was withdrawn as to the named defendant et al.; thereafter, the court, *Bellis, J.*, granted the motion for summary judgment filed by Raytheon Company et al.; subsequently, Marianne Bagley, executrix of the estate of Wayne Bagley, was substituted as the named plaintiff; thereafter, the case was tried to the jury before *Radcliffe, J.*; subsequently, the court, *Radcliffe, J.*, denied the motion of the defendant Wyeth Holdings Corporation for a directed verdict; verdict for the plaintiffs; thereafter, the court, *Radcliffe, J.*, denied the motion of the defendant Wyeth Holdings Corporation to set aside the verdict and for judgment notwithstanding the verdict, and rendered judgment in accordance with the verdict, from which the defendant Wyeth Holdings Corporation appealed. *Reversed; judgment directed.*

Katharine S. Perry, with whom were *James A. Hall* and, on the brief, *Mark O. Denehy* and *Michael T. McCormack*, for the appellant (defendant Wyeth Holdings Corporation).

Kenneth J. Bartschi, with whom were *Robert M. Shields, Jr.*, and, on the brief, *Christopher Meisenkothen*, for the appellee (plaintiffs).

Opinion

PALMER, J. The issue presented by this appeal is whether, in an action brought pursuant to Connecticut's Product Liability Act (act), General Statutes § 52-572m et seq., under strict liability and negligence theories, expert testimony was necessary to prove that a defective, asbestos containing product caused a worker who came in contact with that product to contract a fatal lung disease. The defendant¹ Wyeth Holdings Corporation appeals² from the judgment of the trial court rendered following a jury verdict in favor of the plaintiff Marianne Bagley.³ The jury awarded the plaintiff damages for the wrongful death of her husband, Wayne Bagley (decedent), and for loss of consortium after concluding that the decedent's death was caused by the defendant's negligence and by its sale of an unreasonably dangerous product to the decedent's former employer, Sikorsky Aircraft Corporation (Sikorsky).⁴ The defendant claims that the trial court improperly denied its motion for a directed verdict and its motion to set aside the verdict and for judgment notwithstanding the verdict because the plaintiff failed to prove both that the product at issue was unreasonably dangerous and that it was a legal cause of the decedent's fatal lung disease. We agree and, accordingly, reverse the judgment of the trial court.

The following facts, which the jury reasonably could have found, and procedural history are relevant to our disposition of this appeal. The decedent was employed at Sikorsky from 1979 until shortly before his death in 2012. For approximately ten months in 1979 and 1980, he worked as a manufacturing engineer in the composite blade manufacturing and development department (blade shop), where various helicopter blades were manufactured. The decedent's office was located on a mezzanine overlooking the area where the blade production took place. According to a coworker, however, the decedent often entered the production areas to assist in resolving the various issues that arose during the manufacturing process.

During the time that the decedent worked in the blade shop, the defendant manufactured and sold to Sikorsky an adhesive product known as FM-37.⁵ FM-37 was used in the blade shop to bind together interior components of helicopter blades. It was made of modified epoxy material, supplied in sheet form with strippable release paper, and contained 8.6 percent asbestos. In regular usage, FM-37, after application, was heated until it foamed and expanded. When it expanded onto areas of the blades where it was not supposed to be, it was removed with chisels or by sanding. Product information sheets that the defendant supplied for FM-37 did not indicate that it contained asbestos and further stated that the product could be sanded after curing.

The decedent was diagnosed with mesothelioma on or about August 10, 2011. Mesothelioma is a cancer occurring in the outer cells of the pleura, a membrane surrounding the lung. It is a “signature” or “sentinel” disease for asbestos exposure, meaning that such exposure is the only known cause. Mesothelioma is caused by the inhalation of asbestos fibers and typically takes decades to develop. There is a dose-response relationship between asbestos exposure and mesothelioma; in other words, the more exposure a person has, the greater is the likelihood that he or she will contract the disease.

In the course of the litigation of this case, the decedent acknowledged that he had been exposed to asbestos secondarily due to his father’s employment at a shipyard from 1958 through 1961, and directly during three separate home renovation projects in the 1960s and 1970s. Additionally, a workers’ compensation benefits application entered into evidence reveals that the decedent filed a claim for benefits indicating that he had been exposed to asbestos during his employment with the Torrington Company, prior to his employment at Sikorsky.

In the operative complaint, the plaintiff alleged that the decedent was exposed to asbestos containing products while working at Sikorsky and that the exposure had contributed to his contraction of mesothelioma. She alleged further that the defendant’s actions in selling such asbestos containing products constituted violations of the act in that (1) the products were unreasonably dangerous, that is, dangerous to an extent beyond that which the ordinary worker in the position of the decedent would have contemplated (strict liability claim),⁶ and (2) the defendant knew or should have known that the products were inherently dangerous, yet failed to use reasonable care by, inter alia, not testing or conducting research on the products to ascertain their dangers, or removing the products from the marketplace (negligence claim).⁷

The plaintiff presented the testimony of several witnesses at trial. Barry Castleman testified as an expert in public health and the history of the asbestos industry and asbestos related disease. Castleman explained that the dangers of asbestos to industrial workers began to be known as early as the late nineteenth century and that companies, including the defendant, were cognizant of the dangers of inhaling asbestos dust as early as the 1940s. In response to a hypothetical posed by the plaintiff’s counsel, Castleman opined that a company producing an adhesive product at approximately the time that the defendant produced FM-37 would have been aware that relatively low exposures to asbestos, which might occur from sanding, could cause mesothelioma, and that the company, having that knowledge, could have done air sampling under foreseeable condi-

tions of use to determine what level of exposure would be created. On cross-examination, Castleman acknowledged that he did not examine FM-37 and did not know what percentage of it was asbestos, what its other ingredients were or whether it contained any bonding agent. Castleman further acknowledged that he was unaware of any other case in which someone had developed mesothelioma as a result of exposure to a similar product.

Carl Ulsamer, a senior materials engineer at Sikorsky, testified as to the asbestos containing materials that were used in the blade shop at Sikorsky in 1979 and 1980. He identified FM-37, as well as two other adhesive products manufactured by another company. On cross-examination, Ulsamer named several other asbestos containing products that had been in use elsewhere at Sikorsky and agreed that, over the years, the company had used many asbestos containing components in manufacturing its helicopters.

Michael Petrucci, a coworker of the decedent who held a similar position in the blade shop in 1979 and 1980, testified that the two had adjacent desks in a mezzanine area overlooking the shop but would spend some of their time on the shop floor troubleshooting problems. Petrucci described the layout of the blade shop, which had various rooms, including one where various blades were cured and sanded during production. According to Petrucci, he and the decedent would have worked all over the blade shop on a daily basis, including in the sanding room, and workers in the sanding room also would move about the shop. Petrucci recalled the asbestos containing adhesives that Ulsamer had identified, and he confirmed that both FM-37 and an asbestos containing adhesive supplied by another manufacturer were subject to sanding. He testified that the sanding process created visible dust to which he and the decedent would have been exposed. The sanding room was equipped with a ventilation system that collected some of the dust. During Petrucci's time at Sikorsky, no one informed him that there was asbestos in the dust from FM-37.

Arnold Brody, a pathologist, testified in detail as to the process by which asbestos causes mesothelioma. Brody's presentation, however, was premised on the assumption that a person has been exposed to respirable asbestos fibers; he did not review any materials specific to the decedent's case. In short, he explained that mesothelioma can result when a person inhales tiny asbestos fibers that then make their way past the various defense mechanisms of the body and lodge deeply in the lungs. Brody spoke of animal experiments that he had conducted using dust from raw asbestos but confirmed, on cross-examination, that he had not experimented with asbestos containing products.

Finally, Jerrold L. Abraham, a pathologist and expert

in pulmonary pathology, occupational and environmental medicine, and asbestos related disease, reviewed the decedent's medical records, a pathology slide and other evidence in the case.⁸ He opined that the decedent had mesothelioma and that a proximate cause of that disease, among others, was the decedent's exposure to asbestos from FM-37 in the blade shop. Prior to rendering his opinion, Abraham explained to the jury the dose-response relationship between asbestos and mesothelioma, and how low levels of exposure to asbestos, above the ambient levels that may exist in the general environment, can contribute to causing that disease. He further explained the concept of fugitive exposure, whereby individuals may be exposed to asbestos when they are not working directly with an asbestos source but, rather, are in its general vicinity or have contact with other people who work with it, and how even such indirect exposure could cause mesothelioma.

In rendering his opinion on causation, Abraham responded to a hypothetical question from the plaintiff's counsel that presumed that the decedent had worked in the Sikorsky blade shop for ten months, was in and out of the sanding room periodically and was exposed to visible dust from the sanding of FM-37 both in that room and from contact with workers who sanded blades and then moved about the shop. The hypothetical further directed Abraham to assume that FM-37 contained 8.6 percent asbestos. Abraham responded that what counsel had articulated was "a very clear description of an exposure to asbestos being released from working with an asbestos containing material" and that the presence of dust indicated inadequate control. Abraham confirmed that counsel's hypothetical paralleled the facts of the case as they had been described by Petrucci, the testimony of whom Abraham had reviewed. He later opined that a product that was only 8.6 percent asbestos still would contain a large number of asbestos fibers. On cross-examination, however, Abraham agreed that, in preparing his opinion, he did not inspect FM-37 or speak with anyone at Sikorsky about the ventilation in the sanding room in 1979 and 1980.

After the plaintiff rested her case, the defendant moved for a directed verdict, arguing that the plaintiff had failed to establish a prima facie case for liability under the act. Specifically, the defendant argued that the plaintiff had failed to present any evidence of either a design defect in FM-37 or that asbestos dust from FM-37 had caused the decedent's injuries and death. According to the defendant, expert testimony was necessary to prove the dangerousness of FM-37 because it was a complex product for which an ordinary consumer could not form a safety expectation. As to causation, the defendant argued that there was insufficient evidence that the decedent had been exposed to dust in the sanding room, and, further, there was no expert

evidence that the dust contained asbestos fibers that were released from FM-37 at a level sufficient to cause mesothelioma. The trial court denied the defendant's motion for a directed verdict, reasoning that the plaintiff had presented sufficient evidence from which the jury could conclude that FM-37 was unreasonably dangerous and that the defendant had been negligent in failing to test it or in selling it, and that defect and negligence had proximately caused the decedent to contract mesothelioma.

Following the court's denial of its motion, the defendant rested its case without presenting any witnesses.⁹ The trial court charged the jury, instructing it as to general negligence principles and, in regard to the strict liability claim, as to the ordinary consumer expectation test. While the jury was deliberating, it sent a note to the court asking whether the dust or powder from FM-37 had ever been tested. The court responded that there was no evidence one way or the other on that topic. Thereafter, the jury returned a verdict in the plaintiff's favor on both her negligence and strict liability claims, as well as on her loss of consortium claim. It awarded total damages of \$804,777.

Subsequently, the defendant filed a motion to set aside the verdict and for judgment notwithstanding the verdict. As to the jury's finding of negligence, the defendant argued that there was no evidence that it was negligent in selling or in failing to test or conduct research on FM-37, which contained 8.6 percent asbestos encapsulated in resin and was not shown to be dangerous, or that its negligence had caused the decedent's illness and subsequent death. As to the jury's strict liability finding, the defendant contended that there was insufficient evidence that FM-37 was unreasonably dangerous and that a defect in that product had caused the decedent's illness and subsequent death. Regarding causation, the defendant argued that there was insufficient evidence that the decedent was in the sanding room or otherwise in the vicinity of FM-37 or its dust, and also no evidence that sanding FM-37 caused respirable asbestos fibers to be released from that product. The defendant contended that expert testimony was necessary for the plaintiff to prove both dangerousness and causation so as to prevail on either legal theory. The court denied the defendant's motion to set aside the verdict and for judgment notwithstanding the verdict, again concluding that the evidence presented was sufficient to support both theories of recovery. This appeal followed.

The defendant claims on appeal that the trial court improperly denied its motions for a directed verdict and to set aside the verdict and for judgment notwithstanding the verdict because the plaintiff failed to produce expert testimony establishing that FM-37 was a defective product. The defendant argues that such testi-

mony was necessary due to the specialized and technical nature of the product at issue and to prove, among other things, the product's dangerousness and the risks inherent in its use. In the defendant's view, the plaintiff's failure to produce expert testimony pertaining to FM-37 was fatal to both her strict liability claim and her negligence claim¹⁰ because each type of claim necessarily requires proof of an unreasonably dangerous product. The defendant claims additionally that the plaintiff failed to prove that asbestos released from FM-37 was the proximate cause of the decedent's mesothelioma because there was no direct evidence that he worked in the vicinity of FM-37 or any evidence that he was exposed to any asbestos released from that product.¹¹

The plaintiff, in response, maintains that expert testimony was unnecessary to prove the existence of a defective product, under either a strict liability theory or a negligence theory. As to strict liability, the plaintiff contends that FM-37 is not a complex product, and, therefore, the ordinary consumer expectation test, which does not require expert testimony and on which the jury was instructed, applies. Specifically, she claims, it is within the ken of ordinary jurors to understand that sanding a product creates dust, and, in the present case, the product at issue contained asbestos that, as the evidence introduced at trial established, is dangerous to inhale. In the plaintiff's view, "it is easy to see that sanding a product containing asbestos would create dust containing asbestos." In regard to negligence, the plaintiff claims that that cause of action may be proven by applying ordinary negligence principles and without a showing that a defendant's product is unreasonably dangerous as contemplated by the strict liability standard. Regarding causation, the plaintiff contends that there was ample circumstantial evidence that the decedent was exposed to dust from the sanding of FM-37 either directly or when it drifted throughout the blade shop, and, further, the expert testimony she introduced established that, when it comes to mesothelioma, there is no safe level of exposure to asbestos. In the plaintiff's view, because there is no safe level of exposure, the jury reasonably could infer that FM-37's 8.6 percent asbestos was a significant amount and, moreover, that dangerous levels of asbestos were present in the dust.

In its reply brief, the defendant contends that, regardless of what theory of liability is employed, the plaintiff failed to prove, as required by the act, that FM-37 was defective and that the defect caused the decedent to contract mesothelioma. Specifically, there was no evidence showing that respirable asbestos fibers could have been released from FM-37, given that there was no witness, lay or expert, who performed any testing, examination or analysis of that product. The defendant further maintains that, under either a strict liability or negligence theory, the plaintiff was required to show that FM-37 was unreasonably dangerous, and the plain-

tiff failed to do so.

We agree with the defendant that the plaintiff failed to prove that respirable asbestos fibers were released from FM-37 during sanding in the blade shop. Without such proof, there was insufficient evidence to show either that FM-37 was dangerous or that it was a legal cause of the decedent's mesothelioma. Because lack of proof on these matters was fatal both to the plaintiff's strict liability claim and to her negligence claim, the trial court improperly denied the defendant's motion for a directed verdict and its motion to set aside the verdict and for judgment notwithstanding the verdict.

We begin with the applicable standard of review and general governing principles. "The standards for appellate review of a directed verdict are well settled. Directed verdicts are not favored. . . . A trial court should direct a verdict only when a jury could not reasonably and legally have reached any other conclusion. . . . In reviewing the trial court's decision [to deny the defendant's motion for a directed verdict] we must consider the evidence in the light most favorable to the plaintiff. . . . Although it is the jury's right to draw logical deductions and make reasonable inferences from the facts proven . . . it may not resort to mere conjecture and speculation. . . . A directed verdict is justified if . . . the evidence is so weak that it would be proper for the court to set aside a verdict rendered for the other party." (Internal quotation marks omitted.) *Metropolitan Property & Casualty Ins. Co. v. Deere & Co.*, 302 Conn. 123, 150, 25 A.3d 571 (2011). The foregoing standard of review also governs the trial court's denial of the defendant's motion for judgment notwithstanding the verdict because that motion "is not a new motion, but [is] the renewal of [the previous] motion for a directed verdict." (Internal quotation marks omitted.) *Haynes v. Middletown*, 314 Conn. 303, 312, 101 A.3d 249 (2014). A directed verdict properly is rendered when expert testimony is necessary to prove a plaintiff's claim and the plaintiff has failed to produce such expert testimony. See, e.g., *Grody v. Tulin*, 170 Conn. 443, 451, 365 A.2d 1076 (1976); *Young v. Rutkin*, 79 Conn. App. 355, 363–64, 830 A.2d 340, cert. denied, 266 Conn. 920, 835 A.2d 60 (2003); *Vona v. Lerner*, 72 Conn. App. 179, 190–92, 804 A.2d 1018 (2002), cert. denied, 262 Conn. 938, 815 A.2d 138 (2003).

"Expert opinions concerning scientific, technical or other specialized knowledge may be necessary to assist the trier of fact in understanding the evidence or in determining a fact in issue. Conn. Code Evid. § 7-2." (Internal quotation marks omitted.) *State v. Buhl*, 321 Conn. 688, 700, 138 A.3d 868 (2016). Such testimony is required "when the question involved goes beyond the field of ordinary knowledge and experience of the trier of fact. . . . [Conversely] [t]he trier of fact need not close its eyes to matters of common knowledge solely

because the evidence includes no expert testimony on those matters.¹² . . . Whether expert testimony is required in a particular case is determined on a case-by-case basis and its necessity is dependent on whether the issues are of sufficient complexity to warrant the use of the testimony as assistance to the . . . [trier of fact].” (Citation omitted; footnote added; internal quotation marks omitted.) *Id.* The trial court’s determination as to whether expert testimony was necessary is a legal one subject to plenary review. See, e.g., *Doe v. Hartford Roman Catholic Diocesan Corp.*, 317 Conn. 357, 373, 119 A.3d 462 (2015).

After our careful review of the record, we conclude that the plaintiff’s case lacked essential expert testimony to prove a vital fact in support of her negligence and strict liability claims, namely, that respirable asbestos fibers in a quantity sufficient to cause mesothelioma were released from FM-37 when it was used in the manner that it was in the Sikorsky blade shop during the decedent’s tenure there. Proof of this fact was necessary to prove both that (1) FM-37 was dangerous, and (2) FM-37’s dangerous condition caused the decedent to develop mesothelioma. Although the plaintiff proved that breathing respirable asbestos fibers above ambient levels can cause mesothelioma, that FM-37 contained 8.6 percent asbestos and was sanded, producing dust, and that the decedent was exposed to that dust, both directly and secondarily, she nevertheless failed to establish that the dust from the FM-37 necessarily contained respirable asbestos fibers. Moreover, the question of whether respirable asbestos fibers are released by sanding a modified epoxy adhesive product with 8.6 percent asbestos, after it has been heated and cured, is a technical one whose answer is not within the common knowledge of lay jurors. Accordingly, competent expert testimony was necessary to assist them in answering it. Because the plaintiff did not present such testimony, the trial court should have granted the defendant’s motion for a directed verdict or its motion to set aside the verdict and for judgment notwithstanding the verdict.

This case is akin to *In re R.O.C.*, 131 S.W.3d 129, 131 (Tex. App. 2004), a product liability action in which the Court of Appeals of Texas upheld a trial court’s summary judgment in favor of the defendant manufacturers of asbestos containing paints and other coating substances. The plaintiffs, who had contracted asbestosis, claimed that respirable asbestos was released when the products were sprayed or when they were sanded or ground off of the surfaces to which they had been applied. *Id.* The plaintiffs testified that, when they worked with the products, there was grinding and scraping occurring all of the time, and that those activities produced a thick dust. *Id.*, 137. Because the plaintiffs failed to produce expert testimony that spraying, sanding or grinding the products at issue produced the

release of asbestos fibers that could cause asbestosis, however, the court concluded that they had failed to prove an exposure to asbestos that could have caused their injuries. *Id.*, 136–37. In short, in the absence of expert testimony, proof that there was dust did not equate to proof that the dust contained respirable asbestos fibers.

Similarly, in *DiSantis v. Abex Corp.*, Docket No. 87-0515, 1989 WL 150548, *1 (E.D. Pa. December 8, 1989), *aff'd*, 908 F.2d 961, 962 (3d Cir. 1990), a product liability action, the United States District Court for the Eastern District of Pennsylvania rendered summary judgment in favor of defendant suppliers of asbestos containing electrical equipment used in subway cars, because there was no evidence to support the plaintiff's claim of injury due to his occupational exposure to respirable asbestos fibers. The plaintiff, who had performed service and maintenance work on the subway cars, testified that he and others had cleaned the motors of the cars by blowing them out with an air hose, which caused a good deal of accumulated dust to float up around them. *Id.*, *6–7. The court concluded that this was insufficient to establish asbestos exposure, however, explaining that the “[p]laintiff’s testimony establishe[d] that his job did expose him to a lot of dust. But he has supplied no testimony which would establish [that] the dust he came in contact with contained asbestos.” *Id.*, *7; see also *Sterling v. P & H Mining Equipment, Inc.*, 113 A.3d 1277, 1281–83 (Pa. Super. 2015) (testimony of crane operator and his coworkers that operator worked in vicinity of cranes equipped with defendant’s asbestos containing brakes and wiring and saw dust emanating from crane’s wheels was insufficient to show that operator had inhaled dust containing asbestos).¹³

In contrast, in cases in which courts have found sufficient evidence of exposure to asbestos fibers causing an asbestos related disease, there has been, in addition to testimony that there was visible dust attendant to the use of a defendant’s product, expert testimony that the product, when used under conditions similar to those presented by the case, emitted respirable asbestos fibers. For example, in *John Crane, Inc. v. Puller*, 169 Md. App. 1, 17–19, 899 A.2d 879, cert. denied, 394 Md. 479, 906 A.2d 943 (2006), the Court of Appeals of Maryland concluded that there was sufficient evidence that the defendant’s asbestos containing gaskets and valve packing were a substantial, contributory factor in the development of the plaintiff’s mesothelioma. In addition to the plaintiff’s testimony that he had worked extensively around those products, which released substantial dust when used; *id.*, 11–13; and testimony from an industrial hygienist that a visible dust cloud from an asbestos product indicates a likely health hazard; *id.*, 14–15; there was expert testimony from (1) a doctor of engineering specializing in materials science who performed testing on asbestos gaskets and valve pack-

ing, along with air sampling, to measure the fiber release during operations described by the plaintiff, which revealed that significant amounts of asbestos fibers were released, and (2) an environmental scientist who found protruding fibers when examining the gaskets, demonstrated that fibers would be released if a gasket was tapped with a screwdriver, cut the gaskets and observed microscopically that fibers were released and simulated use of a gasket as the plaintiff described using it while testing the air, which then contained a large amount of asbestos fibers. *Id.*, 15–16. The court described this expert testimony as “[i]mportant links in the chain of evidence” *Id.*, 15.

In *Becker v. Baron Bros. Coliseum Auto Parts, Inc.*, 138 N.J. 145, 157, 649 A.2d 613 (1994), the plaintiff’s expert examined brake shoes manufactured by the defendant with specialized equipment and determined that they contained respirable asbestos fibers that potentially were capable of becoming airborne if disturbed. Although the defendant presented testimony to the contrary, the Supreme Court of New Jersey concluded that the conflicting evidence was sufficient to create a factual dispute for the jury to resolve whether dust emitted from the brake shoes could have caused the plaintiff’s mesothelioma. *Id.*, 158–59; see also *In re Tire Worker Asbestos Litigation*, Docket Nos. 88-4540, 88-4704, 88-4706, 88-4850, 88-4852, 88-7749, 1991 WL 195575, *3 and n.5, *5–6 (E.D. Pa. September 25, 1991) (report of expert in chemistry and environmental matters concluded that respirable asbestos fibers were released from defendant’s brake linings during normal operation and maintenance, which created triable issue of fact as to whether plaintiffs had inhaled such fibers, thereby precluding summary judgment for defendant).

In *Estate of Hicks v. Dana Companies, LLC*, 984 A.2d 943, 952 (Pa. Super. 2009), appeal denied, 610 Pa. 586, 19 A.3d 1051, 1052 (2011), the Superior Court of Pennsylvania, reviewing a decision of the Court of Common Pleas, concluded that there was sufficient evidence for a jury to find that the defendant’s asbestos containing gaskets and rope packing had caused plaintiff’s mesothelioma. The plaintiff testified that he had worked with and near those products throughout his career and that they had created dust; *id.*, 952–53; and a physician testified that asbestos fibers were unsafe and caused mesothelioma with no known safe threshold. See *id.*, 953–55. Although the plaintiff did not present expert evidence that the gaskets and packing emitted respirable asbestos fibers, the defendants’ experts, an industrial hygienist and a chemical engineer, had conceded that the products emitted some respirable asbestos fibers and that the defendants had begun to put warning labels on their products advising users against inhaling their dust as it could result in serious bodily harm. *Id.*, 956.

In the present case, the plaintiff adequately estab-

lished, through the testimony of Petrucci, that the decedent had been exposed to dust from the sanding of FM-37. Furthermore, she presented experts to assist the jury in understanding that: the inhalation of asbestos fibers is dangerous, and that this hazard has been known by manufacturers of industrial products, such as the defendant, for a very long time; the inhalation of asbestos fibers is, essentially, the only cause of mesothelioma, and the precise disease process is well understood; respirable asbestos fibers, once released into the air, can drift or be carried on an individual's clothing for some distance; and the decedent, who had worked with or near a number of asbestos containing products, including FM-37, during his lifetime, had contracted mesothelioma. An important link in the chain of causation, however, was missing: the plaintiff failed to prove that FM-37, when sanded, emitted respirable asbestos fibers that the decedent could have inhaled. Because the defendant did not concede this point and it is not a matter within the common knowledge of lay jurors, the plaintiff was required to prove it with competent expert testimony.¹⁴

As we previously noted, Abraham, one of the plaintiff's expert pathologists, in responding to a hypothetical question from the plaintiff's counsel concerning whether dust from sanding FM-37, which contained 8.6 percent asbestos, under the conditions about which Petrucci had testified, could have caused the decedent's mesothelioma, opined that Petrucci clearly had described an exposure to asbestos released from working with an asbestos containing material. Abraham's opinion, however, was not based on any evidence in the case. Specifically, none of the experts who testified, including Abraham, or any other witness, had done any testing or examination of FM-37 or a similar product to establish that respirable asbestos fibers are emitted when the product is sanded.¹⁵ Moreover, there is no indication in the record that Abraham possesses any specialized knowledge, from his familiarity with published studies or research or otherwise, about how modified epoxy adhesives containing asbestos behave when they are utilized as they were under the conditions in Sikorsky's blade shop.¹⁶ Cf., e.g., *Caruolo v. John Crane, Inc.*, 226 F.3d 46, 52-54 (2d Cir. 2000) (jury, in finding that asbestos fibers released from defendant's pipe packing and gaskets caused worker to contract mesothelioma, properly could have relied on testimony of expert witness that visible dust from products indicated asbestos exposure, given that witness also testified about his familiarity with study measuring fiber release when asbestos containing pipe packing and gaskets are removed); *Vedros v. Northrop Grumman Shipbuilding, Inc.*, Docket No. 11-1198, 2015 WL 3916248, *3-4, *6 (E.D. La. June 25, 2015) (court found no reason to exclude industrial hygienist's expert testimony regarding fiber release from defendant's adhesive product

when hygienist, who testified that he had examined “‘tens of thousands’” of asbestos products throughout his career, relied on, inter alia, published study by United States Environmental Protection Agency measuring fiber release from similar product); *In re Asbestos Litigation*, Docket No. 05C-11-257 (ASB), 2009 WL 1034487, *6 (Del. Super. April 8, 2009) (in opining that friction brakes released respirable asbestos fibers during installation and removal, expert witness properly relied on research of other expert witnesses, his own research, agency reports and peer-reviewed scientific data), *aff’d*, 981 A.2d 531 (Del. 2009); *In re New York City Asbestos Litigation*, 148 App. Div. 3d 233, 238, 48 N.Y.S.3d 365 (2017) (expert testimony that visible dust contains hazardous levels of asbestos must reference studies or reports measuring fibers released by products at issue). In light of these gaps in the evidentiary record, the jury could not have relied on Abraham’s conclusory testimony to find that the decedent had been exposed to respirable asbestos fibers from FM-37.

As a final matter, we must address the question of whether our holding in this appeal is compelled by the law as it existed in Connecticut when the case was tried or, rather, whether it stems from principles newly articulated in this court’s recent product liability jurisprudence, namely, our decisions in *Bifolck v. Philip Morris, Inc.*, 324 Conn. 402, 152 A.3d 1183 (2016), and *Izzarelli v. R.J. Reynolds Tobacco Co.*, 321 Conn. 172, 136 A.3d 1232 (2016), both of which were decided while this appeal was pending and, to some degree, concern the question of when expert testimony is necessary in a product liability action. The plaintiff contends that, if a reversal of the judgment is a result of our reliance on newly articulated standards, she is entitled to a new trial so that she may have the opportunity to prove her case under those standards. We conclude that the requirement of an expert witness on the issue of whether FM-37 emitted respirable asbestos fibers when sanded was required under the law predating *Bifolck* and *Izzarelli* and, therefore, that the plaintiff is not entitled to a new trial.

First, as to the plaintiff’s strict liability claim, it was well established law at the time of trial that the plaintiff was required to prove, inter alia, that the product at issue “was in a defective condition unreasonably dangerous to the consumer or user” and that the product’s “defect caused the injury for which compensation was sought” (Internal quotation marks omitted.) *Potter v. Chicago Pneumatic Tool Co.*, 241 Conn. 199, 214, 694 A.2d 1319 (1997). Additionally, a plaintiff could prove the unreasonably dangerous requirement, as the plaintiff in this case attempted to do, by showing that the product was “dangerous to an extent beyond that which would be contemplated by the ordinary consumer who purchases it, with the ordinary knowledge common to the community as to its characteristics.”¹⁷

(Internal quotation marks omitted.) *Id.*, 214–15. The plaintiff was required to show, therefore, that FM-37 was dangerous because it emitted respirable asbestos fibers when sanded and that FM-37’s emission of respirable asbestos fibers caused the decedent to contract mesothelioma. As we explain, the plaintiff failed to do so.

With respect to the plaintiff’s negligence claim, pursuant to black letter principles, the plaintiff bore the burden of proving that the defendant’s failure to test or conduct research on FM-37 or to remove it from the marketplace was unreasonable and was a legal cause of the decedent’s mesothelioma. See, e.g., *Murdock v. Croughwell*, 268 Conn. 559, 566, 848 A.2d 363 (2004) (identifying essential elements of negligence action). The plaintiff could not do this without showing that, had the defendant performed testing or research, it would have learned that sanding FM-37 emitted respirable asbestos fibers; otherwise, the defendant’s lack of testing or research would be of no consequence. Similarly, the jury could not find that a failure to remove FM-37 from the marketplace was unreasonable and that it caused the decedent to develop mesothelioma unless the plaintiff proved that, under ordinary use, FM-37 would emit dangerous, respirable asbestos fibers. See, e.g., *Johnson v. Newell*, 160 Conn. 269, 273–74, 278 A.2d 776 (1971) (to recover in negligence action for selling dangerous and defective tire without having properly inspected it, plaintiff was required “to have proved a defect in the condition of the tire”).

In sum, proof that FM-37 emitted respirable asbestos fibers was essential for the plaintiff to prevail on either of her theories of recovery under well established law that existed at the time of trial. Such proof required the assistance of an expert because the subject matter was technical in nature and beyond the field of ordinary knowledge of a lay juror. Because the plaintiff did not produce an expert, she failed to prove her case.

The judgment is reversed and the case is remanded with direction to grant the defendant’s motion to set aside the verdict and for judgment notwithstanding the verdict.

In this opinion the other justices concurred.

* This case originally was scheduled to be argued before a panel of this court consisting of Justices Palmer, Eveleigh, McDonald, Espinosa and Robinson. Although Justice Espinosa was not present when the case was argued before the court, she has read the briefs and appendices, and listened to a recording of the oral argument prior to participating in this decision.

The listing of justices reflects their seniority status on this court as of the date of oral argument.

¹ This action was commenced in 2012 and originally named more than fifty defendants. By the time of trial, however, Wyeth Holdings Corporation was the sole remaining defendant and it is the only defendant who remains a party to this appeal. All references herein to the defendant are to Wyeth Holdings Corporation.

² The defendant appealed to the Appellate Court, and we transferred the appeal to this court pursuant to General Statutes § 51-199 (c) and Practice Book § 65-1.

³ The action originally was brought by both Wayne Bagley, to recover for his personal injuries, and Marianne Bagley, to recover for loss of consortium. After Wayne Bagley died, Marianne Bagley, in her capacity as executrix of Wayne Bagley's estate, was substituted as plaintiff as to the claims alleged by him. See General Statutes § 52-555. For simplicity, we refer to Marianne Bagley as the plaintiff both in her individual capacity and in her capacity as Wayne Bagley's executrix.

⁴ Sikorsky was permitted to intervene as a plaintiff in this matter but did not participate in the trial proceedings and is not a party to this appeal.

⁵ More accurately, FM-37 was manufactured by American Cyanamid Corporation. The defendant is a successor corporation to that entity.

⁶ The plaintiff also raised a strict liability claim based on the defendant's alleged failure to warn adequately of the dangerousness of FM-37. See General Statutes § 52-572q. In response to interrogatories, however, the jury found that, although the defendant failed to provide adequate warnings or instructions concerning FM-37, the lack of such warnings did not cause the decedent to contract mesothelioma. The plaintiff has not challenged this finding on appeal.

⁷ The plaintiff also claimed that the defendant was negligent in failing to ensure that FM-37 carried adequate warnings. In light of the jury's adverse findings on the plaintiff's strict liability failure to warn claim, it is apparent that the plaintiff necessarily did not prevail on her negligent failure to warn claim. See footnote 6 of this opinion. In any event, this claim is not an issue in this appeal.

⁸ The record contains a packet of materials provided to Abraham in January, 2012. Those materials include a pathology report and slide, medical records and the decedent's answers to interrogatories, which describe, in relevant part, his occupational history. They do not include any materials or other information pertaining to FM-37 or any testing or analysis thereof.

⁹ The defendant did publish certain exhibits to the jury. They consisted of medical records containing notes that indicated that the decedent had told medical providers that he had not been exposed directly to asbestos.

¹⁰ The plaintiff contends that the defendant failed to preserve its claim that, in order to prove negligence, she needed to show that FM-37 was unreasonably dangerous. In its motion for a directed verdict, the defendant argued generally that expert testimony was necessary to prove product dangerousness and causation as required by the act. At that point in the proceedings, the defendant disputed the viability of a separate cause of action for negligence, contending instead that, under the act, all claims are merged into a single, statutory product liability cause of action. The trial court rejected that claim, however, and the defendant, in its subsequent motion to set aside the verdict and for judgment notwithstanding the verdict, then argued that the evidence was insufficient to support either theory of recovery, specifically that, as to each theory, the plaintiff had failed to prove both product dangerousness and causation. Under the circumstances, we disagree that the defendant has waived its claim as it pertains to negligence or that the plaintiff has been subject to an ambush.

¹¹ The defendant also claims that the plaintiff improperly was permitted to prevail on a "no-threshold" or "single fiber" theory of causation that is contrary to Connecticut's law governing proximate cause. Because we agree with the defendant's other arguments, which are dispositive of the appeal, we need not reach this claim.

¹² "Common knowledge is limited, however, to those well substantiated facts that are obvious to the general community." *State v. Padua*, 273 Conn. 138, 193, 869 A.2d 192 (2005) (*Katz, J.*, dissenting and concurring). Common knowledge is defined as a "fact that is so widely known that a court may accept it as true without proof." Black's Law Dictionary (10th Ed. 2014) p. 334. In contrast, a matter is not common knowledge if it "involves obscure and abstruse . . . factors such that the ordinary layman cannot reasonably possess well-founded knowledge of the matter and could only indulge in speculation in making a finding . . ." (Emphasis omitted; internal quotation marks omitted.) *State v. Padua*, supra, 200 (*Katz, J.*, dissenting and concurring).

¹³ But see *John Crane, Inc. v. Linkus*, 190 Md. App. 217, 225–26, 241, 988 A.2d 511 (2010) (holding, in case in which evidence showed that claimant was directly exposed for seven years to large amounts of dust from defendant's dry rope and wicking products that contained 60 to 90 percent unencapsulated asbestos, that expert testimony was not necessary to prove release of respirable asbestos fibers).

¹⁴ A recent federal product liability case is particularly illustrative, given

the type of product at issue in the present case. In *Dugas v. 3M Co.*, Docket No. 3:14-cv-1096-J-39JBT, 2016 WL 3965953, *1–3 (M.D. Fla. June 22, 2016), the plaintiff alleged that the decedent had contracted mesothelioma due to his exposure to asbestos from the defendant’s epoxy adhesive, which was used in the repair of naval aircraft. The decedent had testified that, after the product was applied and had dried, he would sand and file it, creating a dusty environment. *Id.*, *3. The defendant moved for summary judgment, contending that there was no evidence the decedent had inhaled asbestos fibers released from the adhesive. *Id.*, *6. The United States District Court for the Middle District of Florida denied the defendant’s motion in light of the fact that, one day earlier, it had ruled, over the defendant’s objections, that certain expert testimony proffered by the plaintiff on the contested issue was admissible. *Id.* The court allowed, however, that prior to the admissibility ruling, the defendant’s position was “understandable.” *Id.*

The court’s published ruling on the admissibility of the expert’s opinion provides an example of the type of evidence that the plaintiff in the present case might have introduced. See *Dugas v. 3M Co.*, Docket No. 3:14-cv-1096-J-39JBT, 2016 WL 3946802 (M.D. Fla. June 21, 2016). Specifically, the plaintiff’s expert conducted experiments in which he attempted to recreate the product and to test it under work practices similar to those utilized by the decedent in that case. *Id.*, *3. The ruling also makes reference to a study conducted by the manufacturer of the product contemporaneous with its use that demonstrated the different amounts of asbestos fibers that were released when it was sanded, with and without local exhaust. *Id.*, *4 and n.4.

The arguments advanced in that ruling suggest that fiber release may be affected by the composition of the product, the temperature at which it is cured, the grit of the sandpaper used and the speed of the sander. *Id.*, *3–6. This further illustrates the need for evidence of fiber release that is directed at a particular product or class of similar products. See *Borg-Warner Corp. v. Flores*, 232 S.W.3d 765, 773 (Tex. 2007) (requiring defendant-specific evidence of asbestos exposure, recognizing that proof of causation can differ across products depending on whether asbestos is embedded or friable and noting that “all asbestos products cannot be lumped together in determining their dangerousness” [internal quotation marks omitted]); see also *Marshall v. Celotex Corp.*, 651 F. Supp. 389, 393 (E.D. Mich. 1987) (The court refused to adopt the market share theory of liability, which was developed for fungible products, because “[a]sbestos products . . . have widely divergent toxicities, with some asbestos products presenting a much greater risk of harm than others. . . . This divergence is caused by a combination of factors, including: the specific type of asbestos fiber incorporated into the product; the physical properties of the product itself; [and] the percentage of asbestos used in the product.” [Internal quotation marks omitted.]).

¹⁵ “Under the rules of evidence, [a]n expert may testify in the form of an opinion and give reasons therefor, provided sufficient facts are shown as the foundation for the expert’s opinion. Conn. Code Evid. § 7-4 (a). An expert may have personal knowledge of the underlying facts or may obtain the requisite information by attending the trial and hearing the factual testimony. C. Tait, *Connecticut Evidence* [(4th Ed. 2008)] § 7.91, p. [429]. . . . Finally, an expert may obtain information at trial by having factual testimony summarized in the form of a hypothetical question at trial. *Id.*; Conn. Code Evid. § 7-4 (c).” (Citations omitted; internal quotation marks omitted.) *Viera v. Cohen*, 283 Conn. 412, 444, 927 A.2d 843 (2007). It is established, however, that, “on direct examination, the stated assumptions on which a hypothetical question is based must be the essential facts established by the evidence.” (Internal quotation marks omitted.) *Id.*, 449; see *Graybill v. Plant*, 138 Conn. 397, 403, 85 A.2d 238 (1951); see also Conn. Code Evid. § 7-4 (c) (1) (“[a]n expert may give an opinion in response to a hypothetical question provided that the hypothetical question . . . presents the facts in such a manner that they bear a true and fair relationship . . . to the evidence in the case”).

¹⁶ In February, 2012, prior to trial, Abraham authored a brief report after receiving case specific materials from the plaintiff’s counsel. Those materials did not include any information pertaining to FM-37 or testing thereon. See footnote 8 of this opinion. A cover letter accompanying the materials stated that the decedent had been exposed to various asbestos containing products while working at Sikorsky, and prefatory language in Abraham’s report indicates that he relied on that assumption in arriving at his conclusions. The report then describes Abraham’s interpretation of the pathology material and sets forth Abraham’s opinion that the decedent has mesothelioma and that, because mesothelioma is caused by asbestos and the decedent was exposed to asbestos, the cause of his mesothelioma was the asbestos

exposure.

¹⁷ In *Izzarelli v. R.J. Reynolds Tobacco Co.*, supra, 321 Conn. 172, we clarified that the range of cases in which the consumer expectation test, employed in the present case, would be appropriate is narrow, and that a risk-benefit test, which requires consideration of additional factors, is our primary test for claims of design defects. See *id.*, 202–203; see also *Bifolck v. Philip Morris, Inc.*, supra, 324 Conn. 415–16; *id.*, 432 (renaming tests).
