Radiation Litigation and the Practicing Health Physicist

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Abstract

This article presents a basic outline of the legal elements of proof of a case involving exposure to radiation. It raises issues regarding the standard of care to which a practicing health physicist must adhere in order for his or her employer to avoid liability for “overexposure” of radiation workers. Finally, the article outlines the methods of proving the dose received by a plaintiff and the need for accessible documentation to use in making that proof.

A list of specific cases and of other published material related to this subject has been placed at the end of this article for the convenience of the reader.

Key Words

Database Management
Dosimetry
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Radiation Monitoring
Radiation Workers
Records

INTRODUCTION

Radiation litigation, as used in this article, refers to those lawsuits or workers’ compensation claims filed by individuals who claim to have been injured by some past exposure to ionizing radiation. They are a new breed of personal injury claims and the law is presently struggling with whether these cases can be resolved using the traditional methods of legal analysis or whether new forms of analysis, such as probability of causation, need to be applied. It will be years, or perhaps decades, before this debate will be settled, and it will be resolved through the actual trial of many cases. Consequently, we are still at the beginning of a very dynamic process. There are no absolute certain rules concerning how these particular claims will be tried and analyzed.

Nevertheless, there is a continued and growing pressure to try many radiation cases. The United States and the nuclear industry are presently defending against thousands of plaintiffs who have filed such cases. While not all of these cases will actually be tried on the merits, at least some will. Health physics, specifically personnel dosimetry, will play a very important part in many of those trials.

THE FOUR ELEMENTS OF A NEGLIGENCE LAWSUIT

In a normal personal injury or tort lawsuit the plaintiff cannot recover unless he proves all of four elements: duty, breach of duty, proximate causation and damages. Duty refers to that stand-
ard of conduct the defendant owed to the plaintiff. For example, as drivers we all owe a duty to others that we will obey traffic laws. Breach of duty describes the defendant's failure to abide by his duty. If a driver goes through a red light and smashes into another car, the driver has breached his duty to stop at red lights. Damages are the injury suffered by the plaintiff. In our example, it would include property damage to his automobile and perhaps personal injury to the plaintiff or his passengers. Proximate causation is the connection between the duty and the injury which the law will recognize.

Not all instances of “strict scientific or logical causation” will be recognized by the law. For example, if the speaker at a conference runs overtime, he has violated a “duty” he owed to the audience. If one member of the audience is driving through an intersection five minutes later than he would have been but for the long-winded speaker and happens to be hit by a drunk driver, it is true that but for the speaker’s breached “duty” this particular drunk driver would not have hit this particular member of the audience, but the law will not recognize such a scientific or logical causation as proximate causation. That is why the law adds the term proximate to the word causation, to indicate that the law will not hold us liable for all possible consequences that may eventually occur because of our action. Scientists who are used to speaking about “causation” based upon a hypothesis of risk at low dose and epidemiological numbers are speaking about a different kind of causation than the law traditionally has recognized. How these two different concepts of causation will be used in radiation litigation remains to be seen.

DOSE AND DUTY

What duty does the practicing health physicist owe to the worker under his care? Is his legal duty satisfied if he keeps the worker’s dose under the numerical standards (5 or 12 rem per year)? Can he be guilty of breaching a tort duty to a worker if he allows an exposure which violated ALARA but yet remains well under 5 rem in a year? Does he owe a duty of zero exposure such that any exposure at all is a breach of duty? These questions are unresolved. At least one judge has commented privately that the duty owed is a zero dose, and at least one expert witness has testified in court that an exposure of 3 mrem is negligence for which damages can be collected if the exposure could have been kept to 2 mrem with shielding. Unless a court understands what that “extra” dose of 1 mrem really means, the court cannot decide whether it was negligent behavior to allow that extra dose. Moreover, this is the kind of legal issue which cannot be resolved in the abstract but must be addressed within the context of specific cases.

Regardless of whether the duty owed is the numerical standard or ALARA, the exact dose which a particular plaintiff received is essential information needed to determine whether or not the duty owed was, in fact, breached. Consequently, the dose question will play a very central role in litigating radiation cases within the context of a negligence lawsuit or in litigating the merits of a worker’s compensation claim.
DOSE AND PROXIMATE CAUSATION

If a particular court determines that the duty owed was to keep doses below 5 rem per year and that a particular plaintiff, who now has chronic lymphatic leukemia (CLL), received a dose of 200 rem on one day three years prior to his diagnosis of CLL, there is obvious negligence in relationship to the duty owed, but is there "scientific" causation or proximate causation since CLL is not radiogenic? What if the facts were all the same except that the plaintiff has myeloid (bone marrow) leukemia which is radiogenic? Does proximate causation exist? What if the plaintiff has myeloid leukemia but only received a dose of 5.5 rem? Is there proximate causation even though no radiogenic leukemias have ever been seen in epidemiological studies of adults at this dose level? These examples show us that the exact dose is important for the causation issue as well as for the negligence issue. If the plaintiff suffers from a radiogenic cancer which appeared after the appropriate latency period, then the dose of radiation becomes even more important in determining whether or not causation exists. Consequently, the more confidence we can have in our dose estimates, the more confidence we can have in our causation opinion.

DOSE IN A STRICT LIABILITY LAWSUIT

The previous discussion has been about a negligence lawsuit. This is the only type of lawsuit allowed against the United States, which cannot be held liable without a showing of negligence by a federal employee. That is not true for a private defendant or for a contractor with the United States. Such entities are more likely to be sued in strict liability rather than in negligence. In a strict liability lawsuit the plaintiff only needs to prove causation and injury. In other words, under strict liability no matter how careful the defendant is, he can still be held liable if his non-negligent actions harmed someone. This rule of strict liability will apply if the plaintiff proves that the defendant was engaged in an ultrahazardous activity. Consequently, while the plaintiff need no longer prove duty and breach of duty he must in- stead prove ultrahazardous activity. But what is an ultrahazardous activity? Basically it is something that carries a very large risk of serious harm which cannot be eliminated. Traditional ultrahazardous activities according to the law include: high power electric lines, dams, bridges, and pet lions. The law simply assumes that any use of ionizing radiation is an ultrahazardous activity, especially nuclear weapons and nuclear power plants. This assumption may ultimately be challenged in court, but it will be a difficult battle. For now it would be safe to assume that if the defendant is the United States then the case will proceed as a negligence case but if the defendant is not the United States the case will proceed as a strict liability case. This means that it will be easier for a plaintiff to win a case against a private company or contractor than against the United States since he can win without proving negligence.

WORKERS’ COMPENSATION CLAIMS

The U.S. nuclear workforce includes hundreds of thousands of individuals. As they age, about 30% will develop some form of cancer. No one knows how many will file claims for workers’ compensation in the belief that their past exposure caused their cancer. If ultimately only 1% of these nuclear workers file claims for workers’ compensation there will still be hundreds of such cases.

A workers’ compensation claim is different than a tort lawsuit. The worker need only prove “work connectedness” not duty or breach of duty. In some states the worker must prove by the preponderance of the evidence that his disease was caused by his employment. In other states he need only produce “substantial evidence” that such a connection exists. Most states have expanded traditional workers’ compensation laws to also cover occupational diseases such as “black lung” in coal mines. It remains to be seen whether cancer will be considered an occupational disease for radiation workers, since there is no good evidence that radiation workers have excess cancers and since cancer is common in the general population.
EXTERNAL VS. INTERNAL DOSE

The dose issue has many subparts. Dose as it relates to duty is not the same as dose as it relates to proximate causation. One single dose may violate the duty but may not prove causation. Moreover, both external dose and internal dose have their separate roles to play. It is important to realize that they are different. If the plaintiff has cancer of the paranasal sinuses and he rests his causation argument on a whole body dose of 8 rem in one year, he has totally missed the point. Likewise, the defendant who faces such a case and who rests his defense on film badge readings has equally made a mistake. In such a case both sides should look for a significant internal dose from radium because of the experience of the radium dial painters. Both breach of duty and proximate causation should focus on internal dose not external dose. An external whole body dose sufficiently high to cause cancer of the paranasal sinuses would probably exceed the mean lethal dose by many times!

There is an even further refinement. Too often persons think of dose as the dosimeter badge reading simply because that is perhaps the most common dose measurement made in the entire nuclear industry. However, if a person claims to have a cancer the real question should be: What dose was effectively received by the site of the primary cancer? In other words, the real dose of concern should be the organ dose. This means that we must understand not only the mrem reading on the chest film or TLD badge but also the geometry of the work environment, the field type, and the source term so that we can account for body shielding and other things. Consequently, if the only records available are the dosimeter badge records, there may be inadequate information to accurately determine the organ dose.

PROVING THE ORGAN DOSE

As an example, let us say that a plaintiff has bone cancer diagnosed 20 years after an exposure. What we need to know next is the organ dose: in this case, the dose which was received by the bone from external gamma or x-rays, and from internal-deposited radionuclides such as radium or Strontium-90. How much Iodine-131 passed through this particular person’s body is immaterial to this case.

Measurement vs. Reconstruction

There are two different foundations for the ultimate organ dose estimate, upon which so much depends. The first and best foundation is an actual contemporaneous measurement. The second and lesser foundation is a hypothetical reconstruction of the dose. Any judge or jury is likely to place much more faith in a contemporaneous measurement than a reconstruction by some hired expert which is performed twenty years after the fact for a lawyer who is either defending or prosecuting a particular lawsuit. Accurate contemporaneous measurements are extremely important but since a case often is not filed until ten to twenty years after the exposure, a measurement is ultimately of little help unless it is both recorded and retrievable.

Plaintiff’s Reconstruction vs. Defendant’s Reconstruction

If no actual measurement exists then both sides need to reconstruct the essential organ dose. However, what will be the data relied upon for this reconstruction? Whatever starting assumptions are chosen can greatly affect the outcome. Likewise, certain assumptions must be made during the process, such as the uptake in the gut, which can drastically affect the ultimate result. Such calculations are likely to be Greek to any judge or jury who tries to follow them, so how in the world can they choose between two very different reconstructions when they can not understand either? If the judge and jury cannot rely upon their own ability to find the true facts, are they then left with resolving the case on pure emotion? While it would be nice if every radiation case were decided by a jury of certified health physicists, that is not going to happen. Thus, we cannot always expect the legal system to decide issues of obscure scientific knowledge in a way that will make scientific sense.
LIMITATIONS OF AVAILABLE DATA

We have seen that dose is always an important issue in radiation litigation whether in the context of duty and breach of duty, or proximate causation. We have also seen that the most desirable information is a measured organ dose rather than a reconstructed whole body dose. Now that a number of radiation cases have been tried in the courts, let us ask what are some of the identifiable limitations so that improvements can be made.

The first point to realize is that most cases will involve exposure from ten to twenty years ago. It is likely that all of the actual measurements made at that time were not recorded and that only part of those which were recorded can now be found. Any system of records which improves the retrieval of such old data will be a very positive contribution to radiation litigation.

A second point is that technicians often view their jobs as protecting the employee from high exposures. Consequently, they will survey the environment at the start of the workday and make no record of these measurements if they are insignificant. Twenty years later the plaintiff's expert witness assumes the presence of a high field or source while the employer has no recorded measurements to disprove this assumption. While that case could have been one of a contemporaneous measurement vs. a partisan reconstruction, it is now a much weaker case of a partisan reconstruction vs. a partisan reconstruction. Psychologically, a great advantage has been needlessly lost.

Third, there is sometimes a practice of not badging people who are expected to get only an insignificant dose, if any. While this saves money in the short-term it can be costly in the long-term. A zero dose measurement may well be extremely valuable someday in the courtroom. Film or TLD badges should be used with liberality.

A fourth related problem often turns out to be an absence of urine samples, fecal samples, and whole body counts. These are more costly and inconvenient than dosimeter badges, and consequently most likely not used unless there first is evidence of an internal contamination. Most health physicists have been trained to only use these tests to identify and quantify an already identified internal dose. They are not trained to think that such tests are valuable in disproving any internal dose at all. Yet, just as with dosimeter badges, a contemporaneous test which shows a zero dose may be extremely valuable in the courtroom fifteen years from now, long after anyone complained about the additional cost of such tests. The health physicist must realize that while he has a duty to protect the employee from excessive radiation, he has an equal duty to record as many facts as possible to protect the employer from meritless lawsuits.

Fifth, there is often an absence of baseline whole body counts. If an employer were going to have a workforce working in an environment where they could receive internal contamination it would be a good idea to require a pre-employment whole body count to show how much radioactivity the person had inside his body before he ever started working at the facility. Otherwise, any counts at all, or any counts above some arbitrary average number, may well be seen by a jury as evidence of harmful internal contamination received at the defendant's plant. A baseline reading with periodic follow-ups could go a long way toward proving the correct facts in a way which a jury can understand. Once there is an allegation of internal contamination supported by an expert's opinion testimony, there is no longer any chance to go back and disprove this with a pre-employment whole body count if such a count was not taken years ago. Although cost certainly is a factor, more common use of any technical procedure can often reduce the cost significantly.

Sixth, the health physicist on duty needs to be aware not only of the type of field and the source term, but also of the particular radionuclides in the work environment in the form of surface and airborne contamination. A recording of what is there and what is not there and in what amounts, can become extremely useful many years later when an expert witness is claiming that a large amount of a certain radionuclide in the environment found its way into the plaintiff's body to start the cancer and
then decayed away so that it is not present on a whole body count today. If the case must be argued on one expert’s reconstruction vs. another expert’s reconstruction, any contemporaneous measurements or records which can form the starting point for such a reconstruction are invaluable. They may also be able to prove the absurdity of many of the assumptions made by one of the expert witness.

Seventh, jobs which result in doses are not unique. In other words, the plaintiff claims that he was exposed excessively while doing a certain job. However, many other people might have been in that same room at the same time or most likely many other people performed exactly the same task at other times. One way to “prove” the plaintiff’s dose would be to show the doses of all these people. Logic tells us, and a jury, that the plaintiff’s dose should be similar to all the others. But how can such a comparison be made twenty years after the fact? Not only must many records be made but it would be helpful if they could be cross-indexed so that doses could be retrieved by the type of work performed as well as by the individual’s name.

**CONCLUSION**

Radiation lawsuits and workers’ compensation claims are facts of modern life to which the practicing health physicist must respond. The health physicist of yesterday could be satisfied with his job performance if he kept his worker’s exposures below the numerical guidelines. That is no longer true. The health physicist of today must realize that an important part of his job is to preserve important data concerning the radiological environment in which his workers perform their tasks. This new duty is owed to the employer and to the employee. Regardless of which “side” a health physicist might be induced to take in a later lawsuit, his professional responsibility includes preserving as much important evidence as reasonable for both sides to use in the courtroom.

While many health physicists may see this as an unfair burden, they will be much more unhappy if meritless cases are won due to the lack of factual data, or if cases of merit are lost because the plaintiff could not prove his actual dose. Until such time as there is evidence that employees will not file lawsuits for alleged radiation harm, the practicing health physicist should expand the traditional concept of his professional responsibility.
RELATING SOURCES

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*These citations are written in the standard legal format. The cases may be obtained at any law library.

**These unreported opinions are available from Ellen Kittredge Scott, Esq., Pepper, Hamilton & Schetelz, 3000 Two Logan Square, 18th and Arch Streets, Philadelphia, PA 19103.
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