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Impact Trauma as Legal Cause of Cancer

Donald J. Ladanyi

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CONSIDER THE FOLLOWING HYPOTHETICAL SITUATION: A voluptuous blonde is window shopping along New York's fashionable Fifth Avenue. Her trek brings her to a corner street intersection which she begins to cross. A recklessly driven automobile careens around the corner and strikes the defenseless blonde pedestrian amidships, causing her to be hurled against a utility pole. Her breast strikes the pole and absorbs the full effect of the impact. A local hospital determines that her injuries consist of only a black and blue bruise spot on her breast. The swelling, due to the injury, subsides and the discoloration disappears within a short time. Two months later a routine breast examination reveals a lump within the breast in exactly the same location as the trauma. The examiner suggests that she enlist the aid of a physician. An operation is performed. A malignant, nonmetastasized mass is excised. The operation terminates with a radical mastectomy.

The Issue

Was the impact trauma the cause of the cancer? According to the medical profession, there is no experimental proof that a single trauma may cause cancer.[1] That the cause of cancer is unknown is repeatedly asserted in reported cancer cases.[2] However, lawsuits deal not with the question of medical cause but rather with the question of legal causation. Legal, rather than medical, questions must be dealt with in order to determine causation.

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[1] Brooke, In the Wake of Trauma 359, 420 (1957); Curran, Law & Medicine 77 (1960); Crane, The Relationship of a Single Act of Trauma to Subsequent Malignancy—Uncomplicated Trauma and Cancer, in Moritz and Helberg, Trauma and Disease 147 (1959); Curphy, Trauma and Tumours, 1 J. For. Sci. 27, 28 (1956).

[2] *Recovery allowed*: Atlantic Coast Line R. R. v. Thompson, 211 F. 889 (4th Cir. 1914); Hagy v. Allied Chem. & Dye Corp., 122 Cal. App. 2d 361, 265 P. 2d 86 (1953); Lee v. Blessing, 131 Conn. 569, 41 A. 2d 337 (1945); Slack v. Percival Co., 198 Iowa 54, 199 N.W. 323 (1924); Pittman v. Pillsbury Flour Mills, Inc., 234 Minn. 517, 48 N.W. 2d 735 (1951); Freese v. St. Louis Pub. Serv. Co., 58 S.W. 2d 758 (Mo. App. 1933); White v. Valley Land Co., 64 N. M. 9, 322 P. 2d 707 (1957); Posan v. Industrial Comm., 61 Ohio App. 530, 532, 22 N.E. 2d 1014, 1015 (1939); Hanna v. Aetna Ins. Co., 52 Ohio Op. 2d 316, 259 N.E. 2d 177, 180 (Dayton Mun. Ct. 1970); Sligh v. Newberry Elec. Co-op., 216 S. C. 401, 58 S.E. 2d 675 (1950); Jeffers v. Marretta Mills, 190 S. C. 435, 3 S.E. 2d 489 (1939); Boyd v. Young, 193 Tenn. 272, 246 S.W. 2d 10 (1951); Salt Lake City v. Industrial Comm., 104 Utah 436, 140 P. 2d 644 (1943); Utah Fuel Co. v. Industrial Comm., 102 Utah 26, 126 P. 2d 1070 (1942); Winchester Milling Corp. v. Sencindiver, 148 Va. 388, 138 S.E. 479 (1927); Harbor Plywood Corp. v. Department of Labor & Indus., 48 Wash. 2d 553, 295 P. 2d 310 (1956).

Recovery denied: Tonkovich v. Department of Labor & Indus., 131 Wash. Dec. 192, 195 P. 2d 638 (1948); Boyer v. Dept. of Labor & Indus., 160 Wash. 557, 295 P. 737 (1931).

Useful Terminology

Familiarity with the following terms is necessary in order to understand the cancer causation cases:

A *benign* tumor is not malignant. It grows slowly, does not metastasize to other areas, and causes harm only by its pressure against adjacent tissue or accidental complications.[3]

A *biopsy* is a procedure wherein a whole or segment of a tumor is removed for microscopic examination in order to determine the cell's structure.[4]

Cancer is an inclusive term which comprehends all malignant growths regardless of the type of tissue or cell from which derived.[5]

Carcinoma is a cancer with an epithelial tissue origin. It may cover portions of the external skin surface, line body organs, or occupy cavities.[6]

Etiology refers to the cause of disease.[7]

A *malignant* tumor grows rapidly and tends to metastasize.[8]

Metastasis is the transfer of the cancer from its initial location to a secondary location through the blood vessels or lymph channels.[9]

Neoplastic process or *neoplasia* are terms used to describe an "autonomous new growth of tissue." [10]

A sarcoma is a malignant tumor arising from connective and supporting tissues such as bone, muscle, blood vessels, and lymph-nodes.[11]

A *trauma* is an injury or damage to the body.[12] It may be caused by an impact: a single mechanical force acting upon the body.[13]

A *traumatic cancer* is a malignant tumor following a single uncomplicated mechanical injury, uncomplicated in that it is free from prolonged infection or chronic irritation.[14]

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[3] 5 Lawyers' Med. Cyc. § 38.1 (1960); Adelson, Injury and Cancer, in, Physician in the Courtroom 11 (Schroeder ed. 1954).

[4] Russell and Clark, Medico-Legal Considerations of Trauma and Other External Influences in Relationship to Cancer, 6 Vand. L. Rev. 868, 871 (1953).

[5] 5 Lawyers' Med. Cyc., *supra* n. 3.

[6] Hueper, Trauma and Cancer, 1 Trauma 47, 55 (1959).

[7] Stedman, Medical Dictionary 357 (11th ed. 1930).

[8] Willis, Pathology of Tumors (1st ed. 1948); Adelson, *supra* n. 3.

[9] Flaxman, Trauma and Cancer, 1958 Med. Trial Tech. Q. 223, 224-25; Russell and Clark, *supra* n. 4.

[10] Ewing, Neoplastic Diseases 9 (4th ed. 1940).

[11] Hueper, *supra* n. 6, at 64; 5 Lawyers' Med. Cyc., *supra* n. 3.

[12] Brahdy & Kahn, Clinical Approach to Alleged Traumatic Disease, 23 B.U.L. Rev. 238 n. 1 (1943).

[13] Warren, Criteria Required to Prove Causation of Occupational or Traumatic Tumors, 10 U. Chi. L. Rev. 313, 318 (1943).

[14] Adelson, Injury and Cancer, 5 W. Res. L. Rev. 150, 155 (1954).

A *tumor* is "an abnormal proliferation of cells which serves no useful function, disturbs the normal relationships of tissues, and in comparison with other types of cellular growth, is relatively autonomous." [15]

Basis for "Legal Causation" of Cancer

Case law reveals that two types of claims confront the judge and the workmen's compensation commissioner: (1) Those alleging that the trauma caused the cancer,[16] and (2) Those alleging that the trauma aggravated a pre-existing cancer.[17] The claim must be supported by sufficient evidence to prove a reasonable connection between the plaintiff's harm and the defendant's conduct in order to sustain a recovery in tort.[18] Workmen's compensation cases require proof that the claimant's injury was caused by an accident "arising out of and in the course of employment." [19] The problem then is to determine what factors the administrative and judicial tribunals consider in evaluating the evidence to prove causation. One golden thread that binds case histories together to reveal these factors is Ewing's "postulates." [20]

Ewing's Postulates

In order to prove the existence of a causal relation of trauma to cancer, Dr. James Ewing has established minimal criteria. It must be pointed out that his criteria are used to achieve sufficient *medical certainty.*

1. *Previous integrity of the wounded part.* This postulate is the most difficult to prove by direct evidence, since it must be shown that the situs was free of cancer prior to the traumatic insult.[21] In order to achieve absolute medical certainty, a complete cell examination of the situs tissue would be necessary prior to the trauma. The basis of legal

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[15] Moritz, Pathology of Tumors (1st ed. 1948).

[16] Lee v. Blessing, *supra* n. 2; Emma v. A. D. Julliard & Co., 75 R.I. 94, 63 A. 2d 786 (1940).

[17] Atlantic Coast Line R. Co. v. Godard, 93 Ga. App. 671, 92 S.E. 2d 626 (1956); Town & Blank, Inc., v. Curtis, 141 Ind. App. 115, 226 N.E. 2d 551 (1967); Johnson v. Skelly Oil Co., 181 Kan. 655, 312 P. 2d 1076 (1957); Sullivan's Case, 345 Mass. 762, 186 N.E. 2d 601 (1962); Dixie Pine Prod. Co. v. Dependents of Bryant, 228 Miss. 595, 89 S. 2d 589 (1956); Celeste v. Progressive Silk Finishing Co., 72 N.J. Super. 125, 178 A. 2d 74 (1962); Jackson v. Aarlin Realty Co., 23 App. Div. 2d 598, 256 N.Y.S. 2d 354 (1965); Smith v. Erie County, 15 App. Div. 2d 585, 221 N.Y.S. 2d 756 (1961); De Angelo v. American Can. Co., 11 App. Div. 2d 571, 200 N.Y.S. 2d 614 (1960); Sikora v. Apex Beverage Corp., 282 App. Div. 193, 122 N.Y.S. 2d 64 (1953), aff'd, 306 N.Y. 917, 119 N.E. 2d 601 (1954); Glover v. Columbia Hosp., 236 S.C. 410, 114 S.E. 2d 565 (1960); Kimbell v. Noel, 228 S.W. 2d 980 (Tex. Civ. App. 1950); City of Seymour v. Industrial Comm., 25 Wis. 2d 482, 131 N.W. 2d 323 (1964).

[18] Prosser, Torts § 41 (3rd ed. 1960).

[19] Larson, Legal Aspects of Causation in Workmen's Compensation, 8 Rutgers L. Rev. 423, 425 (1954).

[20] J. Ewing, Neoplastic Diseases (4th ed. 1940).

[21] *Id.*

certainty, however, on this postulate is obscure. Courts apparently are not too concerned with this requirement in that recovery generally requires a mere showing that the injured situs was normal in all respects at the time of the mishap.[22] Perhaps, where possible, the best practice would be to plead that the trauma either caused the cancer or aggravated and accelerated it.[23] An injury is compensable whether it causes a disease or merely aggravates an existing infirmity.[24]

2. *The nature, authenticity, and severity of the trauma.* Dr. Ewing states a minimum effect as the criterion for the trauma: a rupturing of small blood vessels accompanied by hemorrhaging and discoloration of the skin.[25] A single blow may start the regenerative cancer process.[26] The injury is often very minor.[27] One court has even held that the severity of the trauma is irrelevant.[28] This postulate has negligible value in establishing a causal relation between trauma and cancer.[29]

3. *Cancer diagnosis.* Identification of cancer may be accomplished by several methods. Presently, the best method of positive identification is by biopsy.[30] Clinical diagnosis and X-ray pictures are used although the results are medically questionable. However, any question of cancer diagnosis is within the province of the jury.[31]

4. *Origin of the cancer at the place of the injury.* Perhaps the most important of the postulates is this one, in that the cancer must develop at the exact situs of the trauma.[32] A claim for damages based on a cancer which develops at a location other than the area of trauma may be denied.[33]

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[22] Pittman v. Pillsbury Flour Mills, *supra* n. 2 at 739; Hertz v. Watab Paper Co., 184 Minn. 1, 3, 237 N.W. 610, 611 (1931); Peterson v. Kansas City Pub. Serv. Co., 259 S.W. 2d 789 (Mo. 1953); Winchester Milling Corp. v. Sencindiver, *supra* n. 2 at 395.

[23] *See* Dundee Woolen Mills v. Chism, 215 Ark. 126, 219 S.W. 2d 628 (1949); Beatty v. Chandeysson Elec. Co., 238 Mo. App. 868, 190 S.W. 2d 648 (1945); Dalgeish v. Oppenheim Collins & Co., 302 Pa. 88, 152 A. 759 (1930).

[24] Dundee Woolen Mills v. Chism, *supra* n. 23; Gaetz v. City of Melrose, 155 Minn. 330, 193 N.W. 691 (1923); Hogan v. Twin City Amusement Trust Estate, 155 Minn. 199, 193 N.W. 122 (1923); Restatement of Torts § 461 (1934).

[25] Ewing, *supra* n. 20.

[26] Charleston Shipyards, Inc. v. Lawson, 227 F. 2d 110 (4th Cir. 1955); Daly v. Vergstedt, 267 Minn. 244, 126 N.W. 2d 242 (1964); Barker v. J. J. Newberry Co., 279 App. Div. 704, 108 N.Y.S. 2d 463 (1951); Kimbell v. Noel, *supra* n. 17.

[27] Custer v. Higgins Indus., Inc., 24 S. 2d 511 (La. App. 1946); Ellis v. Commonwealth, 182 Va. 293, 28 S.E. 2d 730 (1944).

[28] Ellis v. Commonwealth, *supra* n. 27; Winchester Milling Corp. v. Sencindiver, *supra* n. 2.

[29] Hueper, *supra* n. 6 at 47.

[30] United States v. Hoxsey Cancer Clinic, 198 F. 2d 273, 277 (5th Cir. 1952).

[31] Gluckstein v. Lipsett, 93 Cal. App. 2d 391, 209 P. 2d 98 (1949); Svetecz v. Newark Gear Cutting Mach. Co., 135 N.J.L. 524, 53 A. 2d 220 (1947).

[32] Lee v. Blessing, *supra* n. 2, De Angelo v. American Can. Co., *supra* n. 17, Avesato v. Paul Tishman Co., 142 N.Y.S. 2d 760 (Bronx County Sup. Ct. 1955); Menarde v. Philadelphia Transp. Co., 376 Pa. 497, 103 A. 2d 681 (1954).

[33] Frankenheim v. B. Altman & Co., 13 Misc. 2d 1079, 177 N.Y.S. 2d 302 (Sup. Ct. 1958); Tonkovich v. Dept. of Labor & Indus., *supra* n. 2.

In the hypothetical situation, if a biopsy had revealed cancerous cells within the breast but of a structurally different neoplastic nature, serious doubt would arise as to whether the injury caused the detected cancerous growth. Medical science has demonstrated that neoplasms duplicate the cell structure from which they originally derive. Thus, liver cancer cells found in the breast would indicate the tumor as metastatic in origin.[34]

5. *Reasonable time relationship between the date of trauma and the appearance of the cancer.* Interestingly, no minimum or maximum time interval between the trauma and the detection of cancer has been universally accepted as a standard—to rule out a causal relationship. In Dr. Ewing's opinion the tumor must appear no earlier than three weeks subsequent to the injury or no later than three years.[35] The lack of a standard time limitation has caused some disparity in the cases.[36] One plaintiff whose tumor appeared at the end of sixty days was allowed recovery while another was denied recovery.[37] Until medical experts can establish with certainty the minimum and maximum time standards between trauma and the development of cancer, the question of what is a reasonable time must remain with the jury.

6. *Character or structure of the resulting growth.* The resulting tumor must be uncomplicated in cell structure and related cellularly to the injured tissue,[38] so as to demonstrate that the tumor has not metastasized from another area.[39] Again, the best method to prove that the tumor is not metastatic in origin is to identify the cancerous tissue by biopsy.[40]

Strict judicial adherence to these criteria would result in the establishment of causation to the highest degree of medical certainty presently possible. Requiring such stringent proof would result in few recoveries, however. To circumvent such an insurmountable obstacle, the courts have generally been rather lax in their requirements of proof based on the "postulates." Thus, the belief that strict proof of each of Ewing's postulates would be an undue hardship upon deserving claimants has resulted in the development of the less stringent "sequence-of-events test."[41]

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[34] Rhodes v. American Cent. Ins. Co., 27 S. 2d 388 (La. App. 1946) (Hip cancer metastasized from lung).

[35] Ewing, *supra* n. 20 at 108.

[36] Lee v. Blessing, *supra* n. 2.

[37] Dennison v. Wing, 279 App. Div. 494, 110 N.Y.S. 2d 811 (1952).

[38] Ewing, *supra* n. 20.

[39] Rhodes v. American Cent. Ins. Co., *supra* n. 34.

[40] United States v. Hoxsey Cancer Clinic, *supra* n. 30.

[41] Eidman, Trauma and Cancer, 24 Ins. Counsel J. 421, 425 (1957); Russell & Clark, *supra* n. 4; Warren, *supra* n. 13.

Sequence-of-Events Test

The essence of this test, which is used extensively by courts in aggravation cases,[42] is that since cancer follows the injury, the injury must be the cause.[43] The essence may be restated: If the court finds the presence of valid bridging symptoms, the court will also find a causal relation.[44] "Bridging symptoms" are defined as "symptoms that continue to give evidence of the continuance of disability from the time the injury is sustained to the time the tumor makes its appearance." [45] Thus, if the claimant was in apparently good health before the trauma and a subsequent disability immediately occurred, which progressively increased until cancer was diagnosed, this sequence of events raises a persuasive inference that the injury was a substantial factor in producing the cancer.[46] However, sufficient medical testimony will rebut this presumption.[47]

Aggravation or Acceleration of Pre-existing Condition

Medical authorities "know that many ailments may be aggravated and their harmful or fatal end accelerated by trauma." [48] At issue is the question of how the trauma actually stimulates pre-existing tumor growth. Trauma may perform a beneficial function by damaging or cutting off the tumor cells' blood supply with the result that the cancerous cells die.[49] However, the rupture or perforation of cancerous tissue may cause the cancer to metastasize.[50] Another theory espouses that the trauma may directly cause aggravation, thus hastening death. This theory receives the greatest acknowledgment.[51]

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[42] Smith v. White Pine Lumber Co., 53 Idaho 808, 27 P. 2d 965 (1933); Lyons v. Swift & Co., *infra* n. 51; Smith v. Kiel, 115 S.W. 2d 38 (Mo. App. 1938); White v. Valley Land Co., *supra* n. 2; Sligh v. Newberry Elec. Co-op., *supra* n. 2.

[43] Winchester Milling Corp. v. Sencindiver, *supra* n. 2.

[44] Lyons v. Swift & Co., *infra* n. 51; Taylor v. Mansfield Hardwood Lumber Co., *infra* n. 55; White v. Valley Land Co., *supra* n. 2; Hughes v. Eastley Cotton Mill No. 1, 210 S.C. 193, 42 S.E. 2d 64 (1947).

[45] Warren, *supra* n. 13.

[46] Pixley v. Employers' Mut. Liab. Ins. Co., *infra* n. 51; Taylor v. Mansfield Hardwood Lumber Co., *infra* n. 55; Austin v. Red Wing Sewer Pipe Co., 163 Minn. 397, 204 N.W. 323 (1925); Avesato v. Morell-Brown Inc., 7 App. Div. 2d 796, 180 N.Y.S. 2d 897 (1958); Sligh v. Newberry Elec. Co-op., *supra* n. 2.

[47] Brown v. Ashford, 252 S.W. 2d 7 (Ky. App. 1952); Margoner v. American Marine Corp., 120 S. 2d 281 (La. App. 1960).

[48] Blackfoot Coal & Land Corp. v. Cooper, 121 Ind. App. 313, 95 N.E. 2d 639, 643 (1950).

[49] Avesato v. Paul Tishman Co., *supra* n. 32.

[50] Sikora v. Apex Beverage Corp., *supra* n. 17.

[51] Pixley v. Employers' Mut. Liab. Ins. Co., 102 S. 2d 113 (La. App. 1958); Lyons v. Swift & Co., 86 S. 2d 613 (La. App. 1956); New Orleans and Northeastern R. R. v. Thornton, 247 Miss. 794, 157 S. 2d 129 (1966); Dixie Pine Prod. Co. v. Dependents of Bryant, *supra* n. 17; Ricciardi v. Marcalus Mfg. Co., 47 N.J. Super. 90, 135 A. 2d 339

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Generally, the criteria to establish aggravation or acceleration are similar to those used to prove original causation. To avoid any legal complications when the claimant concedes a pre-existing cancer, several factors should be proved. It should be proved that the trauma was to the cancer itself and not to the surrounding tissue.[52] If this burden of proof is not sustained, the result may be fatal.[53] It must be proved that the tumor existed prior to the injury, but this may be inferred.[54] In addition, it must be proved that the growth rate of the cancer increased or that the trauma caused metastasis.[55]

Notable Cases

As previously stated, the majority of cancer cases raises one of the following issues: (1) whether the trauma caused the cancer, or (2) whether the trauma aggravated or accelerated a pre-existing tumor.

The sequence of events test[56] was applied to the facts in *Austin v. Red Wing Sewer Pipe Co.*[57] The plaintiff was unloading coal from a gondola car as part of his employment duties. He attempted to throw a piece of coal out of the car, but it was deflected and struck him on the cheek, causing a profusely bleeding wound. The wound was bandaged but required continuing care for about a year and a half, when the presence of cancer was discovered.

In allowing recovery, the Supreme Court of Minnesota noted:

> It is not for us to decide as a scientific fact that trauma causes cancer or that cancer is a medical mystery. The employee . . . suffered an injury . . . at a place previously free from blemish. Under constant care, it developed a malignant growth which was eventually diagnosed as cancer. The circumstance alone is pretty strong evidence that the injury was the proximate cause of the result, and would be quite convincing to the mind of a layman. There is no apparent break in the chain of causation.[58]

Thus, the sequence-of-events test has four elements: (1) The apparent

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(1957); Baumstein v. Siegel & Alenikoff, Inc., 9 App. Div. 2d 572, 189 N.Y.S. 2d 431 (1959); Glenn v. National Supply Co., 101 Ohio App. 6, 129 N.E. 2d 189 (1954); Glover v. Columbia Hosp., *supra* n. 17; Boyd v. Young, *supra* n. 2; Harbor Plywood Corp. v. Department of Labor & Indus., *supra* n. 2.

52 Sikora v. Apex Beverage Corp., *supra* n. 17.

53 Ricciardi v. Marcalus Mfg. Co., *supra* n. 51; Frankenheim v. B. Altman & Co., *supra* n. 33.

54 Broussard v. Union Sulphur Co., 5 La. App. 340 (1927); Slemba v. Hamilton & Sons, 290 Pa. 267, 138 A. 841 (1927); Utah Fuel Co. v. Industrial Comm., *supra* n. 2.

55 Whitten v. Liberty Mut. Ins. Co., 257 F. 2d 699 (5th Cir. 1958); Woodbury v. Frank B. Arata Fruit Co., 64 Idaho 227, 130 P. 2d 870 (1942); Taylor v. Mansfield Hardwood Lumber Co., 65 S. 2d 360 (La. App. 1953).

56 Eidman, *supra* n. 41; Russell & Clark, *supra* n. 4; Warren, *supra* n. 13.

57 Cases cited n. 46 *supra*.

58 *Id.*

good health of the individual prior to the injury.[59] (2) The immediate appearance of disability symptoms subsequent to the injury.[60] (3) Persistent and perceptible symptoms from the injury to discovery of the tumor.[61] (4) The progressive deterioration of the individual's health.[62]

In *Dennison v. Wing*,[63] Dr. Ewing's postulates[64] were used to detriment of the plaintiff. The plaintiff fractured her left clavicle and received a contusion of the left shoulder and upper chest in an automobile collision. The testimony of the attending doctor indicated that he had noted no breast injury. During the month after leaving the hospital, the plaintiff made several visits to an orthopedic specialist for treatment of shoulder pain. A couple of days after her discharge by this doctor, the plaintiff observed "a little pimple on the left breast in the armpit." Three and a half years later, when the pimple became as "hard and big as a nut," breast cancer was discovered, requiring radical mastectomy.

The jury found that the accident caused the cancer, but the Appellate Division set aside the jury's verdict, placing great emphasis on Dr. Ewing's postulates. Two of the postulates were pertinent: the cancer must develop exactly at the site of the injury, and the cancer must not reach detectable size until there has been a sufficient time interval after the injury for it to develop. The court noted that the type of cancer involved was a very slow growing cancer and that it was quite inconsistent with the postulates that this cancer could have been detectable within two months after the injury. Furthermore, since the cancer did not develop at the exact situs of the injury, the court concluded that the breast cancer was not caused by the impact trauma of the accident.

A recent case which combines both the sequence-of-events test and Ewing's postulates is *Hanna v. Aetna Ins. Co.*[65] The plaintiff brought suit for injuries allegedly sustained by his wife, a passenger in an automobile accident. The impact jerked her backwards and then threw her

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[59] Dundee Woolen Mills v. Chism, *supra* n. 23; Baynes v. Liberty Mut. Ins. Co., 101 Ga. App. 85, 112 S.E. 2d 826 (1960); Lyons v. Swift & Co., *supra* n. 51; Pittman v. Pillsbury Flour Mills Inc., *supra* n. 2; Milne v. Atlantic Mach. Tool Works, Inc., 137 N.J.L. 583, 61 A. 2d 225 (1948); Menarde v. Philadelphia Trans. Co., *supra* n. 32; Emma v. A. D. Julliard & Co., *supra* n. 16.

[60] Travelers Ins. Co. v. Rowand, 197 F. 2d 283 (5th Cir. 1952); Eliades v. Atlantic Mut. Ins. Co., 2 App. Div. 2d 618, 151 N.Y.S. 2d 771 (1956); Valente v. Bourne Mills, 77 R.I. 274, 75 A. 2d 191 (1950); Sligh v. Newberry Elec. Co-op., *supra* n. 2.

[61] Dundee Woolen Mills v. Chism, *supra* n. 23; Lee v. Blessing, *supra* n. 2; O'Neill v. Babcock & Wilcox, 19 N.J. Misc. 659, 23 A. 2d 116 (1941); Baumstein v. Siegel & Alenikoff, Inc., *supra* n. 51.

[62] Hagy v. Allied Chem. & Dye Corp., 122 Cal. App. 2d 361, 265 P. 2d 86 (1953); Baynes v. Liberty Mut. Ins. Co., *supra* n. 59; Pittman v. Pillsbury Flour Mills, Inc., *supra* n. 2; Milne v. Atlantic Mach. Tool Works, Inc., *supra* n. 59.

[63] *Supra* n. 37.

[64] J. Ewing, *supra* n. 20.

[65] 52 Ohio Op. 2d 316, 259 N.E. 2d 177 (Dayton Mun. Ct. 1970).

forward, onto her knees and into the projection of the dashboard on which she struck her left breast. A month later the plaintiff's wife noticed a bruise on her left breast in the area of the trauma. Two months after the injury, she noticed that touching the left breast pained her and that intermittent drainage was occurring. A month later her doctor found a lump at the site of the original bruise. A malignant, nonmetastasized mass was excised, and the entire left breast was removed.

Approximately two months prior to the accident, her doctor had examined her breasts and found them normal and free of lumps and masses. Thus, both Ewing's first postulate and the first factor of the sequence-of-events test were satisfied. The second factor in the sequence-of-events test requires the immediate appearance of disability symptoms. Mrs. Hanna satisfied this requirement in that she experienced pain coupled with her discovery of a bruise in the immediate area of trauma, subsequent to the injury. The second postulate is also satisfied in that the nature, authenticity, and severity of the trauma is documented.

At this point a divergence occurs in that the third factor of the sequence-of-events test requires continuity of pain from the time of the injury until the discovery of the cancer. The postulates make no such requirement. Thus, Mrs. Hanna's continued discomfort satisfied the third sequence-of-events factor and has no adverse effect upon the establishment of any of the postulates.

The fourth and final factor in the sequence-of-events test also is not included in and does not affect the postulates. Mrs. Hanna satisfied the fourth factor in that a bruise was discovered, she experienced a tingling sensation which later developed into pain, an intermittent drainage began to occur from the bruised area, and finally a cancerous mass developed. The last event in this chain, the discovery of cancer, also satisfied the third postulate.

The remaining three postulates were also satisfied: (1) The cancer developed at the exact situs of the trauma, (2) a reasonable time relationship of three months was established between the date of trauma and the appearance of the cancer, and (3) the cancer was found in the duct rather than in the lymph-nodes, indicating that the cancer was of a nonmetastasic origin.

Thus, the court was presented with the satisfaction of both Ewing's postulates and the sequence-of-events factors. The court held that the plaintiff had sustained his burden of proof to establish that the trauma and the cancer were causally related. The court stated that the pathologist's conclusion (based on the sequence-of-events test) of traumatically induced cancer was "buttressed" by Ewing's postulates.

An often cited case on the issue of whether the injury aggravated

or accelerated a pre-existing tumor is *Sikora v. Apex Beverage Corp.*[66] While walking down a ramp in a subway station, the plaintiff slipped and fell in front of a soda vending machine owned and operated by defendant corporation. Presumably, the fall was caused by soda that had either leaked from the machine or had been spilled by a patron. The plaintiff's injuries were inconsequential except for the claimed aggravation of an existing breast cancer. The plaintiff testified that he first noticed a lump about the size of a pea on his right breast about a week after the accident. Within a few months it had grown to the size of a walnut and was diagnosed as cancer.

The plaintiff immediately conceded that the inception of cancer ante-dated the accident and was not caused by it. This move was perhaps prompted by the court's earlier decision in *Dennison v. Wing,*[67] which held that there must be a reasonable time between the injury and the appearance of the tumor (Ewing's fifth postulate). The appearance of the "pea-sized" lump after only a week's time would not satisfy this postulate. Thus, the plaintiff proceeded on a theory of aggravation, but in this instance the court did not relieve the plaintiff from establishing that the trauma was to the exact tumor situs.[68] Two physicians, a pathologist, and a radiologist testified that the transmission of force to the breast region caused by a fall on the back was sufficient to satisfy this requirement. Nevertheless, the court, noting that the doctor's opinions were not "grounded on scientific fact," concluded:

> In the absence of a direct blow to the site of the cancer or spreading into surrounding areas, there is no adequate basis for believing that the growth of the cancer was in any way affected or accelerated by plaintiff's fall.

The case of *Daniels v. American Airlines, Inc.*[69] encompassed both causation and aggravation. The claimant sustained an injury to his left testicle when he stepped into a hole in the aisle of a darkened airplane. A physician diagnosed his injury as "traumatic orchitis of the left testicle." The prescribed treatment involved medication for the pain and the use of a scrotal suspensory. The claimant's condition sufficiently improved so as to allow his return to normal employment duties. Six months later an examination revealed the testicle to be "a little larger" than upon previous examination. Suspecting that the claimant was suffering from a left testicular tumor, the physician advised an operation. A biopsy revealed the presence of a malignancy, and the testicle and a portion of the spermatic cord were then surgically excised.

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[66] *Supra* n. 17.

[67] *Supra* n. 37.

[68] *See* text at n. 52.

[69] 24 App. Div. 2d 677, 261 N.Y.S. 2d 169 (1965).

Hearings were conducted wherein a referee found accidental causation to have been established. On appeal the sole issue was whether or not there was substantial evidence supportive of the finding of causality. Medical testimony was in conflict as to whether the trauma caused or aggravated a malignant tumor of the testis. The court held that the proof favoring causation did not lack "rational support" in the record. Obviously, the court did not require that the claimant choose whether the injury caused or accelerated the tumor. A trend may develop to plead both causation and aggravation, but currently such cases are scarce.[70]

Conclusion

Medical science allows a theory to be viewed as factual knowledge only when sufficient experimental data is compiled which confirms the theory. The courts, however, require only reasonable certainty in order to establish the legal concept of causation. This legal concept of causation is illustrated in the early case of *Hogan v. Twin City Amusement Trust Estate*: [71]

> The proof required to establish the relation of cause and effect between an injury and a subsequent ailment must be such as to take the case out of the realm of conjecture, but, if the evidence furnishes a reasonable basis for an inference that the injury was the cause of what followed, that is sufficient. . . .

Most modern courts, following their predecessors, also require that the proof be based on reasonable medical probabilities.[72] However, some jurisdictions require strict proof of all of Ewing's postulates in order to sustain a recovery for traumatic cancer. The jurisdictions which follow the sequence-of-events test are, perhaps, more in tune with the legal concept of causation. Their ranks appear to be increasing, but because of the insufficiency of numbers of trauma-cancer cases, major new trends are not readily discernible. Until medical science discovers the *actual* causes of cancer, the courts must rely on a logical chain of events as evidenced by the sequence-of-events test.

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[70] Cases cited n. 23 *supra*.

[71] *Supra* n. 24.

[72] Employers' Mut. Liability Ins. Co. v. Parker, 418 S.W. 2d 570 (Tex. Civ. App. 1967); Texas Emp. Ins. Ass'n. v. Gallegos, 415 S.W. 2d 708 (Tex. Civ. App. 1967).