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Injury and Cancer

by

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WITH LEGAL ANNOTATIONS BY OLIVER SCHROEDER, JR.*

INTRODUCTION

The word "cancer" is one which is charged with emotion and fear, carrying with it implications of prolonged disability and slow, certain and painful death.1 In considering and discussing the subject of cancer, difficulties frequently arise, not because not enough is known, but because so much is known that it is incorrect and untrue. A vast fund of misinformation and false information misleads the unwary stranger and the uncritical observer. Cancer is the second leading cause of death, and problems which arise in connection with it are seen frequently. Cancer is often considered a disease of advancing years, occurring mainly in the older age group. It is, however, found at all ages, ranking as one of the frequent causes of natural death in infants and children. Cancer is not limited to human species; it occurs also in the so-called lower animals.

BASIC BIOLOGIC FACTS

The human body is composed of innumerable individual cells. The cell, the structural unit of all living things, animal and vegetable, is a microscopic structure measuring usually less than 10 micra (10 micra equals .00039 inches)

All living things start from a single cell which by multiplication and differentiation produces a new individual. In higher animals the female ovum (or egg), fertilized by the male sperm, is the source of the new individual. Multiplication indicates an increase in the number of cells; differentiation indicates that some cells proceed along different lines of development from others. Muscle cells of several kinds that are responsible

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1 Courts will take judicial notice that cancer increases the risk of loss on life insurance policies. All States Life Ins. Co. v. Johnson, 239 Ala. 392, 194 So. 877 (1940)
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for motion and locomotion, glandular cells that secrete or manufacture different exocrine and endocrine substances, bone cells that form rigid supporting structures, and all the other cells that make up the body develop from the original ovum and sperm. When similar cells unite they form tissue. A variety of tissues exist—fatty tissue, nervous tissue, glandular tissue, muscle tissue and covering and lining tissues.

Organs are formed by a combination of different tissues. The stomach, for example, has a lining of glandular tissues which produce hydrochloric acid and digestive enzymes which are mixed with the food in the early stages of digestion. Its walls contain muscular tissue which contracts and relaxes, churning and mixing the food and forcing it into the duodenum, the first part of the small intestine. In the wall and lining are nervous tissues which carry nerve impulses or messages to and from the stomach, vascular tissue or blood vessels which carry blood to and from the stomach and fibrous tissue which binds the several tissues to one another. Thus cells combine to form tissues which in turn unite to produce organs.

In health there is, in some tissues, constant replacement of worn out, lost or destroyed cells. Bone marrow throughout life forms new blood cells to replace those which have outlived their usefulness. Skin constantly renews itself. If part of the liver is lost through disease or injury, new liver cells will be formed from those which remain. An ulcer of the stomach, where the surface lining has been destroyed, can heal by the formation of new lining cells. A broken bone has the ability to form new bone and thus restore anatomic integrity. Other tissues and organs do not have the capacity to replace cells which have been destroyed or lost. Highly specialized cells do not reproduce themselves once an organ has reached a completely developed state. A destroyed neurone (nerve cell) is never replaced by a new neurone. Heart muscle cannot regenerate. Lost or destroyed brain and heart tissue are replaced by scar tissue of one type or another.

Cells which reproduce themselves under ordinary conditions do so in an orderly fashion. The number of cells and their arrangement are adapted to the needs of the body. The fibrous scar which replaces damaged or destroyed heart muscle is limited to the site of injury.

CANCER CONCEPTS AND DEFINITIONS

What is cancer? How is it diagnosed? How does it behave? What is the natural course of the disease?

A tumor may be defined as an abnormal mass of tissue, the growth of which exceeds and is uncoordinated with that of normal tissues. It results from an uncontrolled proliferation of cells which serves no useful pur-
pose and which disturbs the normal relationship of tissues. It is sometimes called a neoplasm or new growth. In its ancient and general meaning a tumor represented a swelling. Today this definition is outmoded: all tumors are swellings, but not all swellings are tumors.

Tumors are classified in two main groups, benign and malignant. Malignant tumors are cancers. Between the extremes are borderline growths. The designations benign and malignant are relative, referring to biologic characteristics of the growth.

Stated in broad general terms, a benign tumor grows slowly, remains local, does not invade but pushes aside neighboring tissue and causes harm only by its position or accidental complications. Malignant tumors grow more or less rapidly, infiltrate locally, metastasize distantly, and are fatal unless extirpated early. The ability to metastasize is a noteworthy characteristic of malignant tumors. This feature refers to the capability of small particles of the parent or primary tumor to invade the blood stream or lymphatic stream and to be carried by the blood stream or lymphatic current to other parts of the body where they are arrested. Here they take root and grow, giving rise to secondary (metastatic) growths. A tumor which originates in the breast frequently may spread in this fashion to the brain, lungs, spine and axillary lymph nodes. A tumor which arises in the lung can give rise to secondary growths in the liver, adrenal glands or brain. This is a natural facet of the disease and is to be expected unless the tumor is eradicated before metastasis has taken place.

The essential elements of a tumor are the actively growing cells which multiply without regard for the laws which govern and restrain the growth of normal tissues. Once a malignant tumor is engendered, its cells continue indefinitely to outgrow those of normal tissues. An untreated malignant tumor grows progressively to a fatal termination. Even treatment may not prevent the inexorable course to the grave. If treatment is started late, and the tumor has already spread to sites whence it cannot be removed, the same unhappy termination eventuates. It must be remembered that all tumors start from a minute focus, microscopic in size. It is possible to have a tumor without anyone, patient or doctor, knowing about it. Such tumors are in the subclinical stage, without signs or symptoms. With the passage of time the growth of these tumors gives rise to clinical phenomena which call attention to them. One of the features of cancer which makes it so difficult to treat successfully is that often the presence of symptoms which first call attention to the tumor is already a late manifestation of the disease. By the time the growth makes its presence known, it may already be in an advanced, incurable stage. This is especially true of internal tumors. There are few specific symptoms which in and of themselves indicate the presence

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3 Ibid.
of malignant disease. A cough may be caused by cancer of the lung, but it may also be caused by bronchitis, too much smoking, tuberculosis, nervousness or habit.

A malignant tumor arising from cells which cover an external or internal surface of the body or which line a duct is called a carcinoma. Thus tumors arising from the skin surface, the lining of the bladder or of the stomach or from the glandular part of the prostate gland are all carcinomas or carcinomata. A malignant tumor arising from the so-called supporting tissues, fat, bone, muscle and the like is called a sarcoma. There are a host of special tumors which have their own names.

There is no single disease called cancer. A multiplicity of malignant growths which originate in every organ of the body comprise the broad subject of cancer. Malignant tumors in different organs vary from one another in their natural courses and prognoses. Even within the same organs a variety of malignant tumors can arise with divergent behavior. Thus, there are several types of primary brain tumor which differ from one another strikingly in many important respects. All cancers and suspected cancers must be studied microscopically by one skilled in this phase of diagnosis in order to establish accurately the true nature of the lesion. Only then can one proceed on sound premises. Either the entire tumor should be examined if it is surgically removed, or a small portion of the growth can be excised and examined microscopically if total removal is not feasible. The latter procedure is called "biopsy" and is resorted to frequently in clinical medicine. Should the patient with suspected malignant disease die without a definite diagnosis, autopsy should be performed to establish the nature of the disease.

THE ETIOLOGY OF CANCER

There is no single cause of the heterogeneous group of diseases that are called cancer. While the etiology of most cancers is undetermined, factors responsible for the development of certain malignant neoplasms are known. Most of these involve chronic irritation of some type.

Over-exposure to X-rays or radium can cause cancer. Many of the early pioneers in radiology, unfamiliar with the carcinogenic (cancer-producing) potentialities of the rays, died of cancers induced in this fashion. The radium-dial painters in New Jersey who pointed their brushes with their teeth and thus swallowed minute quantities of radioactive material which was deposited in their bones died of bone cancer or osteogenic sarcoma. Too much sunlight can give rise to skin cancer (epithelioma). Skin cancer is seen much more often in farmers and sailors who are exposed to the sun's rays than in those who spend the greater part of their lives indoors. A parasite which settles in the bladder and lays its eggs in the wall of the bladder where they cause severe chronic irritation is known to be responsible for bladder cancer in Egypt, where this parasite is found. A number of chemi-
cals isolated from coal tar are known to be actively carcinogenic. The list of known cancer-producing substances runs into the hundreds. Industrial cancers will be discussed later when more will be said about known causative factors. Clinically and experimentally the cause of a modest number of cancers is known.

TRAUMA AND TUMORS

Trauma, broadly speaking, is damage to the body. Mechanical trauma or the application of a blow is the most important for the purposes of the present discussion. There are also such forms of trauma as thermal (heat and cold), chemical and radiation.  

The carcinogenic potentialities of mechanical injuries would long since have ceased to stimulate interest were it not for the fact that so many claims for compensation and petitions for personal injury damages are filed each year which allege that a tumor has been caused by mechanical injury. Three aspects must be considered:

1. No satisfactory explanation exists as yet for the development of certain tumors. Thus any antecedent illness or injury appears to the lay mind as a reasonable cause, particularly if the tumor develops at or near the site of an injury.

2. The frequency with which injuries occur is important. Most people receive a number of injuries during their lifetime. By chance, tumors may follow injuries independent of any cause-and-effect relationship.

3. The victims of malignant tumors may attribute their disease to preceding trauma. They will thus receive damages, insurance or workmen's compensation benefits if it can be proved that the tumor was caused by some preceding accidental injury.

Were it not for the fact that the subject of trauma and tumor is a frequently recurring one in courts of law and before workmen's compensation boards where it confounds lawyers and confuses laymen, it would long since have ceased to be of interest to the scientist. The problem has been thoroughly explored clinically at the bedside of the human patient and experimentally in laboratory animals. The consensus of opinion of modern investigators is that a single trauma has never been known to cause or produce a malignant tumor in either human beings or in animals. Much that has been written and published in the past on this subject is utterly unprofitable to read. In no other field of traumatology is the disproportion

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4 Eeggers, The Etiology of Cancer, II Irritation, 13 Arch. Path. 112 (1932).
5 Moritz, Pathology of Trauma Chapter III (1942).
6 Warren, Neoplasms in Pathology Chap. 19 (Anderson ed. 1948); Moritz, op. cit. supra note 5; Willis, op. cit. supra note 2; Seelig, Compensation in One Trauma Cancer, 44 J. Mo. Med. Asso. 27 (1947); Harcourt and Reed, The Relation between Trauma and Malignant Disease, 39 J. Ind. Med. Asso. 14 (1946)
between the number of cases and their scientific value as great as it is in those dealing with trauma and tumor. The voluminous statistics of "Traumatic Tumors" will impress only the uncritical mind.7

Many judicial decisions made in this country on the subject of trauma and tumor have been rendered without regard for the scientific aspects of the question at issue. Legal and medical opinion are often expressed without a clear concept of the nature of the evidence or accurate knowledge of the facts upon which opinion is based.8

Exact definition is essential to bar semantic difficulties. A traumatic cancer is a malignant tumor which arises after, and as a result of, a single uncomplicated mechanical injury, uncomplicated in the sense that there is no subsequent infection, suppuration or foreign body left at the site of injury. This does not include tumors which arise after repeated mechanical injuries (chronic irritation) or those which follow prolonged infection.

Many recent fundamental contributions dealing with the causation of tumors have an important bearing on the relationship of trauma to tumor. When nothing definite was known about the effective exciting factors in cancer, it was natural to adopt the traumatic theory in cases in which clinical evidence seemed to point that way. For example, it is known now that one can produce breast cancer almost at will by over-stimulation with certain endocrine products or granular extracts. The traumatic origin of breast cancer is thus much less acceptable today than it was fifty years ago. Cancer has been produced experimentally by many methods but always under specific conditions not related to trauma. The experimental data reveal that the genesis of cancer requires factors which are not present in simple trauma.9

A single trauma has never been known to produce a cancer in an experimental animal. The consistently negative results indicate that simple trauma, in and of itself, does not possess the essential elements of a cancerigenic agent. Study and analysis have widened the breach between real causation of malignant tumors and the theory that they may be caused by a single trauma. The new facts do not warrant exclusion of trauma as a possible factor in many tumors. Recent knowledge demands that any evidence favoring trauma must be closely and carefully scrutinized. More weight must be given to other factors which are in line with causes known to be effective in exciting neoplastic growth.10

CHARACTERISTICS OF MEDICO-LEGAL EVIDENCE

Statements of interested patients must be accepted with caution. While juries, compensation courts and referees have accepted the statements of

7 STERN, TRAUMA IN INTERNAL DISEASE (1945)
8 KNOX, Trauma Tumors, 7 ARCH. PATH. 274 (1929).
10 Ibid.
claimants at face value, medical science cannot make loose assumptions or indulge in sympathies. To have medico-legal value, statements of claimants and eye witnesses must be corroborated by well-documented evidence. Evidence regarding any accident must be concrete and verifiable. Careful examination of this aspect alone would enormously reduce the number of so-called "traumatic cancers" in medical literature. Without attributing to any claimant a deliberate intention to falsify facts, every student of psychology knows that the human mind is strongly influenced by preconceived notions and by self-interest. The wish is father to the thought. By repeatedly asserting things of which the mind is uncertain, it is possible to convince one's self of the reality of incidents which have not occurred. For scientific purposes this law of psychology can never be disregarded in any inquiry dealing with the traumatic origin of tumors.11

The chief task of the medico-legal expert is not primarily one of theoretical reasoning and argument. It consists almost entirely of laborious fact-finding. This requires time, patience and ingenuity if one is to establish the facts in cases of alleged traumatic tumors. Unless efforts are competently made, the report of the case and any opinion concerning it are, for scientific purposes, worthless. Generalizations can be invalid and misleading.12

There are two varieties of clinical evidence:
1. Histories from hospital charts. These are frequently used as evidence with no regard for the mental capacity, motives or honesty of the patient. Scientific matters cannot be decided on the basis of unreliable and untrustworthy data. The lay individual is not a trained accurate observer. This phase of the subject has been termed "a collection of anecdotes." A stream can rise no higher than its source.13

2. Papers in medical literature by forensic pathologists. These are usually single case reports which, to the writer, appeared to suggest that a definite relationship might exist between trauma and tumor. These cases reveal a post hoc, ergo propter hoc type of reasoning. Sequence and consequence are not differentiated. No matter how much one may respect the accuracy of the observations and the integrity of the statements, it is apparent that the authors arbitrarily assume the importance of trauma as an observed external factor. The literature is in too many instances more confusing than helpful.14

CRITERIA FOR THE DIAGNOSIS OF TRAUMATIC CANCER15

Criteria have been established for assessing the possible responsibility of an injury for the development of cancer.
1. The Authenticity, Adequacy and Nature of the Trauma.

This is an extension of what has already been said. For scientific purposes more is needed to prove that an injury has been incurred than the
mure statement of the patient. Examination by a doctor or by an intelligent layman must corroborate the patient's account. In many instances only the results of competent and thorough medical examination are worthy of credence. Many cases cannot withstand even this basic inquiry. Previous injuries must be excluded where possible.

Adequacy of the trauma means that the injury must be sufficiently severe to produce visible alteration in the tissues. The least effect which one can see is that due to rupture of small blood vessels with resultant discoloration or bruising of the skin. The trauma must elicit some regenerative process wherein cells multiply to repair damage. Otherwise it is difficult to comprehend how the injury can excite the excessive and abnormal proliferation of cells which characterize a cancer. The severity of the trauma must be judged objectively rather than subjectively by the patient in retrospect. The possibility of financial gain adds greatly to the importance of trauma in the mind of the patient. Many injuries are promptly forgotten when the opportunity to gain from them is not present.

The nature of the wound must be considered. Clean, incised wounds cannot lead to cancer. Retention of blood clot and fragments of dead tissue may favor abnormal events. Foreign bodies or irritating chemicals may delay healing and thus lead to atypical results.

2. Previous Integrity of the Injured Part.

While courts and juries may accept patients' statements that the site of injury was previously normal, positive demonstration that the tumor is traumatic in origin requires proof rather than assumption. Most patients who develop cancer rightly assert that they have been in excellent health. They associate the onset of their malignant neoplasm with some incident, of which a satisfactory variety is mechanical injury. Even complete medical examination at the time of injury does not absolutely rule out the presence of a subclinical malignant tumor. Frequently trauma reveals and calls attention to a tumor already present. There are innumerable examples where X-rays of a broken leg or a twisted ankle taken at the time of injury revealed the presence of an unsuspected malignant tumor. X-rays of the chest to determine the presence of fractured ribs taken promptly following...
a contusion of the chest have revealed a malignant lung tumor. Pathologic examination of a badly crushed testis immediately removed surgically has disclosed a malignant tumor whose presence had not been known or suspected.

**Traumatic determinism** must also be kept in mind. A part of the body which has a tumor within it is more readily and frequently injured than is a normal member. The tumor increases the bulk of the part, fixes the organ and causes adherence to neighboring tissues, thus depriving the organ of its normal mobility and elasticity. The individual with a brain tumor is more apt to stumble, fall and injure his head than is the man who has no such tumor. The tumor causes the fall, not vice-versa.

Whenever an apparently trivial injury is said to have produced some peculiar or exaggerated effect, and a tumor is later discovered, it should raise the strong suspicion that the tumor antedated the injury.

3. **Origin of the Tumor at the Site of Injury.**

Any reasonable theory of the traumatic origin of a tumor must postulate that the tumor develops in tissue altered in structure directly by trauma and not by some mild transmitted force leading to intangible tissue disturbances of which nothing is known. If the body falls from a considerable height with resultant general mechanical violence, there is no ground for assuming that the fall is responsible for a tumor unless there are definite symptoms pointing to injury of the organ involved by the tumor. It is difficult to conceive how a general concussion of the body can give rise to a malignant tumor at a particular point in which no structural damage can be demonstrated. If a litigant claims that a fall on the buttocks was involved in the origin of a cancer of the pharynx, such allegation is based on nothing except wishful thinking.

4. **Time Limit Between Injury and Appearance of Tumor**

The temporal phase of the problem is the one about which there is the widest disagreement. The valid time interval between injury and the appearance of a tumor, according to most authorities, ranges from 3-4 weeks to 10-20 years. A tumor which appears within a few days or weeks after injury was probably there before the injury was sustained. It is a well-documented and accepted fact that a tumor can arise many years after exposure to a carcinogenic agent.

5. **Positive Diagnosis of the Presence and Appearance of Tumor.**

Clinical diagnosis, including X-ray, is frequently uncertain. Complete diagnosis of the structure, grade of malignancy, origin and probable course of a malignant tumor are necessary for medico-legal interpretation. Examination of the surgical specimen, biopsy or autopsy are mandatory. What

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appears to be a primary tumor clinically may be tuberculosis, syphilis or a metastatic tumor. The microscopic appearance of the tumor may reveal that it is slowly growing and that its genesis antedated the trauma. The tumor must be of a type reasonably referable to trauma. Judgment in this field must be based on broad knowledge of the causes, natural history and structural features of the different types of tumors.

**SOME SPECIFIC TUMORS—THEIR RELATION TO TRAUMA**

There is no organ in the human body in which the development of a cancer has not at some time or another been ascribed to injury. The most frequently implicated areas are the female breast, the testes and bones. In these three sites one encounters the typical recurring questions that abound in the field of traumotology and tumor.

1. *Cancer of the Breast.*

Cancer of the female breast is one of the most common tumors seen in clinical medicine. Cases of alleged traumatic breast carcinoma appear with regularity in court. The minds of women have been impressed through generations with the fallacy that breast cancer can be caused by a blow. Breast cancer is a systemic and constitutional disease. It is not rare to find that both breasts are the seat of separate cancers.

The earlier one sees cancer of the breast, the less likely is one to find any indication that an episode has occurred which can be ascribed to trauma. Dr. Fred Stewart, a leader in American pathology today, states boldly, "I would refuse to entertain even the suspicion that mammary carcinoma (breast cancer) is caused by trauma."\(^2\)

A sequel of injury to the breast is occasionally confused clinically with breast cancer. The bulk of the female breast is made up of fat. A blow in this region may lead to damage and death of fatty tissue. When the injured fat heals, it forms a firm scar which can simulate cancer to the palpating hand. The microscope will readily disclose the true nature of such a "lump" in the breast. Under the microscope the two diseases, traumatic fat necrosis and breast cancer, are completely unlike and easily differentiated.

A malignant tumor in a breast can be present completely unknown to the patient. Every pathologist has had the experience of finding an unsuspected microscopic focus of cancer while examining breast tissue removed for nonmalignant disease. Microscopic diagnosis is the *sine qua non* of neoplastic disease. It is the only means of absolutely establishing the true nature of the disease.

The classical legal case of traumatic breast cancer is represented by the following: A woman strikes her breast against a pastry mixer while working

in a bakery. The blow is painful and necessitates a cessation of work for a few minutes. The injured site, the inner fold of the breast where it attaches to the chest wall, first appears red and then becomes black and blue. Fourteen months later a lump is noted at the area of former injury; the doctor diagnoses cancer and removes the breast. A compensation award to the woman is upheld on the theory that the blow was the proximate cause of the cancer.\textsuperscript{18} One immediately questions the diagnosis of a "cancerous breast." Were gross and microscopic pathologic examination carried out by a competent examiner? It is possible that the lesion ("lump") was not cancer but rather traumatic fat necrosis. If it be cancer, the sequence of events is mistaken for a consequence. Medically, competent scientific proof will not support the proximate causal connection between a single blow and subsequent breast cancer.

2. Testicular Tumors.

Malignant tumors of the testes are frequently ascribed to trauma.\textsuperscript{19} Located as they are outside the body, the testes are often mechanically injured. All healthy males who reach adult life can remember vividly agonizing episodes when they were accidentally kicked in the scrotum or struck there by a baseball. When a testicular tumor makes its appearance, the human trait of looking for a "cause" asserts itself; the kick or blow comes readily to mind and is immediately incriminated. This view is often readily accepted by the surgeon as well as by the layman.

One case, well documented factually, graphically portrays the issue involved. An electrician was electrically shocked in the right arm by a current carrying 11,000 volts. He was immediately rendered unconscious and thrown astride an iron pole, injuring his right testicle, the right side of the scrotum and the right inguinal area (lower abdomen). Within several days the testis became swollen, and the scrotum appeared bluish in color. The swelling remained for several months during which time the victim suffered great pain. He tried to work, but was forced to stop by the intense pain. Prior to the injury, he had been able-bodied, well and strong. Three years later, two small malignant tumors were surgically removed from the right testicle. Several days later the entire right testicle and the spermatic cord were removed. Lymph node dissection of the inguinal area and abdomen to the level of the diaphragm was also carried out. A metastatic lesion was discovered in the right lung. A compensation award was upheld based on the opinion that the injury was a causative factor in the cancer of the testicle.\textsuperscript{20} Medical facts to support the award were: a trauma adequate


\textsuperscript{19}Leighton, \textit{Single Trauma as an Inciting Factor in Carcinoma}, 24 S. CLIN. NORTH AMERICA 994 (1944).
to produce injury, the site of injury was the site of the tumor, the time elements were reasonable and the diagnosis of the malignant nature of the tumor was established. Amongst opposing facts which denied the proximate relationship were the following: experimental and clinical observations indicate that electrical shock per se is not a carcinogenic agent, and mechanical trauma to the scrotum and its contents have not been proved to be causative factors in the production of malignant disease in the testes. Injuries to the scrotum and testes are frequent while testicular tumors are comparatively infrequent. Testicular tumors occur without a history of trauma. This case, because of the abundance of well-documented facts, permits a decision based on medical opinion. The opportunity for truth to prevail is present only in those cases where adequate, sound, scientific facts are given to the judicial body.

Consider also that tumors occur in the female ovary which are identical with those seen in the testis. The ovary is well-protected in the female pelvis and is not subject to blows or injuries. No one thinks of blaming the genesis of these ovarian tumors on a blow. A testis may remain in the abdominal cavity where it is formed in fetal life (undescended testis). Such a testis is well-protected from trauma, yet tumors identical with those seen in scrotal testes are found in such intra-abdominal protected testes.

Occasionally, the feature of "latent tumors" occurs. Here the primary tumor remains small and unnoticed, whereas the secondary or metastatic tumor is large; the latter first calls attention to the presence of malignant disease. This is seen with testicular tumors where the situation in the scrotum is not discovered until a metastatic tumor is correctly diagnosed as to its origin, and attention is thus focused on the testis.


The etiology of a small percentage of bone tumors is known; ingestion of radioactive material, irradiation and Paget's disease of bone (osteitis deformans) are accepted as responsible factors in the development of some malignant bone tumors. However, no reliable explanation exists for the causation of the greater majority of osteogenic sarcomata. This does not force us into the position of accepting trauma as the explanation.

Accessory evidence of a negative character greatly outweighs supposedly

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20 Traveler's Ins. Co. v. Rowand, 197 F.2d 283 (5th Cir. 1952). In Beatty v. Chandeysen Electric Co., 238 Mo. App. 868, 190 S.W.2d 648 (1945), a blow to the male organs was held to have cancer of the penis which was followed by metastatic carcinoma involving the groin. A biopsy established the diagnosis of squamous cell carcinoma of the penis. A natural sequence of this tumor is metastatic cancer in the groin (inguinal lymph nodes). It has not been demonstrated experimentally that a single simple trauma to the penis can result in cancer. Prolonged, low grade chronic irritation of the penis usually accompanied by phimosis (inability to retract the foreskin) is the most important single etiological factor in the pathogenesis of penile malignancy.
direct positive evidence. The alleged precipitating trauma is frequently described as mild or minimal. Rarely is the trauma allegedly responsible for bone cancer sufficient to fracture the bone. Fractured bones or suspected fractures are usually X-rayed promptly. Tumors are thus visualized or eliminated. Mild injuries do not require X-rays, and the true state of the bone is accordingly not ascertained.21

A recent compensation case provides an excellent example of well-documented pathology and wise decision.22 An 18 year old boy worked three days a week as a grocery packer. His knees pressed against, and occasionally bumped, the top of the stand. After working for a year he noted pain in the knee region. On the inside of his leg below the knee a hard firm swelling and redness appeared. X-rays revealed a bone cancer. Malignant bone tumors in this site are frequent in the second decade of life. Trauma in this case was slight. There was no history of fracture of the involved bone. X-ray studies revealed normal bone structure and knee joint except for the sarcoma in the upper tibia. The court held that there was insufficient evidence to support a probable causal connection between the striking of the knee and the cancerous condition.

Bone surgery provides abundant negative evidence. Bones are sawed, scraped and have metal screws inserted. Nonetheless there are no reports of surgical bone cancers. Innumerable teeth are extracted with trauma to the jaw bones. No one accuses the dentist of causing cancer to the facial bones. Bones may be pressed upon by neighboring tumors or aneurysms (arterial outpouchings) to the point where they are eroded and thinned to a small fraction of their original caliber. Such prolonged chronic injury to bone has never been accused of causing a bone tumor.23

The normal wear and tear of life induces a multiplicity of trauma which are rarely noted or quickly forgotten until a tumor arises to fix them in the mind. Those who advocate the traumatic etiology of bone sarcoma should watch a group of children at play. They will in the course of an afternoon witness all types of injury said to cause cancer; they will return home greatly depressed at the sad outlook for the future of these children.

21Coley, Trauma in Malignant Tumors of Bone, 73 AM. J. SURG. 300 (1947).
22Nightlinger v. Giant Super Market, Inc., 334 Mich. 90, 53 N.W.2d 602 (1952). Cf. Greeby v. Philadelphia Asbestos Co., 120 Pa. Super. 9, 181 Atl. 452 (1935), where recovery for compensation death benefits was allowed because of a causal connection between a fall injuring the arm and a subsequent sarcoma which caused death. The court failed to determine whether the sarcoma was caused by the trauma or whether a pre-existing cancer had been aggravated. The latter theory is the only one medically acceptable. Several questions remained unanswered: How severe was the trauma? Was the skin broken to permit the entry of bacteria? How soon after the injury was an X-ray taken, if at all?
23Stewart, supra note 17
It has been facetiously stated that the probability that an injury will give rise to bone sarcoma is inversely proportional to the severity of trauma sustained, or, "to establish the traumatic origin of a bone tumor requires that one be able to prove that trifling injuries are vastly more carcinogenic than are major injuries."\(^{24}\)

Willis, an outstanding British authority on tumors, has phrased it neatly: "We will continue to be struck by occasional remarkable coincidences and courts will continue to allow compensation claims for allegedly traumatic sarcomas of the bone. But the only attitude for the scientific pathologist is one of stringent scepticism."\(^{25}\)

**Probability of the Coincidence of Trauma and Tumor**

Even if it is assumed that every tumor arising after trauma is traumatic in origin, one would find that the incidence of traumatic tumors is low. The New York State Industrial Compensation Board reported a series of 26,000 injuries of which but thirty-seven involved tumors. This is the expected incidence of tumors in the general population.\(^{26}\)

If trauma were a primary cause of cancer, cancers should be more common. At age forty, 400 of every 100,000 persons in the general population are developing tumors which can be recognized. If, as statistics show, 25,000 persons are injured each day in the United States, it is to be expected that some of the injured individuals will already have tumors in the process of development at the time of their accident.

If trauma is the cause of tumors in individuals on the basis of an "inherent susceptibility," more cases of multiple neoplasms should be seen inasmuch as injuries are constantly received from the cradle to the grave. This brings us to the "temporal phase" of the injury. The proponents of the traumatic etiology of malignant tumors are forced into the position that only a particular injury at a particular time could give rise to the tumor in question. They disregard completely all other injuries which are absorbed by every person in his journey down life's rocky path.\(^{27}\)

Not only those individuals who develop supposedly traumatic tumors but all classes of the population, young and old, are constantly exposed to injuries to which attention may or may not be paid. There is thus a strong probability that by mere coincidence a part of the body in which a tumor develops may have been struck a blow at some time. Cancer does not develop suddenly. It is usually preceded by so-called pre-cancerous changes for months or years before outright malignant disease appears. Trauma to

\(^{24}\) Id. at 152.

\(^{25}\) Willis, op. cit. supra note 2.

\(^{26}\) Ewing, supra note 9.

\(^{27}\) Ibid.; Stewart, supra note 17.
such an area with subsequent tumor must be looked upon as a fortuitous event. The latter is the inevitable result of the long pre-cancerous period.

Prize-fighters who sustain innumerable blows to the head and body have no more cancers than the non-pugilistic population. Anyone who has witnessed a football game is cognizant of the number and severity of bumps, blows and bruises absorbed by the players. Before the days of professional football the bumps and bruises were limited to grammar, high school and college years. Now with professional football such injuries are acquired for several additional years. No one has seriously raised the issue as to whether any or all these individuals are doomed to die of cancer as a result of the multiple trauma received in this sport.

Law reports enumerate many cases where the sequence of trauma-cancer is considered a consequence with the trauma causing the cancer. Every variety of trauma has been incriminated in this confusion of sequence and consequence. The following are examples: a 2400 volt electric shock with subsequent bone pain, death seven months later from "cancer in the liver"; a jolt in a street car resulting in a fall, pain for two weeks, death from cancer 21 months later; a lump of coal striking the cheek, swelling in two or three weeks followed by carcinoma and death; muscle strain from pulling on a rope, followed in two months by a tumor revealed by X-ray, death seven months after the strain; a falling box bruising the side of a healthy man, death three years later from a sarcoma located below the bruise; patient hurled to the ground from a motorcycle, severely jarred and shaken with two bruises above the left knee, death in nine months from osteoid sarcoma developing in the same area as the bruises; sudden stop of a train throwing a woman to the floor with contusion of the hip and "jarring internally," a miscarriage followed, cancer of the womb developed and caused death within several months. To the juror and compensation referee, the trau-

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28 Owensboro v. Day, 284 Ky. 644, 145 S.W.2d 856 (1940) Electricity has not been proved to cause cancer. The most that can be said is that a person with cancer may not be able to recover as rapidly or completely from an electric shock as a person without malignancy.


30 Canon Reliance Coal Co. v. Industrial Comm'n of Colorado, 72 Colo. 477, 211 Pac. 868 (1922) A mere blow to the cheek can not cause cancer, according to the best scientific analysis available. Did a piece of coal become embedded in the skin resulting in chronic irritation which then caused cancer? What kind of "cancer of the cheek" existed—skin, mucous membrane, maxillary antrum, bone?

31 Ralph H. Simpson Co. v. Industrial Comm'n, 337 Ill. 454, 169 N.E. 225 (1929). A pre-existing lymphosarcoma with the strain aggravating the condition is the best medical possibility in this case.


33 Rosenberg v. State To Use of Ambrose, 129 Md. 418, 99 Atl. 680 (1916)

34 Louisville & N. R. Co. v. Kemp's Adm'r, 149 Ky. 344, 149 S.W. 835 (1912). Was the womb tumor cancer of the endometrium (lining of uterus), cancer of the
ma-cancer sequence weighs more heavily than it does with medical scientists trained to search exhaustively for the elements of consequence.

In reported legal cases where causation has been rejected, the absence of injury to the cancer site has been an important deciding factor: a fall which leads to a fractured thigh does not cause cancer in the prostate; a fall from a light pole without injury to the abdomen cannot be the basis for carcinoma of the sigmoid colon; an injury to the ankle sustained in a fall from a log is not the source of a sarcoma in the thigh bone (femur) which metastasizes to the lungs, causing death; fracture of the tibia and fibula in a fall is not the cause of cancer in the liver; injury resulting in contusion of the chest and simple fracture of the sternum will not cause carcinoma of the esophagus.

EFFECT OF TRAUMA ON A PRE-EXISTING TUMOR — THE QUESTIONS OF AGGRAVATION AND ACCELERATION

The theory that aggravation of an existing tumor may occur as a result of trauma has assumed increasing importance in compensation courts. If one denies that the tumor was caused by trauma and states that it already existed at the time the injury was sustained, the problem of aggravation becomes a very real one. The law granting awards for aggravation of tumors seems reasonable when the progress of the disease and its fatal termination are definitely hastened, or when the trauma introduces features and complications which do not normally belong to the disease and which are injurious to the well-being of the patient.

What constitutes aggravation? Any injury which hastens death or leads to premature disability can be said to constitute aggravation. A severe hemorrhage, collapse or fracture are examples of aggravation. However, it must be recalled that hemorrhage, pain, ulceration and closure of hollow organs are natural features of neoplastic disease. They can and do occur without injury. Unless injury introduces into the course of the disease cervix (neck of the uterus) or a chorio-epithelioma (associated with the products of conception)? The first task is always to establish the type and nature of the cancer.

Smith v. White Pine Lumber Co., 53 Idaho 808, 27 P.2d 965 (1933). Carcinoma of the prostate is seen commonly in older men without any history of trauma. The pain can be the result of metastatic carcinoma in the vertebra, a common site for metastasis from prostate carcinoma.


Halleck v. Hartford Acc. & Indem. Co., 75 F.2d 800 (5th Cir. 1935).

Posan v. Industrial Comm'n, 61 Ohio App. 530, 22 N.E2d 1014 (1939). Was the "cancer of the liver" primary or metastatic? A biopsy or autopsy would answer this question.


Ewing, supra notes 9 and 15.
something which does not belong there and which works to the detriment of the patient, aggravation may not properly be assumed.

Acceleration refers to an increase in the rate of growth. It is occasionally asserted that trauma may activate a cancer, increasing the growth energy and growth rate of the cells. This idea has been disproved. The effects of mechanical injury on the rate of tumor growth have been intensively studied. Tumors in experimental animals have been bruised, squeezed and injected with foreign materials. No increase in rate of growth has been noted. The appearance of the cells and the number of mitotic figures (an indicator of the rate of growth) negate any acceleration of growth by mechanical trauma. On the contrary, it has been observed clinically and experimentally that severe injury to a cancer may damage its blood supply and lead to death of parts of the cancer or to a slowing in its rate of growth. A cancer cell cannot grow without nourishment. Damage to its blood supply and nourishment is as detrimental to the health of a cancer as is damage of the blood supply to the health of normal tissue.

An organ in which there is a tumor does not possess the resistance to injury inherent in a healthy organ. Less force is required to produce a hemorrhage in a brain with a tumor than is required to produce a hemorrhage of equal severity in a healthy brain. Bone involved by a malignant tumor, primary or metastatic, is more readily fractured than healthy bone.

Case law has developed dealing with aggravation of cancer by trauma in much the same way as the causation of cancer by trauma. For example, an apparently healthy man was violently struck in the abdomen and died within two months from cancer in the abdomen. The fact that the decedent appeared in good health prior to the injury was felt to be sufficient to sustain the inference that the blow aggravated the cancer.

A further confusing element is the use of the term "aggravation." A blow between the lower ribs and the iliac crest (hip) was followed by continuous pain and a draining abscess in the flank. Three weeks later a fecal fistula developed. It was held that the blow had had sufficient force to traumatize a colonic (bowel) cancer of the napkin ring variety. While

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41 Ewing, supra note 9.
43 Shepard v. Carnation Milk Co., 220 Iowa 466, 262 N.W. 110 (1935). In Elford v. State Industrial Acc. Comm'n of Oregon, 141 Ore. 284, 17 P.2d 568 (1932), decedent lifted and supported across his abdomen a 70 pound sack of nuts. A cancerous growth in the abdomen ruptured, exuding a bloody fluid into the abdominal cavity. The strain applied to the cancerous area was sufficient to perforate the abdominal wall and thus cause death even though the cancer itself was not stimulated to more rapid growth. See also Lucas v. Haas Coal Co., 118 Pa. Super. 182, 179 Atl. 876 (1935), where the term "aggravation" was used, and recovery granted even without evidence of perforation or rupture.
the courts refer to this type of situation as aggravation, in reality it is a precipitation of a complication, namely perforation. The tumor at the site of the blow cannot resist trauma as effectively as does healthy non-tumorous tissue. Aggravation of cancer should be reserved for those cases where new elements are introduced which hasten death or which cause premature disability. Several cases have been decided on this proper basis of aggravation. A lump of coal struck an ulcer on a workman's lip, causing bleeding and swelling. The ulcer had existed for several years, but it grew much more rapidly after the blow. The tumor had existed prior to the trauma, which had sufficient force to cause perceptible damage. Compensation granted the injured man was legally and scientifically sound.\(^{44}\) In another case,\(^{45}\) a blow of slight force struck a boy's knee with resultant swelling but no discoloration. This was followed by a second blow, again without discoloration but with increasing pain. Compensation benefits were denied for death resulting from a sarcoma of the femur arising near the injured site. A minimal blow to the cancer site without perceptible damage and with no acceleration of the patient's downhill course were the facts that medical science and the court relied upon to deny aggravation of the cancer by trauma.

Compare the case of a workman struck by several tons of coal while in a crouched position. No bruise, hemorrhage, or injury to the testicle was noted. A solid malignant fibrous tumor was discovered later in his scrotum. Death came seventeen months after the trauma. Despite the absence of evidence of damage to the testicle and of acceleration of the normally expected downhill course, compensation benefits were awarded\(^{46}\) — a questionable decision from the scientific viewpoint. Opinions regarding aggravation must be based upon broad clinical judgment and observation of fact rather than upon the pursuit of speculative possibilities.

A corollary of the aggravation phase is the question of the conversion of a benign into a malignant tumor. Opinion here is in agreement that it is extremely doubtful whether a single acute injury can ever be responsible for such a change. Most writers categorically deny such an eventuality.\(^{47}\)

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\(^{44}\) Sepes v. Pittsburgh Coal Co., 114 Pa. Super. 385, 174 Atl. 590 (1934). In Ellis v. Jones & Laughlin Steel Co., 111 Pa. Super. 252, 169 Atl. 263 (1933), a pre-existing nodule, believed to be a cyst, received a severe blow. Rapid growth of the nodule and deterioration in general health were followed by death in two months. Compensation benefits were granted, an award in step with scientific knowledge. See also Brown v. Ashford, 252 S.W.2d 7 (Ky. 1952), where a blow to the abdomen with death 5 months later due to cancer in the liver provided no compensation recovery. Keith v. Narrangansett Elec. Co., 53 R.I. 160, 164, Atl. 907 (1933), involved trauma to the abdomen, adenocarcinoma of the liver of a metastatic nature, failing health before and after trauma; no compensation recovery.

\(^{45}\) Gantz v. Brown Shoe Co., 90 S.W.2d 168 (St. Louis Ct. App. 1936).

Yet recovery has been allowed where a woman bruised her breast which contained a pre-existing tumor. The breast was removed because it was felt that the trauma might transform the benign tumor into a malignant variety. The surgeon's fear of malignant degeneration as a reasonably probable result of the trauma was shared by the court which upheld damages for the breast's removal.48

TRAUMA AND METASTASES

A facet of aggravation or acceleration of malignant disease is whether the development of metastases is hastened by injury. Metastases are, in many instances, the feature of the cancerous growth which is responsible for death. While the primary tumor may be readily removed surgically, metastases may be present in locations where they cannot be reached. Therefore the metastatic potentialities of a cancer are among the most important features of the disease as far as curability, therapy and prognosis are concerned.

A single blow to a tumor does not hasten the development of metastases. Massage or repeated rubbing or squeezing a malignant tumor may aid in the migration of tumor particles and hasten the development of secondary growths in other sites. It has been amply demonstrated that trauma does not affect the localization of metastases once the tumor particles (emboli) are in transit.49

TRAUMA, CHRONIC IRRITATION AND CANCER

A single injury can initiate a series of events that result in prolonged irritation or infection and in this fashion be responsible for the development of a cancer. Thus an individual may sustain a compound fracture as the result of a single trauma, and the bone may become infected, resulting in a disease called osteomyelitis. Osteomyelitis is characterized by prolonged drainage of pus and formation of sinus tracts (abnormal passages) which lead from infection in the bone to the skin surface. Occasionally a cancer of the skin develops adjacent to such a sinus tract. Bone tumors, however, do not arise under these circumstances. Burn scars may be the site of a cancer, especially if the burn was due to hot tar. Surgical scars do not develop independent cancers. A wound in which a fragment of metal or chemical is buried may ultimately develop cancer. In this variety of cancer, the period of chronic irritation must be thought of in terms of years.

While the injury which is basically responsible for the cancer is a single event, it is not an uncomplicated injury. The original insult leads to pro-

40 Knox, supra note 8; Toth, Accidental Trauma and Tumor Metastases, 42 Radiology 579 (1944).
longed irritation and chronic inflammation. These are truly carcinogenic agents. Nonetheless, the original injury is the responsible agent even though the cancer develops many years after the accident occurred.

Medical science can support a causal connection between injury and cancer where a piece of transom fell and struck the plaintiff's head and inflicted three wounds, one of which was a jagged abrasion on the temple. Within two years a skin cancer developed at this site. The causal connection is probable if ulceration was continuous at the traumatized site for the two-year period, if the skin had been normal before the injury and if the cancer developed at the site of injury. The court, however, granted a requested instruction that cancer not be considered in the damages because the plaintiff offered no evidence of "probability" that cancer was connected with the injury. In another case involving chronic irritation, the law and medical science were properly in accord in allowing damages against a dentist for causing a cancer in the mouth. The dentist inserted poorly fitting dentures which irritated the patient's mouth and eventually led to pain and discomfort over a period of six months. Although the court's opinion is silent on the point, the cancer was probably a carcinoma which can arise in the lining of the mouth, including the cheeks, jaws, gums and tongue. If the cancer were of a sarcomatous variety, it would indicate development from the jaw bone, muscle or nerve. The causal connection would then be highly questionable. The failure to identify the type of cancer is a weak link in the evidence. A most important task for the lawyer in any cancer issue is to ascertain that the type of cancer has been definitely established.

INDUSTRIAL CANCER

Certain cancers are definitely related to industrial exposure. To think of industrial cancer as mass-production cancer is incorrect. The Texas farmer and the sailor in the Pacific who develop cancer of the facial skin or lip, the Egyptian farmer who develops bladder cancer from working in fields where he is exposed to the parasite responsible for the cancer, and the radiologist who develops leukemia are all examples of industrial cancer.

Casual studies of the incidence of industrial cancer are not enough. They cannot withstand statistical analysis. Figures have been obtained which showed that cancer of the naso-pharynx appeared to be related to the laundry industry. Further investigation showed that the tumor occurred almost exclusively in Chinese who made up a large part of the laundry

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50 Kramer Service, Inc. v. Wilkins, 184 Miss. 483, 186 So. 625 (1939).
52 Downing, Cancer of Skin and Occupational Trauma, 148 J.A.M.A. 245 (1952); Haagensen, Occupational Neoplastic Disease, 15 AMER. J. CANCER 641 (1931).
53 Stewart, supra note 17.
industry in the area under study. Susceptibility to this malignant growth is racial and not industrial. This variety of neoplasm is as frequent in Chinese who have never been near a laundry as in those who have worked in a laundry for many years. The Bantus, an African tribe who work in large numbers in the gold mines of South Africa, have an extremely high incidence of liver cancer. Nonetheless, the tumor has nothing whatever to do with mining gold. The identical tumor is found in Bantus who have never worked in or been near a gold mine. Again, the susceptibility to the cancer is a racial characteristic. The industrial aspect is more apparent than real.

If a hot-metal worker is burned in the course of his employment, the resultant scar breaks down repeatedly, fails to heal, and ultimately a cancer appears in the scar, the worker may then be said to be suffering from an industrial cancer. If a laborer in a chemical plant develops a skin sensitivity for which he is treated over-enthusiastically with X-rays, and as a result he develops a skin cancer, he, too, is suffering from industrial cancer in a remote sense.

The word "industry" must be considered in its broadest sense. The view of what constitutes industrial cancer should be liberalized. At the same time those tumors whose incidence falls within the expected incidence for the population as a whole must not be ascribed to industry.

An occupational tumor is one which arises from contact with some exogenous agent, physical or chemical, brought about by some phase of the individual's regular work. Regular contact leads to the proliferation of cells with the clinical and laboratory characteristics of cancer. The soundest criterion for the occupational character of a tumor is proof of its occurrence in a particular portion of the body among workers in a given industry more frequently than in the general population of comparable age and sex. Secondarily, proof is established by producing similar tumors in experimental animals with the same agent.\(^4\)

The exact nature of the exposure must be ascertained. For example, it is frequently stated that workers in the oil industry are subject to skin cancer as a result of exposure to the oil. A type of oil called Scotch Shale is known to produce much skin cancer; paraffin base petroleum oils are rarely associated with skin cancer, and asphaltic American crude oils never produce skin cancer.\(^5\) The necessity for obtaining concrete data is obvious.

The latent period, i.e., the time interval between exposure to a carcinogenic agent and the development of cancer, may extend over many years. An individual may change his occupation several times subsequent to his carcinogenic exposure to the responsible substance. Minute and exhaustive

\(^4\) Warren, Minimul Criteria Required to Prove Causation of Traumatic or Occupational Neoplasms, 117 ANN. SURG. 585 (1943).

\(^5\) Ibid.
questioning and fact-finding are the basis for accurate reconstruction of the events leading to the development of occupational malignancy.

Mechanical trauma continuously repeated over a period of years can result in cancer. A workman who used an augur to drill holes by pushing against it with his abdomen may cause a desmoid tumor in his abdominal wall. A telephone lineman jams his spurs, strapped to his legs, into telephone poles and thus repeatedly damages the skin of his ankles. This type of injury can be the source of skin cancer when such an irritation is prolonged over a period of several years. A definite diagnosis of the type of tumor involved is essential for the accurate medical and legal opinion that the repeated mechanical trauma produced the tumor.

Another industrial case concerned the inhalation of sulphuric acid mist in a "pickling" occupation. The development of a cancer on the underside of the tongue was held legally to be caused by the acid-mist experience. Medically, sulphuric acid has not been accused of producing industrial cancer. Two important questions were unanswered in this case—did the workman smoke and did he have syphilis? Both are weighty considerations in any mouth cancer case.

**DISCUSSION**

From this brief survey it is evident that an overwhelming mass of documented scientific evidence opposes the theory of a traumatic origin of malignant tumors. Practically all leading modern medical authors and students of the problem have discarded any theory which postulates the traumatic origin of a malignant tumor. The etiologic importance of a single trauma in the genesis of a malignant neoplasm is no longer a matter of interest to the scientist. The question is not revived by academic or scientific curiosity, but rather by commercial interest because of the increasing accessibility of compensation for injuries.

A major reason for the continuing controversy is the phrase "in my opinion." Most physicians avoid using the word "impossible" in discussing a disease whose etiology is not completely known. Many authors who in general absolutely deny the role of trauma in the genesis of tumors do not take as rigid a stand in an individual case.

The dispute at this time is more philosophic than scientific. The statement, "A single trauma has never been proved to be the cause of animal tumor," can certainly not be contradicted. Such a statement cannot be made flatly in human beings since the possibility of a pre-existing tumor can never be safely excluded. On the other hand, "has never been proved"
should not be interpreted as "can never be the cause." The philosophic solution from this line of reasoning is that although the traumatic genesis of tumors has never been scientifically proved, equally unproved is the assertion that trauma cannot be an etiologic factor in the origin of malignant growths. However, the weight of direct and indirect evidence is highly in favor of the former concept.

Attempts to rely on a single trauma to explain the origin of a cancer depend on the exercise of a primitive form of reasoning. They represent a carry-over from pre-pathologic days, appear in text-books which copy from one another and are repeated by writers who do not think critically or who lack the wherewithal to form judgment. They are propagated by systems of compensation medicine which deny payment for services to a doctor who has in good faith assumed the care of the patient, unless the physician can prove a traumatic etiology for the disease. Since the doctor is human and can find many so-called "authorities" to support such an etiology, he is apt to endeavor to prove it. It is questionable if he believes it himself. The theory is propagated by patients who lack information on the origin and nature of malignant disease and who for years have been conditioned to relate lumps, and therefore cancer, to blows. Such patients readily fall into faulty logic with lay, medical and legal encouragement.

Despite insufficient knowledge, the law requires testimony as to a causal relationship between a tumor and a preceding trauma. In rendering such an opinion one cannot in many instances give cold, scientific fact, only probabilities. The probability of causality should be embraced or rejected on the basis of the weight of all the scientific facts that can be accumulated and studied. One cannot argue without facts.

Every question of trauma and tumor is complicated by the following factors:

1. The ready suggestibility of most human beings.
2. The difficulties of life from which trauma frequently offers an escape.
3. Poor management of traumatic cases on the part of doctors and lawyers.
4. The practically universal encouragement of litigation.
5. Modern industrial organization and compensation provisions.

The legal difficulties are increased by the general insistence on a positive opinion which a doctor cannot always give and by the conflicting testimony of experts who take sides in doubtful cases. Added to these elements are cases with out-right lying by patients who make fallacious and mendacious statements.

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Stewart, supra note 17.

SUMMARY

1. Blows and other injuries occasionally call attention to hitherto unsuspected tumors. Proof of the existence of such unsuspected growths is given by the fact that neoplasms which have never given recognizable symptoms are frequently discovered at autopsy. There are many individuals with early and even late tumors who are completely unaware of their disease. This group is the reservoir for "traumatic tumors."

2. Injuries are infinitely more frequent than tumors.

3. Many tumors have a long latent period from the time they begin until they ultimately make their presence known.

4. Experimental evidence to support the theory that a single trauma can cause a tumor is completely lacking.

5. Careful and critical examination of the more important medical literature dealing with trauma and tumors leads inevitably to the conclusion that a causal relationship between the two has not been established. Such a causal relationship can never be established until it is demonstrated by experimental methods that a single injury can regularly produce a neoplasm.

6. The award of compensation or damages solely on the basis of the appearance of a tumor following a single trauma is therefore unjustifiable.

7 The award of compensation or damages on the basis that trauma acted as a collateral or adjuvant agent by causing chronic irritation which in time produced a tumor is probably justifiable when there is proof that the injury was received, that chronic inflammation or irritation resulted directly from the injury, and the presence and nature of the tumor has been verified microscopically.

The following editorial appeared in 1944 in the Journal of the American Medical Association. "In spite of the humanitarian intent of the declaration that a single accident injury can cause cancer, justice has not been done and the public is receiving a wrong impression in regard to the cause of cancer. Undoubtedly awards were based on medical testimony, but such testimony simply cannot be regarded as conclusive. Decisions that single accidental injuries have caused cancer or can cause cancer should be appealed to tribunals which will give the problems involved adequate competent attention in the light of present knowledge."62

Nothing has been discovered or learned since that time which would invalidate the thesis expressed in these few sentences.