ORAL CANCER

J. ROY BOURGOYNE

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Chief of the Division of Oral Surgery,
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With Chapters By

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With the utmost humility this book is dedicated to
THE AMERICAN CANCER SOCIETY
those who have done most toward furthering the
advancement of cancer research
and treatment.

Preface

An appropriate introduction to the preface of such a book might be stated in the words, "The subject is a very timely one". However, such a statement is not the full truth. Indeed it is known and may be stated without fear of contradiction that "CANCER" is always a timely subject. The fact has been presented to us often and it will be found to appear on several occasions in the following chapters that cancer is second only to heart disease as the killer of man. Then should it not be expected of us, whether we be of the lay or professional, to pursue this monster with all of our armamentarium? We may well understand too that he who fights, fights best when well equipped.

With the foregoing statements shall we say then that the purpose of this volume is to arm and forewarn those who wish to partake of the compilation of its contents.

Repetition of certain statements and quotations from authorities are not herein placed for the purpose of occupying space. Emphasis is intended here, for emphasis is one of the basic principles of teaching the mind to be retentive. Repetition too is made for those who may not have a need for, or an interest in, all phases presented and wish to cover only selected portions.

Let us understand also that this was not prepared with intentions of delving into the depths of the chosen subject. Rather it was compiled from the knowledge of numerous authorities and the experiences of the author in order that the average dental and medical practitioner as well as many others connected with the field of the healing arts may be able to advise and direct the afflicted ones as soon as possible in the most accepted manner. We might re-word an old proverb here and say truthfully, "Procrastination is the thief of life", and nowhere does it apply with more force than it does when dealing with cancer; therefore, if those who see the patient first are able to direct him in the most advantageous path, he has a much better chance of survival. Here too another

proverb is recognized for its value, "An ounce of prevention is worth a pound of cure".

My most profound gratitude goes to those who aided in many ways in the preparation of this volume. I would like to thank our present dean at the University of Tennessee College of Dentistry and my professor of pathology while in school, Dr. James T. Ginn, for his contributions, advice and allotment of time for this compilation; Dr. Milton Siskind, assistant professor of oral medicine for his timely suggestions; Dr. Harwell Wilson, chief of staff of the division of surgery at both the University of Tennessee College of Medicine and John Gaston City-County Hospital; Dr. Ralph R. Braund; Dr. Joe M. Chisolm; Dr. David S. Carroll; and Dr. Ralph S. Lloyd.

Memphis, Tennessee. J. R. BOURGOYNE

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Theories of Cancer Etiology

One of the foremost problems today in the mind of Medical Science throughout the world is the question of cancer etiology. The disease which we now term cancer has been known to exist for several thousand years, however, the exact origin of this disease remains as a vague one. Millions of dollars and thousands of scientific minds are now being utilized and placed hard at work in search of any knowledge that will shed some light upon the etiology of cancer, for herein lies the secret of more definite control and eradication of the disease. It is due to the undying effort of these men concerned in this quest that we have arrived at many theories of the etiology of cancer, any one of which might prove to be the solution. Of the many theories, there are several which are most generally agreed upon as being the most logical. Each of these theories will be discussed further, later in the chapter. The etiology of cancer being little understood is made apparent by the fact that few authorities agree on the subject. Theories are still being introduced in great abundance. No disease that has afflicted mankind has received as much attention as cancer in a diligent search to find its nature and cause. The diseases which at one time seemed to threaten the very existence of the race, such as tuberculosis and syphilis, have now sunk into relative insignificance, because medical science has revealed their true nature and conquered most of the causes of their ravages. Because its true origin is yet unknown, cancer is ever increasing in frequency with rapid strides, and now looms as a national scourge. Accepting the fact that the exact etiology of cancer is definitely unknown, an attempt will be made to set forth only the theories now existing on the etiology of cancer.

First, let us define cancer. The word cancer originally referred to the condition of carcinoma but through constant use as such it has come to mean any malignant tumor. According to Behan, "Cancer is a biologic variation in which the cells have acquired a high power of development and multiplication, but have lost the power of contact". Only when a cell growth is definitely cancerous and has gained the distinguishing characteristics from normal

tissue can it be recognized. The most outstanding distinguishing characteristic of cancerous tissue is its power to invade neighboring normal tissue either as singular cells or en masse. The invasion is by infiltration, with no tendency towards encapsulation. A benign tumor, on the other hand, increases in size, pushes aside the surrounding tissues, but does not invade. The cells of cancer are without useful function, and are destructive to the organism. It is growth and reproduction without control. In the development of cancer, fundamental biological principals are violated, for cancer is related to uncontrolled biologic activity. In order to study the cause and effect relationship of cancer, we must consider the changes which so modify physiologic processes that the cell loses its structural entity and becomes cancerous. The three fundamental activities of the normal cell are: (1) growth and development, (2) function of life processes in the cell, and (3) the act of reproduction. Behan states that the first and last of these are more important in the production of carcinomatous tissues than function.

In normal tissue, regulated and coordinated growth, development, and reproduction are the result of controlled cellular activity. In malignant tumors, the cellular growth serves no purpose, is uncontrolled, and is not the result of a biological necessity.

Throughout the years, attempts at explaining the origin and growth of cancer have advanced numerous strange theories. The ancients knew cancer. It is mentioned in the Papyrus Ebers (1500 B.C.), and in the remnants of the oldest literature of India and Persia. Such ancient scientists as Hippocrates and Celsus attempted to distinguish gross varieties of cancer and to prescribe treatment for these unnatural conditions. Speculation as to the cause of this disease was general and continued for many centuries to be a fascinating subject. Galen (131 to 203 A.D.), was the founder of experimental physiology and pathology, and though he failed to make any advance in the conception of cancer, the humoral doctrine of atra bilis in his writings formed the scripture which dominated medical thought for more than a thousand years. He thought that there were four fluids in the body – blood, mucus, yellow bile, and black bile. An excessive accumulation of black bile was thought to be the cause of cancer. "Open" cancers were cauterized or treated by excision, while vegetable diets were recommended for internal cancers. Walnuts were specifically forbidden in the diet.

In the seventeenth century, Galen's doctrine was demolished by the discovery of blood circulation by Harvey in 1628. Malpighi used the microscope and found that the black bile was nowhere

to be found, instead, blood and lymph were everywhere. He postulated that lymph coagulated and varied in density, and formed cancer. The period of research that followed was one during which the lymph theory held sway. While English and French students added important contributions to the descriptive history and pathology of tumors, they failed to pass the limits of the prevailing theoretical conceptions of the time.

With the construction of the achromatic microscope in Paris in 1824, a new era in cancer research was opened. Studies of vegetable and animal tissues were made, showing with this instrument that the growth of tissues resulted from the multiplication of cells. Regardless of their careful histological studies of tumor tissue the writers of this period were led to believe in the origin of cancer from a fluid blastema. Cancer was defined as an organized exudate from the blood with over-nutrition and over-growth.

Virchow advanced the first really rational theory of causation. He believed that if irritation of a chronic nature existed for a long time, the irritation produced a granulation tissue which brought about changes in the connective tissue and resulted in a cancerous lesion. He clearly defined cells as always arising from previously existing cells. However, Remak opposed his view that cells could only arise from cells of the same type. His theory was supported by Thiersch. Thiersch also associated cancer with diminished nutrition, function capacity, and mechanical resistance.

Waldeyer, following up Thiersch's work, postulated that all carcinomata were epithelial growths derived from the corresponding epithelium, and that the secondary growths were the offspring of transplanted cells, and not a transformation of the tissue in which they occurred. He also conceived as did Virchow, that repeated irritation was the essential factor.

Cohnheim expressed a viewpoint much like that of Remak. He surmised that cancer arose in persistent embryonic rests, which, because of their displacement from their normal environment, had not been incorporated during the normal development of the organism and had not degenerated. Thus cancer was a renewal of embryonic growth. He did not explain, though, why these cells remained dormant for years, nor why only an occasional cell rest developed into cancer. There were many arguments pro and con on Cohnheim's theory. It is now known, however, that tumors and malignant new growths do arise at times from what are the results of anomalies of development, for example, teratoma and mixed tumors.

There was also existent at this time the theory that cancer was caused by an external parasite. It was held that cancer was infectious because it resembles tuberculosis, but this view is based on a false analogy, as has been proven. In tuberculosis the tubercle bacillus is the cause of the disease, while in cancer actual portions of the body grow in places where they should not be, having themselves been transported. One might say that one part of the body has become parasitic upon the other.

In an earnest effort to maintain the supremacy of their science, pathologists of the last century were so busily engaged with the assortment, classification, and digestion of the facts which had been accumulated in relation to structural variations and abnormalities that little real progress was made in clarifying the etiology of malignant tumors.

With the dawning of the twentieth century came the era of experimental cancer research. None of the past theories concerning the essential cause have proved demonstrable, and attention has come to be more or less confined to the determination of predisposing factors so that working out from indirect causes, the direct cause may be found.

Endless experimental work is now being done in research laboratories throughout the world, with reference to the influence of heredity, irritation, environment, diet, etc., upon the cause of this disease. Experiments are being made upon animals, and even in some cases upon human subjects. The theories concerning the origin of tumors are more numerous than the varieties of tumors themselves. The best-known theories of the time are: (1) heredity, (2) embryonal theory (Cohnheim), (3) irritation theory (Virchow), and (4) parasitic theory.

To the above group of theories, one might add several others, though some of which are held in ill repute by man, seem logical to others. Some of these are: (1) the endocrine theory, (2) the chemical theory, (3) the bacterial theory, and (4) avitaminosis.

It is being accepted by an increasingly greater number of scientists that the most fundamental of the systemic causes of cancer is a modified hereditary influence or tendency. It has been concluded from the study of cancer in lower animals that there is a hereditary tendency in certain animals, but as yet this theory has not been extended to apply to human beings. The most enlightening knowledge has been given this subject by Maude Slye, who did much to convince the medical profession of the existence of an inherited predisposition to cancer. She carried out her work at the University of Chicago in the Cancer Laboratory, using mice as

the experimental animal. She took the utmost care to rule out errors that might complicate the experiment. Her work was so thorough that the student of cancer is almost bound to coincide with many of her viewpoints. According to her research, selective breeding may ultimately produce strains of animals in which different organs will acquire a definite predisposition to certain cancer types. From her work a theory of cancer inheritance was developed which states that: Malignancy is transmitted as a localized recessive character which is capable of suppression by a dominant unit. The localization of a malignancy is determined by localization factors that provide the occasion for malignancy in tissues that are capable of malignancy, if there exists an external causative factor in the correct interrelationships. Her theory states that cancer is hereditary, with one recessive character for carcinoma, one for sarcoma, and one for leukemia, also the location of the cancer is determined by these recessive characters, with a different recessive character for each of the different locations that cancer may be discovered.

The viewpoint of Maude Slye accords with that of Leo Loeb, who believes that in mice there is not only an inherited predisposition to cancer of a certain type, but also that there is present a predisposing factor which determines whether the transformation of the normal into cancerous tissue will be accomplished within a certain age period. He also says that the inheritance of a cancer predisposition is restricted to a certain type and to a particular organ. He believes that the cancer predisposition inheritance is analogous both in men and in animals.

These experiments, carried out on mice and from which the above mentioned gained their theories, do not necessarily hold true for human beings. However, it is a known fact that there is more of a tendency for the children of families who have a high rate of cancer to develop cancer than there is when there is no cancer in the family. The question of inherited susceptibility in the origin of human cancer is still not definitely answered.

The evidence favoring the doctrine of hereditary disposition to cancer consists mainly in records of "cancer families" and in statistical studies of the incidence of the disease in the relatives of numerous cancer patients.

In 1837, Warren reported a family history in which the grandfather had cancer of the lip, while the son, his daughter, two sisters, and one of their daughters died of the same disease. The most noted cancer family was that reported by Broca, 1866, of Madame Z, the details of which were furnished by a member of