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HISTORY OF SCIENCE

BIOGRAPHICAL SKETCH AND CONTRIBUTIONS TO MEDICINE OF XAVIER BICHAT

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Xavier Bichat was born in Thoirette, France, on 11 November 1771, the oldest son of Jean-Baptiste Bichat, a physician. As a young man, Bichat went to the city of Lyon and became the pupil of a surgeon, M.-A. Petit. In 1793, he went to the Hôtel-Dieu Hospital and studied under the surgeon, P.-J. Desault; they became close friends. Desault died at age 47 in 1795 leaving unfinished a four-volume manuscript on surgery. Faithfully, Bichat completed this work. Bichat was named Physician of Hôtel-Dieu Hospital at age 28. There, he continued his research on cadavers and treatment of patients; his writing included treatises on the treatment of membranes (coverings of organs, such as pleura and meninges), and descriptive anatomy. He was preparing a third volume on anatomy when he died on 22 July 1802. He was one of the first to link anatomy and physiology with the practice of medicine. Bichat was one of the earliest physicians to describe the lesions of cancer, beginning with descriptions at the cellular level and proceeding with those in glands, arteries, bones, membranes, mucous system (organs with internal cavities), and skin. Bichat noted that only by continued observation of different forms of tumors and cancer could they be classified. That had been his plan when death intervened at the age of 30.

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BIOGRAPHICAL SKETCH

Early Life and Training

Xavier Bichat was born in the village of Thoirette, France, 11 November 1771, the oldest son of Jean-Baptiste Bichat, a physician and a member of the faculty of the Montpellier Medical College. Even though his father set an example for Xavier, at an early age he was upset by the sadness of illness and death. Bichat overcame his early repugnance concerning illness and set forth to Lyon where he became the pupil of a well-known surgeon, M.-A. Petit. In 1793, at the age of 22, Bichat went to Paris and to the famous Hôtel-Dieu Hospital where he became the student of another well-known surgeon, P.-J. Desault. Desault treated Bichat like a son and they soon became professional colleagues and close friends. Bichat assisted with medical lectures with such precision that it could have been thought that he was the "master" himself. Desault's students were given the opportunity of abstracting his lectures. When Bichat abstracted one concerning a fractured clavicle and how to dress it, it was so well done that Desault then asked him to continue with this work (Launois, 1902). Until that time Bichat had done no writing, but had studied, read, observed, compared, and understood the difficulties of the science and practice of medicine (Gauthier, 1839).

Desault died at the age of 47, leaving unfinished a four-volume manuscript on surgery. Faithful to his memory, Bichat completed this work concerning Desault's teaching of the treatment of external illnesses.

Professional Career

Bichat was named Physician of Hôtel-Dieu Hospital at the age of 28. Though he was an avid reader of medical literature, he thought that more could be learned about illness at the bedside of a sick person and about causes of death from the study of cadavers (anatomy). And, as his predecessors Dubois and Desault had done before him, he stole out at night to the Clamart and Porcherons cemeteries to procure cadavers (Genty, 1943).

The Hôtel-Dieu had been built long before Bichat's time for housing lepers. After a fire, it was rebuilt on the banks of a

small arm of the Seine River in Paris. It had four stories and was approached by two bridges, the Saint Charles and the Pont-au-Double. On each of the four floors 24 windows faced the river. There were 23 large halls or wards, the largest measuring 160 m. Eleven wards were for men and 12 for women (Genty, 1943).

Bichat once said as he stood by the statue of Desault, that he would give 30 years of his life to resemble that great man (Gauthier, 1839). However, Bichat had no doubt about his own future: "I believe I shall go far," he once said to his student, Roux, not considering his hemoptysis that was recognized by himself as tuberculosis (Genty, 1943).

Bichat's colleague, Pinel, was the first to perceive that a disease can only be an alteration of textures (observable appearance of external parts of the body or of organs before dissection) or of organs, and had produced a treatise on that subject that described the relationship between symptoms and underlying diseases (Pinel, 1813). This research influenced Bichat to extend his research to all membranes of the body, resulting in his preparation of a book entitled, *Treatment of Membranes* (Gauthier, 1839). These studies and his treatment of patients resulted in his next two publications, *Recherches physiologiques sur la Vie et la Mort* (Bichat, 1827), and *L'Anatomie générale appliquée à la Physiologie et la Médecine* (Bichat, 1812), the latter being first published in 1801. Bichat then completed only the first part of his fourth work entitled *L'Anatomie descriptive* (Bichat, 1801–1803, and 1829) in which he conceived the idea of connecting by a regular chain all the parts of the art of healing, of introducing a complete system of medicine founded upon anatomy, study of the functions in the state of health and of disease, observation of the local and general effects of medicines, and results of examination of dead bodies (Gauthier, 1839). Sadly, however, he did not live to complete this work; he died at the age of 30. His students, Roux and Buisson, later completed this work.

Illness and Death

On a hot and humid 19 July 1802 Bichat came to the Hôtel-Dieu to examine some macerated skin. He remained at the hospital until evening. On his way to one of the wards, he fell on some steps, hurt his chest, and fainted. Since early 1801, Bichat had suffered frequent stomach illnesses which caused a yellowish appearance to his face, but he never stopped working with cadavers (and illnesses which caused their deaths) and teaching.

Bichat spent a restless night after arriving home, a short distance from the hospital. The next day, despite a violent headache, he made his customary visit to the hospital; however, fatigue overcame him and he went home to bed.

On 21 July, Bichat spiked a high fever and his students, Roux and Esparron, called Dr. Corvisart, thinking Bichat had a bilious or gastric "fever," but Bichat wanted to consult Pinel. On the seventh day of the fever, Bichat became comatose and had a convulsion. He then appeared to improve, but two days later he became delirious. On the 14th day of the "fever," Bichat died. Some thought it might have been meningitis. Or, was it cancer of the stomach with metastasis to the brain, or was it tuberculosis?

BICHAT'S IDEAS ABOUT CANCER

Observations

Bichat began his ideas about cancer at the cellular level, though he never had the advantage of the use of a microscope. (The microscope had been developed at that time, but he did not have the opportunity to use one.) He wrote as follows: "In cancerous affections of the glands and of the viscera, the lamellated texture is almost always confounded with the diseased parts which it covers and is degenerated like them, and thus is found scirrhous, carcinomatous, tubercular, and fungus masses, in which the texture alone appears to be altered" (Gauthier, 1839).

Next he described the havoc to some arteries caused by cancer, stating that arteries "partake of the affections of the organs of which they make a part" (Gauthier, 1839). He noted that the destruction of arteries caused by cancer produced hemorrhages.

In describing cancer of the bones, Bichat wrote, "The bones, compressed by neighbouring tumours, experience various changes in their shape. These tumours often also destroy them in part, perforate them, and wear them out to a greater or lesser extent" (Beclard, 1823).

Bichat described *"spina ventosa"* as a true cancer of the medullary membrane, different from cancer of the bone and from that which affects the periosteum. He observed that these tumors occurred most often on the long bones, and the bones formed a covering to the tumor, which because of its growth sometimes became perforated by it (Beclard, 1823).

Bichat noted that the periosteum was sometimes affected with cancer. Some of his colleagues described this as fungus, medullary fungus of the periosteum, bony tumor, or even lymphatic tumor of the periosteum (Beclard, 1823).

In his description of the morbid anatomy of the mucous system, Bichat described the transformations caused by cancer. (By mucous system is meant all the organs that have internal cavities such as stomach, intestine, etc.) He noted

the thickenings, growths, and excrescences in these organs which caused their enlargement. An example was his description of polyps in the intestinal tract that were outgrowths or outpouching from the normal internal lining of the bowel. He described these as "alteration of texture" (of the bowel), some of which he described as cancerous (Beclard, 1823).

In addition to the cancer which could occur in intestinal polyps, Bichat noted this condition also in the rectum, nasal fossae, and the uterus. He noted also that some tumors occur below the surface of the mucous membrane and finally ulcerate at the surface, causing a spread of the malignancy in this area. Such were his descriptions of cancers of the stomach, esophagus, intestines, and bladder. Other cancers had their origin in the mucous system, later, and after a long period of time, penetrating into the organ. Examples were cancer of the lip, glans penis, and uterine cervix (Beclard, 1823).

"Cancer of the skin assumes a peculiar form which is only observed in this membrane and in a mucous system; it constitutes most of the ulcerations around which the neighbouring texture is little altered, so that in an anatomical view, there is no resemblance between these ulcers called 'carcinomatous' and the other cancerous affections" (Beclard, 1823). Polyps, like those in the mucous membranes, may also arise. In the subcutaneous tumors, the skin is subsequently affected in two different ways, sometimes contracting to form a remarkable kind of hardness at the same time that it adheres intimately to the parts that it covers, and sometimes ulcerating from within outwards, both kinds occurring in terminal cancer.

Preternatural Textures

Bichat described preternatural textures (unusual, unnatural, or abnormal growths in various parts of the body) as increase in size and shape of organs caused by the occurrence and growth of tumors within them. He thought that almost all organs of the body could be affected in this way, and that a number of organs could be so affected in one person (metastasis). He explained that some tumors could become so enlarged that they formed additional tumors on the exterior of the involved organ. He noted also that there appeared to be two varieties of tumors in organs. In one, the tumor appeared to become a part of the organ "interposed between the textures which compose the organ" (Beclard, 1823). In the other, the tumor replaced the original organ.

Theories about Cancer or Preternatural Textures

Bichat described several theories, those by Bayle, Laennec, Meckel, J. Hunter, and Abernethy, concerning how the preternatural textures (or abnormal growths) occur, ending with, "Hence, it follows that all these textures are far from being equally well known; that daily observation shows productions which do not resemble any of those hitherto described" (Beclard, 1823). We do not know how to classify such alterations as polyps, fungi of the dura mater, etc. The only textures which have characters that can be adequately described are: "1) tubercles, 2) scirrhus, 3) cancer, and 4) melanosis" (Beclard, 1823).

Descriptions of Cancer

Cancer, as described by Bichat is "soft cancer, cerebriform or encephaloid matter" (Laennec), the fungoid inflammation (Burns), the fungus hematodes (Hey and Wardrop), and the medullary sarcomas (Abernethy). The texture of soft cancer is of less consistency than the scirrhous: "it is milky white, variegated when it is cut, by red points formed by the divided vessels; . . . the masses which this texture forms are divided on their surface by lobes convoluted nearly like those of the brain" (Beclard, 1823). Some thought that nervous tissue of the brain was the cause of such cancers. The masses occupy a small area at first, but later are "propagated in all directions [metastasis]" (Beclard, 1823).

Launois (1902) summed up Bichat's contribution to science as follows: "Bichat's life was not long, but his work was immense during ten years as witnessed by the number of his manuscripts which are preserved in the Library of the Faculty of Medicine. . . . In order to understand his influence on biological sciences one must evaluate his contributions to anatomy, physiology and medicine."

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