

OUR DEBT TO ORTHOPAEDIC PATHOLOGISTS

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Everyone in Orthopaedic practice and especially those of us who deal with connective tissue neoplasms owe a great debt to a group of clinicians, outstanding scientists and superb teachers and collectors who over the last 100 years have solved the problems of diagnosis of bone, joint and soft tissue tumors and other forms of connective tissue disease. They are our pathologists and they have enormously contributed to our understanding and development of treatment systems for bone and joint diseases.

Were we to go back to ancient days we would have to mention Abernethy who, in 1804, first described a malignant bone tumor and was the first to introduce the term "sarcoma". Shortly thereafter, in 1805, Dupuytren described a similar tumor arising from bone and alluded to its aggressiveness and the likelihood of metastasis. The more extensive description of connective tissue tumors and more specifically those within or arising from the bone were those of Rudolph Virchow in his remarkable three-volume book published in 1863-1869. Virchow was considered to be the father of bone pathology and indicated that although these tumors were a problem for patients, they were much rarer than carcinomas. In 1845, Hermann Lebert published an illustrated atlas entitled "Physiologie Pathologique" in which he used artistic pictures of cut sections of tumors arising from bone to identify them and distinguish them from other forms of cancer. These and others were the great pathologists who gave us a basis for our systems for treatment.

It is however in more recent times that the leaders have defined our pathologic world. Some did it with articles in journals, some with books and some with programmed teaching but all of them looked at case material, described it, gave us names for the disease they observed and forecasted some concept of the risks and problems for afflicted patients.



Figure 1
Jakob Erdheim MD (1874-1937)

The first of these great contributors was Jakob Erdheim who was born in 1874 in Galicia and received his medical degree from the University of Vienna in 1900. (Figure 1). He became interested in pathology and joined the Pathology Institute of the Municipal Hospital of Vienna. In 1923, he became Director of that Institution and with great commitment, performed thousands of autopsies and trained hundreds of students in pathology.

Included amongst his revering students were Fritz Schajowicz, Henry Jaffe, Heinrich Karpas, Leo Low-Beer, Ernst Freund and Fuller Albright. His capacity as an investigator is reflected in his remarkable studies of hyperparathyroidism, acromegaly, Paget's disease, pituitary gland abnormalities, action of growth hormone and a variety of pathologic entities. He died in 1937 allegedly of an occlusion of his left coronary artery.

The next great contributor to our pathologic knowledge was James Ewing who was born in Pittsburgh, Pennsylvania in 1866 (Figure 2). At the age of 14 he developed osteomyelitis of the femur and spent almost two years in bed during which time, he learned to use a microscope. He completed his education at Amherst College and received an AB degree in 1888 and an MA in 1891. He entered the College of Physicians and Surgeons in New York City and after receiving his doctorate became very interested in pathology. In 1899 he was named a Professor of Clinical Pathology at Cornell and he not only performed clinical pathology but also biologic research related to lymphosarcoma and other disorders. In 1913, he founded the America Society for the Control of Cancer and he and Ernest Amory Codman started the Registry of Bone Tumors. He was elected President of the medical board and subsequently the Director of Research for Memorial Sloan Kettering Hospital. He wrote a great textbook on neoplastic diseases in 1919 but one of his greatest contributions was the description of Ewing's sarcoma in 1921, which he initially called diffuse endothelioma of bone. He had a spectacular career as a teacher, scientist and clinician and died in 1943 at the age of 77.



Figure 2:
James Ewing MD (1866-1943)

Henry L. Jaffe MD was an extraordinary person who contributed considerably to our knowledge of musculoskeletal pathology (Figure 3). He was born in New York City in 1896 and attended undergraduate school at New York University and then the medical school to earn his doctorate in medicine in 1920. He served two internships, one at Bellevue in surgery and a second at Montefiore in medicine. Despite these early interests, he became fascinated with



Figure 3:
Henry L. Jaffe MD (1896-1979)

pathology and became a student and colleague of David Marine, an illustrious Chief of Pathology at the Montefiore Hospital during the early part of the 20th century. In 1922 based on his remarkable efforts, Dr. Jaffe was appointed Assistant Pathologist at Montefiore Hospital, where he quickly became famous for the intensity of his commitment and his extraordinary discoveries. In 1925 at age 28, he accepted the position of Chief of Pathology and Director of the Laboratories at the Hospital for Joint Diseases at 124th St and Madison Avenue, a Hospital devoted to the care of patients with orthopaedic disorders. He held that post for almost four decades until his retirement in 1964, but then he stayed on until he completed his second major volume on bone pathology in 1972. During his time at the Hospital for Joint Diseases, Henry Jaffe taught medical students, residents and fellows in Orthopaedics and Pathology both there and at Columbia Presbyterian Hospital, New York Medical College, and Albert Einstein College of Medicine. His lectures were legendary and remarkable for the spectacular material he presented in an era prior to visual display technique. He became a famous consultant in bone, joint and soft tissue pathology and had cases sent to him from all over the world asking for his opinion regarding not only the diagnosis, but what the patients might expect and how such a disorder may best be treated. The imaging and pathological material for all the patients for which he gave an opinion were all added to what became a vast collection of connective pathology. Jaffe's areas of interest included endocrine pathology, skeletal development and bone and soft tissue diseases. He wrote over 130 original articles in the field of pathology and wrote two books, both of which remain as major sources of information regarding bone disease. These include a volume entitled "Tumors and Tumorous Conditions of Bone and Joints" published in 1958; and a second volume entitled "Metabolic, Degenerative and Inflammatory Diseases of Bone and Joints" published in 1972. Material from both these volumes are still widely quoted by current authors who find the descriptions and illustrations for these diseases still unparalleled in current literature. Jaffe described or clarified the nature of tumorous disorders of bone including unicameral bone cyst, aneurysmal bone cyst, osteoblastoma, osteoid osteoma, giant cell tumor of bone, eosinophilic granuloma, pigmented villonodular synovitis, chondroblastoma, non-ossifying fibroma, fibrous dysplasia, and chondromyxoid fibroma. Perhaps Dr. Jaffe's most extraordinary contribution, which has lived on after him is in the form of an enormous collection of pathologic material that he acquired over his lifetime

During his life and times, Henry Jaffe maintained a close association with many pathologists and clinicians but one of these that he respected the most was Jakob Erdheim (1874-1937) of Vienna. Erdheim was a superb clinical pathologist, a world famous educator and also a major collector of pathologic material for patients with bone and soft tissue disorders. He was killed by the Nazi's during the Anschluss in Vienna in 1937; but just before that occurred he sent his collection of pathologic material to Henry Jaffe. He wrapped all of his pathology slides collected over many years in a rug and sent it to Jaffe via several

other individuals. Jaffe revered the Erdheim collection and kept it separate from his own material although periodically used it for education or pathologic description of disease.

In 1979, when Jaffe died, he willed his own and the Erdheim collection to me. The material is in filing cabinets and in slide trays, currently residing in my basement. Surrounding the Jaffe-Erdheim collection is the Crawford Campbell collection of hundreds of radiographic images of patients with tumors; and a personal collection of thousands of 2 x 2 photographic slides acquired by me and my colleagues over the past 40 years.

The Jaffe collection consists of over 3000 cases each one in a brown envelope with the patients name, the diagnosis, the referring physician and a Jaffe number, which relates to a series of filing cards contained in boxes. Using the Jaffe system, which far preceded computers, one can quite easily locate patients by their name, diagnosis or Jaffe number. The file cards are also used for the Erdheim collection and a similar system exists for the Crawford Campbell collection so that it is possible to access large amounts of pathologic material with relative ease. Each brown envelope contains the imaging studies, usually in the form of X-rays but occasionally specimen photographs, and hematoxylin and eosin stained slides of different relative magnification ranging from 10x to 400x. In addition many of the cases have typed pathology reports and letters to the referring physicians all signed by Dr. Jaffe. We are currently digitizing the system and plan ultimately to put it on the web for all who are interested in education or research regarding bone pathology.



Figure 4:
Louis Lichtenstein MD
(1906-1977)

Louis Lichtenstein was perhaps the most famous of Jaffe's colleagues (Figure 4). He was born in 1906, received his MD degree from Yale in 1929 and trained in pathology at Mt. Sinai Hospital in New York City. He served as an instructor in Pathology at Louisiana State University. He moved to New York City and joined Henry Jaffe at the Hospital for Joint Disease for 11 years. He then moved to California to assume academic posts

at both Los Angeles and San Francisco. He wrote a book on Bone and Joint Tumors in 1952. He died in Palm Springs, CA in 1977 at the age of 71. His book is outstanding and is still read and frequently quoted.

David C. Dahlin was born in South Dakota in 1917 and received a degree from the University of South Dakota (Figure 5). He received his MD from Rush Medical School in 1938 and completed a fellowship in Pathology at Anker Hospital in St. Paul. He was accepted for a residency in surgery at the Mayo Clinic but was drafted into the Army Medical Service and spent 3 years as a flight surgeon in Italy. Following his return he started his



Figure 5:
David C. Dahlin MD
(1917-2003)

residency but became intrigued with pathology, completing his training in 1948 when he joined the Mayo Clinic Staff. He was a great pathologist and teacher and wrote many great publications including a very prestigious book on bone tumors, which is now with Unni as the major author is in its fifth edition. He died in 2003 at the age of 86.



Figure 6:
Fritz Schajowicz MD
(1912-1992)

Another great contributor to our knowledge and education was Fritz Schajowicz who was born in Vienna in 1911 (Figure 6). He attended medical school in Vienna and after graduation started his practice in surgery, but then fell under the spell of Jakob Erdheim and became an anatomic pathologist. He worked with Erdheim for several years and published several important papers. He moved to Bologna and worked with Vittorio

Putti at the Istituto Rizzoli but because of the war and problems in Europe, he emigrated to Argentina and became a close colleague of Carlos Ottolenghi at the Italian Hospital in Buenos Aires. He published extensively and also was responsible for the development of needle biopsy technology for bone and soft tissue tumors. He also wrote a superb book entitled "Tumors and Tumorlike Lesions of Bone and Joints" in 1981, which remains a major resource for physicians interested in tumors of connective tissue. In 1977, Schajowicz moved to University of St. Louis and in 1988 to Rush Presbyterian St. Lukes Medical Center to work with Jorge Galante. He was much honored and considered a very effective pathologist and educator. He died in 1992 at the age of 80.

There are many more great pathologists who have lectured, written books and taught students over the last 50 years. These include Andrew Huvos who was the Chair in Pathology at Memorial Sloan Kettering Hospital in New York and wrote a superb book on bone tumors in 1979. Joseph Mirra wrote a two volume text on bone tumors while working in University of Los Angeles in 1989. Franz Enzinger and Sharon Weiss have written an outstanding text on soft tissue tumors, now in its 5th edition. Sharon Weiss remains the world's authority on these kind of neoplasms. Howard Dorfman worked at the Hospital for Joint Diseases in the 1960's and then joined the faculty at Montefiore Hospital in New York. He and his colleague Bogdan Czerniak have produced one of the best modern books on bone tumors, published in 1998.

At the Massachusetts General Hospital, where I currently serve, there are some excellent individuals who have enormously contributed to the quality of our tumor treatment. Walter G. J. Putschar, an Austrian pathologist was appointed in 1959 and wrote a great text on paleopathology (Figure 7). He was an excellent teacher and



Figure 7:
Walter Putschar MD
(1904-1987)

there is a conference room named for him in our Pathology Department. Alan Schiller started working at the Massachusetts General Hospital many years ago but left us to become the Irene Heinz Given and John LaPorte Professor of Pathology at Mount Sinai Medical School and Hospital. He is a superb clinician and educator and he still works with us in several courses given to residents. Andrew E. Rosenberg, the current head of bone pathology at the Massachusetts General Hospital, received his MD at Temple University in Philadelphia. He is a major teacher in our courses, gives our clinical team enormous support in dealing with patients and contributes to our research projects. Our oncologic team would be lost without him and his colleague Gunnlauger P. Nielsen, another great participant who received his initial training in Iceland (Figure 8).



Figure 8: The MGH Connective Tissue Oncology Group have been and are still tremendously dependent on the knowledge and skill of their three pathologists...seen on the far right. Andrew Rosenberg, Gunnlauger Nielsen and Alan Schiller.

So that is the great team who over the past 100 years have provided orthopaedic surgeons with accurate diagnoses, honest appraisal of their treatment protocols and a superb education, perhaps better than for any other specialty. We thank our pathologists and salute them for their dedication and remarkable talent. They have enormously improved our lives and more importantly, the lives of our patients.

SEQUENTIAL LIST OF MAJOR TEXTS WRITTEN BY OUR ORTHOPAEDIC PATHOLOGISTS:

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