The Veterinary Service of the United States Air Force: Its Contributions to Comparative Medical Research

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DURING the generation of its existence as a separate service, the US Air Force has maintained its strength and increased its capabilities through research and development. The history of the youngest of the armed services is characterized by advances in the physical sciences resulting in aerospace vehicles whose speed and maneuverability impose severe physical stress on pilot and crew. Paralleling the changes in the physical sciences has been medical research and development essential to keeping man a vital part of any weapon system and to protecting him from hostile environments. This requires the judicious use of animal models to help estimate the influence that the aerospace environment may have on man. Air Force veterinarians have continuously participated in this comparative medical research. Their contribution to advancements in medicine and in our nation's military power is an important aspect of the growth and development of military veterinary medicine.

Origin and Development

In July, 1949, 78 veterinary officers transferred from the US Army to the newly formed Air Force Medical Services. Three were assigned to research and development activities. By 1960, approximately 40 veterinarians were engaged in research and development projects, and today about 75, or 25% of the Air Force veterinary service, are assigned to this endeavor. The numbers give only a statistical perspective on the growth of veterinary participation in Air Force comparative medical research, but tell little of individual achievements and personal commitments to our nation. Since 1949, the expanding chronology of accomplishments has centered on supporting the flyer. In pursuit of this primary goal, veterinarians have furthered the national policy of humane care and handling of research animals and have participated in research and educational activities with national and international implications.

Medical research and development in biotechnology is a synthesis of the efforts of scientists from every field in the biomedical community. Air Force veterinarians have contributed a diversity of medical knowledge and ability, as well as a personal compatibility necessary for this collaborative research. Multidisciplinary teams including veterinarians have worked to find solutions to such problems as the effects of altitude and acceleration on all systems of the body, the biologic effects of space flight, the applications of nuclear energy, and the remote sensing and transmission of biological information. Because of the nature of collaborative research, the activities of veterinarians have been woven so completely into the research projects that individual accomplishments are almost unrecognizable. The following is a partial listing of individual efforts compiled from personal notes of the author and the publications of Col Donald W. Ringley,[2] and Lt Col Albert A. Taylor.[3]

Unique Accomplishments

In the 1950's, Lt Col Ulysses S. Grant Kuhn III, Majors Max M. Nold and Charles M. Barnes, and Capt Richard E. Benson helped compile baseline radiobiological data necessary for the space flights that were to follow for 2 decades. These and other military radiobiologists were a source of knowledge and experience essentially unavailable in the civilian veterinary community. Major John D. Mosley and Capts William E. Britz, Bobby L. Caraway, Jerry Fineg, and Victor J. Cook and others supported the well-publicized flights of nonhuman primates in the early 1960's throughout long preparation and tedious sifting of data. The in-

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volvement of veterinarians increased as animals were used as research subjects in orbital flights and for investigations during the lunar quarantine program. Majors Ralph F. Ziegler and Farrel R. Robinson provided toxicologic evaluation of the water produced by the Gemini-type fuel cell and the coolant fluid used in the Gemini capsule. Major Johnie L. Reeves received the USAF research and development award in 1962 for work on the physiologic and toxicologic effects of various rocket propellants. Space feeding research projects for the Gemini and the Apollo flight programs were conducted in the mid-1960's by Majors Norman D. Heidelbaugh and William T. Ashby, and in the late 1960's, Lt Col Vernon L. Carter and Major Richard A. Boster provided toxicology and laboratory animal support, respectively, for the lunar receiving laboratory.

Although much attention was focused on the space program, Air Force veterinarians were also working in other areas. During the 1950's, Col Harry A. Gorman developed a prosthetic hip joint that contributed to advances in both human and animal orthopedic surgery.

The virus of feline rhinotracheitis was first recognized in 1957 by Major Robert A. Crandell. Others who worked on this virus included Majors Thomas P. Griffin and William V. Howells.

In the late 1960's, the fabrication and testing of a mechanical heart pump by Major George L. Anstadt contributed to the knowledge and success of cardiopulmonary resuscitation.

The development of a blood-sampling valve by Major Dean E. Ewing permitted an investigator to obtain multiple arterial or venous samples from animals without repeatedly puncturing them.

During the 1970's, acceleration studies using animals and supported by Lt Col Howard H. Erickson helped to determine the optimal angle of the seat back necessary to reduce the effect of gravitational forces on the pilot during combat maneuvering of the new F-15 fighter.

Those who follow the 2 professions of doctor of veterinary medicine and US Air Force officer have a unique perspective on military medical problems. This ability was recognized in 1956 by Lt Gen Thomas S. Power, commander, Air Research and Development Command, who wrote in a letter to the Surgeon General, "The veterinary service . . . provides vital assistance in many of our research projects . . . no exact civilian counterpart exists . . . ." For example, from 1971 to 1975 the entire medical research effort of the Aerospace Medical Division, Air Force Systems Command, was directed by a veterinarian, Colonel Neville P. Clarke. From bench-level research to complete project management, innovative and motivated veterinarians contribute significantly to biotechnology.

Laboratory Animal Medicine

A US Senate subcommittee chaired by the Honorable Hubert H. Humphrey reported in 1961 that "one of the most important and growing phases of veterinary medicine is its service toward healthy, uniform laboratory animals, for these represent indispensable elements in biomedical research." Animal models have been the foundation of much comparative medical research in the Air Force, and Air Force veterinarians have been proponents of advances in the care of laboratory animals. They recognized early that high-quality, healthy laboratory animals are necessary for sophisticated research involving minute biological changes. Air Force representatives were active in the Animal Care Panel (later to become the American Association for Laboratory Animal Science (AALAS)). In 1966, the vivarium directed by Major Donald B. Gisler at the 6571st Aerospace Medical Research Laboratories, Dayton, Oh, and the vivarium directed by Major Albert E. New at the Naval Aerospace Medical Institute, Pensacola, Fl, were the first Department of Defense facilities accredited by the American Association for the Accreditation of Laboratory Animal Care (AAALAC). Currently, Lt Col William H. Pryor and Robert J. Russell are among the consultants to AAALAC. During 1967, Col Jack H. Hempy, Lt Col John W. Cable, and Major James A. Stunkard helped develop implementation standards for the Animal Welfare Act (P1 89-544). Lt Col Dale D. Boyd has served as representative to the Institute for Laboratory Animal Resources (ILAR) and many have assisted in information gathering committees for this organization.

Among the founders of the American College of Laboratory Animal Medicine in 1957 were Col Harry A. Gorman, Major Benjamin D. Fremming, Capt Milford D. Harris, Jr., and Lt Robert J. Young. By 1958 an Air Force publication, Pamphlet No. 160-12-3, addressed the Care and Management of Laboratory Animals. The residency in laboratory animal medicine, developed in 1961 by Col Robert L. Hummer and Capt Frank H. Kriewaldt at the US Air Force School of Aerospace Medicine, San Antonio, Tx, was one of the first training programs to combine graduate research education and supervised experience in the management of laboratory animals. By August, 1976, 37 veterinarians will have graduated from this 2-year program.

In 1970, Major Gale D. Taylor and Capt George W. Irving, III, initiated a series of publications entitled "Selected Topics in Laboratory Animal Medicine" that supply information on laboratory animal medicine to both military and civilian veterinarians. The short course in Operational Laboratory Animal Medical Problems, developed in the early 1970's under the direction of Major Thomas M. Butler, is an annual source of current information on laboratory animal medicine, surgery, and management.

In the early 1950's, when no texts on diseases of laboratory animals were available, Major Charlie N. Barron, Capt James R. Prine, and others at the Armed Forces Institute of Pathology (AFIP) were instrumental in the development and teaching of a course in the Pathology of Laboratory Animals. This course, lauded by military and civilian clinicians, pathologists, research workers, and ed-

ucators, is still offered in September of each year. A residency program in veterinary pathology was established at the AFIP during the late 1950's. It has been taught by both Army and Air Force veterinarians and has graduated pathologists from both services. Those Army and Air Force veterinarians assigned to the AFIP have had a profound effect on the development of veterinary and comparative pathology in this country.

International Activities

The continual participation by Air Force veterinarians in international comparative medical research has been recognized and praised by foreign governments. In 1963, Major Robert M. McCully began a long association with South African veterinarians for the study of diseases important to the nations of that continent.

During the mid-1960's, Lt Col Robert A. Crandell conducted research on foot-and-mouth disease virus in Brazil. He was followed at that Pan American Health Organization laboratory by Major Jere M. Phillips and Lt Col Paul W. Schilling who provided animal colony management and instructed veterinarians and technicians in the care and management of laboratory animals. Majors August R. Bankmieder and Peter L. Joseph are a few of those who have participated in research on human influenza, dengue, Japanese B encephalitis, and scrub typhus in Taiwan, Indonesia, and the Philippines.

Research in animal reservoirs of human diseases has been conducted by Lt Col Richard J. Brown in Indonesia, Java, Borneo, and Sumatra. The International Center for Comparative Oncology is directed by Lt Col Harold W. Casey and the US/USSR space-biology project is managed by Major Richard C. Simmonds.

Lt Col Alvin W. Smith, who isolated from sea lions and seals the San Miguel sea lion virus which proved to be indistinguishable from the vesicular exanthema of swine virus, is a participant in studies of marine mammals sponsored by the exchange scientists program of the US National Academy of Sciences and the Academy of Sciences of the USSR.

Contributor to the Civilian Community

Air Force veterinarians are inextricably bound to their colleagues in the civilian community. Accomplishments in the diagnosis and control of animal disease, new surgical procedures, techniques used in the management of animal colonies, and the results of individual research are exchanged between the Air Force and civilian communities in the literature or at scientific meetings. It is common to see Air Force veterinarians as speakers or session moderators at local, national, and international meetings. Upon leaving the Air Force, the training and experience gained in the Air Force are ultimately put to use in the civilian community. The talents of former Air Force veterinarians are utilized in government research institutions, universities, commercial laboratories, and private practice.

Like our nation, the Air Force veterinary service is characterized by diversity and possesses a rich heritage of which we are understandably proud. The Air Force has an aggressive research and development program, and the role of the veterinarian in military comparative medical research has been firmly established. Air Force veterinarians are exploring the future of medical science and technology with a tenacity akin to that of our country's founders and an enthusiasm described in the biblical quote, "See, I am doing something new! Now it springs forth, do you not perceive it?"[1] Our nation has benefited from the growth and development of Air Force veterinary participation in comparative medical research, and the returns will continue.

References

1. Bible: Isaiah 43: 19.
2. Ringley, Donald W.: Introduction of a Professional. The Air Force Veterinarian. A Case Study. Air War College Professional Study No. 3493, Air University, Maxwell Air Force Base, Al, 1967.
3. Taylor, Albert A.: The Veterinarian's Part in Air Force Space Research In *Comparative Medicine in Transition.* Edited by Henrik J. Stafseth, et al. University of Michigan School of Public Health, 1960.