The Veterinary Technology profession offers many diverse career opportunities and continues to expand its diversity. Veterinary technicians, vital to the Veterinary Team, are equipped with skills including but not limited to providing nursing care, anesthesia, surgical assistance, diagnostic imaging, laboratory procedures, practice management, and client education.

As with human nursing, the relatively young profession pursues development of continuing education programs, specialty academies, and four year bachelor degrees. Academies require additional training, formal education, and examination to earn recognition as a Veterinary Technician Specialist (VTS) of a specific discipline. Currently the National Association of Veterinary Technicians in America (NAVTA) approves eleven academies including the disciplines of dentistry, anesthesia, internal medicine, emergency and critical care, behavior, zoology, equine nursing, surgery, clinical practice, nutrition, and pathology.

Veterinary technicians contribute to numerous areas of the veterinary profession ranging from private and specialty practice, zoo and wildlife rehabilitation, public health, industry, research, and academia. Research provides a niche of diversity including opportunities as animal or veterinary care staff, project coordinators, protocol / data monitors, or consultants for budget and Animal Use Form (AUF) preparation. It allows unique opportunities for the veterinary technician and provides the foundation for advancement and continual education in all areas of the veterinary and biomedical professions.

Before discussing specifically the technician’s role in research, an introduction to the research field is warranted. An image of test tubes and rodents typically comes to mind for most individuals when mentioning research. In reality, research is conducted in every career discipline ranging from social science, marketing, arts and humanities, education, and most familiar, the biomedical field. The Merriam Webster dictionary broadly defines research as:

*Careful or diligent search. Studious inquiry or examination; especially: investigation or experimentation aimed at the discovery and interpretation of facts, revision of accepted theories or laws in the light of new facts, or practical application of such new or revised theories or laws. The collecting of information about a particular subject.*

Additionally, The National Institutes of Health (NIH) defines research as:

*A systematic, intensive study intended to increase knowledge or understanding of the subject studied, a systematic study specifically directed toward applying new knowledge to meet a recognized need, or a systematic application of knowledge to the production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes to meet specific requirements.*

Ethically, research exists to answer questions when clear, objective evidence is not available for description of clinical disease, diagnostics, treatment or procedure options, or micro- and macro-pathophysiological processes. Results generated from research provide the basis of all decisions in clinical medicine including every aspect of diagnosis, treatment, and prognosis.

The research field divides into one of two broad categories: pre-clinical (laboratory or basic) or clinical research. The use of purpose-bred or client-owned animals (or humans),
respectively, remains the major distinction between the two, and both are highly regulated. Federal regulations focusing on welfare, ethics, and scientific integrity exist to protect all individuals, both animals and humans, used in research.

Despite allegations of haphazard research conducted with no regard to animal wellbeing, the scientific community operates within strict guidelines and regulations. The Animal Welfare Act (AWA) established in 1966 is federal law which establishes the minimal requirements for the care and use of research animals. The Guide for the Care and Use of Laboratory Animals (The Guide), established in 1963, was composed by the National Research Council and the Public Health Service requires its compliance. The United States Department of Agriculture (USDA) enforces these laws with rigorous inspection of animals, medical records and facilities. Many institutions and organizations, however, voluntarily embrace more stringent criteria striving for accreditation from the American Association for Assessment and Accreditation of Laboratory Animal Care (AAALAC), a nonprofit, private organization encouraging humane and ethical use of animals in research. Each institution is required to establish an Institutional Animal Care and Use (IACUC) committee responsible for AUF approval, oversight, and regulatory adherence of all animal use occurring at that institution. Veterinary technicians play an integral role in maintaining compliance and ensuring ethical and humane animal use.

As mentioned previously, veterinary technicians fulfill many different roles within the research field. Technicians, versatile due to their skill-set, may be utilized in many of the animal or veterinary care activities without the employer spending time or money for additional training. In the role of pre-clinical animal care, staff monitor animals daily, responsible for recording environmental and medical information required by the AWA and The Guide. Although non-veterinary staff train to recognize certain signs of pain, distress, and discomfort, veterinary technicians, due to their extensive clinical training, are more qualified to perform a thorough assessment and recognize abnormal behavior. Technicians train as patient advocates, understanding normal species behaviors and comforts which allows them to provide appropriate enrichment and husbandry. In the veterinary care operation, technicians function similar to technicians in general private practice administering prophylactic treatments, diagnostics, and treating ill animals. Documentation of animal care, another inherent veterinary technician skill, remains critical to compliance and project success. For those interested in formal continuing education, three levels of pre-clinical laboratory animal certification exist through the American Association for Laboratory Animal Science (AALAS): Assistant Laboratory Animal Technician (ALAT), Laboratory Animal Technician (LAT), and Laboratory Animal Technologist (LATG). Certification is widely recognized and may be required for some pre-clinical research positions.

In both clinical and pre-clinical settings technicians contribute as project coordinators, data monitors, or consultants for budget and Animal Use Form (AUF) preparation. Technicians’ experiences dealing with the ‘little details’ becomes invaluable in thoroughly preparing for a successful study and acquiring valid data. Primary investigators prefer to leave planning for potential challenges to a competent technician. Technicians assisting in a technical role know timelines and supplies required for tasks such as anesthesia, project-specific protocols, clinical observations, harvesting tissue, submitting samples, shipping and receiving materials, and in clinical trials both obtaining owner consent and admitting patients. Technicians serve as the reality check ensuring the budget accounts for every last detail and possible difficulty as well as ensuring the AUF includes adequate yet realistic animal care and use. For instance, once an animal is fully recovered from anesthesia, it is not necessary to monitor the animal every 5 minutes or half hour for the next 24 hour period. If IACUC approves this AUF protocol,
someone would need to come in overnight at the specified intervals to maintain compliance - unnecessary and costly. Understanding the anatomy and physiology behind anesthetic drugs, fluid administration, etc gives veterinary technicians an obvious advantage and value against those hired to fulfill physical labor and read monitors. Technicians, trained in client communication, possess the skills to administer informed consent required for all clinical research participation. The ability to anticipate potential problems, provide detailed supply lists, coordinate communication between departments, organize shipping, design adequate documentation forms and systems, perform thorough clinical observations, and advocate for the animal all validate the value of technicians in research. Opportunities exist to obtain certification through the Association of Clinical Research Professionals (ACRP) as clinical coordinators or associates of Good Clinical Practice (GCP), required for research seeking FDA approval. Certification from this prestigious, globally recognized organization is required for most individuals employed for conducting human clinical trials.

Technicians may be involved directly or indirectly in research processes. Clinical research commonly requires collaboration between the research site and primary general clinician – or his/her veterinary technician. Technicians indirectly associated with the research processes may be asked to provide medical, physical exam, and diagnostic information or submission of samples. Understanding the basics of clinical study design along with the study purpose and the population involved are important for effective collaboration and study implementation to ensure data integrity and accurate information. Research study design falls into one of two categories: descriptive which describes frequency of the outcome of interest or analytical in which scientists test a hypothesis-driven theory. Most concepts apply to both human and animal research; however, this discussion focuses on the use of animals in each research design. Descriptive research often involves community surveys to ascertain event prevalence (number of total outcomes over total individuals at risk during a defined time period).

Analytical research, more widely conducted and aimed at establishing associations between exposure and outcome, involves three areas of focus: experimental, quasi-experimental, and observational. Experimental research, the gold standard, compares the outcomes of two groups: one group randomly assigned an intervention, such as a pharmaceutical or device, to the other group randomly assigned placebo or standard-of-care. Experimental research referred to as fundamental, laboratory, or pre-clinical trials utilize purpose-bred laboratory animals whereas experimental clinical trials (phases I – IV) utilize client-owned animals. Strict inclusion / exclusion criteria ensure comparable groups for maximal, accurate results. Quasi-experimental study design is similar to experimental design; however, the intervention or exposure is not randomly assigned. Observational study design, most commonly conducted in veterinary science, involves several types of design based on exposure – outcome status. Cohort studies, the most ideal observational design for establishing causation, involves two similar cohorts (groups) of individuals: one with a specific exposure status and one without. These groups are monitored prospectively at designated time points for occurrence of the outcome. Although this design provides the most information regarding cause and effect association, it is difficult to perform due to loss-to-follow-up and noncompliance – both areas that technicians indirectly involved in the research process can help minimize. Clinical studies also require collaboration from the patient’s regular clinician, frequently inadequate due to lack of research understanding or interest. Case-control studies, popular in place of cohort studies, involve two groups which have (case) or have not (control) experienced the outcome of interest. The investigator then looks back in time to determine the incidence of a defined exposure for each group. Historical,
or retrospective, studies are also popular; however, this design relies on the integrity of data collected previous to the study and often lacks important information. Hybrid designs also exist but due to complexity will not be discussed.

Overall, veterinary technicians contribute to research in many different aspects. Research offers technicians a challenging environment to apply critical thinking and technical skills while contributing to the advancement of biomedical information. The opportunities are endless and involve working with a variety of species and procedures. With experience, technicians contribute to the intellectual process of project planning. Understanding basic study design whether directly or indirectly involved with research processes is important to comprehensive, successful collaboration and maximizes data integrity. As translational research and medicine gain popularity, veterinarians and veterinary technicians become even more crucial to the research field. Most importantly, animal use in all aspects of research is highly regulated and technicians facilitate compliance efforts through their clinical skill set. Veterinary technicians, as patient advocates with well-rounded clinical skills, contribute to compliance by providing the best animal welfare and care possible. In a larger context, a career in biomedical research contributes to the overall knowledge that both veterinary and human clinicians use for daily diagnoses and treatment.

RESOURCES:
NAVTA (National Association of Veterinary Technicians in America): https://www.navta.net/
NIH (National Institutes of Health): http://nih.gov/
AAALAC (American Association for Assessment and Accreditation of Laboratory Animal Care): http://www.aaalac.org/
AALAS (American Association for Laboratory Animal Science): http://aals.org/