The Role of Veterinary Technicians in Preclinical Ophthalmic Imaging and Electrophysiological Assessment: Improving Research Quality, Efficiency, and Animal Welfare

P148

Presenting Author:
Samantha Setter; ssetter@meritcro.com

Samantha Setter,[1]
[1]MERIT CRO, Inc., Madison, WI, USA

MERIT
Your Clinical Endpoint Expert

INTRODUCTION

Preclinical ophthalmic imaging is crucial for examining models of ocular disease, evaluating therapeutic effectiveness, and assessing safety in translational research. Non-invasive techniques such as optical coherence tomography (OCT) and fundus autofluorescence (FAF) provide visualization of retinal structure, while electroretinography (ERG) and visual evoked potentials (VEP) measure retinal and visual pathway function. Reliable, reproducible data depends on precise positioning, accurate electrode placement, stable anesthesia, and careful physiological monitoring. While physicians, vision scientists, and ophthalmic technicians bring essential knowledge, the integration of credentialed veterinary technicians (CVTs) strengthens these efforts with specialized expertise in animal handling, anesthesia, and welfare to directly support both data quality and animal welfare.

Figure 1: Collaborative Roles in Preclinical Research

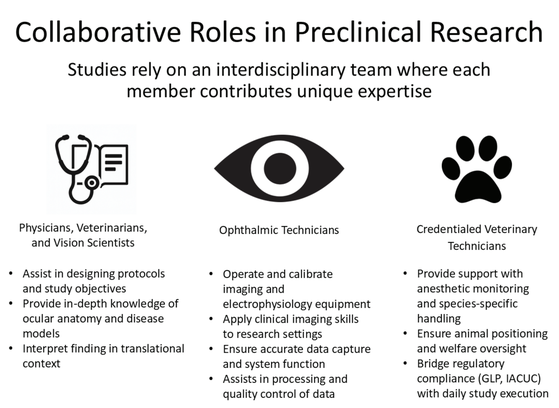
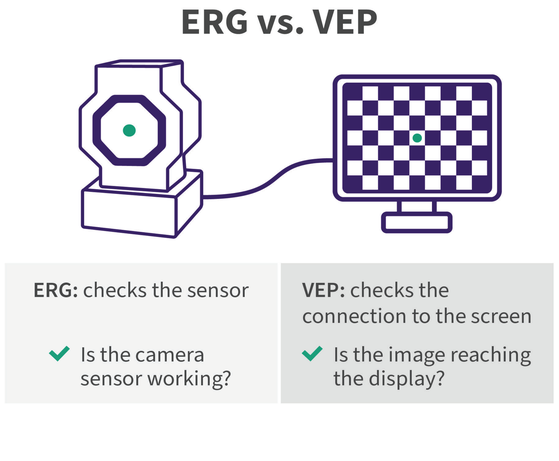


Figure 2. ERG vs. VEP



ELECTRORETINOGRAPHY (ERG) AND VISUAL EVOKED POTENTIAL (VEP)

ERG and VEP are often performed together to assess visual system function.

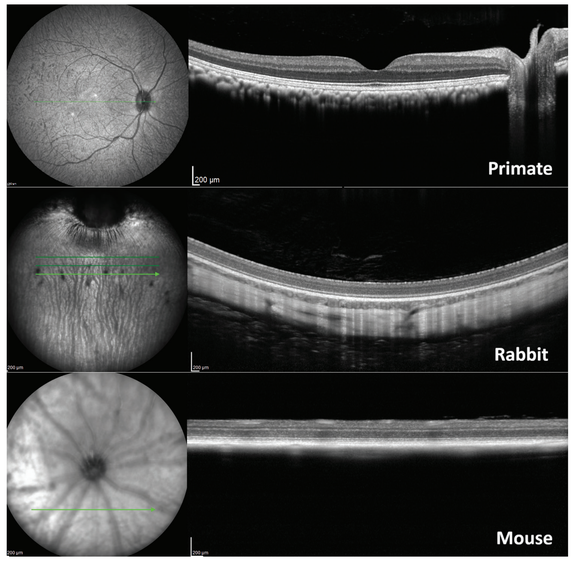
- ERG: Evaluates retinal health and detects functional changes not visible on imaging
- VEP: Assesses optic nerve and central visual pathway function
- Technician Role in Testing:
  - Prepare and calibrate equipment
  - Position anesthetized animal in front of Ganzfeld dome
  - Place electrodes to record responses
  - Monitor animal health throughout procedure
  - Remove electrodes and move animal to recovery
  - Save and upload data for analysis and processing

OPTICAL COHERENCE TOMOGRAPHY (OCT) AND FUNDUS AUTOFLUORESCENCE (FAF)

OCT and FAF are complementary techniques used for assessing retinal structure and health.

- OCT: High-resolution, cross-sectional imaging of the retina and optic nerve
- FAF: Imaging of the retinal pigment epithelium (RPE)
- Technician Role in Testing
  - Prepare the camera and equipment
  - Position anesthetized animal in front of camera
  - Maintain corneal hydration to ensure clear images
  - Monitor animal health throughout imaging
  - Save and upload images for analysis and processing

Figure 3. Representative OCT scans from primate, rabbit, and mouse



CHALLENGES IN OPHTHALMIC IMAGING AND ELECTROPHYSIOLOGY

Reliable data requires careful control of multiple variables:

- Precise animal positioning for consistent results
- Accurate electrode and equipment placement to avoid artifacts/noise
- Controlled lighting to reduce variability in visual responses
- Stable anesthesia to prevent physiological or ocular changes
- Compliance with Good Laboratory Practices (GLP) and Institutional Animal Care and Use Committee (IACUC) standards

Together, these challenges underscore the need for skilled personnel. CVTs bring expertise that addresses each of these variables, improving both data reliability and animal welfare.

Figure 4. Primate and Rabbit Ocular Photos

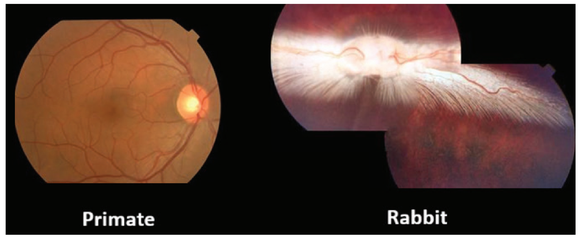
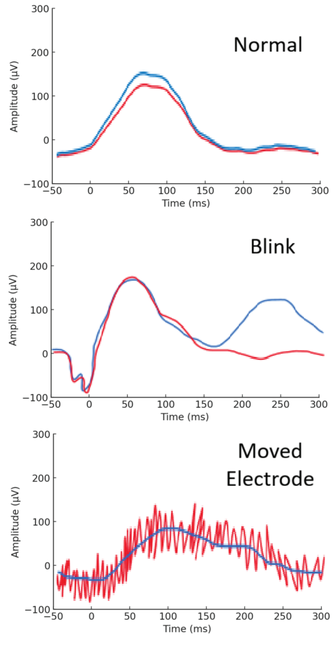


Figure 5. ERG artifacts



THE ROLE OF VETERINARY TECHNICIANS

CVT's provide specialized knowledge and skills that directly support both animal welfare and research quality.

- Anatomic Knowledge
  - Recognize species-specific ocular differences (e.g. macula in primates vs visual streak in rodents/rabbits)
  - Understanding predator vs prey eye placement (binocular vs panoramic vision) and its impact on testing
- Positioning and Airway Protection
  - Safely position animals for imaging/electrophysiology
  - Maintain airway patency in obligate nasal breathers (rodents, rabbits)
- Anesthetic Monitoring
  - Monitor HR, RR, and temperature across species
  - Recognize ocular position changes in relation to anesthetic depth
  - Detect when animals are too light or too deep to prevent artifacts

By combining anatomical knowledge, precise positioning, anesthetic monitoring, and welfare assessment, CVTs help reduce the risk of animal injury while minimizing procedure length and the need for repeat testing.

OUTCOMES AND CONCLUSIONS

The inclusion of CVTs in preclinical ophthalmic imaging and electrophysiology strengthens both research quality and animal care. Their experience in anesthesia, positioning, species-specific anatomy, and welfare oversight leads to:

- **Improved reproducibility:** Fewer artifacts, consistent data collection
- **Enhanced efficiency:** Reduced complications, shortened procedures, and less repeat testing
- **Better animal welfare:** Careful monitoring reduces stress, injury, and recovery time
- **Regulatory alignment:** Supports compliance with GLP and IACUC standards
- **Professional growth:** Expands the role and recognition of CVTs in vision research

These outcomes highlight the dual impact of CVTs: ensuring high quality reproducible data while maintaining the highest standards of animal care and welfare. Their integration within interdisciplinary teams reflects both the scientific rigor and humane care that is essential to meaningful research.

ACKNOWLEDGEMENTS

Thank you to everyone on the Ocular Services on Demand team with a special mention to Yelena Krakova and Gary Leatherberry as well as MERIT for sponsoring this poster. Special thank you to Diana Voisin for the graphic design in this poster.