



# The Charles T. Campbell Ophthalmic Microbiology Laboratory

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## Summary of The Campbell Laboratory's Research Capabilities and Expertise

- 1. *In vitro* antibiotic/antifungal assessment** – Using a variety of tests (MIC, time-kill assays, CAPA assay [Cell Associated Antibiotic Protection Assay]) and our vast collection of bacterial clinical isolates (blepharitis, conjunctivitis, endophthalmitis, and keratitis) and fungal clinical isolates (endophthalmitis and keratitis) we can evaluate the antimicrobial activity of any type of test agent.
- 2. *In vivo* antibiotic testing** – Rabbit keratitis models are used to test the efficacy and ocular penetration of antibiotics against ocular bacterial isolates with quantitative clinical and microbiological outcomes.
- 3. *In vivo* rabbit ocular bacterial occupancy model** – This assay evaluates the ability of antimicrobials to eradicate bacteria from the ocular surface, such as in conjunctivitis or prophylaxis. This assay is particularly useful for evaluating direct acting antimicrobials that kill bacteria on contact.
- 4. *In vivo* endophthalmitis prevention assays** – These assays test the ability of topical or intraocular antimicrobials to prevent bacterial endophthalmitis.
- 5. *In vitro* biofilm assays** – We have a variety of assays to test the ability of a compound to prevent or destroy bacterial biofilms (surface attached and antimicrobial tolerant bacterial communities).
- 6. *In vivo* contact lens infection models** – We have a variety of assays using contact lenses with rabbit eyes including contact lens induced keratitis models.
- 7. *In vitro* acanthamoeba susceptibility assay** – We have developed an assay that evaluates the efficacy of compounds for killing acanthamoeba cysts.
- 8. *In vitro* antiviral assays** – We use several antiviral assays (virus inactivation, plaque reduction assay, progeny yield assay) depending on the mechanism of action of the antiviral to test for antiviral activity using our large collection of ocular adenovirus serotypes and HSV-1 isolates. We also have a coxsackievirus assay.
- 9. *In vivo* antiviral testing** – We have rabbit models for adenovirus replication and HSV-1 epithelial keratitis, viral replication and resolution. Quantitative virological outcome measures provide the main assessment of antiviral activity. Our models are predictive of antiviral efficacy in patients.
- 10. Outstanding imaging of the ocular surface** and contact lenses with confocal, fluorescent, and scanning electron microscopy. Movies can be made using our microscopy resources.
- 11. *In vivo* ocular tolerability models** – Draize and Modified MacDonald-Shadduck ocular tolerability tests graded by board certified ophthalmologists to test the ocular tolerance of all classes of compounds.
- 12. *In vivo* ocular inflammation assays** – Cytokine analysis and ocular clinical inflammatory signs following addition of candidate therapeutic compounds with and without LPS, bacterial, or viral challenge.
- 13. Corneal wound healing assays** – *In vitro*, *ex vivo*, and *in vivo* models for testing the impact of compounds on corneal epithelial wound healing.
- 14. Assay development** – We can work with you to design assays to achieve your research goals.