Antimicrobial Efficacy
A Validated In Vivo Model for Device Implants

WuXi AppTec has developed an FDA-accepted animal model to test the efficacy of various antimicrobial agents when combined with devices. As post-implant device/site infections are a significant clinical issue, this model provides an infectious-agent-challenge methodology to evaluate antimicrobial therapeutics-device combinations.

[See reverse for an abstract on a study conducted using this model.]

Markets Served

- **Cardiology**
  Antimicrobial devices coating and shell
- **Neurology**
  Antimicrobial device shell
- **General Surgery**
  Antimicrobial polymer mesh
- **Cranial Surgery**
  Antimicrobial embedded in hydrogel
- **Orthopedic**
  Polymeric drug delivery of an antimicrobial agent

Bacterial Strains

Seven (7) clinically relevant bacterial strains are validated and available:

- Staphylococcus aureus
- Staphylococcus epidermis
- Staphylococcus capitis
- Escherichia coli
- Acinetobacter baumannii
- Pseudomonas aeruginosa
- Meticillin-resistant Staph A (MRSA)

Species

- **Rabbit Model**
  Validated (including regulatory review) and FDA accepted.
- **Alternative Methods**
  Include mice, rats, dogs and pigs.

Model Steps

- **Surgery**
  Device is implanted utilizing an aseptic surgical technique.
- **Inoculation**
  Implanted device is inoculated with the appropriate strain.
- **Recovery**
  After appropriate in-life period, the specific inoculated organism is recovered, including biofilm disruption, without non-specific contamination.
- **Sampling**
  Multiple quantitative sampling techniques allow for quantitation of log reduction.
- **Terminal Analysis**
  Consisting of bacterial quantification, efficacy analysis, biofilm examination and pathologic analysis.

Additional Analysis

- **Identification**
  Identifies organism by DNA identification.
- **Zone of Inhibition**
  Tests antimicrobial sensitivity to various bacterial strains.
- **Minimum Inhibitory Concentration (MIC)**
  Quantifies antimicrobial concentration.

WuXi AppTec also performs other custom, preclinical implant studies, as well as complete biocompatibility/safety and toxicology testing.

For more information on WuXi AppTec’s services please contact:

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In Vivo Model of Human Pathogen Infection and Demonstration of Efficacy by an Antimicrobial Pouch for Pacing Devices

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ABSTRACT

Background: Device-related infections represent a significant clinical challenge. Once established, these infections prove difficult to treat with existing antibiotic regimens, compromising the health of device recipients, and usually requiring surgical intervention to resolve.

Objective: The purpose of this study was to determine the efficacy of the AIGIS_{RX} Anti-Bacterial envelope designed to reduce device-related infections by incorporating minocycline and rifampin in a controlled release polymer.

Methods: An infection was established in a rabbit model by creating bilateral subcutaneous implant pockets, into which a pacing device with or without AIGIS_{RX} was placed. The incisions were closed, and a defined dose of bacteria was infused into each implant pocket. After seven days, devices were explanted and sampled for viable bacteria by swabbing and sonication.

Results: Initial studies evaluated the ability of the AIGIS_{RX} pouch to reduce Staphylococcus epidermidis infection in this model using clinical and quantitative microbial endpoints. Results demonstrate Staphylococcus epidermidis infection in all control samples, while no pathogens were recovered from samples with the AIGIS_{RX} pouch. Systemic antibiotic levels were undetectable. Additional studies tested the efficacy of the AIGIS_{RX} pouch with additional bacterial strains, Staphylococcus capitis, Escherichia coli, and Acinetobacter Baumannii. In each case the device and implant pocket with the AIGIS_{RX} pouch was free of any signs of infection. An assessment of biofilm produced by Acinetobacter demonstrated the elimination of biofilm formation on the implanted device.

Conclusion: These results demonstrate that in this animal model, the AIGIS_{RX} device reduces the risk for infection of viable pathogens within implant pockets.

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