Natural Product Chemistry & Testing for Mosquito Repellents

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Background

- DEET: excellent repellent; long track record of highly reliable, safe & effective performance

- Problems:
  - skin sensitivity
  - melts plastics
  - odor
  - unsafe use perception

- Great interest in natural product alternatives

- Wide variety of products available

- Need comparative efficacy & duration data

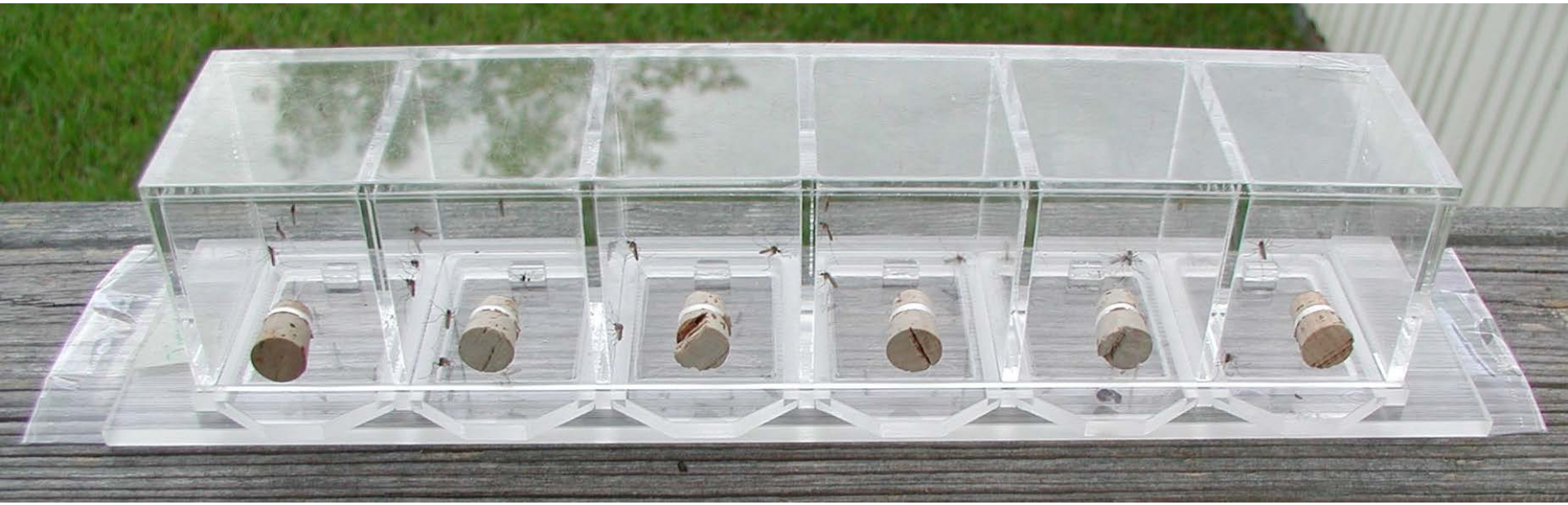
Objectives

1. Screen 25 plant oil mixtures for mosquito repellency

2. Conduct dose-range experimentation

3. Isolate mixtures comparable to DEET in efficacy and duration

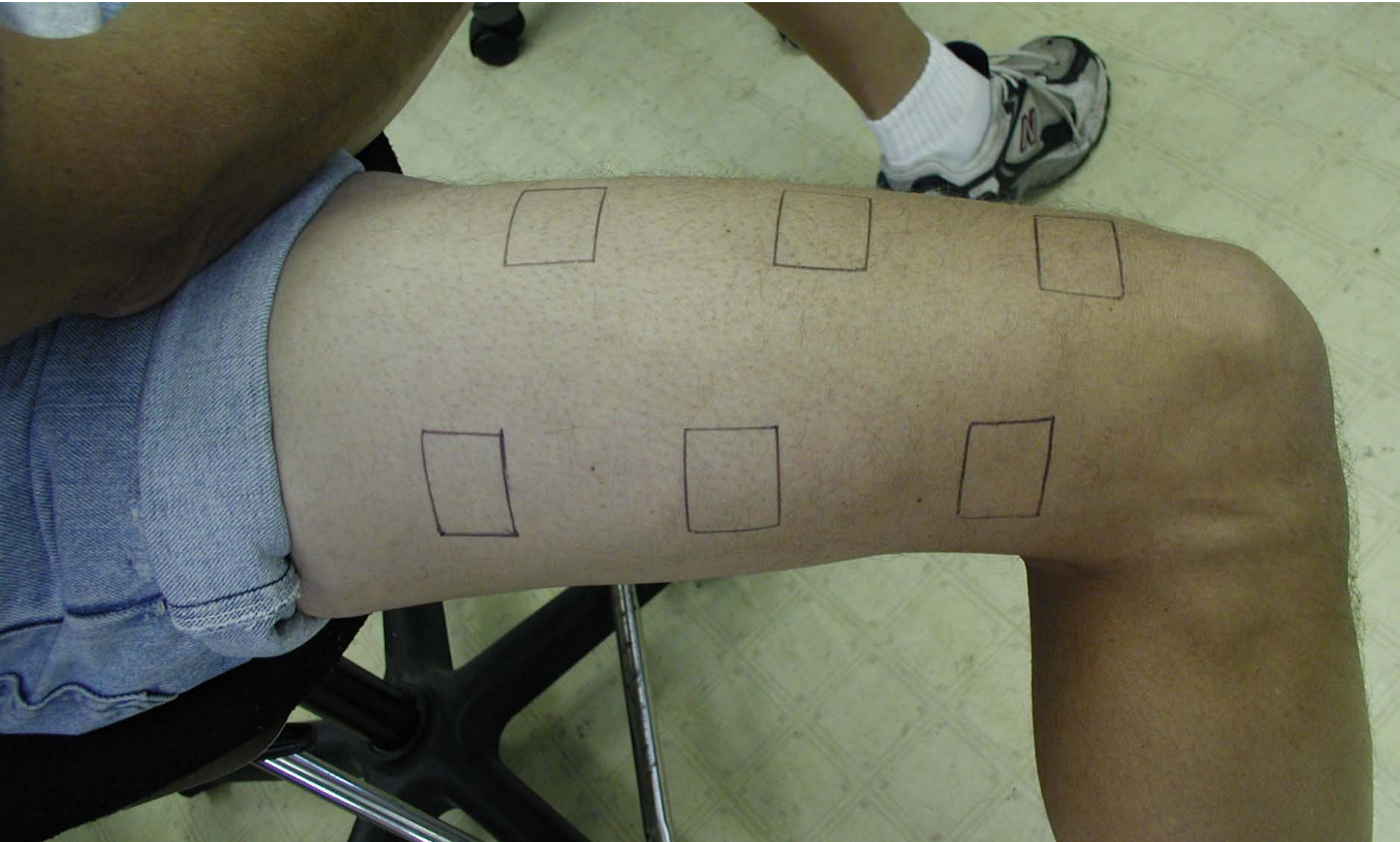
K & D Module



- Six-chambered Plexiglas module
- Sliding doors
- Expose mosquitoes to leg surface

Marking treatment areas with ink pen & template

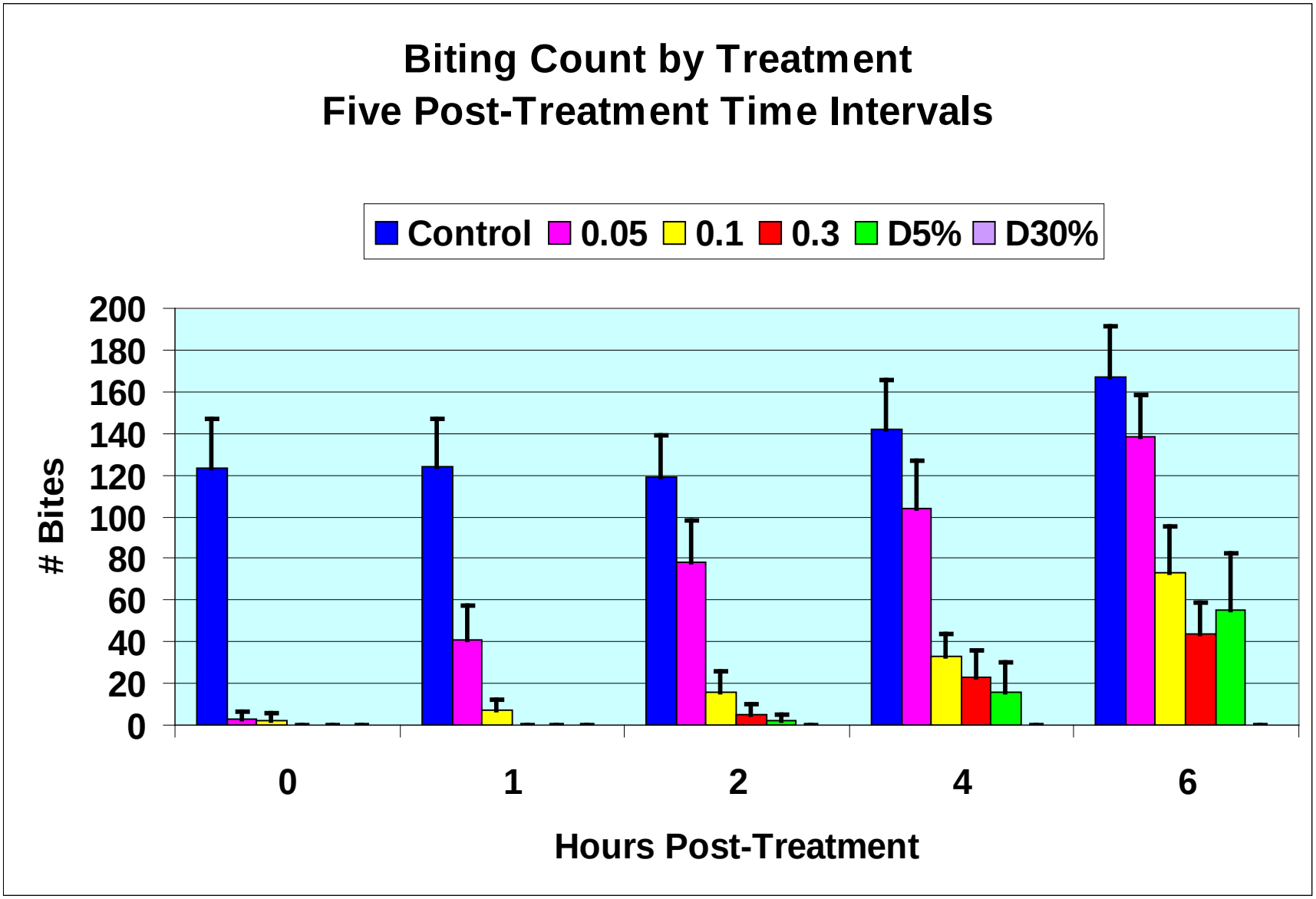
Treatment areas delineated on leg surfaces

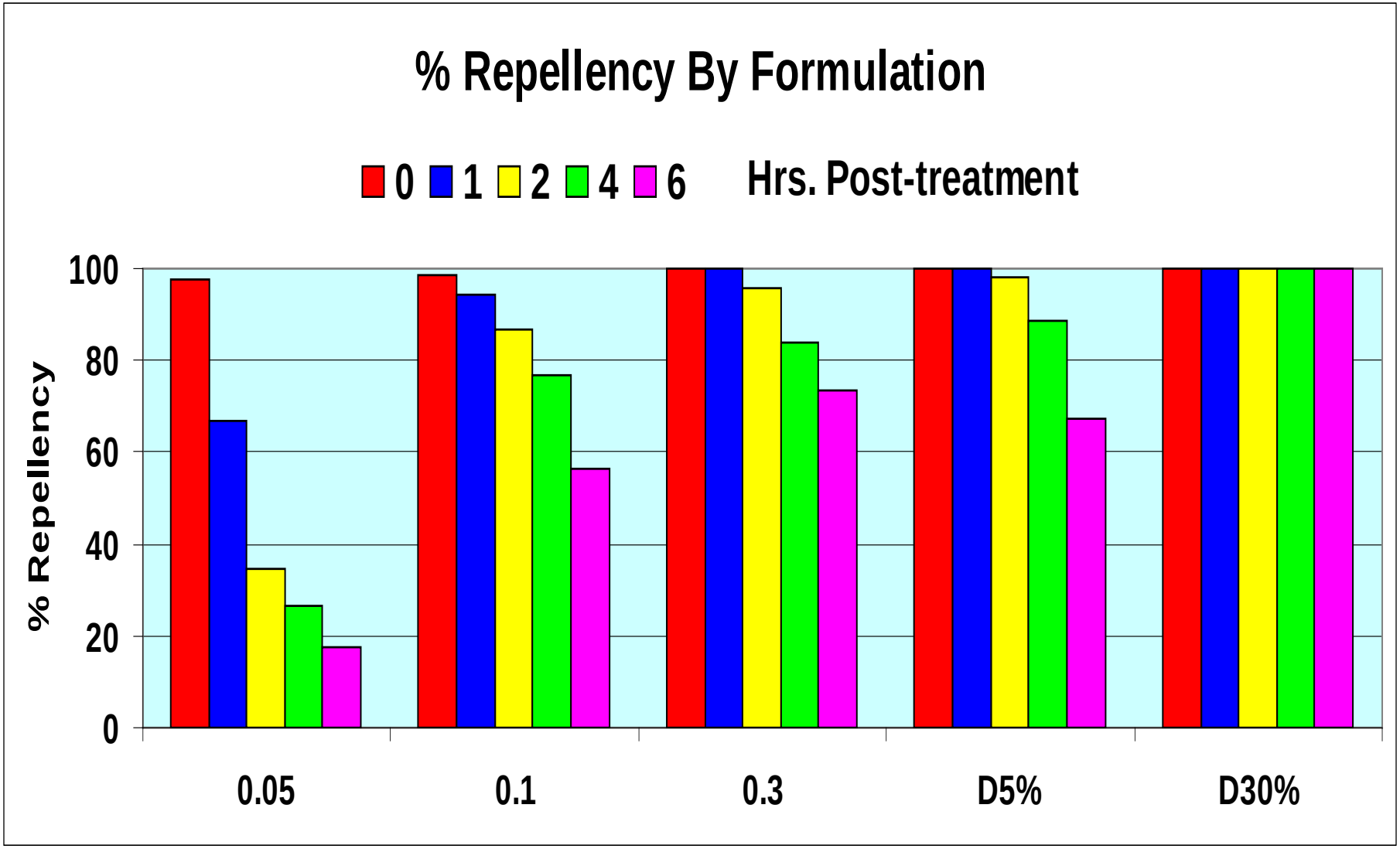


K&D module placed over rectangular treatment areas

Procedures

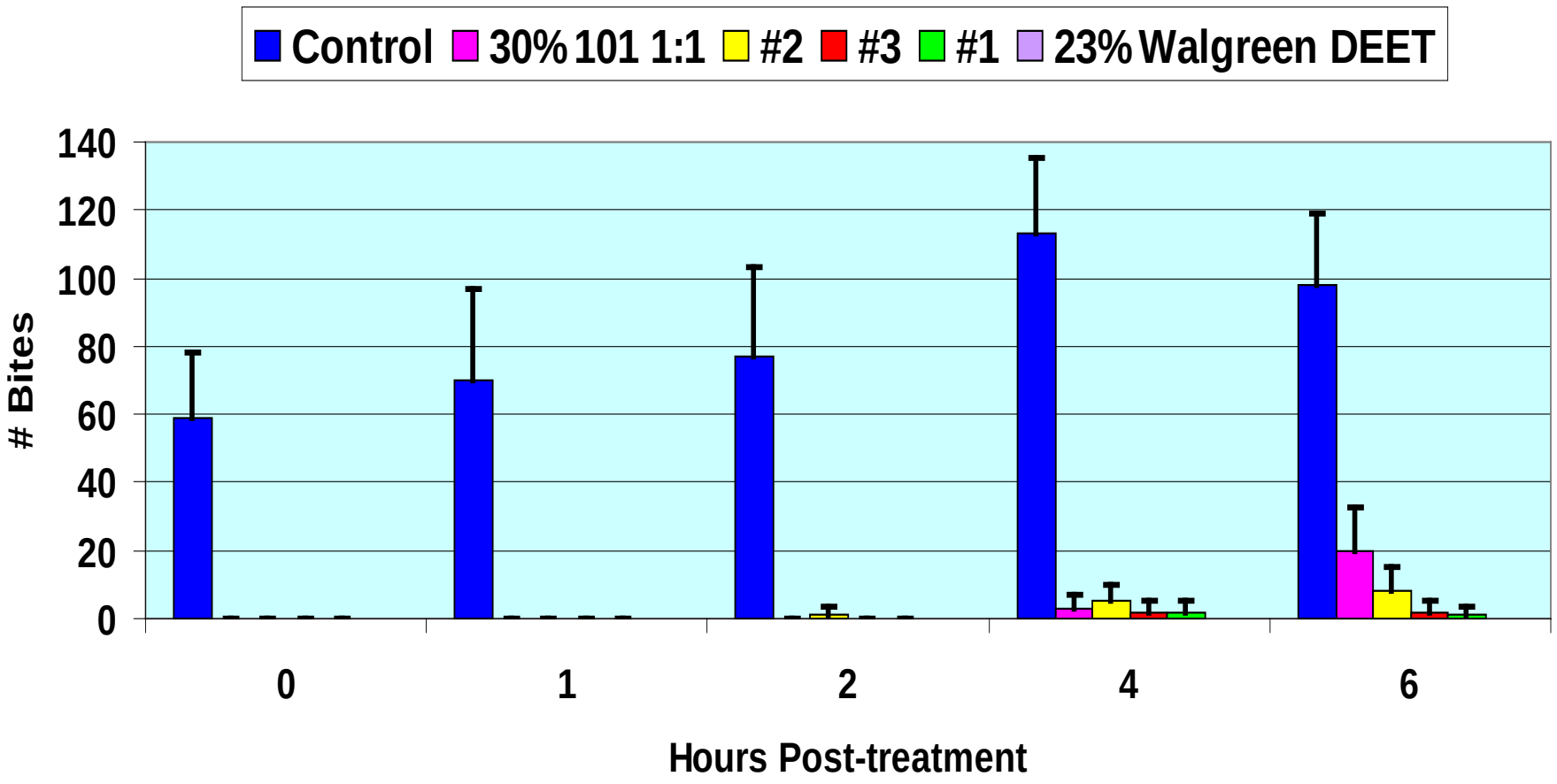
- 3 evaluators
- 10 starved female *Culex quinquefasciatus* per chamber
- Treatments applied with micropipettor at 26.7 ul/12 cm^2 skin surface
- 2-minute biting counts @ 0, 1, 2, 4 & 6 hrs post-treatment
- Chambers restocked with fresh mosquitoes after each time interval
- Each treatment replicated 3 times X 3 evaluators X 3 days of repetition, i.e., each treatment tested 27X per time interval
- Ambient temp. & humidity recorded with Hobo datalogger

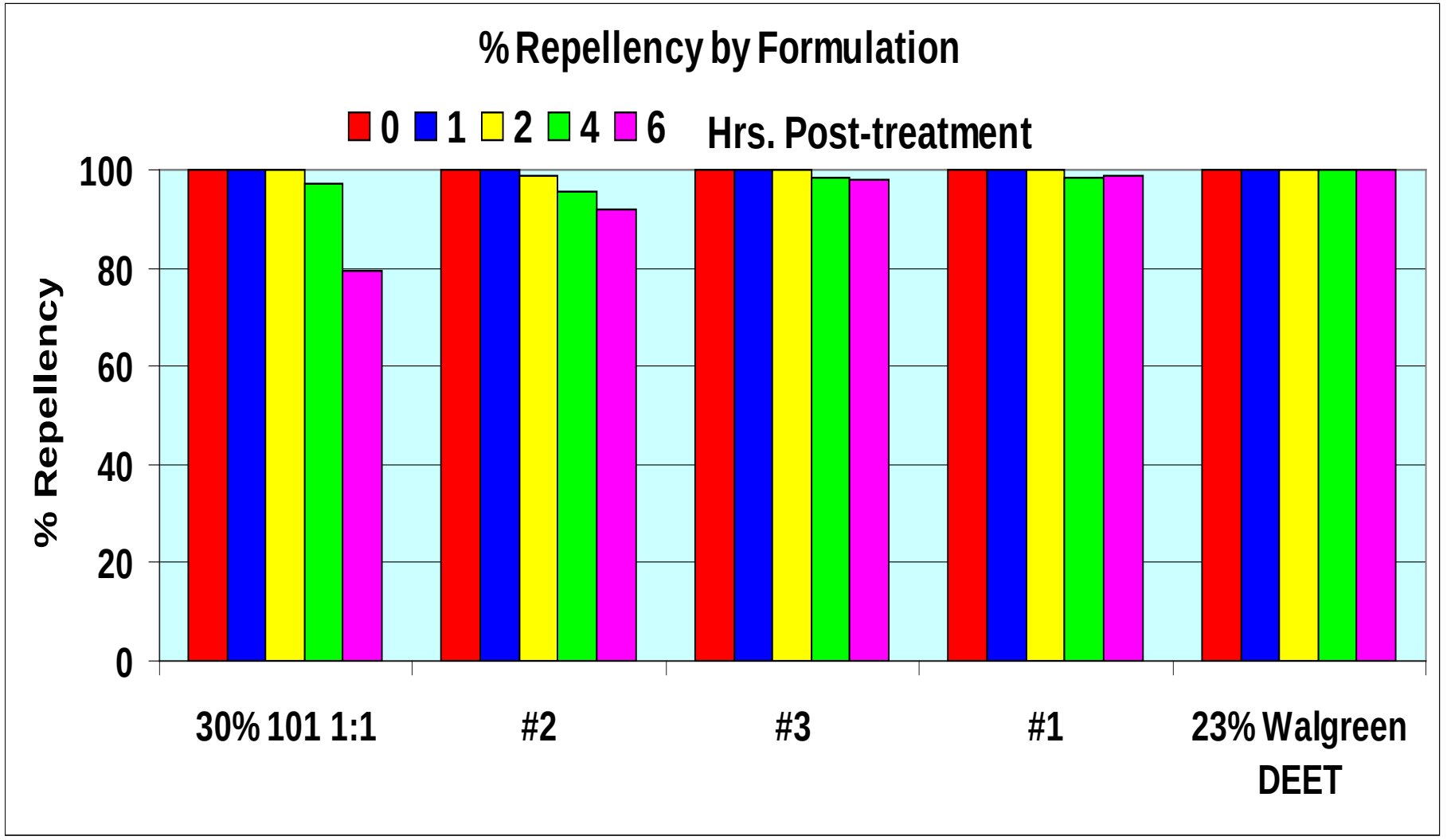

Biting Count by Treatment
Five Post-Treatment Time Intervals
Control
0.05
0.1
0.3
D5%
D30%
Bites
200
180
160
140
120
100
80
60
40
20
0
0
1
2
4
6
Hours Post-Treatment



% Repellency = (Control – Treatment) / Control X 100; n=27

Biting Count by Treatment at Five Post-Treatment Time Intervals





% Repellency = (Control – Treatment) / Control X 100; n=18

Significance & Future Research Needs

- Among first plant oils rivaling high concentrate DEET in efficacy & duration
- Tests against additional species
- Corroborate findings with field trials
- Develop commercial formulations acceptable to consumers

Acknowledgments

- **Partial funding provided by XL TechGroup (TyraTech) Melbourne, FL**

- **K&D modules supplied by Precision Plastics, Beltsville, MD**

- **These studies were approved by Florida A&M University Institutional Review Board**

- **All human subjects gave written informed consent before participating in study**