**Objective**

To determine whether prostaglandin E₂ increases immune function in female house crickets (*Acheta domesticus*).

**Introduction**

- Prostaglandins (PG) are biologically-active, oxygenated metabolites of C₂₀ polyunsaturated fatty acids. Their synthesis can be inhibited by many common substances, including aspirin.
- Animals possess a variety of prostaglandins (PGE, PGF, PGI, and PGD), which have different biological functions.
- In crickets, prostaglandins mediate two important life history traits:
  - Immunity: PG mediates cellular immune reactions such as phagocytosis, encapsulation, and nodulation
  - Reproduction: PG increases egg production and oviposition
- PG₂, precursors are present in the spermatophore passed from the male to the female during mating. This is used by females for reproduction and possibly also immune processes.

I predict that females injected with PGE₂ will have higher survival and that prostaglandin-inhibited females will have lower survival compared with controls.

**Methods & Materials**

- Virgin females 5-7 days post imaginal molt were randomly assigned to one of three treatments and received a 1 μl injection of either:
  1. 95% ethanol (control)
  2. Prostaglandin E₂ (50 μg PGE₂/μl)
  3. Prostaglandin-synthesis inhibitor (25 μg dexamethasone/μl)
- Immediately after injection, females were injected with an LD₅₀ dose of live *Serratia marcescens*, a potentially lethal pathogen of crickets. The LD₅₀ dose comprised approximately 200,000 cells/μl and was expected to induce death in 50% of the crickets within 2 days of injection.
- Females were then placed individually into plastic containers and checked twice daily for mortality for 5 days.

**Results**

Injection with PGE₂ (Kaplan-Meier survival analysis: \( z = -0.87, p = 0.38 \)) or PGE₂-inhibitor (\( z = -0.25, p = 0.80 \)) did not significantly affect survivorship compared with control females. Heavier females had significantly greater survival (\( z = 3.44, p = 0.0006 \)).

**Conclusion**

- The data does not support my hypothesis. Crickets injected with prostaglandin or inhibitor did not have significantly different survival rates compared to the control group.
- Heavier females exhibited significantly greater survival than lighter females. This could be due to larger females receiving proportionally less bacteria in combination with having more hemolymph (blood) and immunological resources with which to mount an immune response.
- My results suggest that PGE₂ is not the primary PG involved in immunocompetence.
- Future studies could include:
  - A comparison of mated and virgin females to determine if males provide immune-boosting compounds to females
  - Injecting females with PGF to determine if another variant of PG has a greater effect on immunity

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