Biological and Behavioral Effects of PCOS on Cognition

PURDUE HEALTH & HUMAN SCIENCES

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Introduction

Polycystic Ovary Syndrome (PCOS) is a hormonal condition that affects 10-15% of women. It is characterized by displaying 2/3 of the Rotterdam criteria:

- Cystic ovaries
- Irregular menstrual cycle
- Increased androgens

Recent studies have found that women with PCOS performed worse on cognitive testing measuring spatial memory than normal controls (Huddleston et al., 2022). Despite the prevalence of PCOS, few animal models of the disorder have attempted to replicate the cognitive symptoms shown in humans.

Objective

We aimed to address the gap in knowledge by treating rats with DHEA (dehydroepiandrosterone) to induce PCOS. We hypothesized that animals that developed the PCOS phenotype would display decreased spontaneous alternations in the Y-Maze, showing impaired spatial working memory.

Methods

We assigned female Long Evans rats (N = 9) to two different groups. We treated the experimental group with DHEA dissolved in sesame oil (60mg/kg) and the control group with pure sesame oil for 25 days. During this time, subjects completed the Y-Maze, a model of spatial working memory.
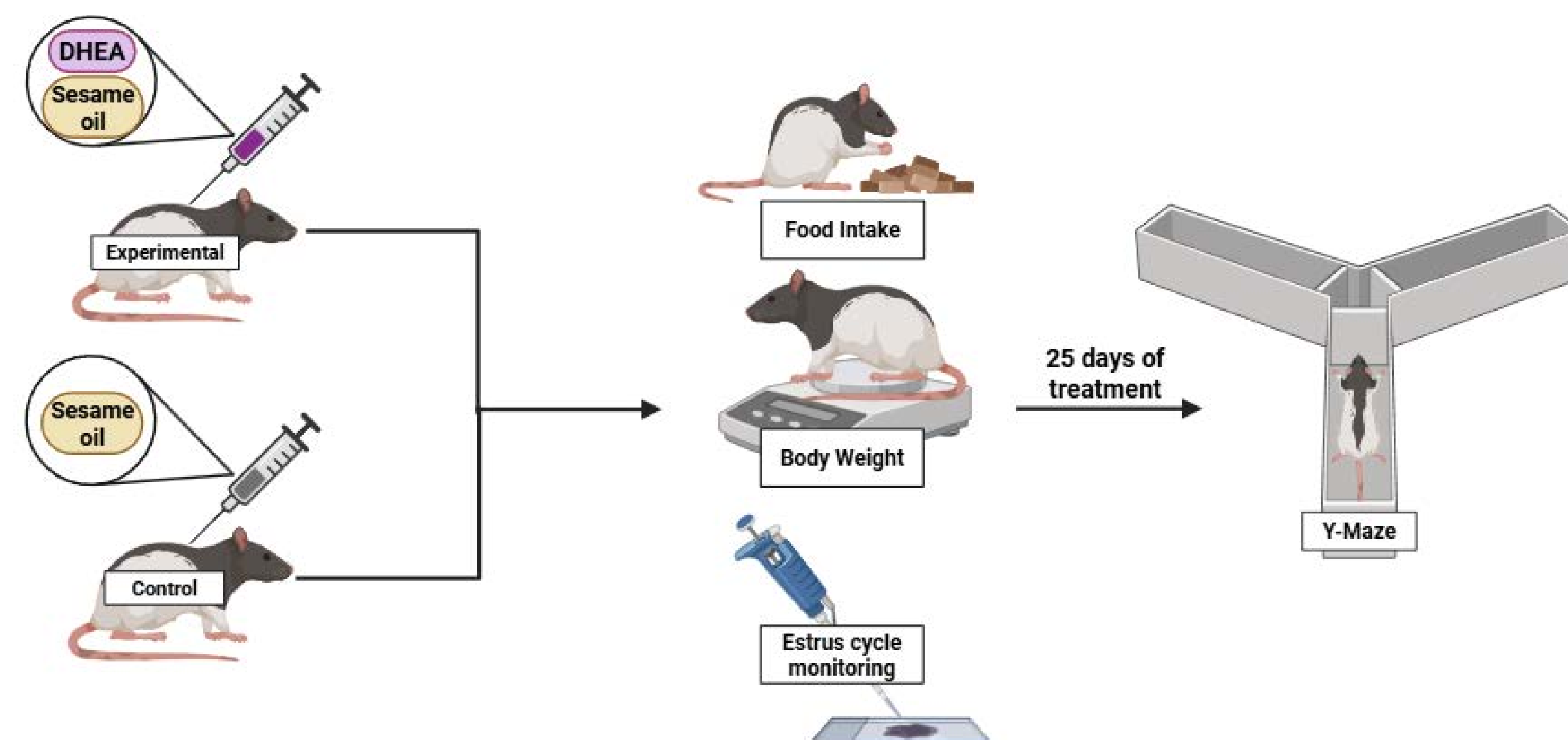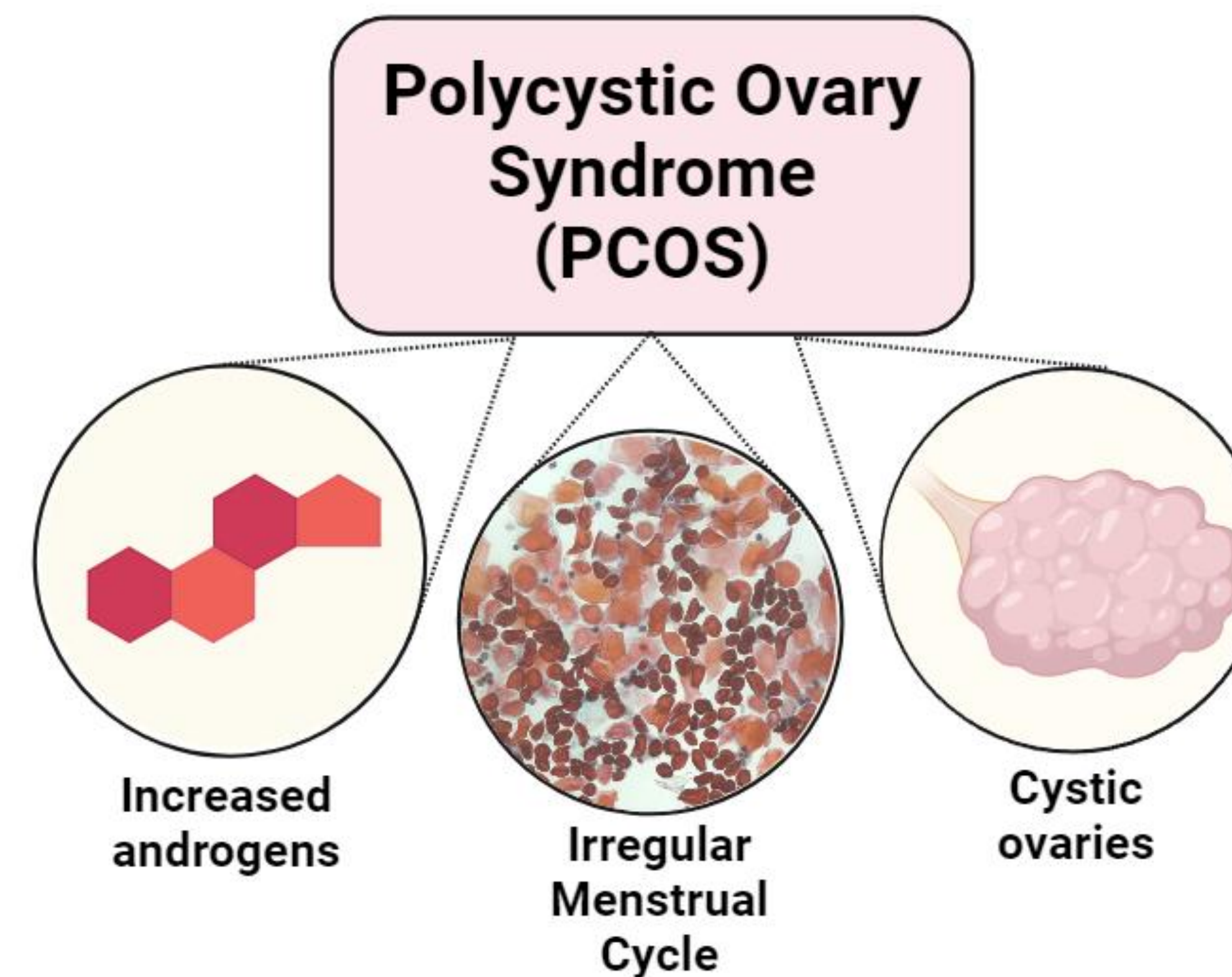

Figure 1: Methodology.

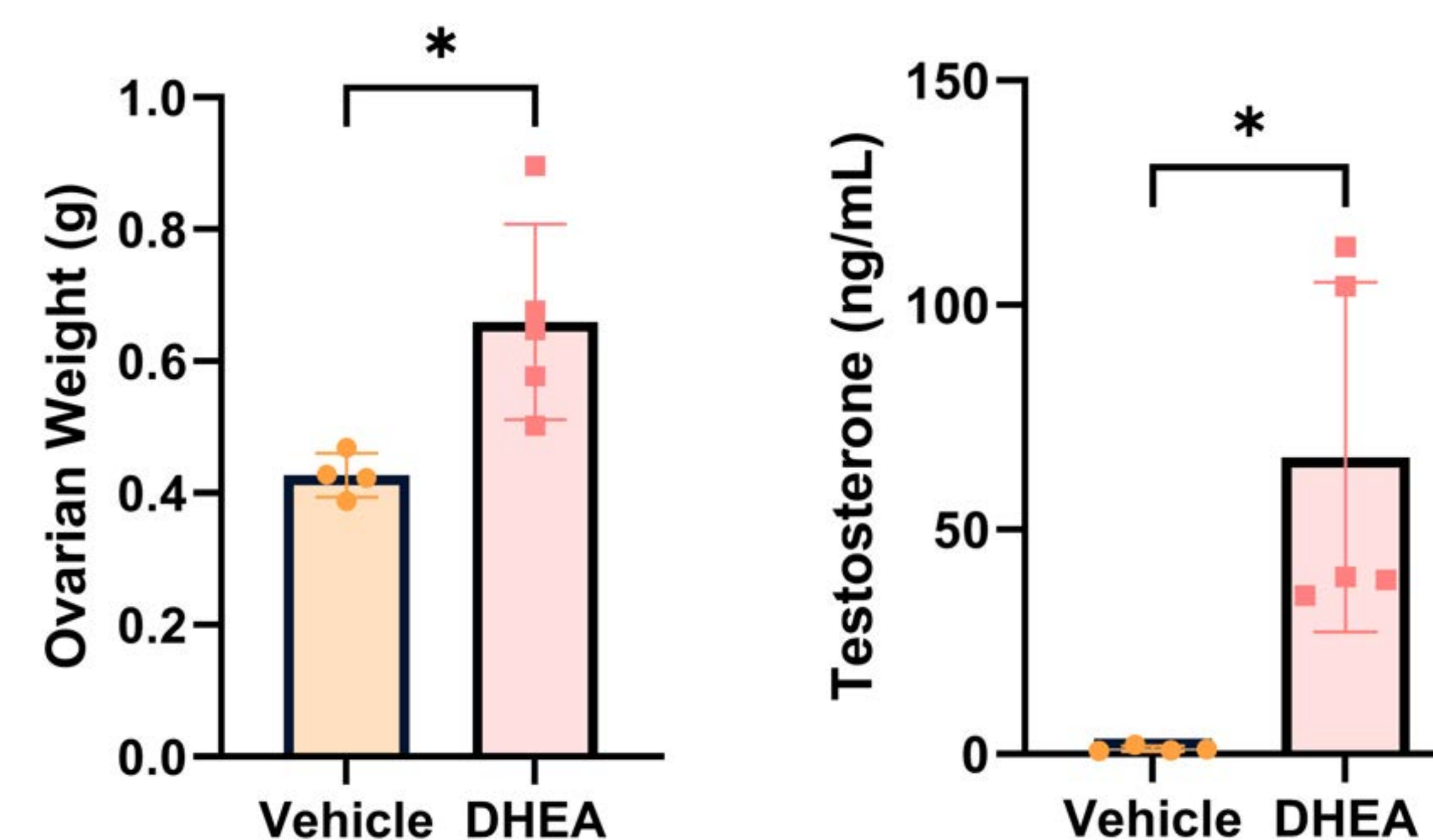Figure 2: Figure details PCOS and the Rotterdam criteria used to define the disorder.

Figure 3: Ovary weight in vehicle and control groups. Data points represent the mean ± SEM with individual data points. * denotes p < 0.05.

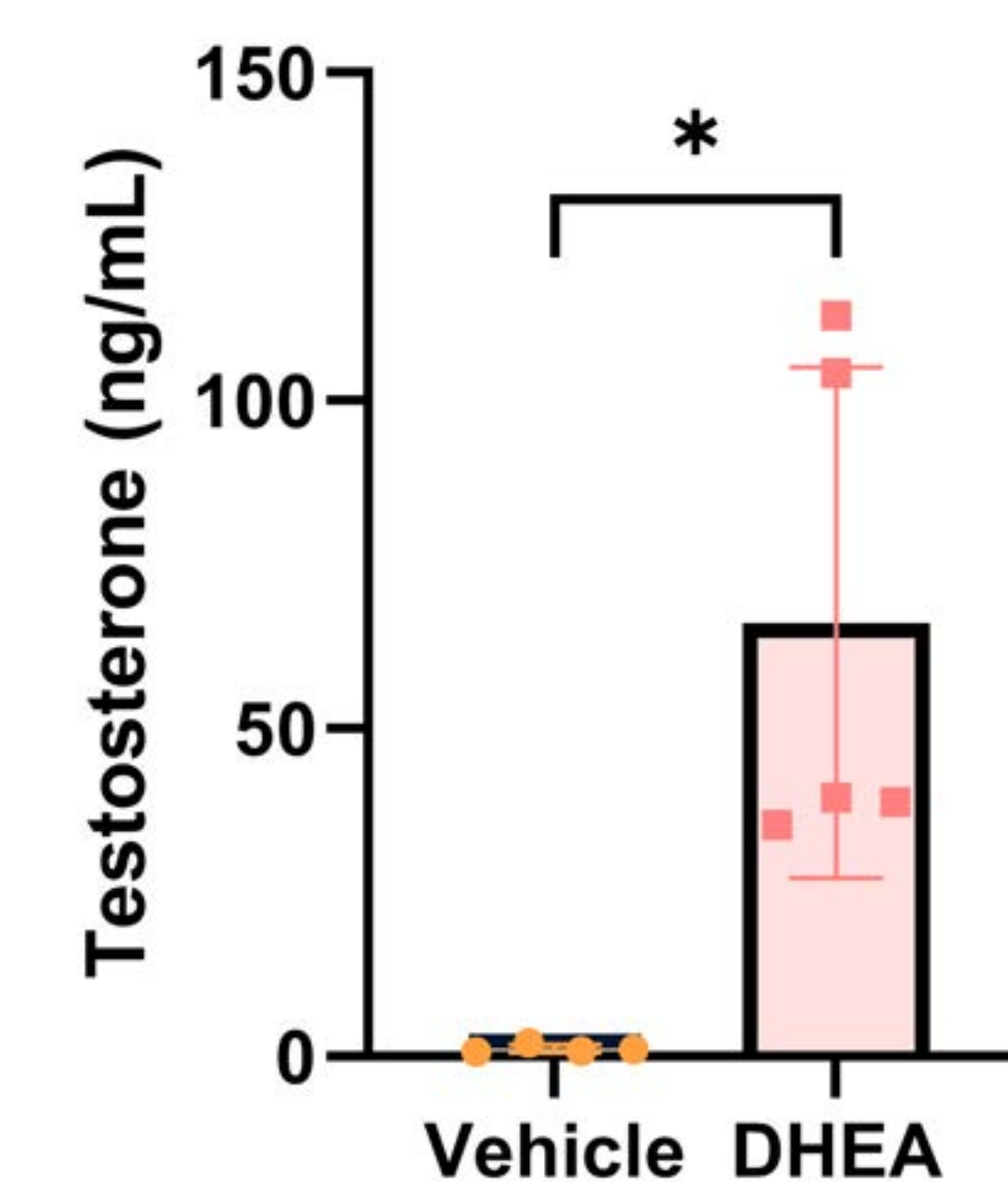Figure 4: Testosterone (ng/mL) in vehicle and control groups. Data points represent the mean ± SEM with individual data points. * denotes p < 0.05.
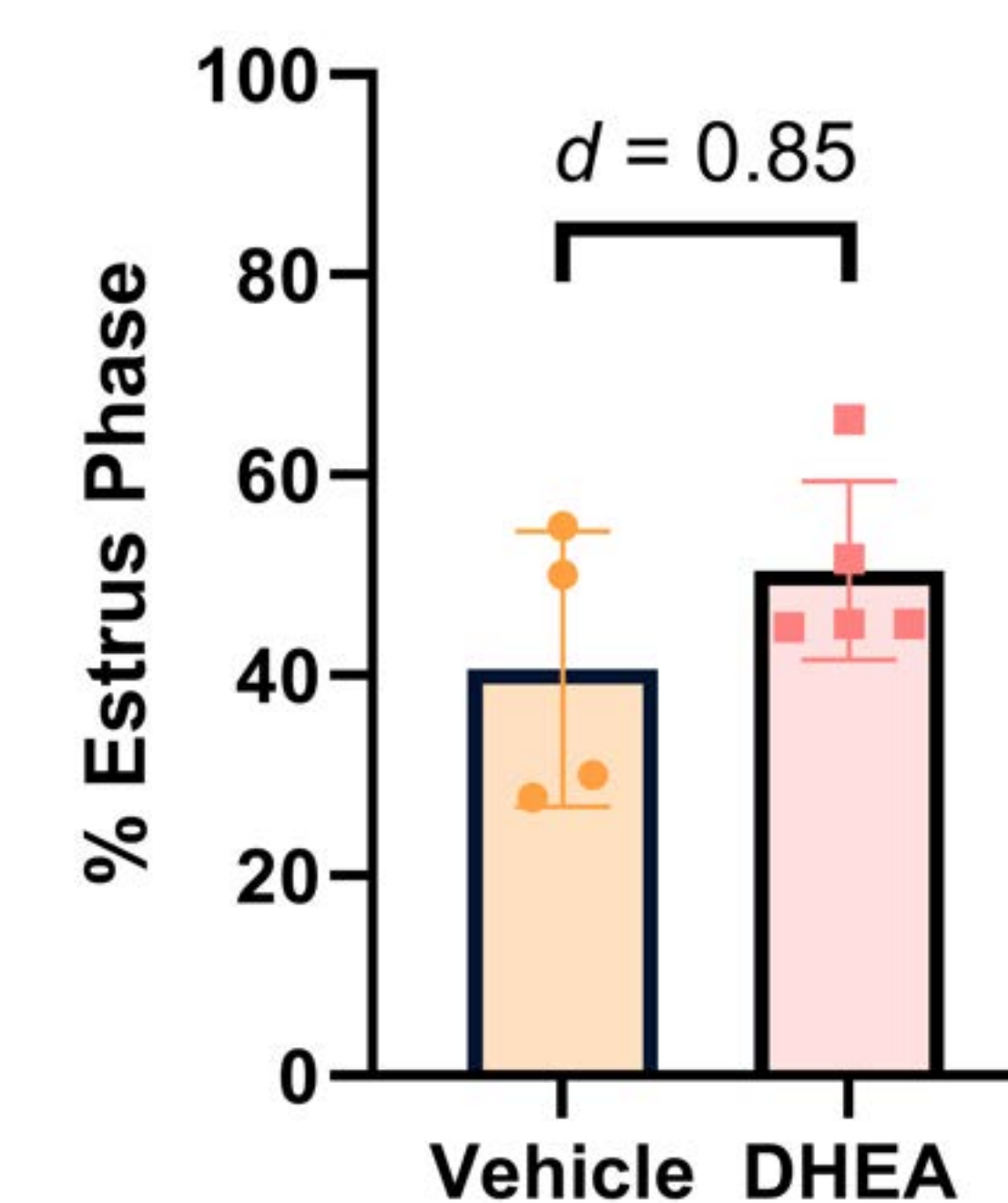

Figure 5: Time spent in estrus phase in vehicle and control groups. Data points represent the mean ± SEM with individual data points.
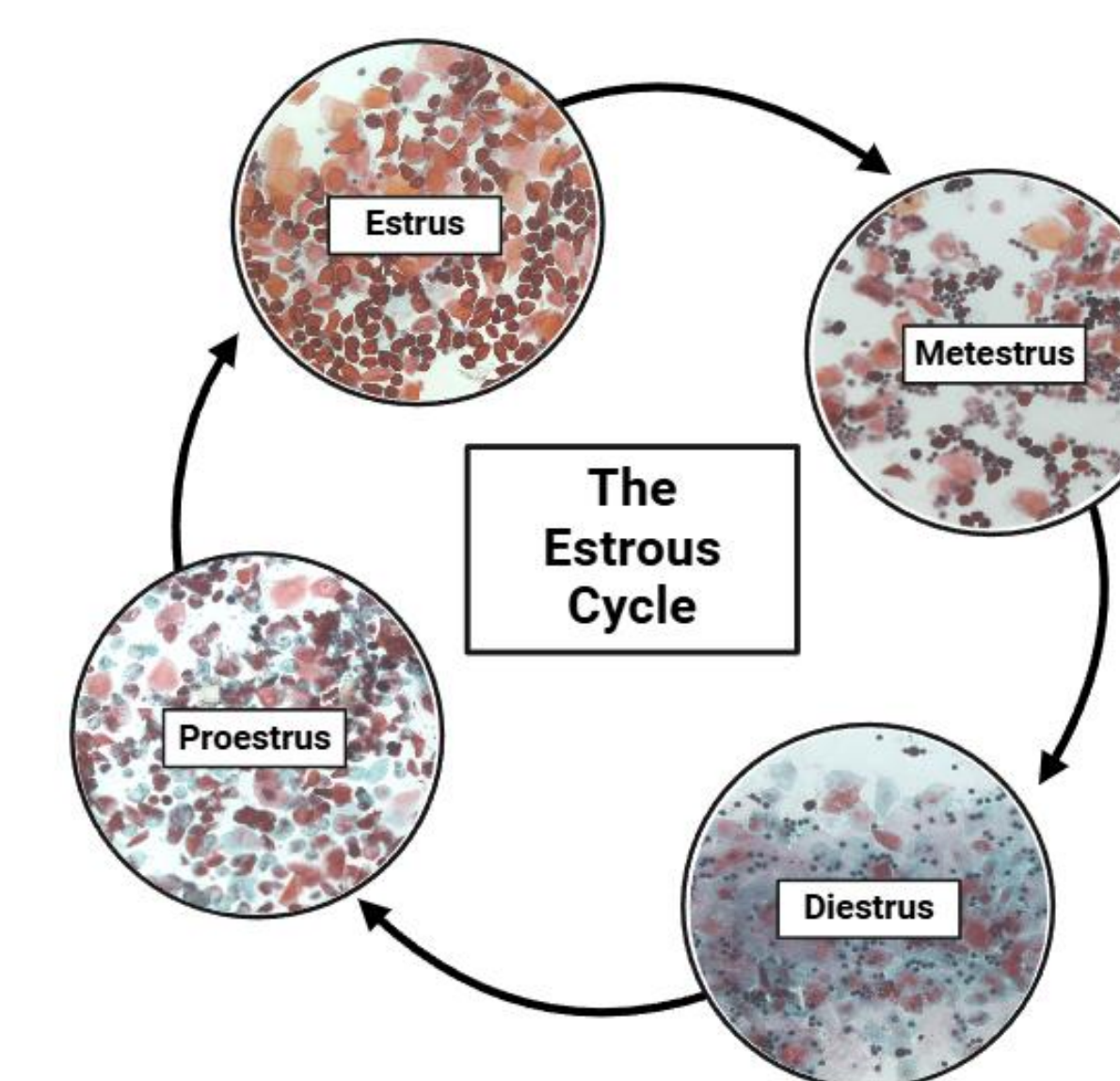

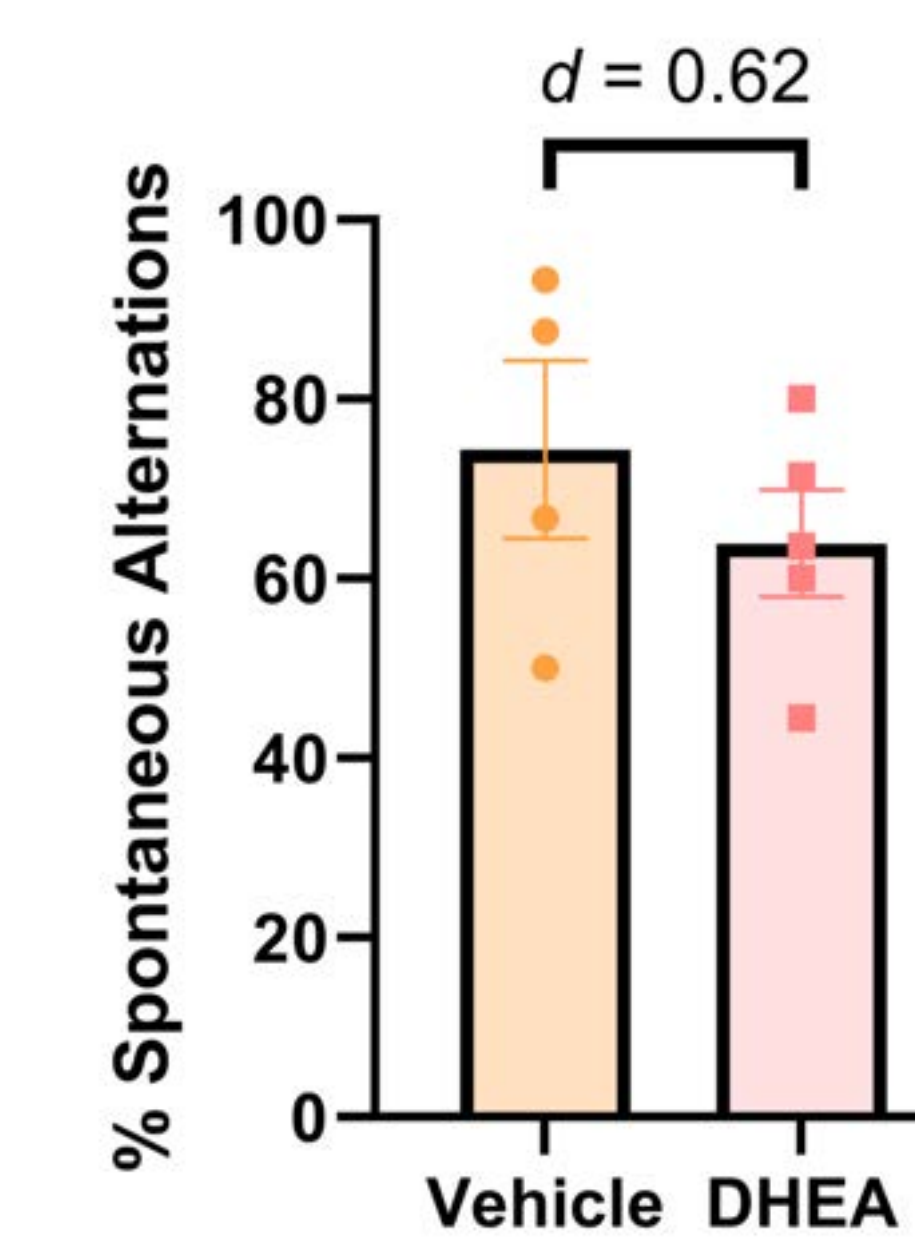Figure 6: The estrus cycle and phases, with images collected throughout experiment.

Figure 7: Percentage of spontaneous alternations in vehicle and DHEA groups. Data points represent the mean ± SEM with individual data points.
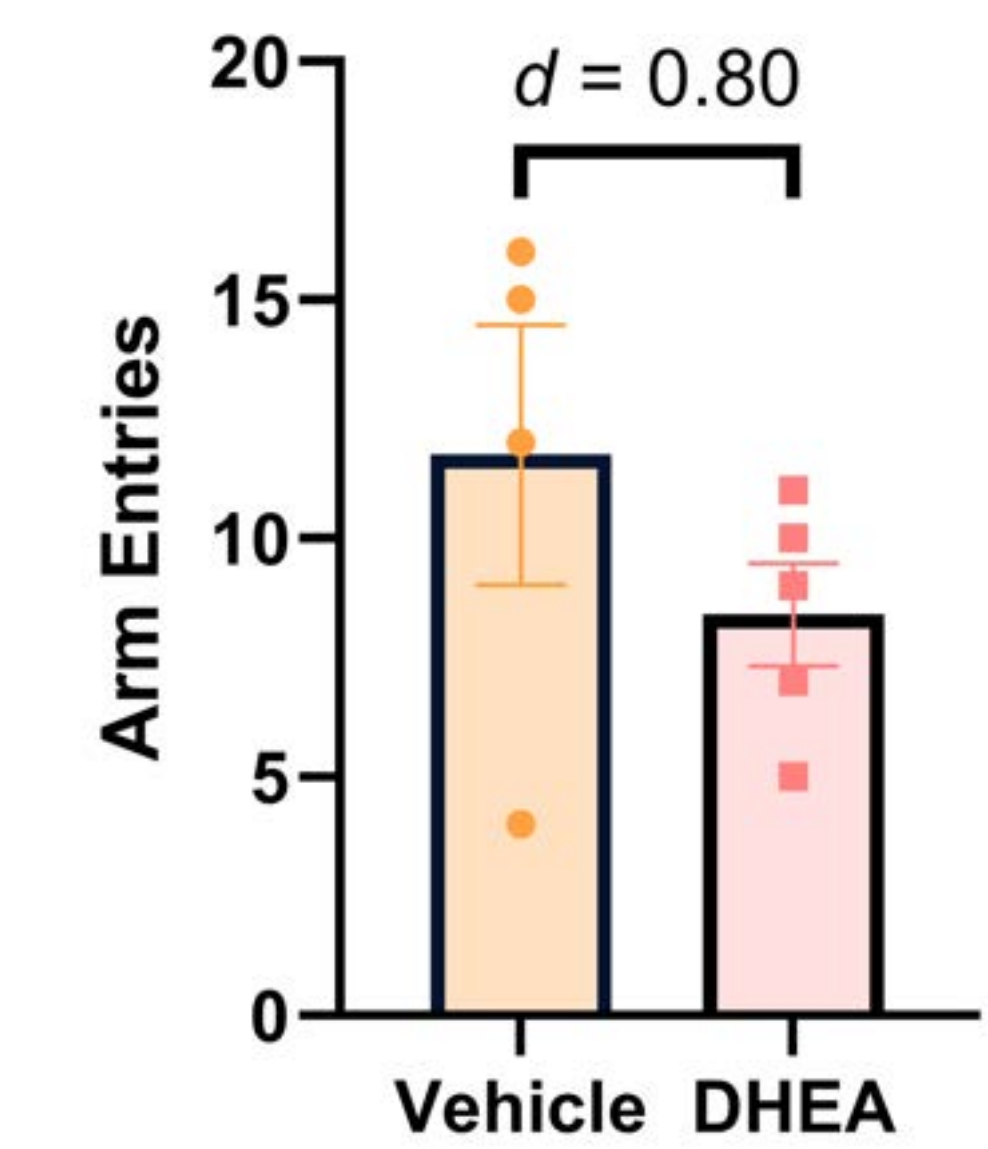

Figure 8: Total arm entries in vehicle and DHEA groups. Data points represent the mean ± SEM with individual data points.
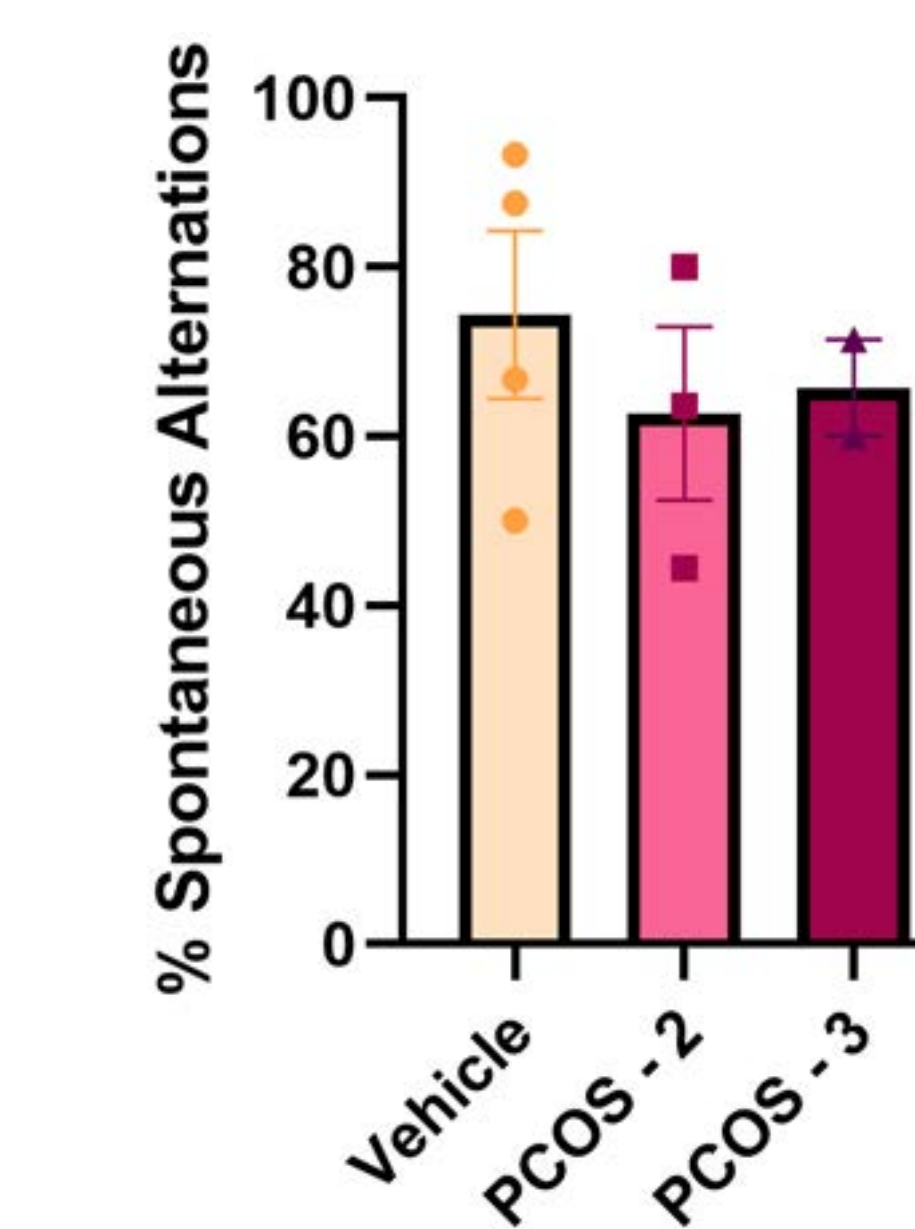

Figure 9: Percentage of spontaneous alternations in vehicle, 2 Rotterdam criteria fulfilled, and 3 Rotterdam criteria fulfilled groups. Points represent the mean ± SEM with individual data points.
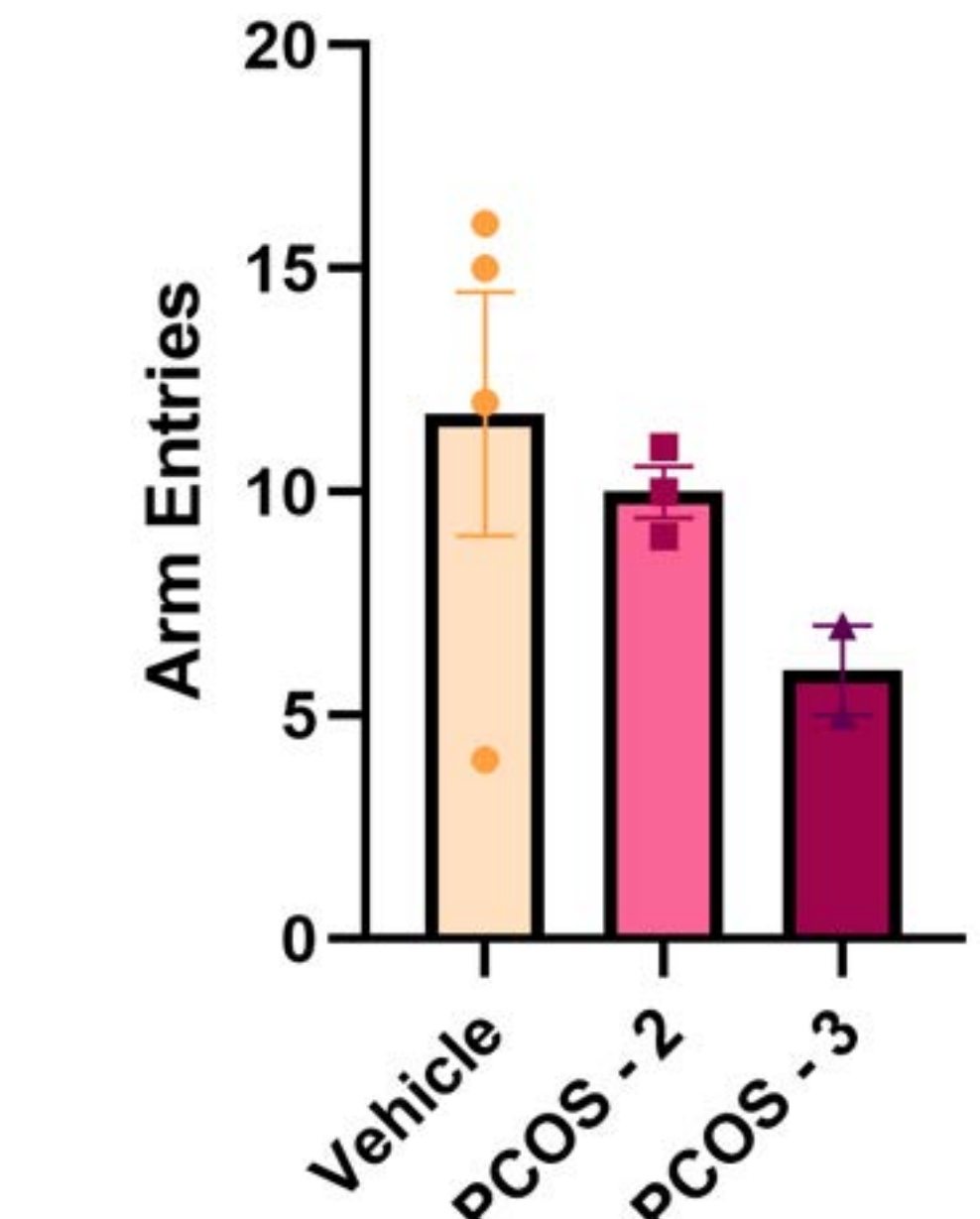

Figure 10: Total arm entries in vehicle, 2 Rotterdam criteria fulfilled, and 3 Rotterdam criteria fulfilled. Data points represent the mean ± SEM with individual data points.

Future Directions

Further steps will involve analysis of this cohort's data as well as using immunohistochemical (IHC) analysis to examine inflammation within the brain. This work will allow for a better understanding of the consequences of PCOS on spatial working memory and elucidation of the mechanisms underlying its effects.

Acknowledgments

References