

Effects of the Menstrual Cycle and Hormonal Contraception on Protein Turnover



Hannah E. Cabre PhD RDN^{1,2}, Sam R. Moore MS CSCS^{1,2}, Kelly E. Joniak BS,¹ Alex N. Ladan BS,¹ Abbie E. Smith-Ryan PhD CSCS^{1,2}

¹Department of Exercise and Sport Science, Applied Physiology Lab, University of North Carolina, Chapel Hill, NC 27599, USA

²Human Movement Science Curriculum, Department of Allied Health Science, University of North Carolina at Chapel Hill, Chapel Hill, NC, 27599 USA



INTRODUCTION

- Protein turnover, the rate of muscle protein synthesis and breakdown, is highly correlated with nutrition needs.¹

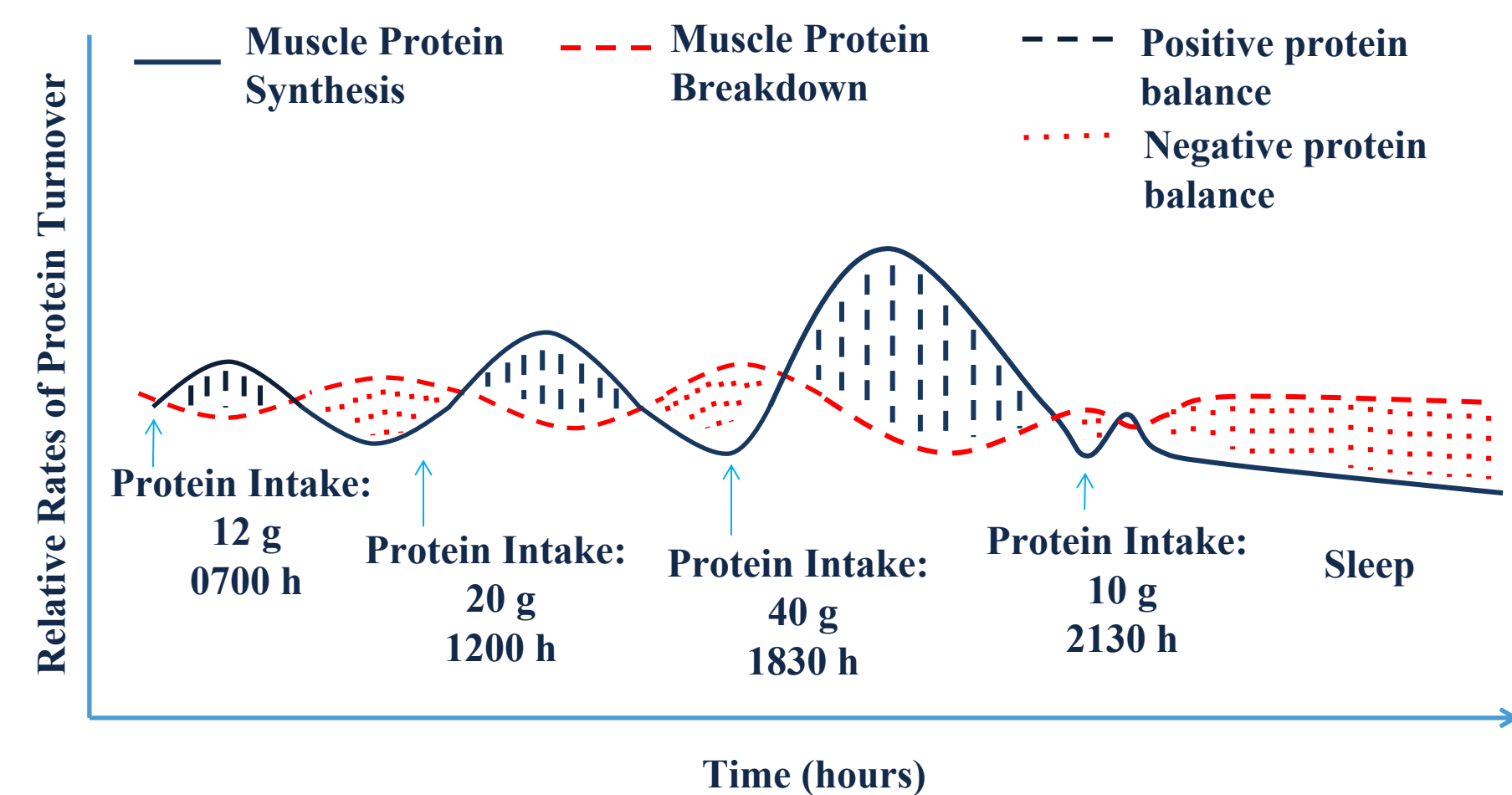


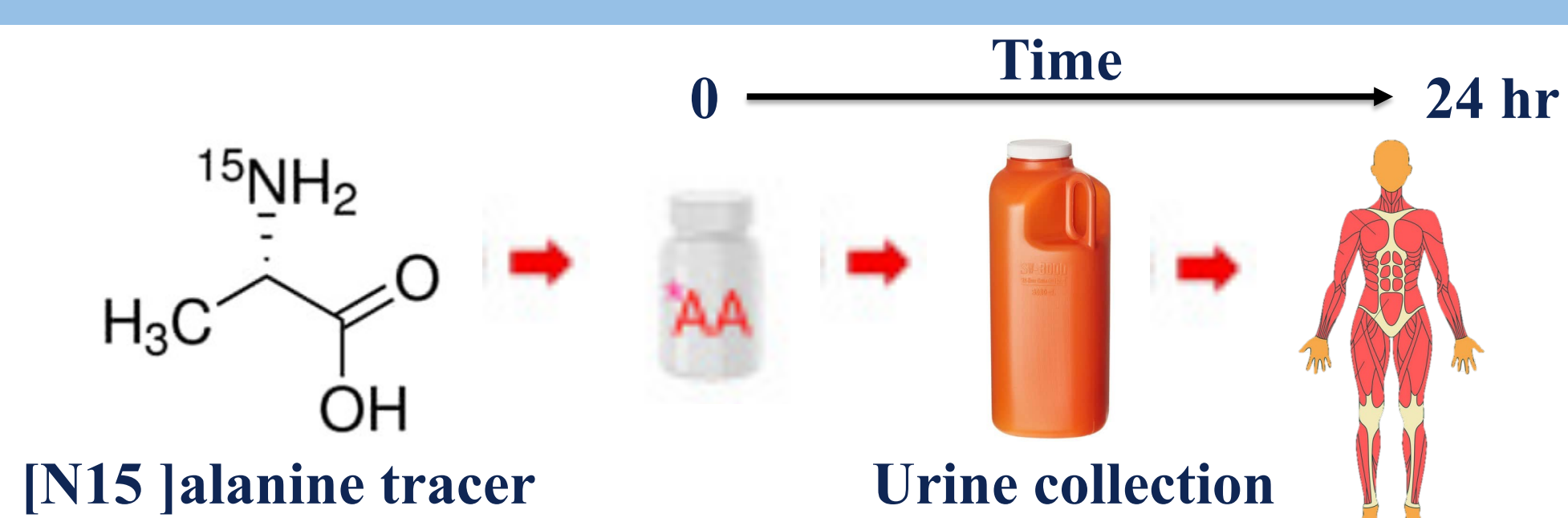
Figure 1. Overview of protein turnover related to dietary protein intake.

- Elevated progesterone in the luteal phase of the eumenorrheic (EUM) menstrual cycle increases protein oxidation, whereas elevated estrogen in the follicular phase promotes protein synthesis.²
- Exogenous hormones from oral contraceptives (OC) and intrauterine devices (IUD) may influence rates of protein turnover differently than EUM menstrual cycle.³
- Data are limited in OC users and do not exist in IUD users.³

OBJECTIVE

Evaluate the modulatory effects of the menstrual cycle and hormonal contraception on whole body protein turnover in an active female population.

METHODS



Total Nitrogen (N; mg/mL) and Total N excretion over 24 hrs

HYPOTHESES

- Females using **hormonal IUDs** will have **similar** protein turnover rates compared to **EUM** females and both groups will have **lower** protein turnover than females using **OCs**.
- Protein turnover will be **increased** in the **luteal phase/high hormone phase** compared to **follicular phase/low hormone phase**.

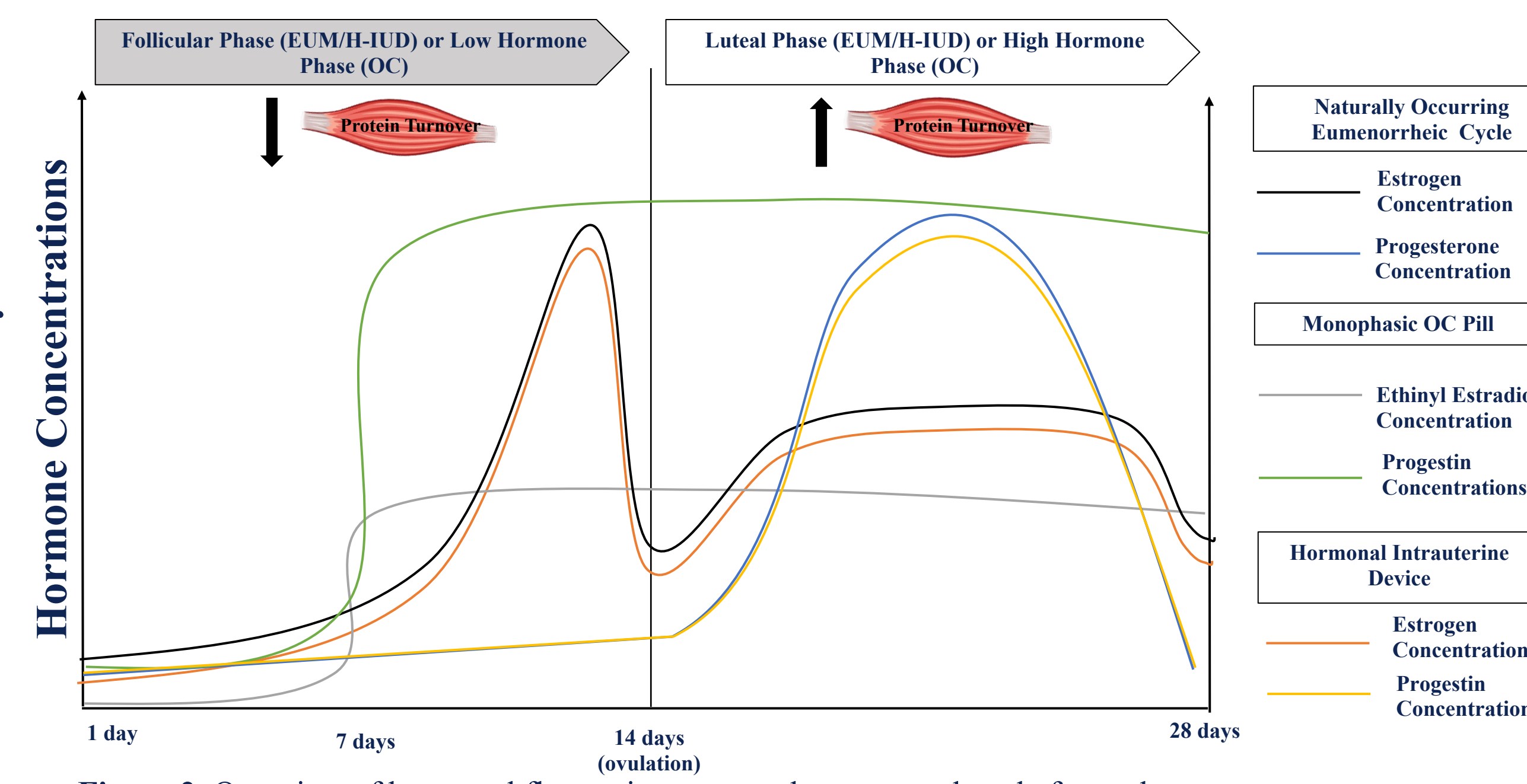


Figure 2. Overview of hormonal fluctuations across the menstrual cycle for each group.

RESULTS

Total N concentration was slightly higher for OC users at each time point.

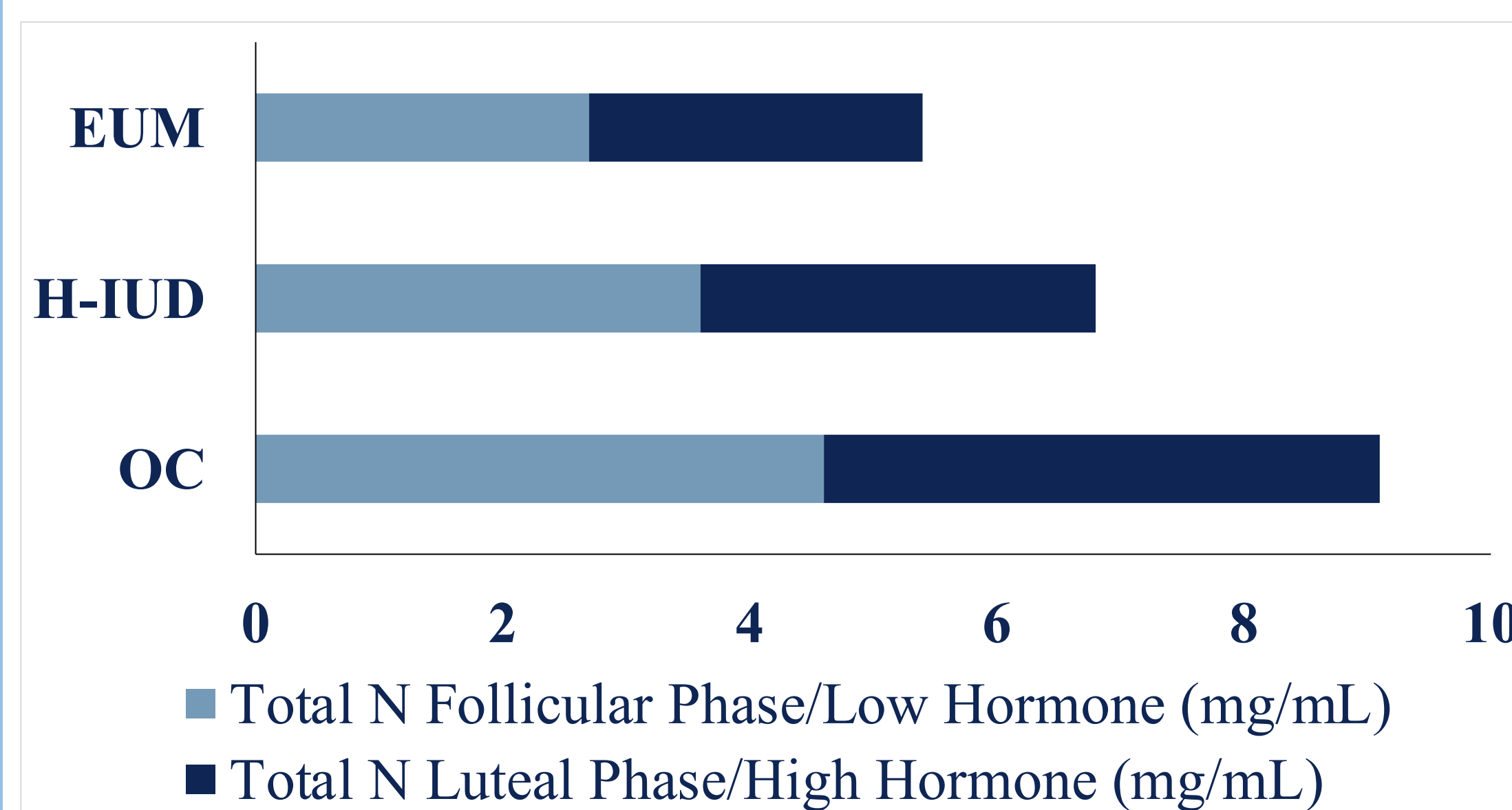


Figure 3. Mean averages for total N concentration at each time point for each group. There were no significant differences between groups from one-way ANOVA ($p > 0.05$).

N excretion was slightly higher for EUM and OC users at each time point.

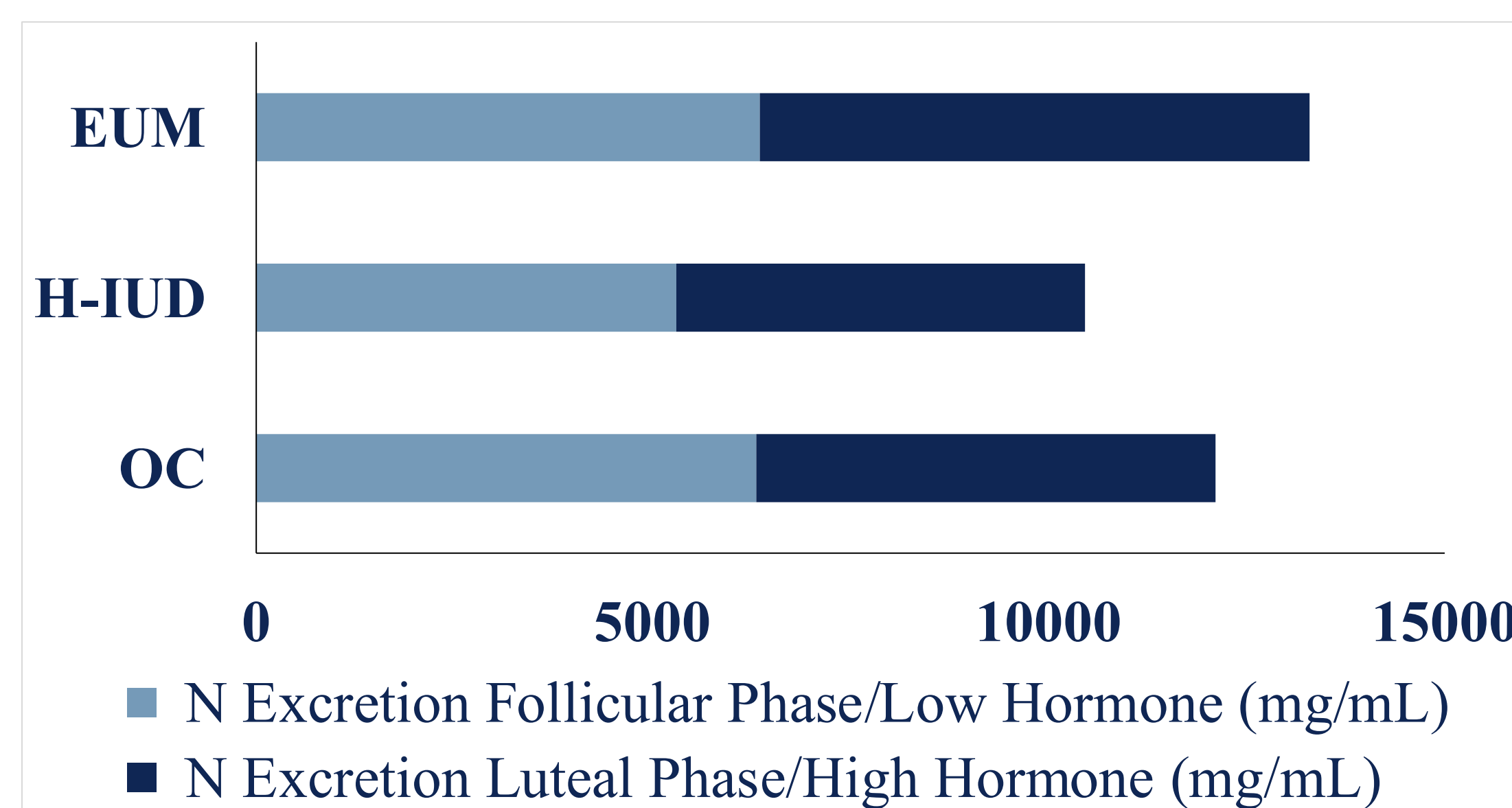


Figure 4. Mean averages for total N excretion at each time point for each group. There were no significant differences between groups from one-way ANOVA ($p > 0.05$).

All groups demonstrated slightly greater N concentration in the follicular phase/low hormone phase.

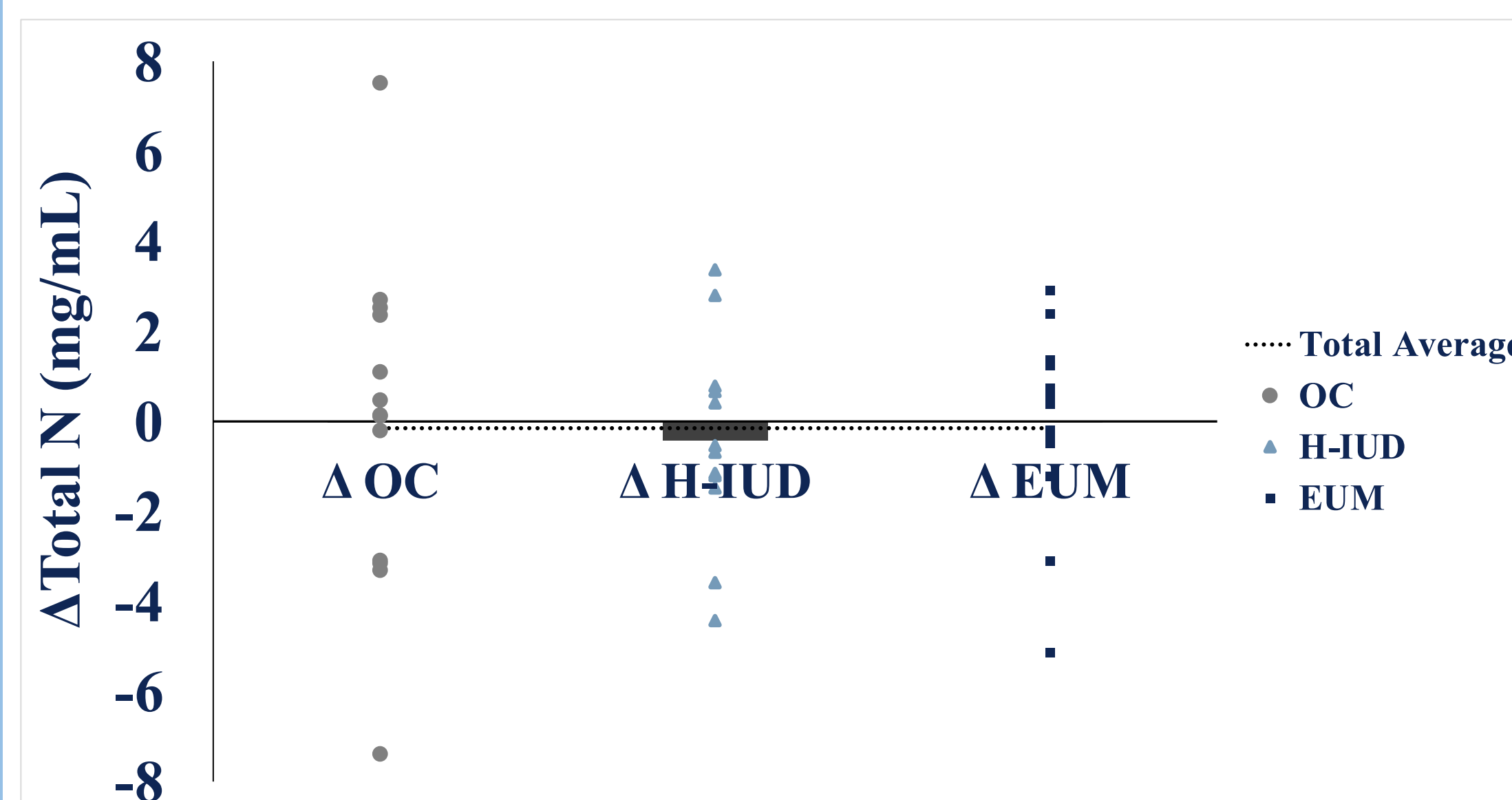


Figure 5. Individual effects between groups of change score (luteal phase-follicular phase). Group averages are denoted by the bars in the middle. No significance was found between groups across the menstrual cycle phases from univariate ANOVA ($p > 0.05$).

OC and H-IUD showed greater N excretion in the follicular/low hormone phase while EUM showed greater values in the luteal phase.

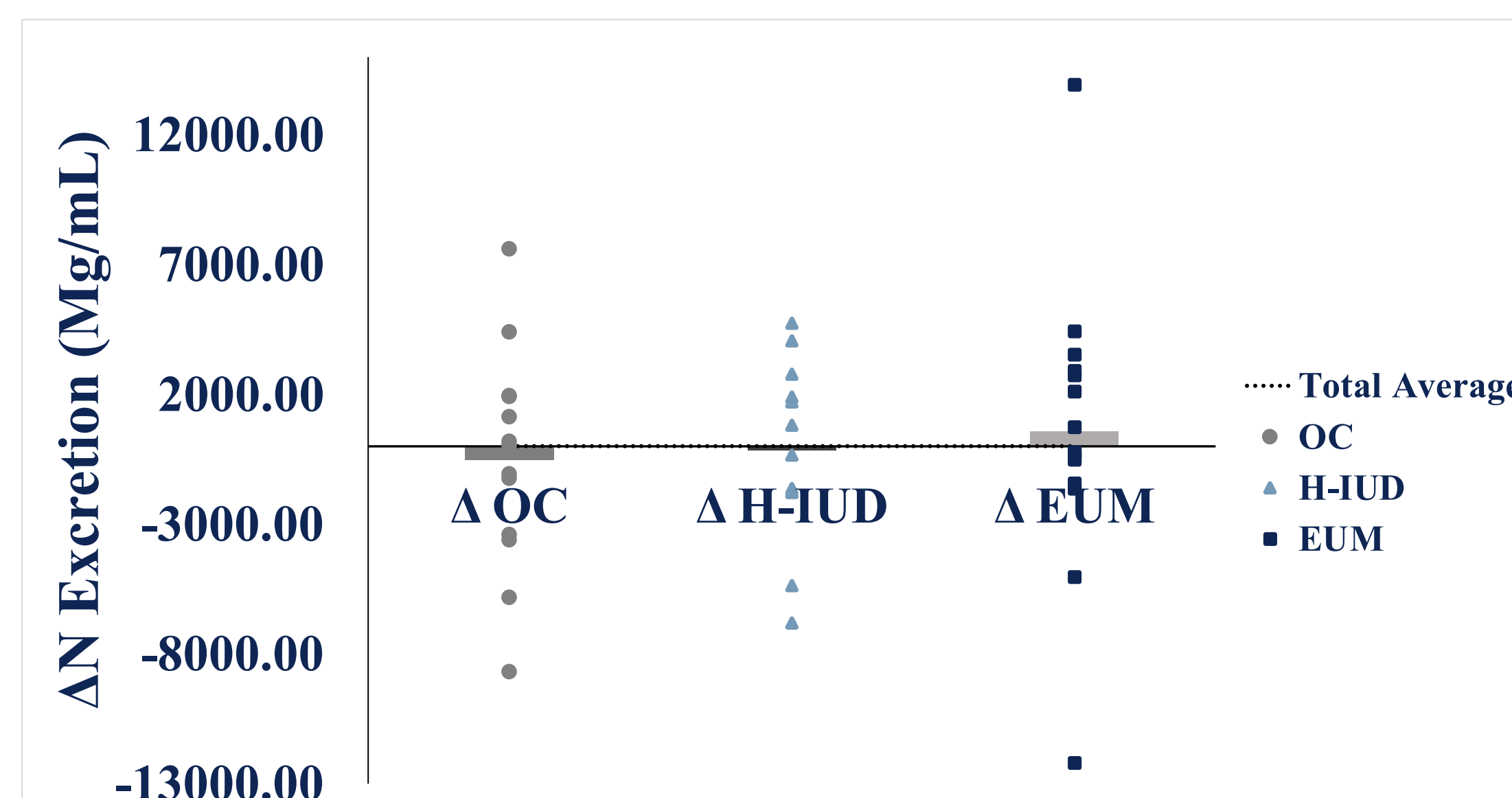


Figure 6. Individual effects between groups of change score (luteal phase-follicular phase). Group averages are denoted by the bars in the middle. No significance was found between groups across the menstrual cycle phases from univariate ANOVA ($p > 0.05$).

PARTICIPANTS

40 Healthy, Active Adult Females

Table 1. Participant demographic information presented as mean \pm standard deviation.

Group	Age (yrs)	Height (cm)	Weight (kg)	BMI (kg/m ²)
EUM (n=15)	27.9 \pm 7.3	165.7 \pm 7.5	65.0 \pm 8.6	23.5 \pm 2.4
OC (n=13)	22.3 \pm 5.7	166.1 \pm 6.7	65.0 \pm 10.4	23.5 \pm 3.2
H-IUD (n=12)	27.0 \pm 7.3	166.1 \pm 5.2	65.2 \pm 9.3	23.7 \pm 9.3

Group Characteristics

EUM: Non-hormonal IUD users or had a regular naturally occurring menstrual cycle for >3 months

OC: Monophasic oral contraceptive use > 6 months

H-IUD: Hormonal-IUD use > 6 months

CONCLUSION

- Despite **no changes between menstrual cycle phase**, N concentration was **6% higher in the low hormone phase for OC users** compared to EUM.
- Protein intake may need to be increased in the low hormone phase for OC users and in the luteal phase for EUM females.**

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