



Advancement in Understanding Ovarian Follicular Wave Dynamics: Repeatability Across Menstrual Cycles

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Background

- Antral follicles are fluid-filled sacs within the ovaries that contain the oocytes¹
- The number of antral follicles ≥ 2 mm detected ultrasonographically (i.e., antral follicle count; AFC) is a marker of ovarian reserve (reproductive potential)¹
- Two-three waves of antral follicles develop during the human menstrual cycle²
- Follicular waves are defined as the synchronous growth of a group of antral follicles at regular intervals throughout the menstrual cycle¹
 - **Major waves:** a single dominant follicle grows ≥ 10 mm in diameter and exceeds the diameter of all other follicles by ≥ 2 mm
 - **Minor waves:** a dominant follicle is not selected for preferential growth³
- Research in domestic farm animals has shown that repeatable patterns of follicular wave dynamics occur across multiple estrous cycles in 70% of animals⁴
- The repeatability of follicular wave dynamics over multiple menstrual cycles in women is not currently known

Objective

- To test the hypothesis that the numbers and patterns of follicular waves are repeatable across 2 cycles in women

Methodology

- A prospective observational study was conducted in 22 healthy women from data obtained as part of a previous study⁵
 - Reproductive Age (RA, 18-35, n=14)
 - Mature Reproductive Age (MRA, 36-44, n=8)
- Transvaginal ultrasonography was conducted every 1-3 days over 2 interovulatory intervals (IOI)
- The numbers and diameters of all follicles ≥ 2 mm were quantified at each visit via retrospective review of ultrasound videoclips
- Sketches were drawn for the size and location of each follicle ≥ 4 mm within each ovary on each study visit (MicroDicom, IC Measure)
- Growth profiles of individual follicles that reached a diameter ≥ 6 mm were retrospectively graphed over the two IOIs for each participant
- Changes in AFC for the categories were tabulated across the IOI: 2-5 mm, 2-10 mm, ≥ 4 mm, ≥ 5 mm and 4-6 mm
- Fishers Exact and Wilcoxon's Signed Rank test were conducted to compare the proportions of waves and patterns, stratifying data by age group and cycle (SPSS)

Results

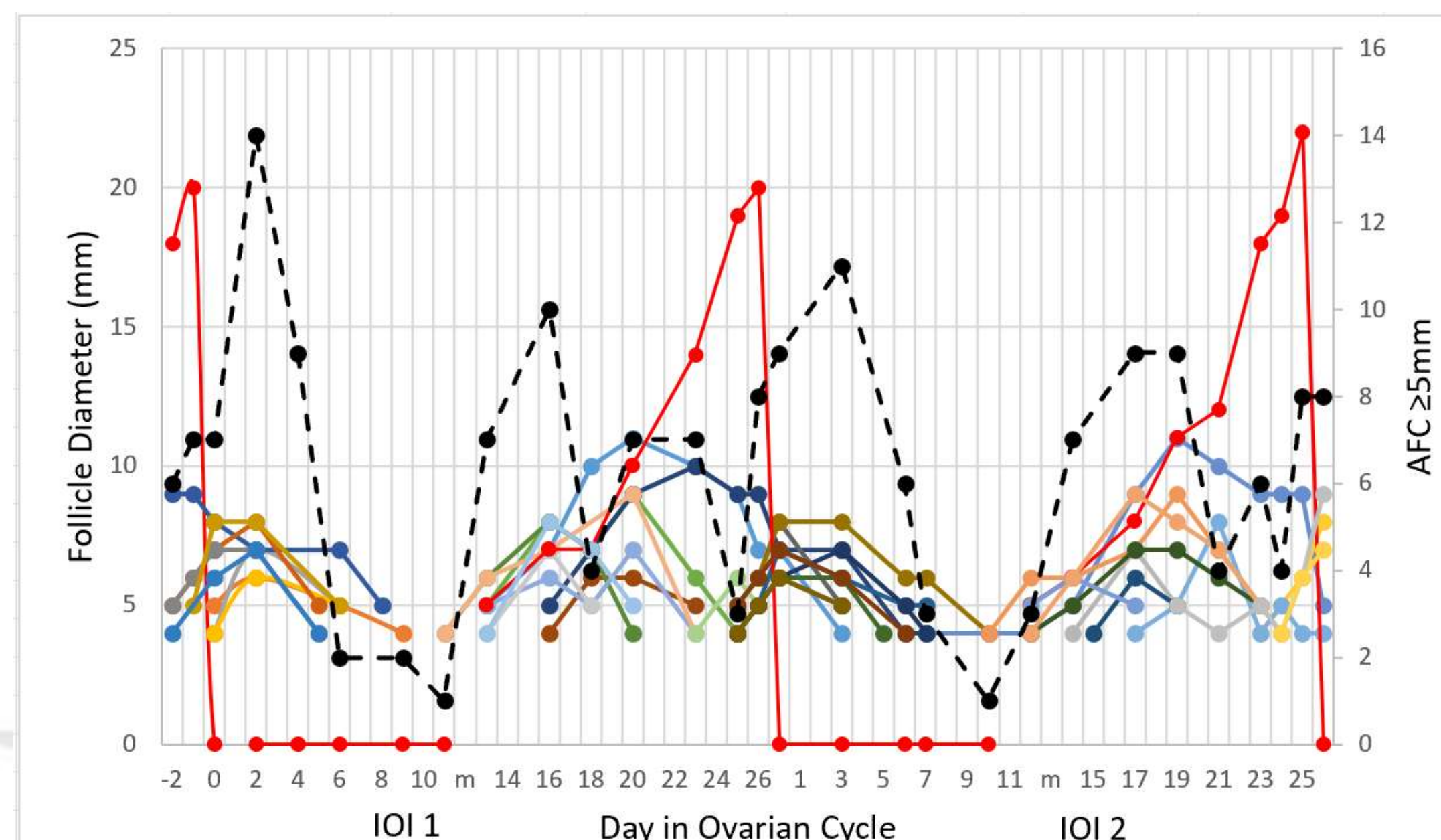


Figure 1: Follicular growth and AFC profiles in a single participant (age=35) showing 2 cycles, each with 2 follicular waves developed in a minor, major pattern

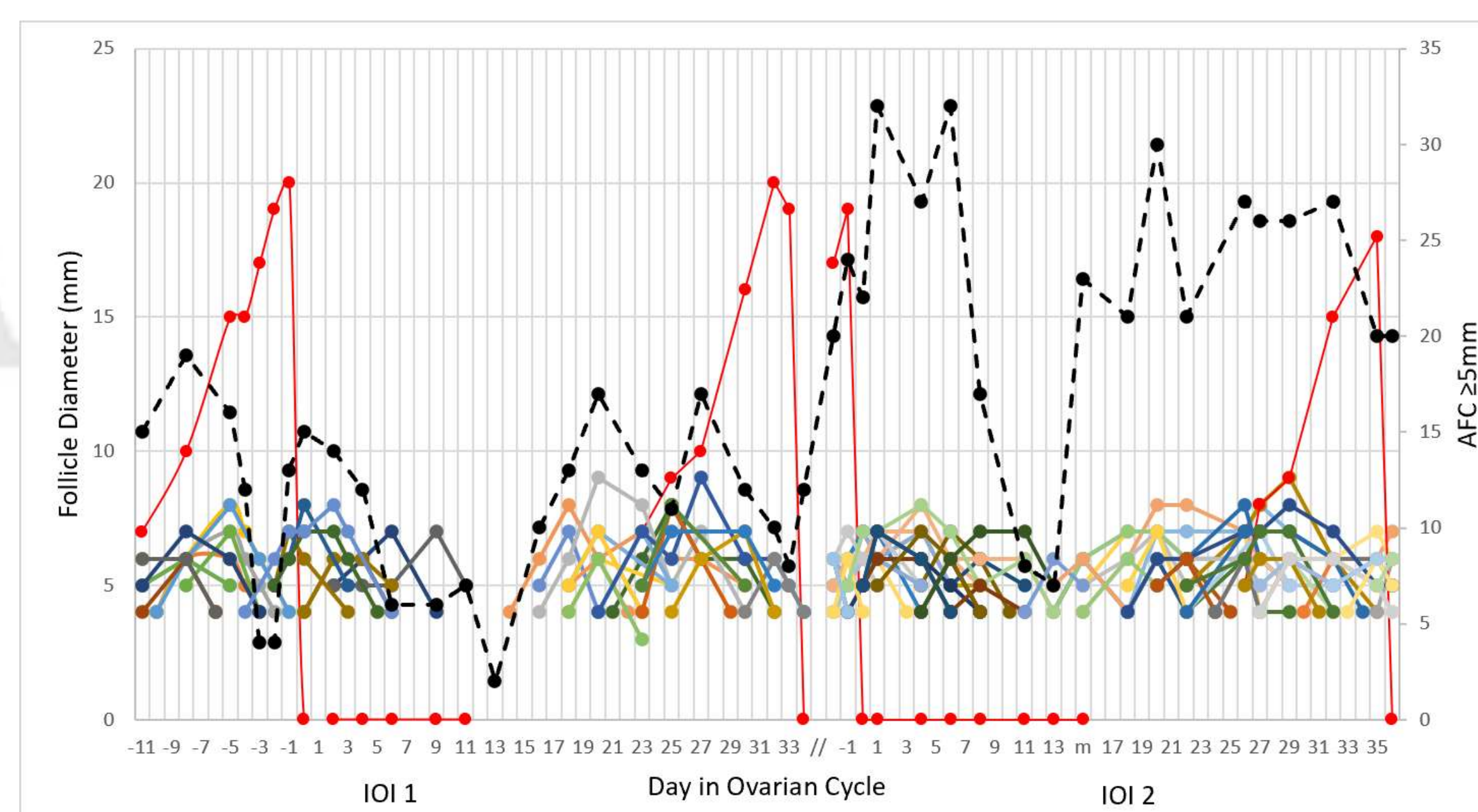


Figure 2: Follicular growth and AFC profiles in a single participant (age=36), in which 2 follicular waves developed in the first cycle (minor, major pattern) and 3 follicular waves developed in the second cycle (minor, minor, major, pattern)

All women n=22			
Pattern	Cycle 1	Cycle 2	P-value
	Proportion (%)		
Minor, major	16/22 (73)	17/22 (77)	1.000
Major, major	6/22 (27)	3/22 (14)	0.083
Major, minor, major	0/22 (0)	1/22 (5)	0.317
Minor, minor, major	0/22 (0)	1/22 (5)	0.317
Number of Waves			
2 waves	22/22 (100)	20/22 (91)	0.157
3 waves	0/22 (0)	2/22 (9)	0.157

Table 1: The proportions of numbers and patterns of waves between the 2 IOIs for RA and MRA age groups combined

Results

Age category	Repeatability	
	Number of Waves	Wave Patterns
All women	20/22 (91)	13/22 (59)
RA	13/14 (93)	9/14 (64)
MRA	7/8 (88)	4/8 (50)
P-value	0.606	0.416

Table 2: The proportions of repeatability between the 2 IOIs are represented for numbers and patterns of waves among the different age groups

Conclusions

- Preliminary data suggest that the numbers and patterns of follicular waves are repeatable in the majority of women
- A greater understanding of repeatability of follicular waves in women is fundamental for optimizing fertility, contraceptive and menopausal care
 - Ovarian follicular waves are suppressed during the use of hormonal contraception⁶
 - Ovarian follicular waves are stimulated during fertility therapy⁷
 - Ovarian follicular wave dynamics become more variable in women, leading to variations in hormone production and unwanted symptoms, during the transition to menopause⁵

Acknowledgements

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