

# ETHNIC DIFFERENCES in the ENDOMETRIAL MICROBIOMES of CANADIAN PATIENTS

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## INTRODUCTION

Evidence has suggested that the composition of the vaginal microbiome can vary among ethnic groups. Specifically, the vaginal microbiomes of Hispanic and Black women were found to have higher levels of anaerobic organisms and lower levels of Lactobacilli, compared with Asian and White women (Ravel et al., 2011).<sup>1</sup> We were interested if these differences extend to the endometrial microbiome in women undergoing assisted reproductive technology (ART) in Canada.

## MATERIALS and METHODS

The results of 3,467 first endometrial microbiome tests (analyzed by Next Generation Sequencing)<sup>2</sup> from endometrial biopsies of Canadian patients were reviewed and the distribution of results (Normal, Abnormal, Mild Dysbiosis and Ultralow Biomass) were recorded. A normal result was defined as the presence of Lactobacilli at greater than 90% and the absence of pathogenic bacteria. An abnormal result was defined as the presence of one or more pathogenic bacteria in significant amounts. A mild dysbiosis result was defined as the absence of pathogenic bacteria, but a low level of Lactobacilli and/or the presence of dysbiotic bacteria in significant amounts. An ultralow biomass result was defined as the absence of bacteria in the analyzed sample.

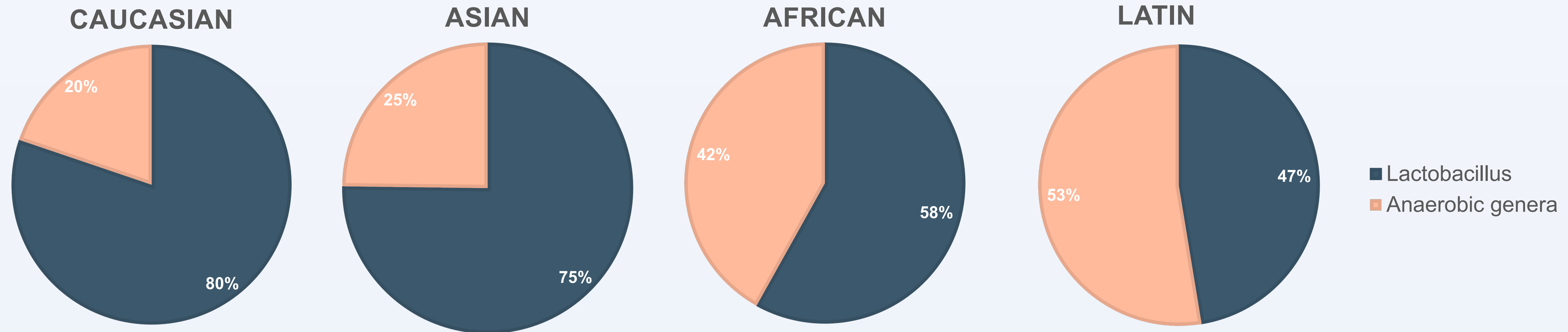
Results were then classified into categories based on ethnicity (voluntarily self-reported). Ethnicity classes included White (Caucasian), Asian, Hispanic (Latin) and Black (African) as defined by Ravel et al., 2011. Among all first endometrial microbiome samples where ethnicity information was provided, we analyzed the frequency of *Lactobacillus* compared to anaerobic pathogens; *Gardnerella*, *Escherichia*, *Atopobium*, *Prevotella*, *Sneathia* and *Aerococcus*.

## RESULTS

Ethnicity information was voluntarily provided for 28% of first endometrial microbiome samples. Of these, 81% were Caucasian, 14.8% were Asian, 2.6% were African and 1.6% were Latin. Results of first endometrial microbiome testing by ethnicity are presented in Table 1. The frequency of *Lactobacillus* compared with the frequency of 5 anaerobic genera in each ethnic group is shown in Figure 1 while Table 2 shows a further examination of the frequencies of the 5 anaerobic genera studied among the different ethnic groups.

**Table 1** Summary of results from the analysis of 954 first endometrial microbiome samples

Result	n	Caucasian	Asian	African	Latin
Normal	369 (38.7%)	313 (40.5%)	39 (27.7%)	11 (44%)	6 (40%)
Abnormal	186 (19.5%)	127 (16.4%)	45 (31.9%)	10 (40%)	4 (26.7%)
Mild Dysbiosis	198 (20.7%)	166 (21.5%)	31 (22%)	0	1 (6.7%)
UltraLow Biomass	201 (21.1%)	167 (21.6%)	26 (18.4%)	4 (16%)	4 (26.7%)



**Figure 1.** The frequency of *Lactobacillus* compared with anaerobic genera among 954 first endometrial samples by ethnic group

**Table 2.** The frequency of *Lactobacillus* and 5 anaerobic genera among 954 first endometrial samples by ethnic group.

Frequency of bacteria		Caucasian	Asian	African	Latin
		n=773	n=141	n=25	n=15
	Lactobacillus	80.2%	75.2%	58.1%	47.4%
	Anaerobic genera	19.8%	24.8%	41.9%	52.6%
	<i>Gardnerella</i>	12.1	17	25.8	26.3
	<i>Atopobium</i>	3.3	4.6	9.7	10.5
	<i>Prevotella</i>	3.8	1.6	6.4	10.5
	<i>Sneathia</i>	0.4	0	0	5.3
	<i>Aerococcus</i>	0.1	1.6	0	0

## CONCLUSIONS

It has been previously reported that approximately 60% of the vaginal microbiome of African and Latin women are normally composed of Lactobacilli, while in White and Asian women, the normal composition of Lactobacilli is 80-90% (Ravel et al., 2011). Our preliminary observations in the endometrial microbiome of Canadian women undergoing ART, support this concept. If the endometrial microbiome of reproductive-age women varies by ethnicity, then it would be important to take this into consideration when diagnosing and treating pathogens of the endometrial microbiome in infertile women. Uneven sample sizes in this study made meaningful comparisons difficult, however, interesting trends were observed. Asian, African and Latin women appear to have a higher proportion of Abnormal endometrial microbiome test results following first biopsy, compared with Caucasian women (27-40% compared to 16%). Additionally, when we analyzed the frequency of Lactobacilli to anaerobic genera, we found that African and Latin women appeared to be skewed in favour of anaerobic genera, particularly *Gardnerella*, *Atopobium* and *Prevotella*. Further research will allow us to determine if in fact African and Latin women have different endometrial microbiome profiles compared with Caucasian and Asian women. A higher level of anaerobic genera in the endometrial microbiome may be normal in women of these ethnicities.

## REFERENCES

- Moreno, I. et al., 2022. Endometrial microbiome composition is associated with reproductive outcome in infertile patients. *Microbiome*. 10(1): 1-17.
- Ravel, J. et al., 2011. Vaginal microbiome of reproductive-age women. *PNAS*. 108(1): 4680-4687.