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# The Vaginal Microbiome Post-Menopause and Urinary Tract Infections

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# The Vaginal Microbiome Post-Menopause and Urinary Tract Infections

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## BACKGROUND

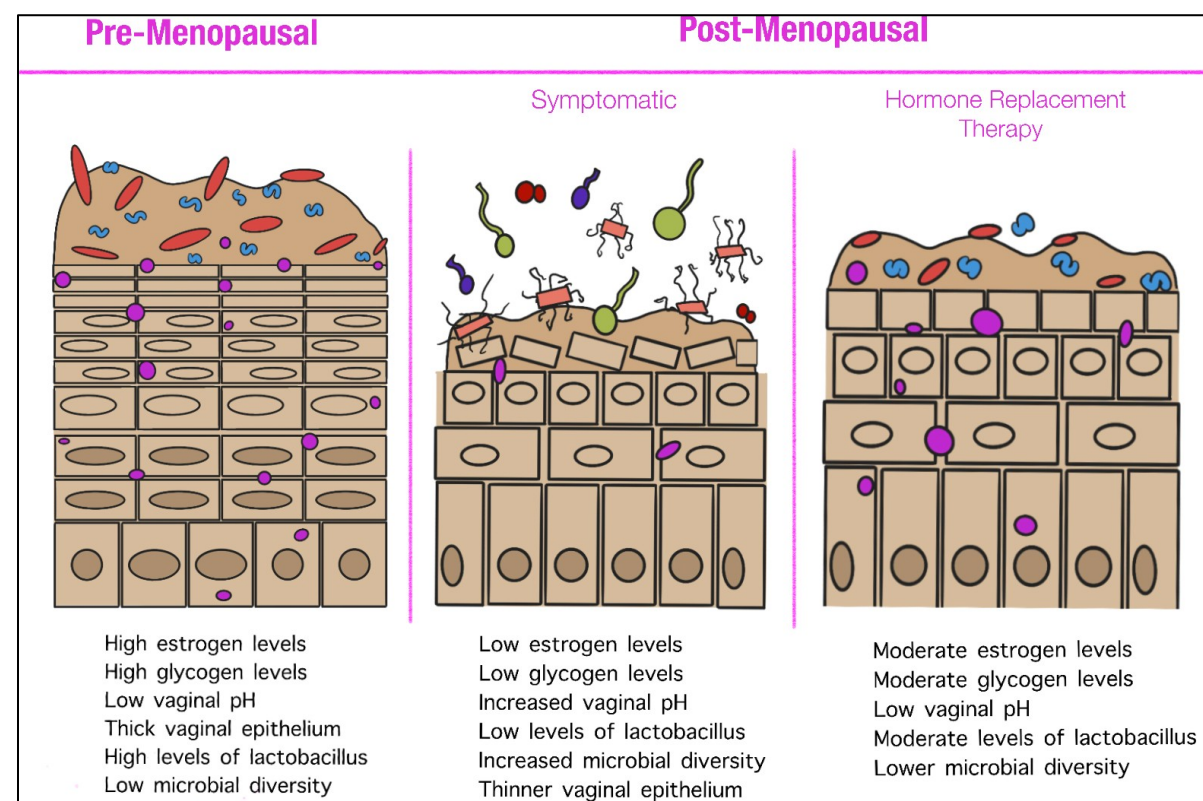
Urinary Tract Infections (UTIs) occur when pathogens gain access to the urinary tract and can cause symptoms ranging from asymptomatic to dysuria, urinary frequency and urgency, hematuria, confusion, and even sepsis. 50-60% of females experience a UTI in their lifetime<sup>1</sup>, with incidence rising significantly after menopause<sup>2</sup>, leading to higher rates of hospitalizations, antibiotic use, and severe complications. The vaginal microbiome refers to the bacterial flora which inhabit the vagina and includes  $10^{10}$ - $10^{11}$  bacterial cells<sup>3</sup>, with lactobacillus as the predominant species. Lactobacilli protect the vaginal and urinary tracts by acidifying the environment, making it difficult for pathogen survival and entry<sup>4</sup>. Estrogen increases lactobacillus levels and it is this decrease in estrogen after menopause which leads to decreased levels of lactobacillus and consequently decreased protection from invading pathogens<sup>5,6</sup>.

## METHODS

This literature review utilized PubMed and Embase as primary databases. Search terms included: vaginal microbiome, urinary tract infections, post-menopause, UTI complications, antibiotic resistance, estrogen replacement therapy, Lactobacillus, topical estrogen, estrogen replacement therapy, and probiotics.

## RESULTS

Increasing vaginal lactobacillus levels may offer enhanced protection and decreased rates of UTIs. Literature review of published studies looking at the role of estrogen and probiotics found that exogenous estrogen in the form of a topical cream or an intravaginal ring increased levels of vaginal lactobacillus<sup>7,8</sup>. This effect was seen less with oral estrogen usage<sup>9</sup>. Topical probiotic creams improved levels of lactobacillus as well<sup>10</sup>, and were more effective than oral probiotics<sup>11</sup>, however studies have shown varied results and often consist of small sample sizes<sup>12</sup>.



**Figure 1- Changes in the vaginal epithelium:** This image depicts the changes in the vaginal epithelium with respect to thickness, cellular layers and arrangement, and microbiome. These changes are portrayed through pre and postmenopausal (with and without hormonal treatment) stages. Estrogen levels are relative to postmenopausal levels. The image is adapted from figure 1 of *Muhleisen et al*<sup>7</sup>.

## CONCLUSION

Using preventative measures such as topical estrogen or topical probiotics offer the potential to decrease the rates of UTIs in the postmenopausal population through their influence on the vaginal microbiome. Further studies with larger sample sizes are indicated.

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