

## Use of LAB to Control Urogenital Infections

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### Introduction

A urinary tract infection (UTI) is an **infection** that affects part of the **urinary tract**. When it affects the lower urinary tract, it is known as a simple **cystitis** (a bladder infection) and when it affects the upper urinary tract, it is known as **pyelonephritis** (a kidney infection). The indigenous microbiota plays an important role in protecting the host from colonization of invading pathogens. *Lactobacillus* is the predominant genus in the vaginal [1] and endocervical microbial communities [2] and is present at concentrations of 10<sup>7</sup> to 10<sup>8</sup> CFU/ml of vaginal fluid in healthy postmenopausal/ premenopausal women [3].

There is an emerging role of lactobacilli in the control and maintenance of the vaginal bacterial microflora. *L. jensenii* and *L. gasseri* are two of the most common species present, as determined by culture-independent techniques [4]. Relationship between LAB and vaginal pathogen have been studied which indicates that antibiotic treatment should not kill healthy LAB to preserve healthy vagina [4]. Pascual et al. (2010) found that *L. fermentum* L23 isolated from vaginal swabs of healthy woman can prevent and cure *E. coli* infection in a murine vaginal tract model [5].

*Lactobacillus* sp. ferment glycogen secreted by vaginal epithelial cells into lactic acid, and colonization by these microorganisms

correlates to the low pH in the vagina [6,7]. The acidic environment protects the vagina against over-growth of pathogens [8,9]. *L. salivarius* subsp. *salivarius* CRL 1328 was able to inhibit the growth of *E. coli*, *Klebsiella* sp., *G. vaginalis*, *S. aureus* and *S. agalactiae* by the effect of pH, and *N. gonorrhoeae* and *E. faecalis* by a bacteriocin-like substance that was reported previously [10-12]. *L. acidophilus*, *L. brevis*, *L. plantarum*, *L. casei*, *L. lactis* subsp. *lactis*, *L. raffinolactis*, *P. acidilactici* and *P. pentosaceus* isolated from healthy female vaginal fluid, are able to inhibit the growth of *C. albicans*, *G. vaginalis* and *N. gonorrhoeae*, *Escherichia coli*, *C. albicans* and *S. aureus* [13-17].

Earlier, Raiz and others (2010) isolated 72 strains from yogurt and fecal materials of human, chick, parrot and cat. Only two isolates namely *L. fermentum* and *L. acidophilus* were found to produce bacteriocins having antimicrobial potential against cephalosporin resistant *E. coli*. In a clinical trial performed using capsules containing *L. fermentum* RC-14 and *L. rhamnosus* GR-1, Gil et al. (2010) have proven their effectiveness for the treatment of patients with vulvovaginal candidiasis. Recently, *L. fermentum* was isolated from human milk and its bacteriocin has been assessed for preventing urinary tract infections [18-23]. Probiotics recommended for eradication of common human UTI vaginal pathogens are enlisted in Table A [24-26].

Causal Organism	Disease	Symptoms	Recommended Probiotics	References
<i>Candida albicans</i>	Vaginitis, Vulvovaginal candidiasis	Irritation and soreness of the vulva, a thick, white vaginal discharge that doesn't usually smell.	<i>L. pentosus</i> TV35b	[19]
<i>Enterococcus faecalis</i>	UTI	Blood in urine, pyelonephritis	<i>L. salivarius</i> subsp. <i>salivarius</i> CRL 1328	[10]
<i>Enterococcus faecium</i>	UTI	Normal commensals in human vagina, but if exceeds in counts can cause disease.	<i>L. salivarius</i> subsp. <i>salivarius</i> CRL 1328	[11]
<i>Escherichia Coli</i>	UTI cystitis	Pain or burning with urination, lower abdominal pain or pressure, and/or the need to urinate frequently; cloudy darker or bloody urine	<i>L. acidophilus</i> CRL 1259, <i>L. crispatus</i> 21L07	[24,25]
			<i>L. jensenii</i> 5L08	[17]
<i>Escherichia Coli</i>	UTI cystitis	Pain or burning with urination, lower abdominal pain or pressure, and/or the need to urinate frequently; cloudy darker or bloody urine	<i>L. acidophilus</i> CRL 1259, <i>L. crispatus</i> 21L07	[24,25]
			<i>L. jensenii</i> 5L08	[17]

<i>Klebsiella pneumonia</i>	UTI	Burning sensation during urination, back pain, abdominal pain	<i>L. salivarius</i> subsp. <i>salivarius</i> CRL 1328	[21]
<i>Neisseria gonorrhoeae</i>	Gonorrhoea	Vaginal discharge and pain during urination, urethritis, vulvovaginitis	<i>L. salivarius</i> subsp. <i>salivarius</i> CRL 1328	[10,11]
			<i>L. jenseni</i> ATCC 25258, <i>L. gasseri</i> ATCC 33323	[21]
<i>Pseudomonas aeruginosa</i>	Burning sensation during urination, back pain, abdominal pain	Hospital-acquired urinary tract infections from catheterization, instrumentation or surgery	<i>L. gasseri</i> TL093C, TL143A, TL029, TL080 <i>L. acidophilus</i> TL099 <i>L. delbrueckii</i> TL059	[15]
<i>Staphylococcus aureus</i>	Toxic shock syndrome	Variety of local and systemic infections	<i>L. bulgaricus</i>	[14]
			<i>L. paracasei</i> CRL 1289	[26]
<i>Streptococcus agalactiae</i>	UTI	Bacteria can be passed from a pregnant woman to her baby during labor, if she is a carrier of the bacteria.	<i>L. bulgaricus</i>	[24,25]

**Table A:** Common Opportunistic Pathogens of Human Urogenital System and their control by probiotic LAB.

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