Objectives. Lactobacilli are predominant vaginal microorganisms in healthy women offering protection against urogenital tract infections and microbiota imbalance. Since these properties may be species- and strain-specific, numerous strains must be screened during probiotic development. Several probiotics for gastrointestinal tract but only a few probiotics for urogenital tract disturbances are currently on the market.

The aim was to screen vaginal lactobacilli for their probiotic potential assessing functional properties – hydrogen peroxide (HP) and lactic acid (LA) production as well as antagonistic activity against Escherichia coli, Candida albicans and Gardnerella vaginalis.

Methods. 135 lactobacilli strains were investigated, 70 of them originated from women of infertile couples (48 from partners of healthy men, 22 from partners of men with inflammatory prostatitis [IP]) and 65 from healthy women. The strains were identified by sequencing of the 16S rDNA fragment as L. crispatus (53%), L. jensenii (28%) and L. gasseri (19%). For HP detection, the change of colour on tetramethylbenzidine (TMB) agar was assessed. Production of LA was estimated using gas chromatography. Antagonistic activity against 5 E. coli strains (ATCC 700414, ATCC 700336 and 3 strains from women with bacterial vaginosis) was tested using agar spot method. Antagonistic activity against two C. albicans and one C. glabrata strains (ATCC 32032 and two strains from women with vaginal candidiasis) was tested using agar streak method. Antagonistic activity against two G. vaginalis strains (DSM 4944 and a strain from woman with bacterial vaginosis) was tested using optical density assessment in liquid medium.

Results. Most of L. crispatus (88%) and L. jensenii (86%) strains while only 46% of L. gasseri strains produced HP (p=0.001). The strains of healthy women (p=0.037) and partners of healthy men (p=0.029) expressed stronger production of HP than partners of IP patients. The best LA producer was L. gasseri (p<0.01 in comparison with two other species). The strongest antagonist against E. coli was L. crispatus (p=0.001 in comparison with L. jensenii). The strongest antagonist against Candida sp. was also L. crispatus (p=0.006 in comparison with L. gasseri). At the same time L. gasseri displayed the best activity against G. vaginalis.

Conclusion. Our study suggests that functional properties of vaginal lactobacilli necessary for probiotic development are highly species- and strain-specific and depend in some extent also on donors’ group. According to our data L. crispatus strains display the most promising properties against causative agents of urinary tract infections and vaginal candidiasis while L. gasseri strains against bacterial vaginosis-associated G. vaginalis. Hence, screening of numerous strains is obligatory prerequisite for targeted probiotic development.