

1 **Vaginal lactobacilli inhibit growth and hyphae formation of**  
2 ***Candida albicans***

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22 **Supplementary Tables**

23 Table S1. Primers used for qPCR analysis

Gene	Sequence
<i>ACT1-F</i> <sup>a</sup>	TCAGACCAGCTGATTTAGGTTTG
<i>ACT1-R</i> <sup>b</sup>	GTGAACAATGGATGGACCAG
<i>ALS3-R</i>	CCTGAAATTGACATGTAGCA
<i>ALS3-F</i>	CTAATGCTGCTACGTATAATT
<i>ECE1-F</i>	GCTGGTATCATTGCTGATAT
<i>ECE1-R</i>	TTCGATGGATTGTTGAACAC
<i>HWPI-F</i>	TGGTGCTATTACTATTCCGG
<i>HWPI-R</i>	CAATAATAGCAGCACCGAAG
<i>SAP5-F</i>	CAGAATTTCCCGTCGATGAGA
<i>SAP5-R</i>	CATTGTGCAAAGTAACTGCAACAG

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25 <sup>a</sup>F represents a forward primer

26 <sup>b</sup>R represents a reverse primer

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Table S2. Lactobacillus strains isolated from vaginal specimens of healthy women

No.	Species	Strains	Source	Confirmed_ID
1	<i>L. crispatus</i>	152	Twin 1	Lactobacillus crispatus strain G10 16S ribosomal RNA gene, partial sequence
2	<i>L. crispatus</i>	210	Mother	Lactobacillus crispatus strain G10 16S ribosomal RNA gene, partial sequence
3	<i>L. crispatus</i>	219	Mother	Lactobacillus crispatus ST1 complete genome, strain ST1
4	<i>L. crispatus</i>	220	Mother	Lactobacillus crispatus strain A014 16S ribosomal RNA gene, partial sequence
5	<i>L. crispatus</i>	227	Twin 1	Lactobacillus crispatus strain G10 16S ribosomal RNA gene, partial sequence
6	<i>L. crispatus</i>	236	Twin 1	Lactobacillus crispatus strain G10 16S ribosomal RNA gene, partial sequence
7	<i>L. crispatus</i>	241	Twin 1	Lactobacillus crispatus strain G10 16S ribosomal RNA gene, partial sequence
8	<i>L. crispatus</i>	250	Twin 1	Lactobacillus crispatus strain G10 16S ribosomal RNA gene, partial sequence
9	<i>L. crispatus</i>	253	Twin 1	Lactobacillus crispatus strain G10 16S ribosomal RNA gene, partial sequence
10	<i>L. crispatus</i>	282	Twin 2	Lactobacillus crispatus strain A014 16S ribosomal RNA gene, partial sequence
11	<i>L. crispatus</i>	358	Twin 2	Lactobacillus crispatus strain A014 16S ribosomal RNA gene, partial sequence
12	<i>L. crispatus</i>	367	Twin 1	Lactobacillus crispatus ST1 strain ST1 16S ribosomal RNA, complete sequence
13	<i>L. crispatus</i>	381	Mother	Lactobacillus crispatus strain G4 16S ribosomal RNA gene, partial sequence
14	<i>L. crispatus</i>	385	Mother	Lactobacillus crispatus strain G10 16S ribosomal RNA gene, partial sequence
15	<i>L. crispatus</i>	476	Twin 1	Lactobacillus crispatus ST1 strain ST1 16S ribosomal RNA, complete sequence
16	<i>L. fermentum</i>	155	Twin 1	Lactobacillus fermentum strain IMAU32493 16S ribosomal RNA gene, partial sequence
17	<i>L. fermentum</i>	157	Twin 1	Lactobacillus fermentum strain TY5 16S ribosomal RNA gene, partial sequence
18	<i>L. fermentum</i>	168	Twin 1	Lactobacillus fermentum gene for 16S ribosomal RNA, partial sequence, strain: YS2
19	<i>L. fermentum</i>	175	Twin 1	Lactobacillus fermentum strain A045 16S ribosomal RNA gene, partial sequence
20	<i>L. fermentum</i>	240	Twin 1	Lactobacillus fermentum strain TY5 16S ribosomal RNA gene, partial sequence
21	<i>L. fermentum</i>	245	Twin 1	Lactobacillus fermentum strain A045 16S ribosomal RNA gene, partial sequence
22	<i>L. fermentum</i>	257	Twin 1	Lactobacillus fermentum strain A045 16S ribosomal RNA gene, partial sequence
23	<i>L. fermentum</i>	258	Twin 1	Lactobacillus fermentum strain A045 16S ribosomal RNA gene, partial sequence
24	<i>L. fermentum</i>	259	Twin 1	Lactobacillus fermentum strain L4 16S ribosomal RNA gene, partial sequence
25	<i>L. fermentum</i>	264	Twin 1	Lactobacillus fermentum strain CMUL54 16S ribosomal RNA gene, partial sequence
26	<i>L. fermentum</i>	374	Twin 1	Lactobacillus fermentum gene for 16S ribosomal RNA, partial sequence, strain: S107D
27	<i>L. fermentum</i>	430	Twin 1	Lactobacillus fermentum gene for 16S ribosomal RNA, partial sequence, strain: YS2
28	<i>L. fermentum</i>	444	Twin 1	Lactobacillus fermentum strain BCS30 16S ribosomal RNA gene, partial sequence
29	<i>L. gasseri</i>	159	Twin 1	Lactobacillus gasseri strain BLB1b 16S ribosomal RNA gene, partial sequence
30	<i>L. gasseri</i>	281	Twin 2	Lactobacillus jensenii strain A084 16S ribosomal RNA gene, partial sequence
31	<i>L. gasseri</i>	431	Twin 1	Lactobacillus gasseri strain BLB1b 16S ribosomal RNA gene, partial sequence
32	<i>L. gasseri</i>	457	Twin 2	Lactobacillus gasseri strain VEL 16S ribosomal RNA gene, partial sequence
33	<i>L. gasseri</i>	462	Twin 2	Lactobacillus gasseri 16S ribosomal RNA gene, partial sequence
34	<i>L. gasseri</i>	463	Twin 2	Lactobacillus gasseri strain BLB1b 16S ribosomal RNA gene, partial sequence
35	<i>L. gasseri</i>	464	Twin 2	Lactobacillus gasseri strain BLB1b 16S ribosomal RNA gene, partial sequence
36	<i>L. jensenii</i>	181	Twin 2	Lactobacillus jensenii strain A084 16S ribosomal RNA gene, partial sequence
37	<i>L. jensenii</i>	184	Twin 2	Lactobacillus jensenii strain A084 16S ribosomal RNA gene, partial sequence
38	<i>L. jensenii</i>	185	Twin 2	Lactobacillus jensenii strain A084 16S ribosomal RNA gene, partial sequence
39	<i>L. jensenii</i>	190	Twin 2	Lactobacillus jensenii strain G16 16S ribosomal RNA gene, partial sequence
40	<i>L. jensenii</i>	200	Twin 2	Lactobacillus jensenii strain G16 16S ribosomal RNA gene, partial sequence
41	<i>L. jensenii</i>	226	Mother	Lactobacillus jensenii strain A084 16S ribosomal RNA gene, partial sequence
42	<i>L. jensenii</i>	287	Twin 2	Lactobacillus jensenii strain A084 16S ribosomal RNA gene, partial sequence
43	<i>L. jensenii</i>	290	Twin 2	Lactobacillus jensenii strain A084 16S ribosomal RNA gene, partial sequence
44	<i>L. jensenii</i>	291	Twin 2	Lactobacillus jensenii strain A084 16S ribosomal RNA gene, partial sequence
45	<i>L. jensenii</i>	354	Twin 2	Lactobacillus jensenii strain A084 16S ribosomal RNA gene, partial sequence
46	<i>L. jensenii</i>	360	Twin 2	Lactobacillus jensenii strain A084 16S ribosomal RNA gene, partial sequence
47	<i>L. jensenii</i>	448	Twin 2	Lactobacillus jensenii partial 16S rRNA gene, strain Gasser 62G
48	<i>L. jensenii</i>	465	Twin 2	Lactobacillus jensenii strain A084 16S ribosomal RNA gene, partial sequence
49	<i>L. jensenii</i>	470	Twin 2	Lactobacillus jensenii strain A084 16S ribosomal RNA gene, partial sequence
50	<i>L. jensenii</i>	478	Twin 2	Lactobacillus jensenii strain A084 16S ribosomal RNA gene, partial sequence
51	<i>L. jensenii</i>	479	Twin 2	Lactobacillus jensenii strain G16 16S ribosomal RNA gene, partial sequence
52	<i>L. spp.</i>	230	Twin 1	Uncultured Lactobacillales bacterium clone 4426 16S ribosomal RNA gene, partial sequence
53	<i>L. spp.</i>	362	Twin 1	Lactobacillus sp. JCM 1035 gene for 16S rRNA, partial sequence, strain: JCM 1035

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35 Yellow, green and blue denote isolates obtained from T1, T2 and their mother, respectively

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39 Table S3. Study subjects

SampleID	Family	Stage_of_Menopause	Age(years)
R048	F1	Post-menopause	62
R049	F1	Pre-menopause	41
R050	F1	Pre-menopause	41
R051	F2	Post-menopause	71
R052	F2	Pre-menopause	44
R053	F2	Pre-menopause	44
R055	F3	Post-menopause	61
R056	F3	Pre-menopause	39
R057	F3	Pre-menopause	39

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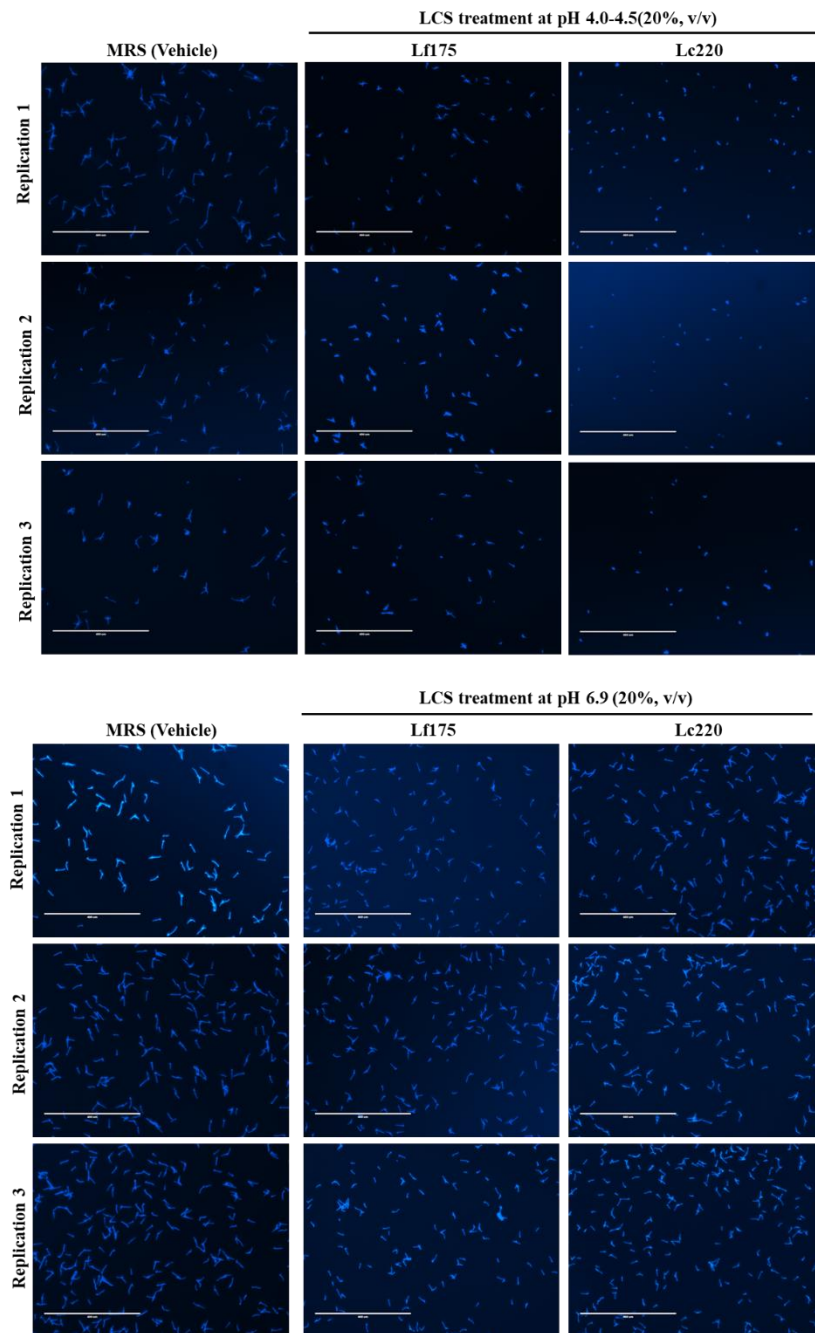
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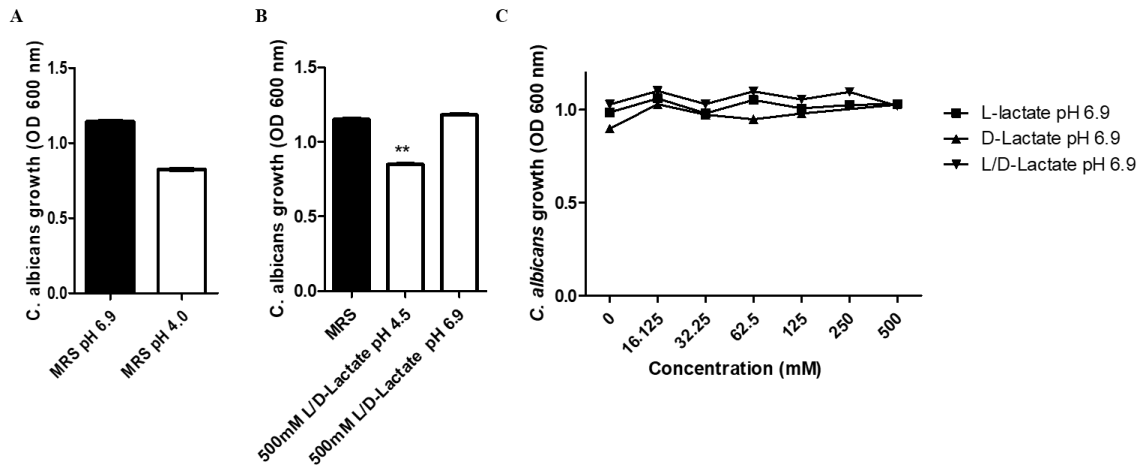
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53 **Supplementary Figures**



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55 **Supplementary Figure S1. Effect of LCSs on *C. albicans* hyphal growth.** *C. albicans* was  
56 treated with LCSs at acidic (4.0–4.5) and neutral (6.9) pH. Hyphae were stained with  
57 Calcofluor white and examined under a fluorescence microscope. Scale bar: 200  $\mu$ m. Lf175  
58 and Lc220 represent *L. fermentum* SNUV175 and *L. crispatus* SNUV220, respectively.



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60 **Supplementary Figure S2. Effect of pH and lactate concentration on *C. albicans* growth.**

61 (A–B) Effects of pH (A) and lactate (B) on *C. albicans* growth (N=2). (C) Effects of various

62 concentrations of lactate isomers on *C. albicans* growth. Statistical significance was

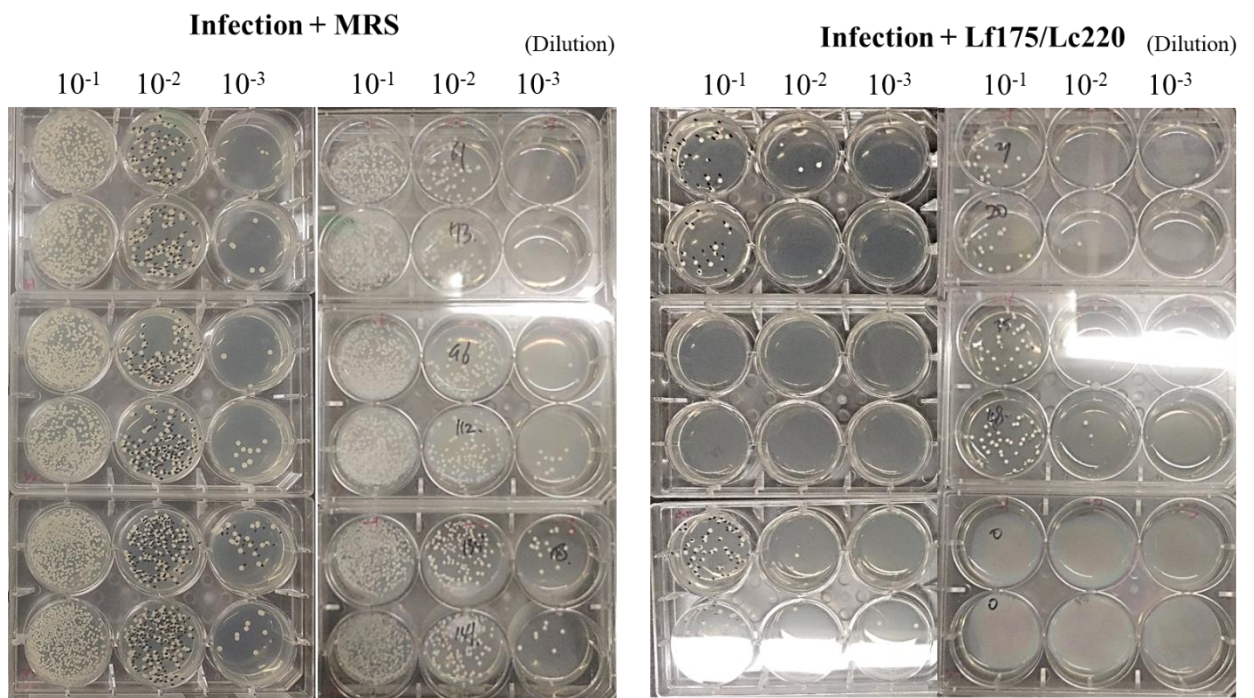
63 calculated using the Mann-Whitney U test. \*\*,  $p < 0.001$ .

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70 **Supplementary Figure S3. Effect of LCSs on vulvovaginal candidiasis.** Vaginal fluid was  
 71 harvested from *C. albicans*-infected mice treated with MRS or a mixture of LCSs from Lf175  
 72 and Lc220. Colony forming units (CFUs) were counted. Vaginal fluid was diluted with PBS.  
 73 Lf175 and Lc220 represent *L. fermentum* SNUV175 and *L. crispatus* SNUV220, respectively.

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