



LF-1 against *Streptococcus mutans* and its underlying mechanism

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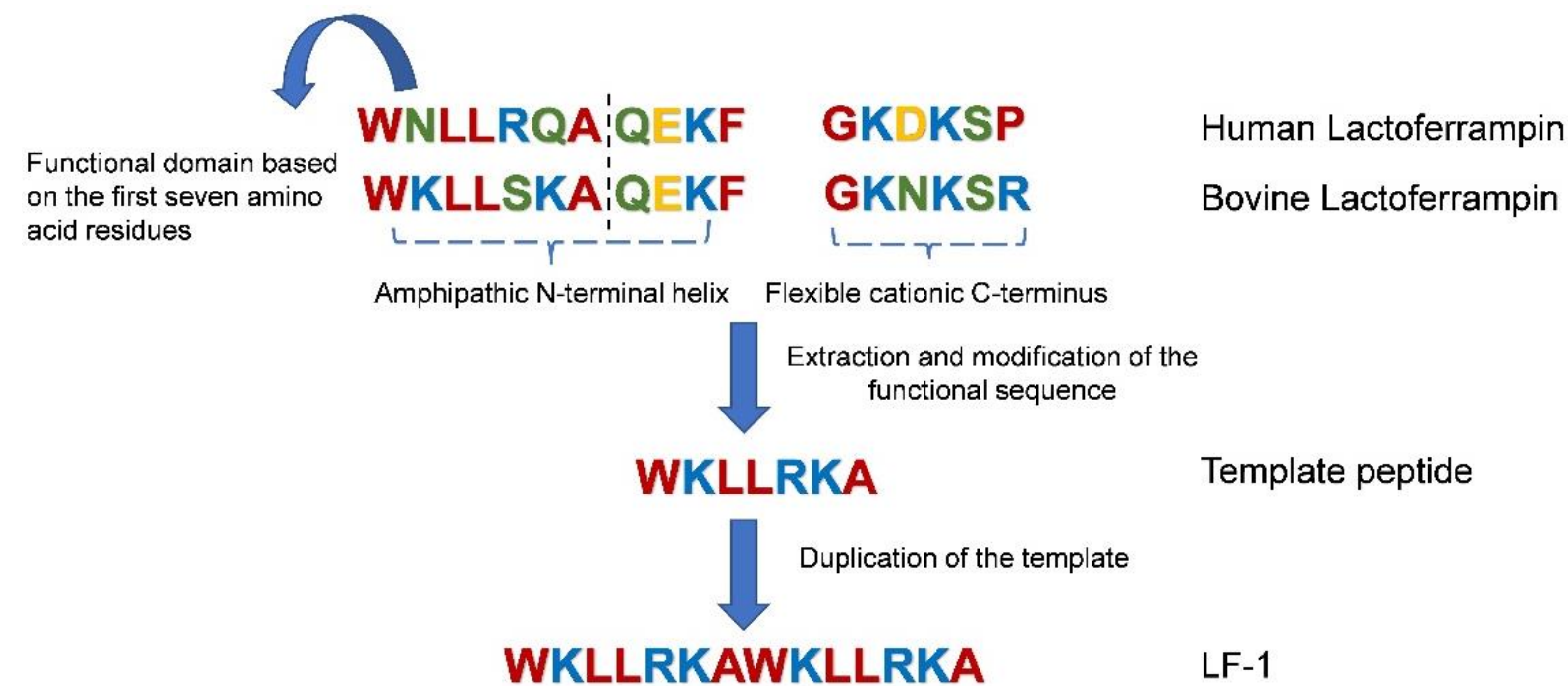
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Introduction

Dental caries is a primary worldwide oral disease, and *Streptococcus mutans* (*S. mutans*) has been considered the leading cariogenic bacterium. We developed a novel lactotransferrin-derived antimicrobial peptide LF-1, which might possess potential selectivity targeting *S. mutans*.



STRAINS	LF-1	
	MIC	MBC
<i>S. mutans</i>	8.00 ± 0.00	16.00 ± 0.00
<i>S. sanguis</i>	128.00 ± 0.00	128.00 ± 0.00
<i>S. gordonii</i>	89.60 ± 35.05	204.80 ± 70.11
<i>S. salivarius</i>	16.00 ± 0.00	25.60 ± 8.76

Objective

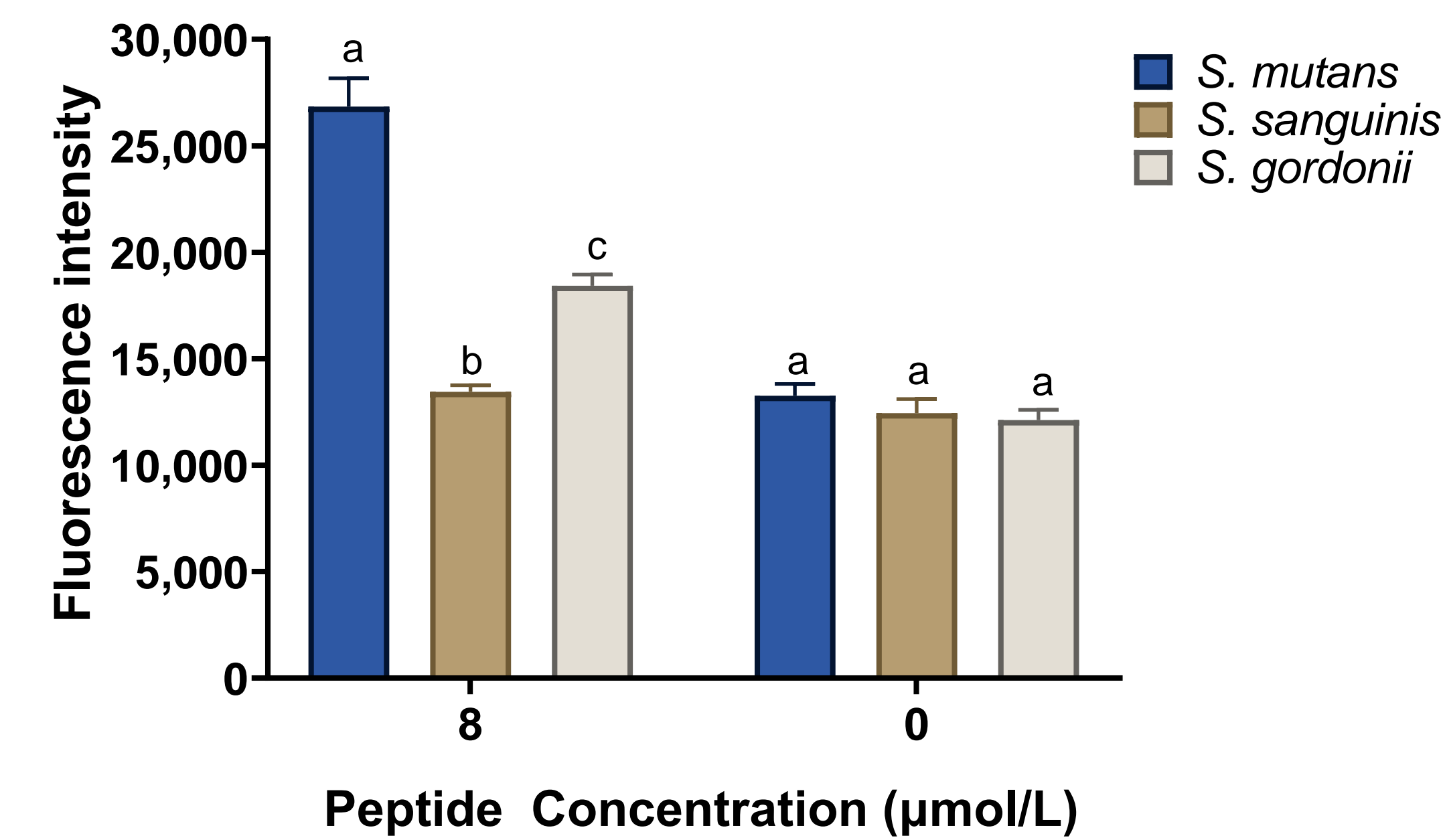
To confirm the selective antibacterial activity of a LF-1 and explore the possible mechanisms of its activity against *S. mutans*.

Methods

S. mutans UA 159, *S. sanguinis* ATCC 10,556 and *S. gordonii* ATCC 10,558 were used in this study. Propidium iodide assay was applied to measure the antibacterial effect of LF-1. Membrane affinity of LF-1 to different streptococci was evaluated by hydrophobicity assay, 3',3'-dipropylthiadicarbocyanine iodide experiment and flow cytometry. Transmission electron microscope (TEM) was used to observe the effect of LF-1 on bacterial morphology.

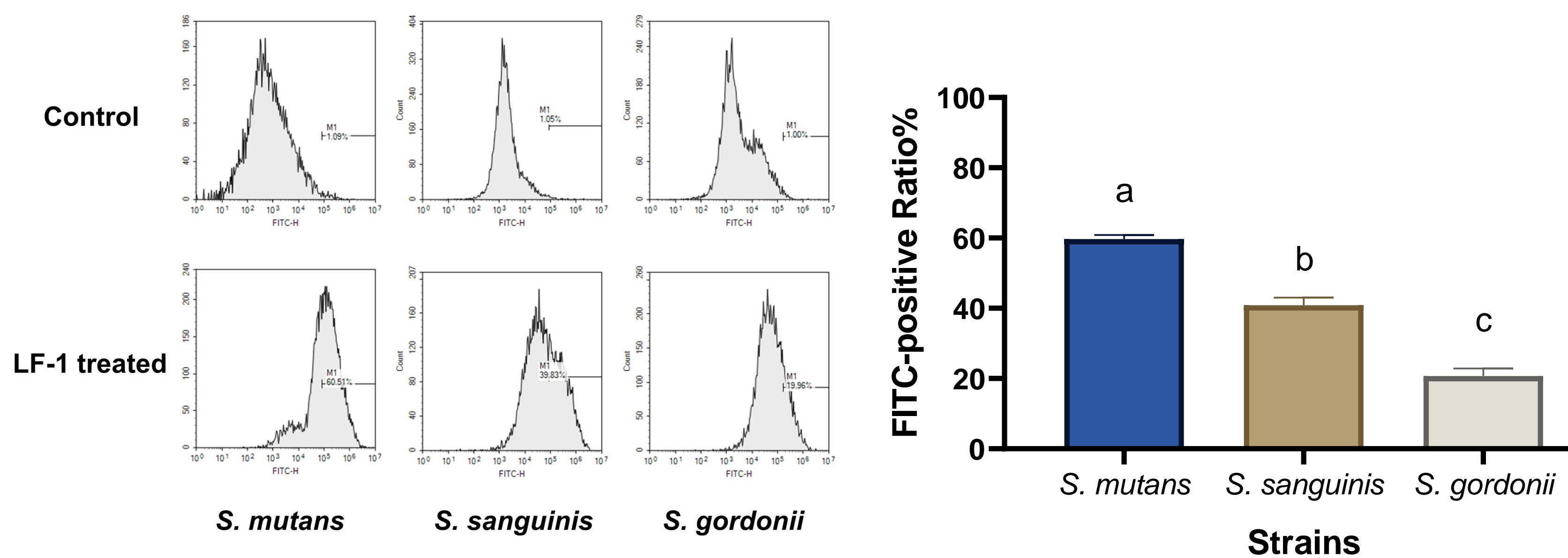
Result

1 the antibacterial effect of LF-1



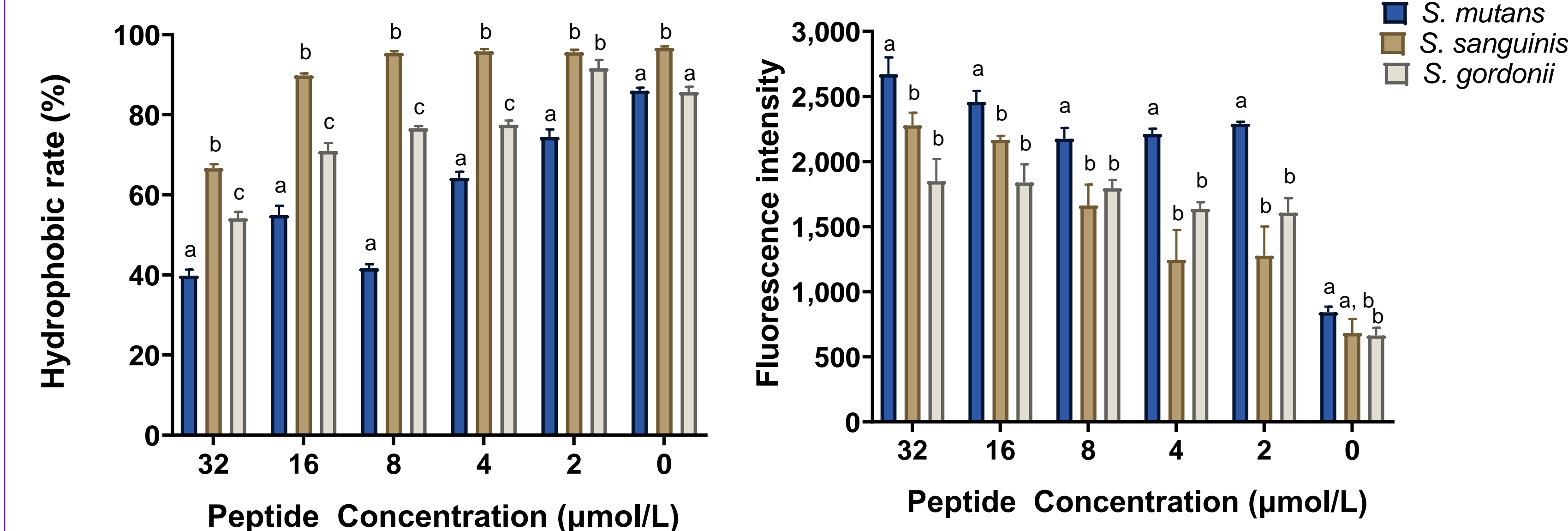
- low dose of LF-1 can exert high antibacterial activity against *S. mutans*

2 The adsorption capacity of LF-1



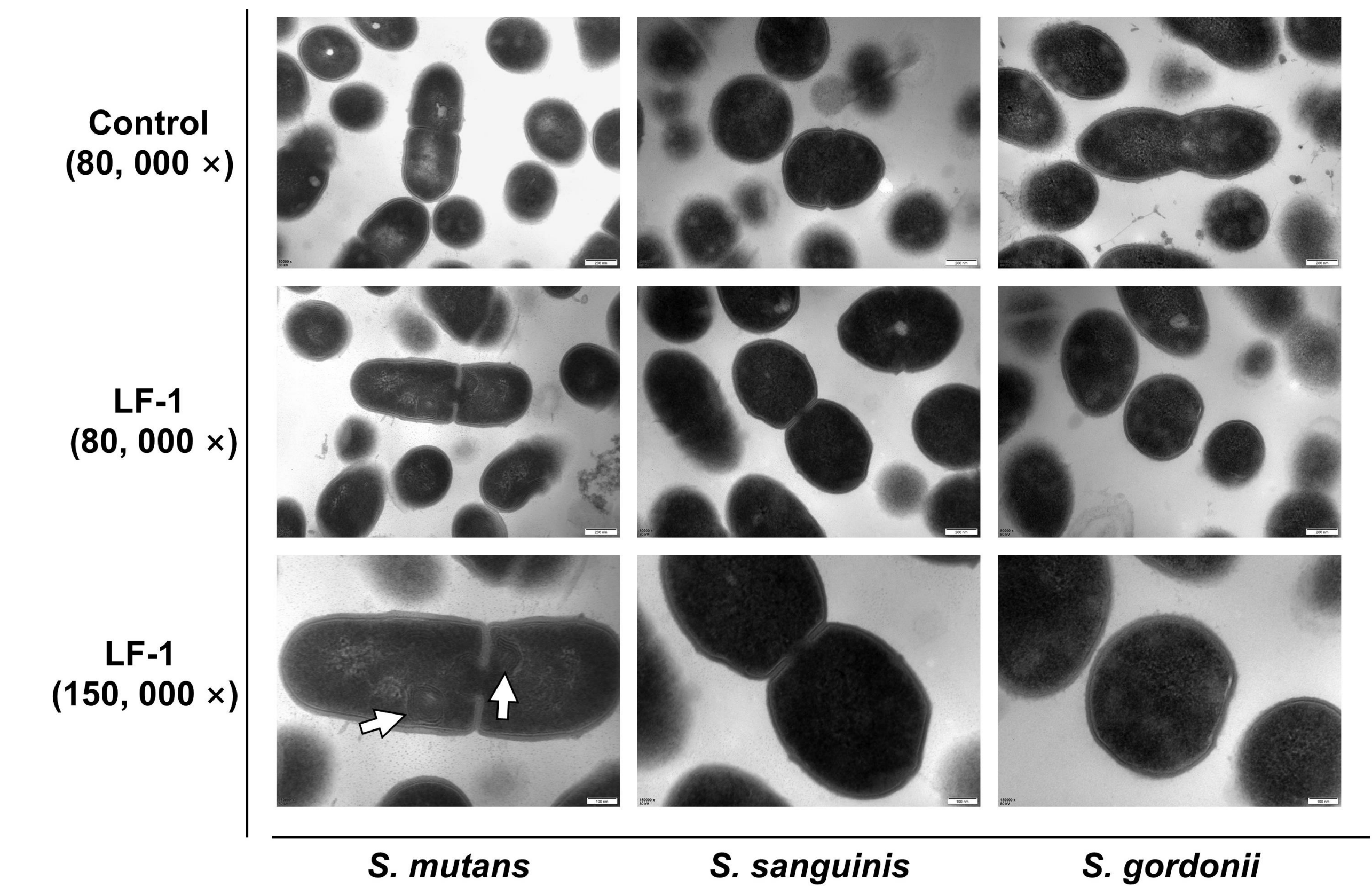
- LF-1 exhibited apparent adsorption capacity to *S. mutans*

3. The membrane disruption of LF-1



- LF-1 could induce the most potent cell membrane disruption to *S. mutans*

4 *Streptococcus* morphology after being treated with LF-1



- LF-1 triggered structural changes in the cell membrane of *S. mutans*

Conclusion

In conclusion, LF-1 displayed selective antibacterial activity against *S. mutans* and induced evident morphological changes in its membrane. The mechanisms of this selective targeting are attributed to LF-1 having a strongest affinity for *S. mutans*, which allows it to create considerable disturbance in their membrane. This selective targeting of *S. mutans* highlights the potential of LF-1 as a crucial antibacterial in caries prevention.

Ethics approval and consent to participate

The study was approved by the Ethics Committee of West China Hospital of Stomatology, Sichuan University (#WCHSIRB-D-2017-047).

Acknowledgement

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Reference

1Luo, J. *et al.* Novel lactotransferrin-derived synthetic peptides suppress cariogenic bacteria in vitro and arrest dental caries in vivo: [Novel lactotransferrin-derived anticaries peptides]. *J Oral Microbiol* 13, 1943999, doi:10.1080/20002297.2021.1943999 (2021).