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Hacking gut–immune axis with non-*Saccharomyces* yeasts: effects of *Candida intermedia* supplementation in SARS-CoV-2-vaccinated animals

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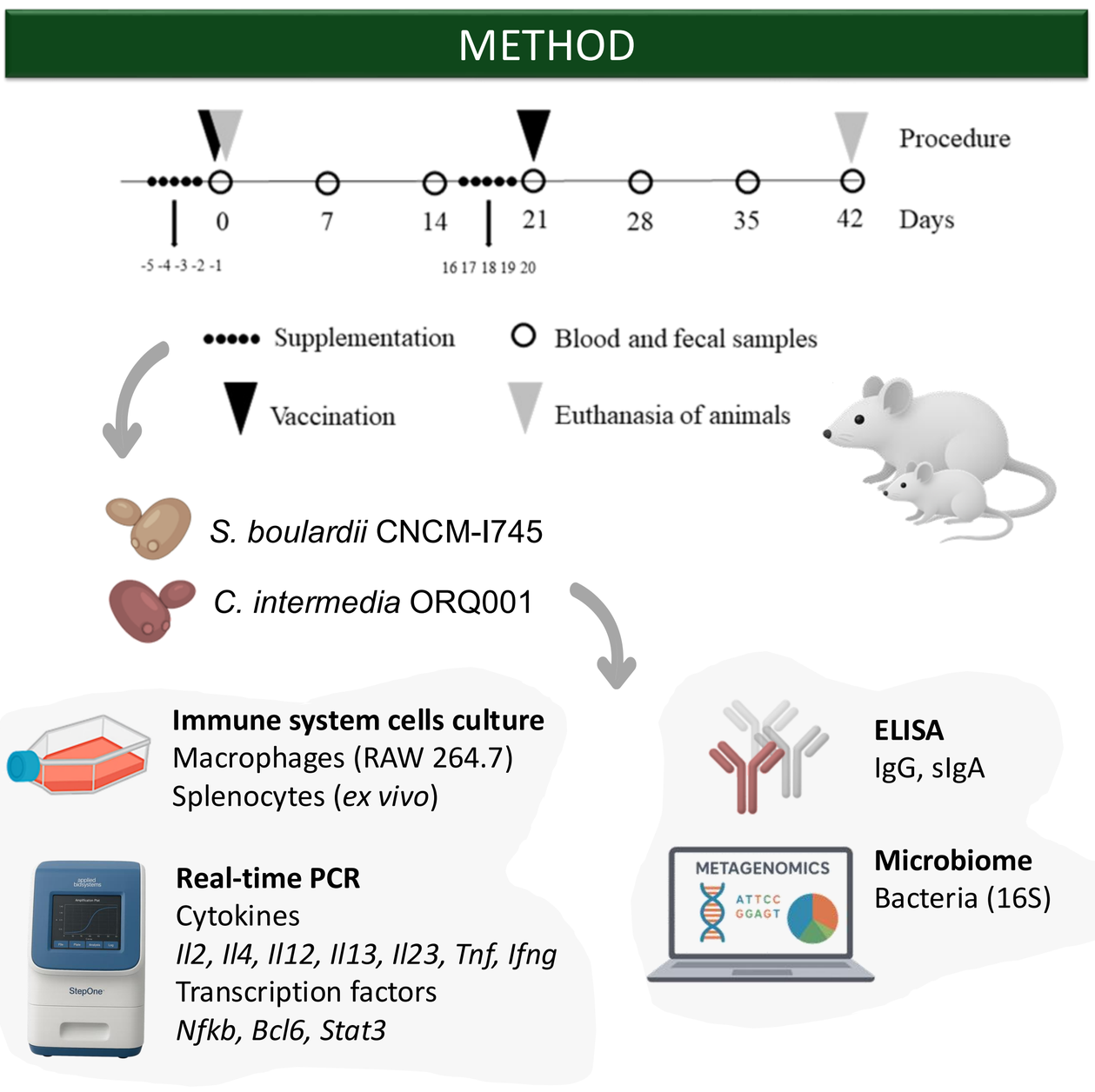
INTRODUCTION & AIM

Non-Saccharomyces yeasts are emerging as promising probiotics, showing biological effects comparable to the reference strain *Saccharomyces boulardii*. In previous studies, we identified *in vitro Candida intermedia* ORQ001 (a non-albicans yeast not considered a common human pathogen) as possessing probiotic traits [1]. Probiotics are known to modulate host immune responses by enhancing antibody production, increasing phagocytic activity, and altering cytokine expression. Based on these findings, this study aimed to evaluate the immunomodulatory effects of *C. intermedia* in mice vaccinated with inactivated SARS-CoV-2, providing further evidence of its probiotic potential.

METHOD



RESULTS & DISCUSSION

FIG.1

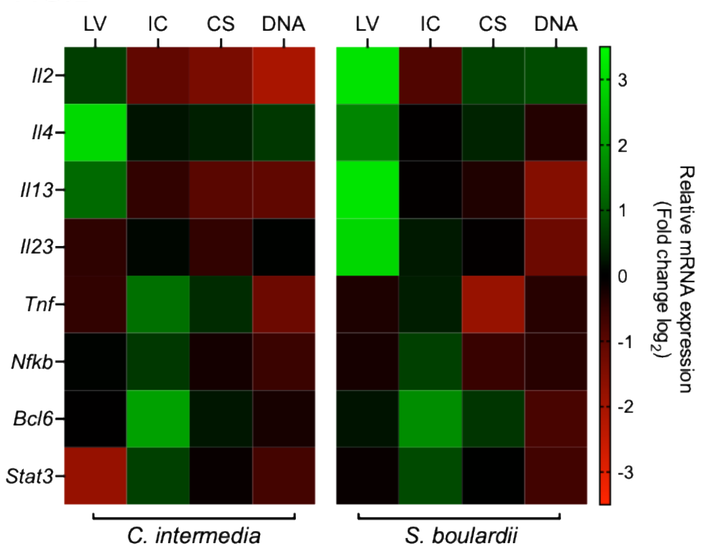


FIG. 1: Gene transcription of cytokines (*Il2, Il4, Il13, Il23, Tnf*) and transcription factors (*Nfκb, Bcl6, Stat3*) in RAW 264.7 macrophages stimulated with yeasts and their derivatives. LV: live cells; IC: inactivated cells; CS: culture supernatant; DNA: DNA extracted from fungal cultures.

FIG.2

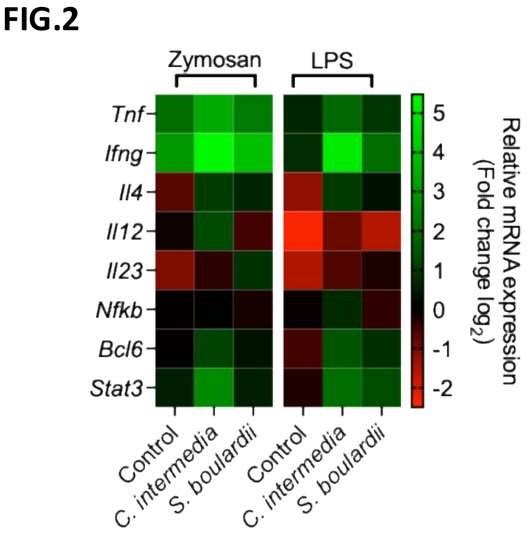


Fig. 2: Gene transcription of cytokines and transcription factors during splenocyte stimulation. Splenocytes were obtained from animals supplemented with *C. intermedia* or *S. boulardii*, or from non-supplemented). Cells were cultured in vitro and stimulated with Zymosan or LPS.

FIG.3

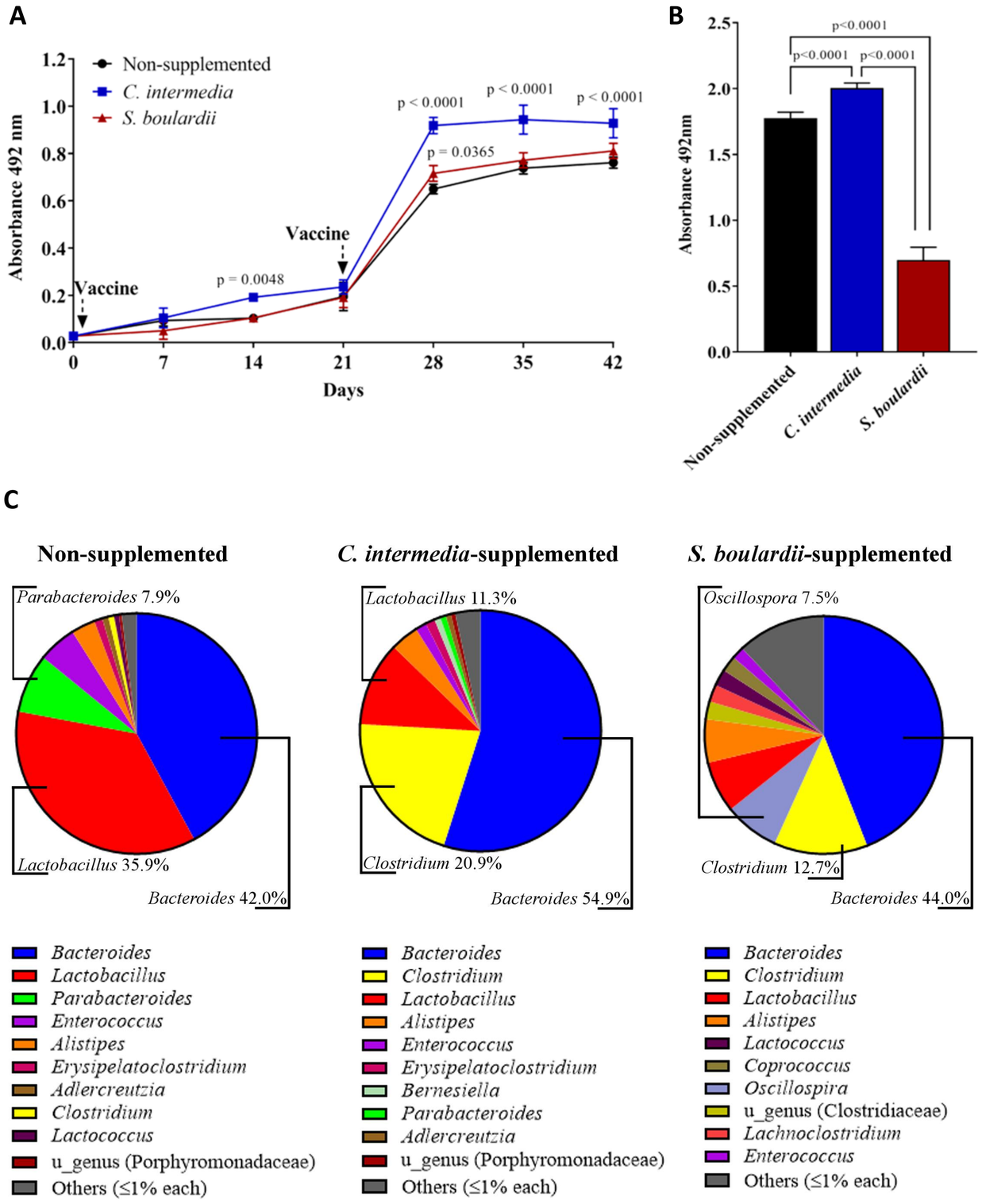


FIG. 3: Humoral immune response and gastrointestinal tract microbiome of non-supplemented animals (control) and supplemented with *C. intermedia* and *S. boulardii,* vaccinated with inactivated SARS-CoV-2. A) Dynamic of serum IgG production, analyzed each seven days from pooled sera of the experimental groups. B) sIgA detection on pooled fecal samples of mice in the 42nd experimental day. C)The most abundant bacterial genera in the sequenced samples, emphasizing the top 3 in each sample.

CONCLUSION

C. intermedia supplementation modulated the expression of key immune-related genes and enhanced humoral responses in mice. Furthermore, its influence on gastrointestinal microbiota suggests a synergistic effect on vaccine immunogenicity. This work provides original insights that may broaden the understanding of host–microbe interactions in vaccination and contribute to the development of innovative probiotic-based strategies to improve vaccine efficacy.

FUTURE WORK / REFERENCES

[1] Piraine, R.E.A.; Retzlaf, G.M.; Gonçalves, V.S.; Cunha, R.C.; Conrad, N.L.; Bochman, M.L.; Leite, F.P.L. Brewing and probiotic potential activity of wild yeasts *Hanseniaspora uvarum* PIT001, *Pichia kluyveri* LAR001 and *Candida intermedia* ORQ001. *Eur. Food Res. Technol.* **2023**, *249*, 133–148.

ACKNOWLEDGMENTS

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