

# Supplementation with *Akkermansia muciniphila* improved intestinal barrier and immunity in Zebrafish (*Danio rerio*)

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## Introduction

A long-term high-fat diet can weaken the immunity and disease resistance of fish, which ultimately adversely affects the intestinal health of fish. *Akkermansia muciniphila* has been shown to be important for physiological processes involved in metabolic disorders such as maintenance of intestinal barrier integrity and regulation of host metabolism. In order to achieve high yield and high quality development of aquatic products, this study used high fat diet (HFD) to induce immune dysfunction in zebrafish, and explored the effects of Akk and P-Akk on immune response and intestinal barrier in zebrafish.

## Experimental design

experiment	Group	Diet
1	control group: CFD	Control feed
	High-fat group: HFD	High-fat feed
	The Akk group of live bacteria: Akk	High-fat feed+1 × 10 <sup>9</sup> CFU/mL Akk
2	Pasteurized Akk group: P-Akk	High-fat feed+1 × 10 <sup>9</sup> CFU/g Pasteurized Akk
	control group: HFD	High-fat feed
	Low concentration of Pasteurized Akk: LP-Akk	High-fat feed+1 × 10 <sup>8</sup> CFU/g P-Akk
	The medium concentration of pasteurized Akk: MP-Akk	High-fat feed+1 × 10 <sup>9</sup> CFU/g P-Akk
	High concentration of Pasteurized Akk: HP-Akk	High-fat feed+1 × 10 <sup>10</sup> CFU/g P-Akk

## Results

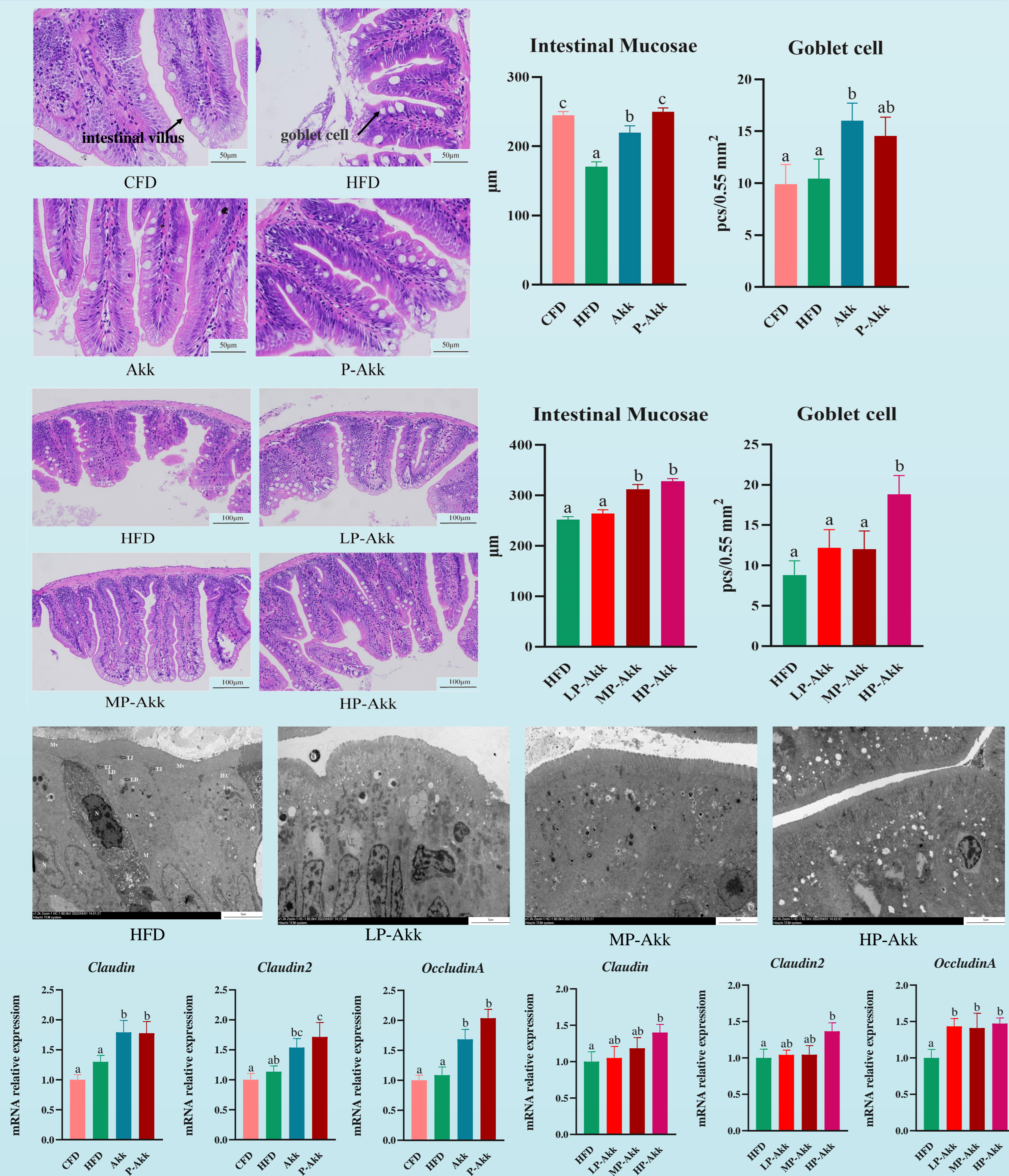


Fig.1 Akk and P-Akk improved the intestinal barrier in zebrafish fed a high-fat diet.

## Results

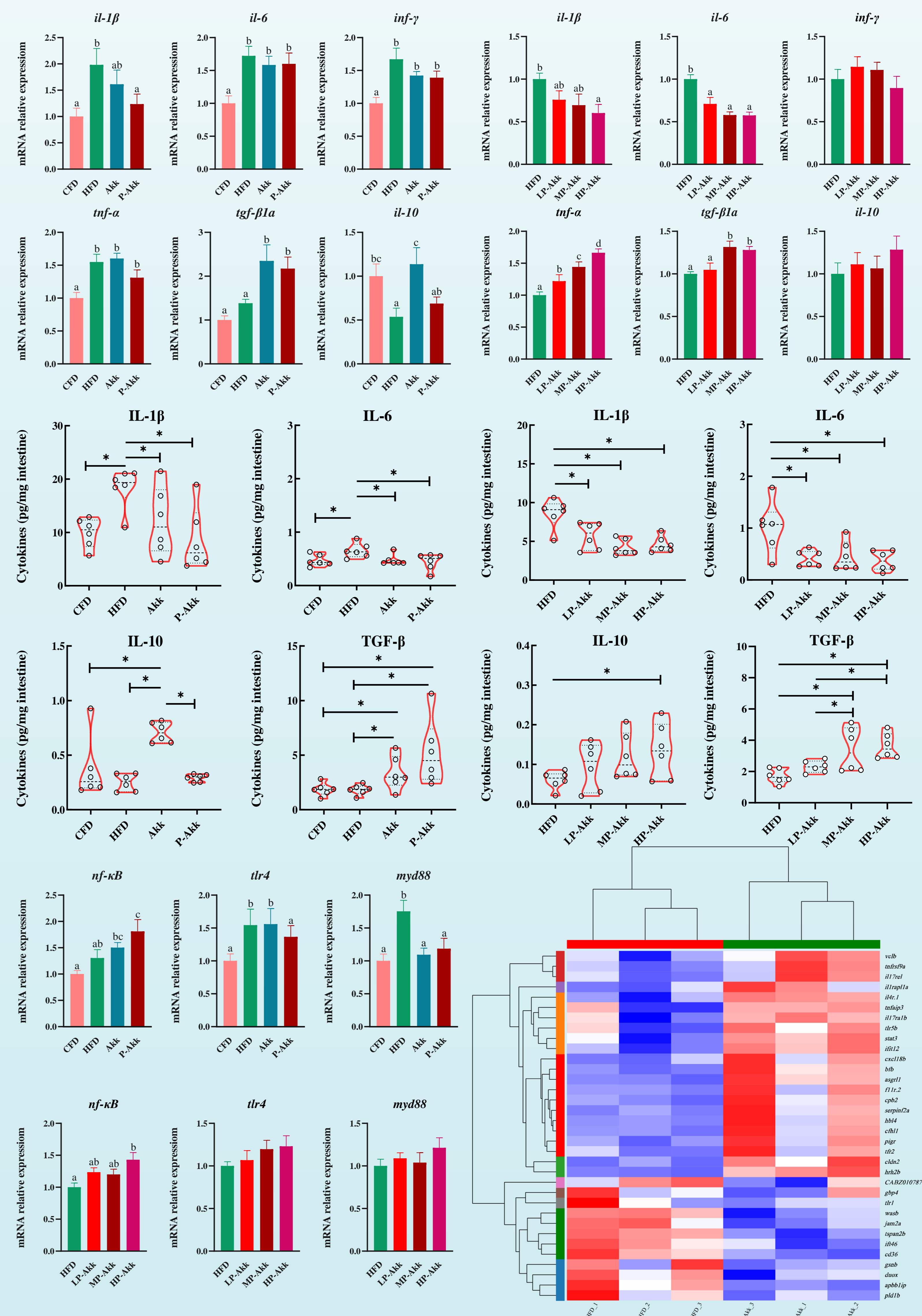
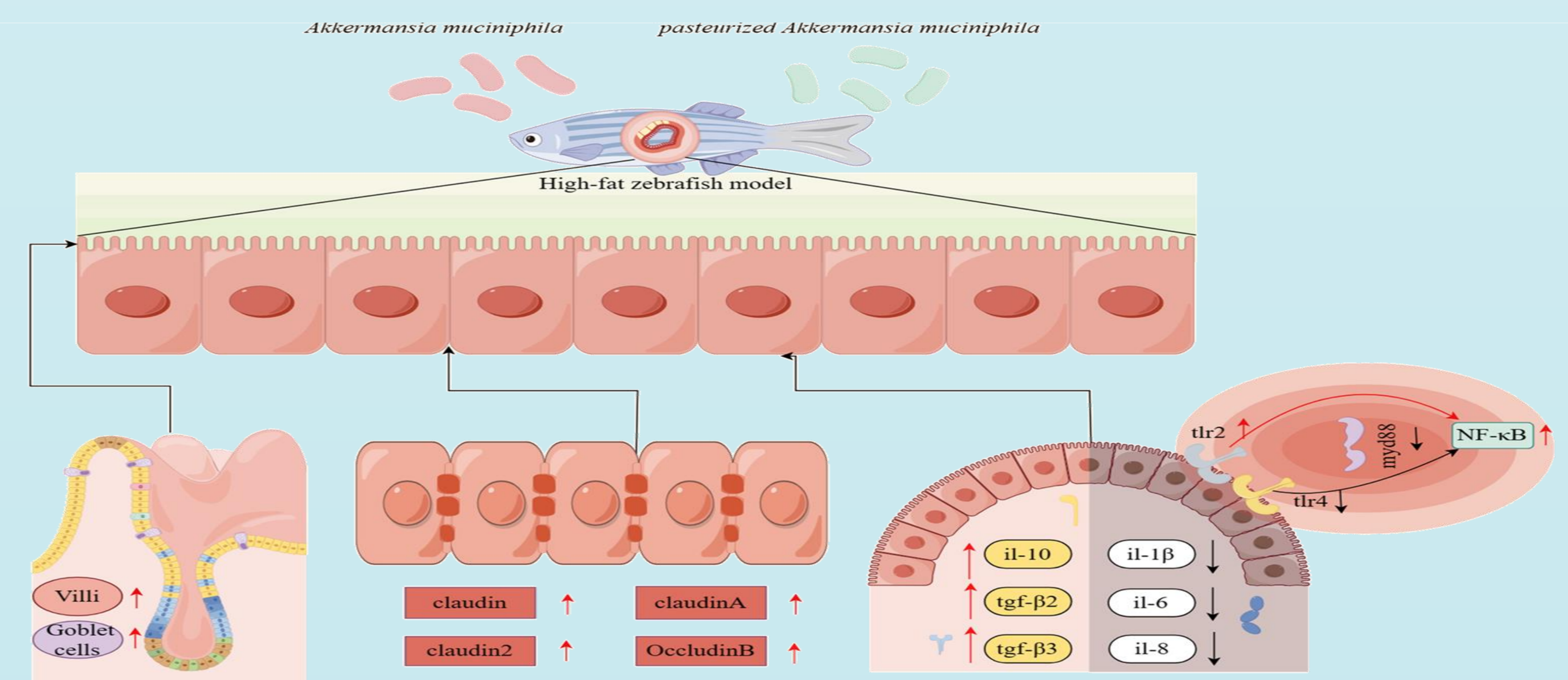


Fig.2 Akk and P-Akk improved the inflammatory response induced by the high-fat diet.



## Conclusion

In conclusion, dietary Akk supplementation alleviated intestinal barrier damage and immune dysfunction in high-fat zebrafish, and P-Akk is more effective. This study provides important insights into the potential use of Akk in fish and lays the foundation for further studies on its role in fish immunity.

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