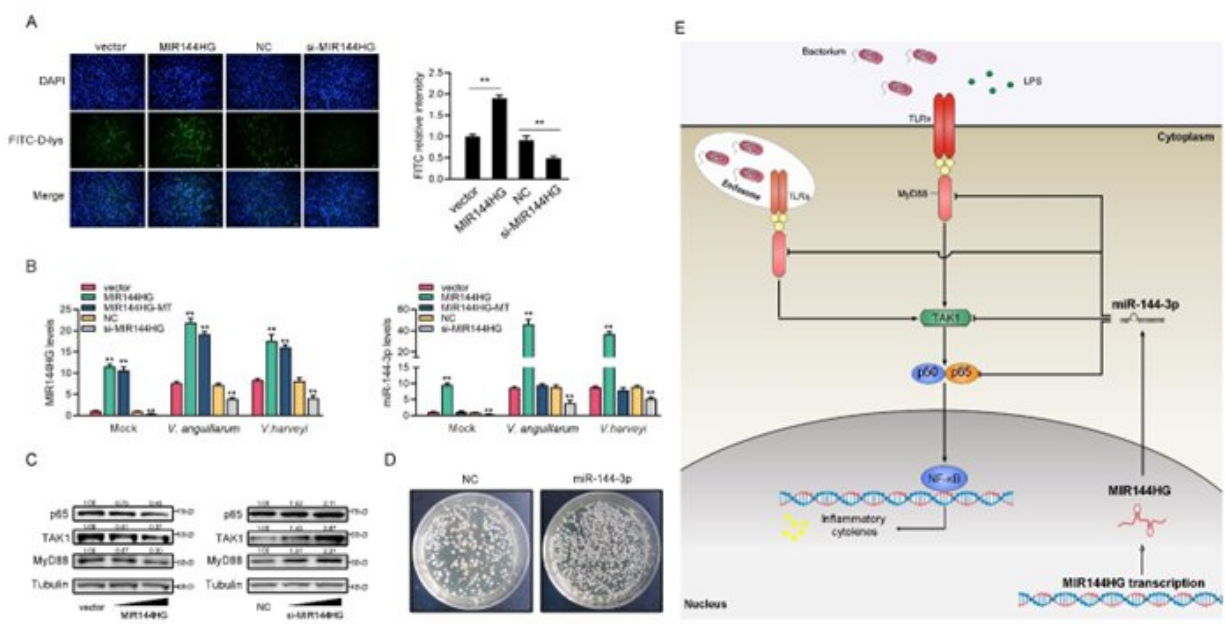


# The role of a novel long non-coding RNA in the immune escape of pathogenic *Vibrio* in fish

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LncRNA MIR144HG regulates the antibacterial innate immune mediated by MyD88, TAK1, and p65 by deriving miR-144-3p in fish. Credit: Tianjun Xu

MicroRNAs (miRNA) are small non-coding RNAs that regulate almost all biological processes, protein production, inflammatory responses, immune regulation, tumorigenesis and infection. In mammals, the classic formation of miRNA needs to transcribe a long primary miRNA in the nucleus and then process it into hairpin RNA with about 60–70

nucleotides. Eventually, this precursor miRNA will be transported to the cytoplasm for processing and shearing resulting in the generation of mature miRNA.

In recent decades, there have been reports of an alternative way of generating miRNA. The coding genes of some miRNAs are actually located in the coding genes of long non-coding RNA (lncRNA) and transcribed together with lncRNA. There is also increasing evidence of lncRNA playing a critical and irreplaceable role in innate immunity in mammals. Such evidence in lower vertebrates, such as the teleost fish (ray-finned fish) is, however, lacking.

To that end, a research team from Shanghai Ocean University led by Tianjun Xu, set out to elucidate the functions and characteristics of lncRNA in the teleost fish.

"We have identified a lncRNA-miRNA-mRNA axis regulatory network involved in antibacterial responses in teleost fish miiuy croaker, an important species of marine fish that supports capture fisheries and aquaculture," says Xu.

"A novel immune-related lncRNA MIR144HG was shown to negatively regulate the antibacterial immunity of miiuy croaker caused by the bacteria *Vibrio anguillarum* and *Vibrio harveyi*—the two most susceptible Gram-negative pathogens in aquaculture. The [economic losses](#) caused by these two bacteria every year are immeasurable."

Previous reports of lncRNA in teleost fish shown that it mostly positively regulates the innate immune response. This is the first time that a non-coding RNA has been found to promote the escape of the two bacteria in a teleost. Furthermore, the team demonstrated that MIR144HG can function as a precursor of miR-144-3p to produce miR-144-3p and enhance the inhibitory effect of miR-144-3p on the

proteins MyD88, TAK1 and p65, and thus inhibit the antibacterial immune response.

There was also evidence of MyD88 and p65 participating in the regulation of innate immune response caused by the two *Vibrio* bacteria, with both proteins having an important role in combatting invasion by *V. anguillarum*.

The team's findings are published in the journal *Water Biology and Security*.

"This study not only clarifies the mechanisms of the lncRNA-miRNA-mRNA axis in antibacterial immune responses, but also sheds light on the impact of lncRNA on host immunity and bacterial escape," says Xu.

**More information:** Weiwei Zheng et al, LncRNA MIR144HG-derived miR-144 suppresses antibacterial signaling and facilitates bacteria escape in fish, *Water Biology and Security* (2022). [DOI: 10.1016/j.watbs.2022.100093](https://doi.org/10.1016/j.watbs.2022.100093)

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