Functional role of piRNAs in animal models and its prospects in aquaculture

ABSTRACT

The recent advances in the field of aquaculture over the last decade has helped the cultured-fish industry production sector to identify problems and choose the best approaches to achieve high-volume production. Understanding the emerging roles of non-coding RNA (ncRNA) in the regulation of fish physiology and health will assist in gaining knowledge on the possible applications of ncRNAs for the advancement of aquaculture. There is information available on the practical considerations of epigenetic mechanisms like DNA methylation, histone modification and ncRNAs, such as microRNA in aquaculture, for both fish and shellfish. Among the non-coding RNAs, PIWI-interacting RNA (piRNA) is 24–31 bp long transcripts, which is primarily involved in silencing the germline transposons. Besides, the burgeoning reports and studies establish piRNAs' role in various aspects of biology. Till date, there are no reviews that summarize the recent findings available on piRNAs in animal models, especially on piRNAs biogenesis and biological action. To gain a better understanding and get an overview on the process of piRNA genesis among the different animals, this work reviews the literature available on the processes of piRNA biogenesis in animal models with special reference to aquatic animal model zebrafish. This review also presents a short discussion and prospects of piRNA’s application in relevance to the aquaculture industry.