



Cloning and expression of prolactin receptor gene during parental care of the discus fish (*Symphysodon aequifasciatus*)



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Introduction

- * The discus fish (*Symphysodon aequifasciata*) displays extensive parental care behavior^[1] through utilization of the mucus secreted by the epidermal mucosa to raise free-swimming fry.
- * Prolactin (PRL) is a polypeptide hormone which has been shown to play a significant role in regulating parental care in birds, mammals and fish^[2].
- * The action of PRL is initiated through the binding to the membrane prolactin receptor (PRLR).
- * There is no systematic and comprehensive identification on the subtypes of PRLR in discus fish, especially related to its unique parental care behavior.



Materials and methods

- * Bioinformatics technology was used to identify and analyze the structure and evolutionary relationship of the *S. aequifasciata* prolactin receptor (SaPRLR), and the expression pattern of SaPRLR molecules during the parental care period was analyzed by transcriptomics.
- * Tissues samples (Brain, skin and gonad) of eight periods of discus fish were collected for RNA-seq analysis. All tissues were collected from NP for qRT-PCR.

Breeding period	Description
B1	Be sexually mature but were unpaired
B2	Be sexually mature and paired
B3	Eggs spawned
B4	Eggs hatched
B5	Free-swimming fry bited on parents' skin mucus on the first day
B6	On the seventh day
B7	On the fourteenth day
B8	Fry stopped biting on parents' skin mucus

Results

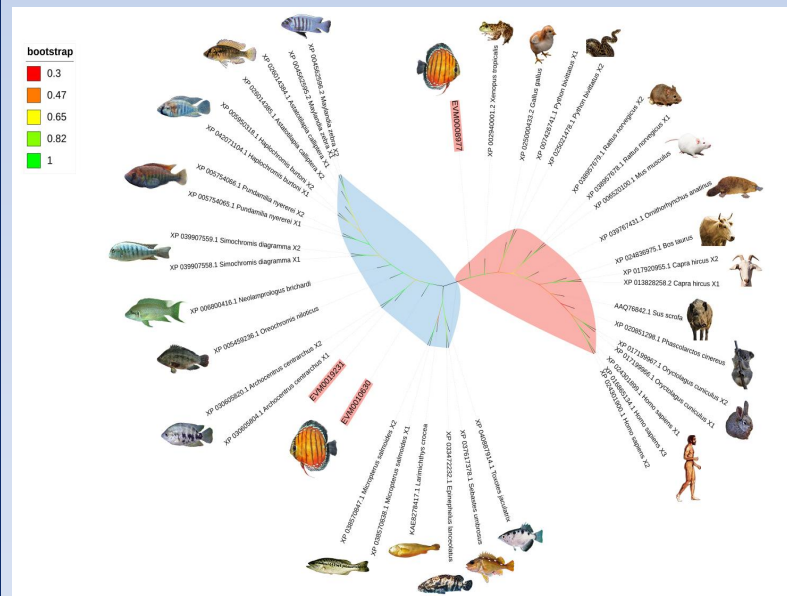


Fig.1 Phylogenetic tree analysis between *prlr* genes in other species and *prlr* genes in discus fish

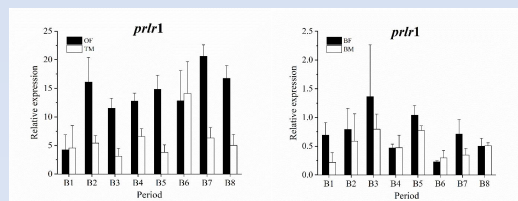


Fig.2 mRNA expression pattern of SaPRLR1 in eight periods (SaPRLR1 was expressed in the brain and gonad, but barely expressed in the skin)

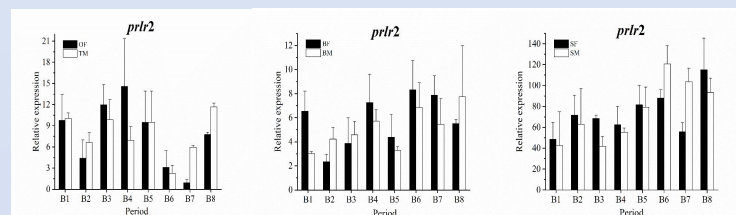


Fig.3 mRNA expression pattern of SaPRLR2 in eight periods (SaPRLR2 was highly expressed in the skin)

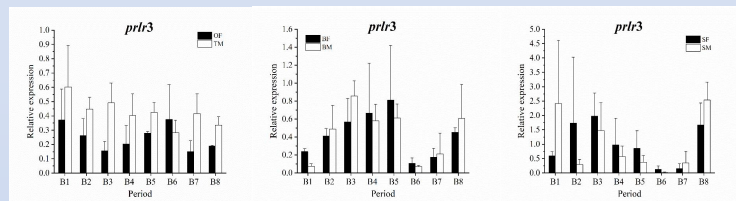


Fig.4 mRNA expression pattern of SaPRLR3 in eight periods (The expression level of SaPRLR3 was relatively low)

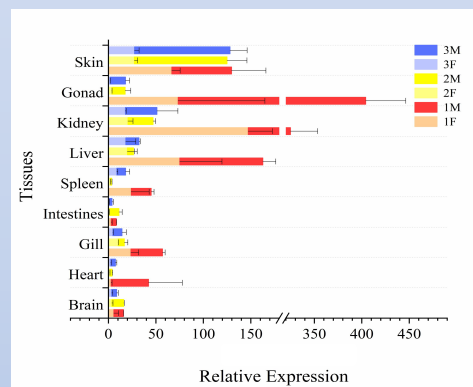


Fig.5 qRT-PCR relative expression of SaPRLR1, SaPRLR2 and SaPRLR3 in different tissues (SaPRLR1 was higher expressed in several osmoregulatory tissues)

Conclusion

- There are three prolactin receptor gene subtypes in discus fish, but only the SaPRLR2 shared higher identity with higher animal.
- The presence of SaPRLR in several osmoregulatory tissues including kidney, gill and intestine is consistent with the known role of PRL in mediating hydromineral balance in teleosts^[3].
- Upregulated expression of SaPRLR2 mRNA was observed in skin of parental fish compared to non-parental fish and exhibited a certain stages specific pattern between male and female parents.
- Our findings indicate possibility of a role of the PRL hormonal signaling in regulation of mucus production in relation to parental care behavior.

Advance

Further experiments will be needed to elucidate the complete signaling pathways associated with PRL mediated effect on mucus production and verify whether it can be applied to production.

Acknowledgements

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