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The application of transcriptome sequencing: New insights into the understanding of sex-steroid hormone synthesis in echinoderms

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In invertebrates, the presence of sex steroid hormones such as progesterone (P4), testosterone (T) and estradiol-17β (E2) has been reported in Echinoderms and Molluscs and classified as vertebrate-like sex steroid hormones (VLSHs). In Echinoderms, VLSHs levels were found to change in relation to gametogenesis and suggested to be synthesized primarily in the ovary. However, the synthesis and functions of these VLSHs in Echinoderms are still poorly understood. Therefore, this study aimed to identify transcripts of enzymes that are crucial in the steroid biosynthetic pathway by selecting ovaries from the sea star *Patiriella regularis* in early and late stages of oogenesis for *de novo* transcriptome sequencing using Illumina HiSeq2000. The study also investigated the steroidogenic activity of *P. regularis* ovary and pyloric caeca during the reproductive cycle by incubating these tissues with pregnenolone (P5) or androstenedione (AD) and measuring P4, AD, T and E2 concentrations using liquid chromatography-atmospheric pressure chemical ionization tandem mass spectrometry. Surprisingly, the transcripts that encode key steroidogenic enzymes, such as P450scc, 3β-HSD and aromatase, were not found in the transcriptome from the ovary. The results also showed the ability of both pyloric caeca and ovary to convert P5 into P4 and AD into T, but the in vitro production of P4 or T was not significant during the reproductive cycle. Therefore, it seems probable that the synthesis of VLSHs in *P. regularis* stems from non-specific activity of hydroxysteroid dehydrogenases and P450 enzymes. More similar studies using advanced molecular techniques are needed to understand the synthesis and function of VLSHs in invertebrates.

Biography

Alqaisi K M has completed his PhD in 2014 from the Department of Zoology at University of Otago, New Zealand. His PhD research was focused on understanding vitellogenesis and sex steroid hormone synthesis in Echinoderms using advance molecular and biochemical techniques. He also has research experience in the area of developmental neurotoxicity from his Master's research. He has published several papers in peer-reviewed journals. Currently, he is interested in understanding the endogenous signals that control gametogenesis in Echinoderms. Also, he is interested in studying how brain signals control energy homeostasis and obesity in human.

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