促性腺素於體外培養吳郭魚性腺之固醇類荷爾蒙生成與腦垂腺?酸環化?激活?及其受體基因表現之影響

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摘 要

脊椎動物之生殖主由下視丘-腦下垂體-性腺之內分泌軸（hypothalamus-pituitary-gonads axis）所調控，下視丘分泌促性腺素釋放素（gonadotropin releasing hormones）誘導腦垂體前葉（anterior pituitary）分泌如促濾泡素（follicle stimulating hormone，FSH）及促黃體素（luteinizing hormone，LH）等之促性腺素（gonadotropins）作用至性腺並調控其之發育、配子生成與成熟，並促進固醇類荷爾蒙生成（steroidogenesis）。於水產養殖中，吳郭魚（Oreochromis mossambicus）為目前本國主要經濟養殖魚類之一，然目前其生殖調控相關研究極少。本研究室先前之研究顯示，除肝臟外，於吳郭魚之各臟器及性腺包含精巢（testis）及卵巢（ovary）等組織中皆有腦垂體腺?酸環化?激活?（pituitary adenylate cyclase activating polypeptide，tpacap38）及其受體（type-I PACAP receptor，tpac1-r）之表現，而藉由添加cAMP類似物（dibutyryl-cAMP）、合成之綿羊PACAP及腺?環化?（adenylyl cyclase）之活化劑forskolin誘導濾泡細胞（follicle cells）及精巢組織於劑量及時間相關試驗之結果顯示，tpacap38之表現經三藥劑誘導後顯著提升，然其表現可被PKA抑制劑H89所抑制，上述結果顯示tpacap38表現可能與cAMP-PKA之訊號傳遞路徑（3'-5'-cyclic adenosine monophosphate/protein kinase A signal pathway）有關。本研究以半定量反轉錄?-聚合?鏈鎖反應（RT-PCR）及酵素免疫分析（enzyme immunoassay，EIA）偵測經促性腺素誘導後吳郭魚之性腺其tpacap38及其受體tpac1-r之表現量及固醇類荷爾蒙生成量，經添加如類促黃體素（LH）功能之人類絨毛膜促性腺素（human chorionic gonadotropin，hCG；5、15及50 IU）與類促濾泡素（FSH）功能之孕馬血清激素（pregnant mare's serum gonadotropin，PMSG；5、15、50及100 IU）誘導2小時之劑量相關試驗結果顯示，相較於控制組（無添加組），添加15 IU之hCG可顯著提高雌性與雄性吳郭魚性腺中tpacap38與tpac1-r mRNA之表現量，並可促進固醇類荷爾蒙如雌激素、助孕酮及睪固酮之生成。而添加50 IU之PMSG可顯著誘導雌魚濾泡細胞中tpac1-r mRNA之表現量，亦可促進精巢及濾泡細胞中雌激素、助孕酮及睪固酮之生成。另外經不同濃度hCG（5、15及50 IU）及PMSG（5、15及50 IU）各劑量共同添加誘導2小時之結果顯示，共同添加促性腺激素可誘導性腺中tpacap38及tpac1-r mRNA之表現。共同誘導亦可促進精巢及濾泡細胞中雌激素、助孕酮及睪固酮之生成。於時間相關之試驗中，添加15 IU hCG或50 IU PMSG誘導性腺於不同時間（2、4、6及8小時）之結果顯示，精巢與濾泡細胞中之tpacap38及tpac1-r mRNA之表現量經hCG誘導後於4小時達到高峰。而添加50 IU PMSG誘導後，精巢與濾泡細胞中之tpacap38 mRNA之表現量於2小時達到高峰；而共同添加15 IU hCG與50 IU PMSG誘導後之結果顯示，性腺中tpacap38及tpac1-r mRNA之表現量於6小達到高峰。性腺固醇類荷爾蒙經促性腺素（15 IU hCG、50 IU PMSG或共同誘導）於不同時間誘導後，其分泌量於2小時後生成量顯著增加，然隨著培養時間增加而降低。上述促性腺素誘導基因表現與固醇類荷爾蒙分泌之作用皆可受H89所抑制。本研究結果顯示，於硬骨魚類中，tpacap38及tpac1-r可能以旁分泌或自分泌之方式參與促性腺素-性腺生殖路徑之調控，並影響性腺固醇類荷爾蒙之生成。

關鍵詞 : 吳郭魚、腦垂體腺?酸環化?激活?、腦垂體腺?酸環化?激活?第一型受體、性腺、促性腺素、固醇類荷爾蒙生成

目錄

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