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Immunolocalization of oxytocin receptor in relation to estrogen receptor beta in the reproductive tissues of unilateral abdominal cryptorchid dogs

Nawarus Prapaiwan\textsuperscript{A}, Sukanya Manee-in\textsuperscript{B}, Sayamon Srisuwatanasagul\textsuperscript{A}

\textsuperscript{A}Department of Veterinary Anatomy, Research Unit of Obstetrics and Reproduction in Animals, Chulalongkorn University, Pathumwan, Bangkok, Thailand

\textsuperscript{B}Department of Clinical Sciences and Public Health, Mahidol University, Salaya, Nakhon Pathom, Thailand

prapaiwan.n@hotmail.com

In males, oxytocin involves with various physiological functions, such as reproductive tract contractility and steroidogenesis.\textsuperscript{1} Due to the role of estrogen to the oxytocin receptor (OTR) expression and the cryptorchidism pathogenesis, the investigation of the OTR and estrogen receptor beta (ER\textsubscript{β}) expression may provide more information about this defect. Therefore, this study aimed to investigate the expression of OTR and ER\textsubscript{β} in the reproductive tissues including testis, epididymis (divided into 4 parts; efferent duct, caput-, corpus- and cauda-epididymis) and vas deferens of both normal and unilateral abdominal cryptorchid dogs using immunohistochemistry. Male dogs were classified into 2 groups; normal (n=30) and cryptorchid groups (n=10). Tissue samples from each cryptorchid dog were separated into 2 subgroups; scrotal and abdominal subgroups. The expressions of OTR and ER\textsubscript{β} were evaluated by avidin-biotin-peroxidase complex method. Each sample was analyzed by the image analysis software after whole-slide digitalization (3DHISTECH, Budapest, Hungary). The results were demonstrated as percentage of OTR positive areas and ER\textsubscript{β} H-score (mean \(\pm\) SD). The results showed that the positive OTR immunostaining in both normal and cryptorchid groups were observed in all parts of male reproductive tract. Comparing between scrotal and abdominal cryptorchid groups, the localization of OTR in testis and epididymis of the abdominal subgroup (testis=17.73\(\pm\)6.89, efferent duct=25.47\(\pm\)5.08, caput=23.34\(\pm\)3.50, corpus=21.26\(\pm\)4.16, cauda=20.87\(\pm\)4.19) was less than that of the scrotal subgroup (testis=35.81\(\pm\)6.24, efferent duct=38.54\(\pm\)6.26, caput=32.29\(\pm\)4.67, corpus=33.33\(\pm\)4.24, cauda=29.05\(\pm\)3.99) (paired \(t\)-test, \(p<0.05\)). These findings supported the earlier study suggesting that the functions of a cryptorchid testis are disturbed by the high temperature from an abnormal position of that testis.\textsuperscript{2} In addition, the lower percentages of positive OTR immunostaining in testis and epididymis were observed in both scrotal and abdominal cryptorchid groups than those in normal group (testis=43.64\(\pm\)2.49, efferent duct=44.42\(\pm\)5.27, corpus=46.76\(\pm\)4.08, cauda=33.97\(\pm\)3.44) (\(t\)-test, \(p<0.05\)). In testis, the ER\textsubscript{β} H-score of both scrotal and abdominal cryptorchid groups were also less than that of the normal group (\(t\)-test, \(p<0.05\)). Furthermore, the localization of OTR and ER\textsubscript{β} in male reproductive tissues positively correlated (Pearson's correlation coefficient, \(p<0.05\)) only in normal group, but not in cryptorchid group. In conclusion, the present study proposed that male reproductive tract, including testis, epididymis, and vas deferens were the target site of oxytocin acting through its receptor. Moreover, the expression of OTR, as well as the correlation between OTR and ER\textsubscript{β} in reproductive tissues of male dogs can be disturbed by unilateral cryptorchidism.

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