Cytochrome P450 aromatase expression in canine nervous tissue: an immunohistochemical study

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Abstract

The enzyme cytochrome P450 aromatase is responsible for conversion of androgens to estrogens. Estrogens have been implicated in neurophysiology and neuropathology. The present study investigated the presence of aromatase immunoreactivity in the temporal, parietal and occipital cortices, olfactory bulb, cerebellum, and choroid plexus of the normal dog. Aromatase immunoreactivity was localized exclusively in neurons in the cortices and olfactory bulb. Immunoreactivity was also present in a small number of astrocytes in the substantia alba of the cerebellum. In the cortical regions, immunoreactive neurons, morphologically identified as pyramidal cells, were found throughout Layer II down to Layer VI, but not all pyramidal neurons were immunoreactive. In the olfactory bulb, immunoreactive neurons were mainly observed in mitral cells and inner granular cell layers. In the cerebellum, immunoreactivity was present in neurons of the deep cerebellar nuclei and in some neurons of the molecular and granular cell layers. Immunoreactivity was also present in endothelial cells of the subarachnoid vessels and those adjacent to ventricles in the cortex. The presence of well defined cytoplasmic aromatase immunoreactivity in neurons, some astrocytes, and endothelial cells suggests estrogen involvement in CNS physiology and function in the dog. The presence of aromatase in ependymal cells lining cerebral ventricles and choroid epithelial cells suggests that these cells may be partially responsible for estrogen concentration in the cerebrospinal fluid.

Key words: aromatase, estrogen, neurosteroids, immunohistochemistry, dog

Introduction

Cytochrome P450 aromatase, also called estrogen synthase, is the enzyme responsible for conversion of androgens to estrogens. It is expressed in gonads as well as extra-gonadal tissues including skin fibroblasts, placenta, bone, adipose tissue, and vasculature as well as nervous tissue (Emoto et al. 1991, Rink et al. 1996, Sasano et al. 1998, Harada et al. 1999, Lambard et al. 2005, Mendelson et al. 2005, Ribot et al. 2006). As the enzyme that determines local availability of estrogen in the nervous system,