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Postnatal Development and Regulation of ß-Hexosaminidase in Epithelial Cells of the Rat Epididymis

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ß-Hexosaminidase (Hex) catalyzes the hydrolysis of terminal sugar residues from a number of substrates such as GM2 gangliosides, glycoproteins, glycolipids, and glycosaminoglycans. As an enzyme present in lysosomes of epithelial cells of the adult rat epididymis, it serves to degrade substances endocytosed from the epididymal lumen. In this way, it modifies and creates a luminal environment where sperm can undergo their maturational modifications. In this study, the postnatal developmental pattern of expression of Hex was examined in animals from days 7-56. In addition, the role of testicular factors on Hex expression in the different cell types and regions of the epididymis of adult rats was examined in orchidectomized and efferent duct-ligated rats. Both parameters were examined on Bouin-fixed epididymides in conjunction with light microscope immunocytochemistry. At postnatal day 7, the epithelium of the entire epididymis was unreactive for anti-Hex antibody. By day 21, narrow and clear cells of their respective regions became reactive, whereas basal cells became reactive only by day 29. Principal cells displayed only an occasional reactive lysosome at day 21, several by day 29, and numerous reactive lysosomes by day 39, comparable to the region-specific distribution noted for 90-day-old animals, and at an age when high androgen levels are attained. Thus, postnatal onset of Hex expression varies according to the different cell types of the epididymis, suggesting different regulatory factors. This finding was confirmed from studies employing adult orchidectomized and efferent duct-ligated adult rats. Indeed, in all experimental animals, Hex immunostaining in narrow, clear, and basal cells was intense and comparable to control animals. In contrast, there was a notable absence of lysosomal staining in principal cells at all time points after orchidectomy, which was restored, however, following testosterone replacement. No effect on Hex expression was observed in efferent duct-ligated animals. Taken together, the data suggest that Hex expression in lysosomes of principal cells is regulated by testosterone or one of its metabolites. However, the expression of Hex being independent of testicular factors in narrow, clear, and basal cells of adult animals, but occurring at different time points during postnatal development, suggests that different regulatory factors are responsible for onset of Hex expression in these cell types during development.

Key words: Principal, narrow, clear, basal cells, lysosomes, orchidectomy, efferent duct ligation

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