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Does repetitive stimulation of the rat with ACTH accelerate migration of adrenocortical glomerulosa cells?

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Adrenocortical glomerulosa cells express aldosterone synthase (CYP11B2) and synthesize aldosterone. Literature indicates that postnatal glomerulosa cells migrate centripetally and undergo a lineage conversion to fasciculata-like cells. The process is described to take from weeks to months in experimental animals. ACTH stimulation which elevates glucocorticoidogenesis suppresses *CYP11B2* gene expression. This study investigated whether repetitive stimulation of rats with ACTH for four consecutive days would affect adrenal tissue distribution and protein level of the enzyme, using immunohistochemistry and Western blot techniques, respectively. The experimental outcomes are summarized as follows: Cells stained for *CYP11B2* were localized principally in zona glomerulosa (ZG) of the control. Strikingly, ACTH-stimulation caused pronounced appearance of *CYP11B2*-stained cells in the inner cortex. Concomitantly, the intensity of staining decreased in ZG. Cells stained for 11 β -hydroxylase (*CYP11B1*) were seen all over the inner cortex, but not in ZG of the control. However, *CYP11B1*-expressing cells were found in the ZG after ACTH stimulation, reflecting hypertrophy of zonal fasciculata. ACTH-stimulated rats showed comparable *CYP11B2* and *CYP11B1* protein levels in the adrenal homogenate as the control. The above findings suggest that repetitive ACTH-stimulation accelerates migration of glomerulosa cells into the inner cortex. As a consequence, the inner cortex becomes a mixture of aldosterone-producing cells and corticosterone-producing cells. To the best of our knowledge, this phenomenon has not been reported before.

Biography

Behling Cheng is an Academic Staff Member of the Biochemistry department, Kuwait University Faculty of Medicine. He served as the Chairman of the Biochemistry department for 14 years (1998-2012) and was as a Member of the Central Committee for medical curriculum reform from discipline-based courses to an integrated organ systems curriculum in 2005. He continues serving as a Member in the Endocrine System Committee for course development and examination. He is currently involved in teaching and research in the areas of Endocrine Biochemistry, Lipid Metabolism and Cell Biology of Aging.

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