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Identification and Partial Characterization of Specific Oestrogen-Binding Components in Human Kidney

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Summary: In normal human kidney from adult males cytoplasmatic components which bound 17β-oestradiol specifically and with high affinity were demonstrated by dextran-coated charcoal assay, sucrose gradient centrifugation and agar gel electrophoresis. The dissociation constant of the oestradiol-binder complex amounted to $2.2 \pm 0.1 \times 10^{-9}$ mol/l. The binding capacity was limited to 34.0 ± 9.7 fmol/mg of cytosol protein. Sedimentation in sucrose gradient revealed the bulk of these components to be in the 4S region. The binding entities could be clearly separated from sex hormone-binding globulin by agar gel electrophoresis. The ligand specificity for binding to these components indicated a requirement for oestrogens. The fact that an excess of aldosterone had no competitive effect on oestradiol binding suggests that the oestrogen-binding sites are independent of mineralocorticoid receptors. It is concluded that the specific binding components in human kidney have the properties of oestrogen receptors.

Identifizierung und teilweise Charakterisierung spezifisch östrogenbindender Komponenten in der menschlichen Niere

Zusammenfassung: In normalen menschlichen Nieren erwachsener männlicher Patienten wurden mittels Kohle-Adsorptionstechnik, Sucrose-Dichtegradientenzentrifugation und Agargelelektrophorese zytoplasmatische Komponenten nachgewiesen, die 17β-Östradiol spezifisch und mit hoher Affinität binden. Die Dissoziationskonstante des Östradiol-Binderkomplexes betrug $2{,}2 \pm 0{,}1 \times 10^{-9}$ mol/l. Die Bindungskapazität war begrenzt und belief sich auf 34,0 ± 9,7 fmol/mg Cytosolprotein. Bei der Sucrose-Dichtegradientenzentrifugation sedimentierte der größte Teil dieser Komponenten in der 4S-Region. Durch Agargelelektrophorese konnten diese Komponenten klar von sexualhormonbindendem Globulin getrennt werden. In Kompetitionsexperimenten konnte gezeigt werden, daß diese Komponenten spezifisch Östrogene binden. Da ein Überschuß an Aldosteron keinen kompetitiven Effekt auf die Bindung von 17β-Östradiol hat, sind die östrogenbindenden Komponenten nicht mit Mineralcorticoidrezeptoren identisch. Die Untersuchungen zeigen, daß die östrogenbindenden Komponenten die Eigenschaften von Östrogenrezeptoren aufweisen.

Introduction

Although the kidney is not generally regarded as one of the oestrogen target organs, the induction of hamster kidney tumors by prolonged oestrogen administration is well-known (1, 2). One of the reasons for the paucity of information on the oestrogen responsiveness of kidney is the former paradoxical failure to demonstrate oestrogen receptors in normal hamster kidney (3). However, there are some indications of oestradiol binding to cytosol macromolecules and the nuclear fraction of rat kidney (4, 5). Moreover, oestrogens have been shown to decrease renal sodium excretion in adrenalectomized rats (4), dogs (6), and normal humans (7). These studies prompted an examination of normal human kidney for oestrogen-binding components. A partial characterisation of these binding sites is presented in this paper. Portions of these data have been reported in a preliminary form (8).