REGULATION OF KIDNEY FUNCTION IN RELATION TO FILTRATION RATE AND HYPERTENSION

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Description:

The emphasis of our research focus on elucidating the role of the hormone, angiotensin II (Ang II), in angiotensin-induced hypertension. As is the case with any biological system, an abnormal condition, in this case hypertension, is attributed to a suite of factors and influences. Therefore our research uses angiotensin as a starting point and looks at how angiotensin II influences kidney function and ultimately induces hypertension as well as how other hormones or conditions affect angiotensin's role in potentiating hypertension. For example, the cardiovascular and nervous systems as well as the adrenal glands, to name a few, are all influenced by or exert an influence on the role angiotensin plays in hypertension and normal kidney function. We use a number of advanced techniques in molecular and cellular biology and genetics such as transgenic mouse models and immunohistochemistry as well as well-established, yet more conventional methodologies to addresses particular questions of renal physiology and hypertension.

Objectives:

Specifically, one area of research that has received little attention, but warrants further investigation is the interaction of the pituitary hormone, vasopressin (AVP), on angiotensin II. Most of the current data shows that angiotensin II is a potent stimulant of AVP release under both stress and water deprived conditions. Moreover, AVP possess a pressor effect on the cardiovascular system that may be responsible for increasing filtration rate. However, the role AVP may have on the kidneys, especially in promoting angiotensin-induced hypertension has yet to be examined in detail. Therefore, we propose to infuse different groups of rats with different doses of AVP once the animals have been treated with angiotensin II in order to induce a chronic state of hypertension. The recent discovery of a dual AVP/AngII receptor in the kidney suggests that AVP will potentiate angiotensin-induced hypertension. The objectives of the proposed study are to examine the role AVP plays on angiotensin II release and content in the kidney and whether or not it potentiates hypertension. The study will provide students with opportunities to 1) handle animals, 2) implant mini-osmotic pumps for hormone delivery, 3) assist in tissue preparation for molecular and immunohistochemical techniques, 4) obtain daily physiological and metabolic measurements, 5) prepare blood samples for various biochemical and hormonal analyses and 6) participate in data analysis.

Prerequisites:

Because the postdoctoral fellows in the lab primarily conduct these studies, the students do not require any prerequisites to participate in the lab. All techniques and methodologies will be learned first-hand via on the job training. Students will be expected to maintain a lab notebook containing detailed descriptions of methods and techniques used. Students should also express a desire to obtain advanced degrees in biology with an interest in research, preferably in biomedical science.