Renal Vignettes

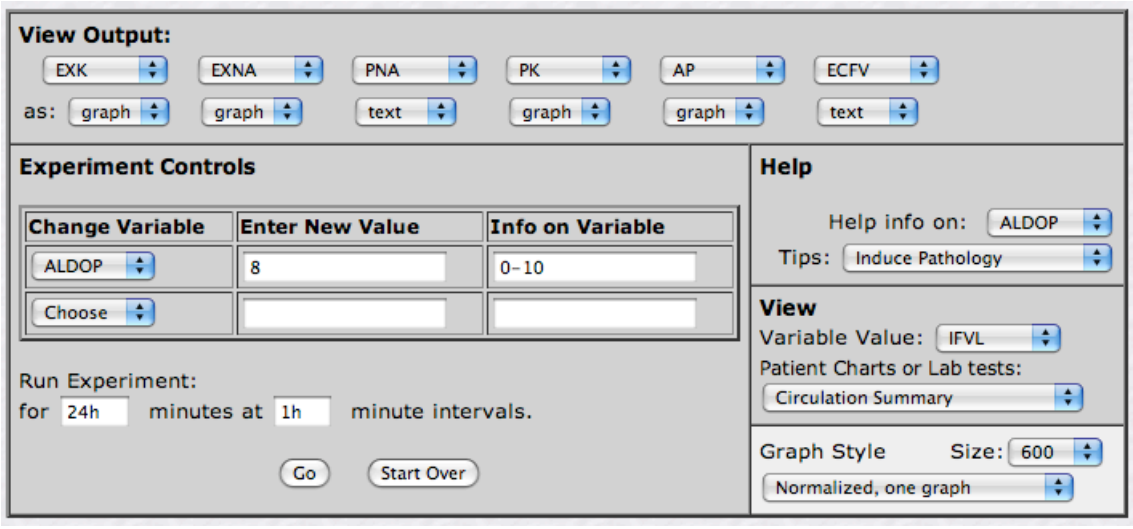
Aldosterone in Potassium Regulation- Response to High Aldosterone Simulated (Aspects of) Primary Aldosteronism

HUMAN vignettes are brief, highly targeted exercises aimed at reinforcing single basic physiological points. The student may then continue to explore by further modifying the experimental design as they wish.

Final K+ balance is largely achieved by regulation of the K+ secreting aldosterone sensitive principal cells of the late distal and cortical collecting tubules. These cells reabsorb Na+ in exchange for K+ secretion and are under aldosterone regulation. In situations where there is too much aldosterone (e.g. primary aldosteronism) disturbances in these electrolytes and in volume regulation occur. Primary aldosteronism is often the result of a tumor of the zona glomerulosa of the adrenal gland.

Below we simulate the high adosterone (ALDOP=8) then monitor the K+ and Na+ excretion response along with indicators volume regulation disturbances. [Further discussion of this topic can be found in Guyton 370-71 and accompanying figs.].

Below please find the experimental protocol to carry out this investigation. [Note well that *you should understand each of the variables employed*; use Help info on: or from a Help screen pick the View summary of all variables link.]



Characterize how well the kidney is handling electrolyte excretion (EXK, EXNA) given the high ALDO levels. Account for the values of blood K+ (PK) and Na+ (PNA). Why does ECFV begin to rise? Why does blood pressure (AP) begin to rise? Note: you could extend this experiment to > 24 hour period to evaluate the full effects of the longer term response. Also note that the (vascular) alpha blocker, Phenoxybenzamine (PHOXY), might prove useful in diagnosis/treatment. Try it out!