Renal Vignettes

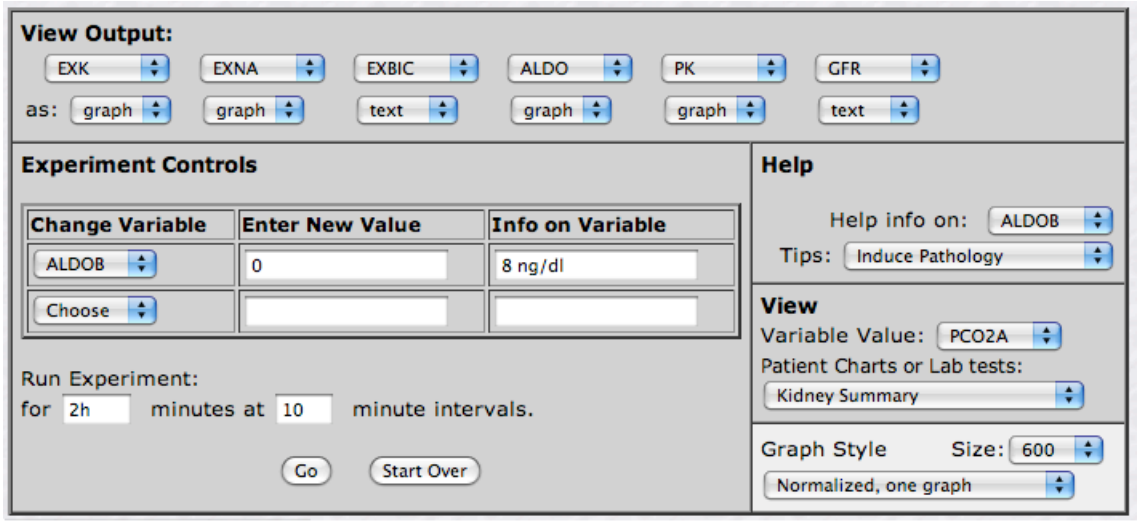
Aldosterone in Potassium Regulation- Response to Low Aldosterone Simulated (Aspects of) Addison's Disease

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 little aldosterone (e.g. primary adrenal insufficiency, also called Addison's disease) disturbances in these electrolytes naturally ensue.

Below we simulate the low adosterone (ALDOB=0) then monitor the K+ and Na+ excretion response to determine the effects on electrolytes. [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) without aldosterone adjustments. Account for the values of blood K+ (PK). What percentage of the mass flow into the nephrons of K (GFR*PK) is being eliminated at the beginning? At the end? Why does EXK begin to rise depite the lack of ALDO? Note: you could extend this experiment to > 2 hour period to evaluate the effectiveness of the longer term response. Also note that EXBIC can be used as an indicator of H+ excretion/retention provided PCO2 remains fairly constant. A decrease indicates MORE acid is being excreted.