Renal Vignettes

Free Water (Osmolar) Clearance

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.

If one's plasma is hyperosmolar, the water-electrolyte balance system conserves (reabsorbs) water by turning out a concentrated urine in order to restore plasma osmolar balance. That is instead of eliminating free H2O it conserves it.

This can be quantified by the calculation of free water clearance. In the above case it would be negative indicating conservation.

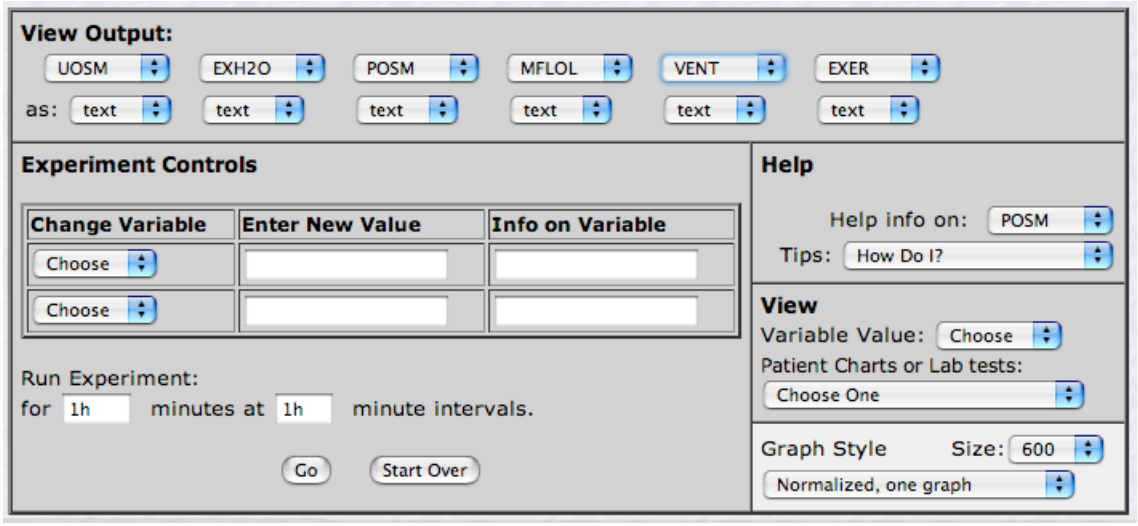
Osmolar clearance (C_{osm}) is simply = ($Urine_{osm}$ x V_{urine}) / $Plasma_{osm}$ or in web-HUMAN terms C_{osm} = (UOSM x EXH2O) / POSM. Clearance itself is simply the (virtual) volume of plasma that, if filtered, would yield the mass flow of that substance that we find in the urine.

Free water clearance (C_{H2O}) is actual water eliminated minus osmolar clearance (e.g. see Guyton pg. 357). Thus in HUMAN free water clearance can be calculated as

(C_{H2O}) = EXH2O – C_{osm} where C_{osm} = (UOSM x EXH2O) / POSM

In this experiment you calculate free water clearance under normal conditions and decide whether free water is normally being created (that is, (C_{H2O}) is negative).

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.



Is free water normally being created?