

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 $= (Urine_{osm} \times V_{urine}) / Plasma_{osm}$ or in web-HUMAN terms $C_{osm} = (UOSM \times EXH2O) / POSM$. 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 (CH_2O) is actual water eliminated minus osmolar clearance (e.g. see Guyton pg. 357). Thus in HUMAN free water clearance can be calculated as

$$(CH_2O) = EXH2O - C_{osm} \text{ where } C_{osm} = (UOSM \times EXH2O) / POSM$$

In this experiment you calculate free water clearance under normal conditions and decide whether free water is normally being created (that is, (CH_2O) 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.

The screenshot shows the HUMAN software interface with the following sections:

- View Output:** A row of six dropdown menus for UOSM, EXH2O, POSM, MFLOL, VENT, and EXER, each with an 'as:' dropdown menu set to 'text'.
- Experiment Controls:** A table with three columns: 'Change Variable', 'Enter New Value', and 'Info on Variable'. It contains two rows of 'Choose' dropdown menus, empty input fields, and empty text boxes.
- Run Experiment:** A section with input fields for 'for 1h minutes at 1h minute intervals.' and two buttons: 'Go' and 'Start Over'.
- Help:** A section with 'Help info on:' (dropdown: POSM), 'Tips:' (dropdown: How Do I?), 'View' (dropdown: Choose), 'Variable Value:' (dropdown: Choose), 'Patient Charts or Lab tests:' (dropdown: Choose One), 'Graph Style' (dropdown: Normalized, one graph), and 'Size:' (dropdown: 600).

Is free water normally being created?