Human Cerebrospinal Fluid Osmolality at 37° C.

NORMA BOONE GOLDBERG, M.D.,* VINCENT J. SAWINSKI, PH.D.,†
ALLEN FRED GOLDBERG, D.D.S.†

Although the normal range of many of the physical and chemical properties of human cerebrospinal fluid (CSF) are well documented, little mention is made of the osmolality of CSF. The references to the osmolality of CSF which do appear are based on data gathered by determination of freezing point depression.[1] The determination of the osmolality of CSF at 37° C. was, therefore, undertaken to provide a normal range of osmotic pressure for human CSF at body temperature.

Osmolality determinations of normal CSF at 37° C. were performed on samples of CSF obtained from 50 healthy patients undergoing elective surgery. Cerebrospinal fluid samples were withdrawn in the course of performing a lumbar puncture prior to the administration of a spinal anesthesia. CSF samples were placed in sealed, rubber stoppered glass tubes and refrigerated for transportation to the laboratory. Preliminary studies showed that no significant change in osmolality occurred during transportation. A vapor pressure osmometer (Mechrolab model 301) equipped with an aqueous probe and a 37° C. thermostat was used.[2, 3] Standard solutions of known osmolality were prepared using aqueous sodium chloride solutions as specified in the International Critical Tables.[4]

The mean value for CSF osmolality in this series of 50 normal subjects was 281 milliosmoles while the actual range of values extended from 269 to 304 milliosmoles. Figure 1 shows the distribution of the values obtained.

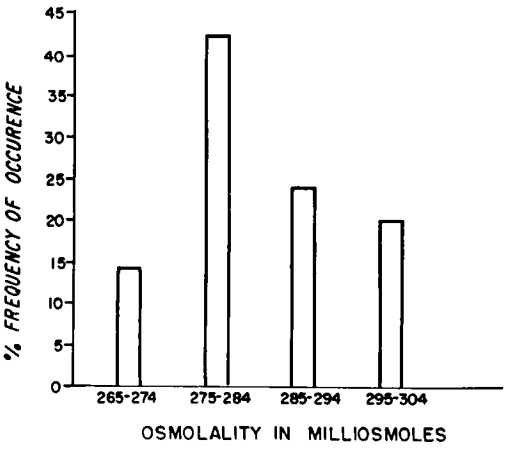

FIG. 1. The distribution of the osmolality of normal cerebrospinal fluid at body temperature expressed in 10 milliosmole groups.

Calculation of the range from an estimation of the standard deviation gives a calculated range (mean ± 3s) of 257 to 305 milliosmoles. This value for the mean osmolality of normal human CSF determined at 37° C. compares rather closely with the data obtained by Hendry from "sick" patients and determined by the freezing point depression techniques (288 milliosmoles).

* Lutheran General Hospital, Park Ridge, Illinois, and University of Illinois College of Medicine, Chicago.

† Veterans Administration Hospital, Hines, Illinois, and Loyola University, Chicago.

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