

JULY 2008  
QUESTION 06

Describe the formation, circulation and functions of cerebrospinal fluid.

Cerebrospinal fluid is a specialised extracellular fluid

located in the ventricles, spinal central cord canal and the subarachnoid space.

Its normal volume is 150ml (2ml/kg)

It is isotonic with respect to plasma

Has increased CO<sub>2</sub>, increased sodium and chloride, reduced K, Ca and Mg and almost no proteins

#### Formation

Occurs in choroid plexus (70%)  
endothelial cells lining ventricles and capillaries (30%)

Process of ultra filtration (through the BBB)  
secretion (via active transport)

Dependent on cerebral perfusion pressure

Formation is relatively constant within normal physiological parameters

Daily production is approximately 500ml, representing a turnover of 3-4 times

#### Absorption

Occurs in the arachnoid villi and granulations

These act as valves and prevent backflow

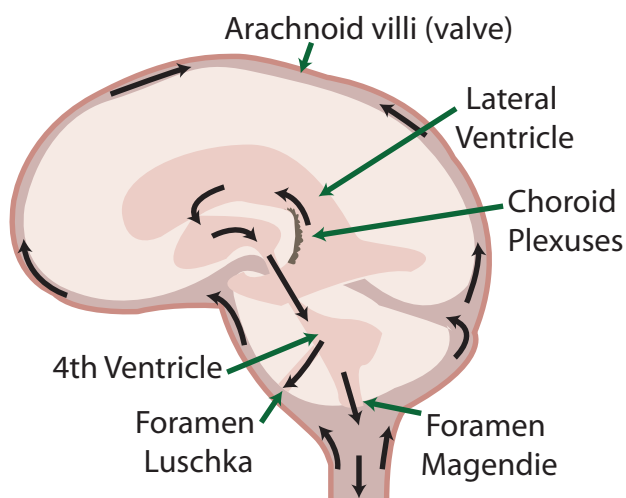
These valves widen with raised ICP and this is the main regulatory mechanism for volume control

#### Flow

Is determined by the pressure in the lateral ventricles (normally 10-15mmHg)

Cilia direct flow towards the fourth ventricle

Flow terminates at the arachnoid villi which act as pressure valves



#### Functions

mechanical support (brain's relative weight changes from 1400g to 50g),

mechanical buffer in the setting of raised ICP (monroe Kellie, it is normally 15% of total volume)

isotonic bath

important roles in acid-base regulation