

## The limbic system

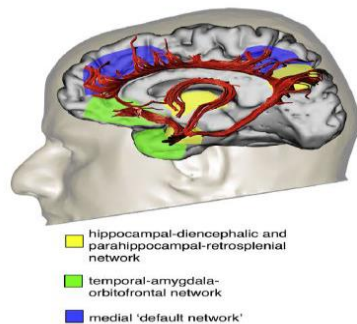
It's a group of organs as a ring interconnected ,with multiple functions .the circuits of the limbic system ( according to its functions ) :

1-hippocampus-diencephalon –parahippocampus-retrosplenial network.

2-temporal-amygdala-orbitofrontal(as part of the prefrontal) network.

3-the dorsal circuit (other parts of the prefrontal ,cingulate gyrus (the main part of the limbic system ),little from the parietal)and also called the **default network/ circuit** ,responsible for the default working status of the brain.

it contains the dorsomedial network , so it is the main network.



#functions of the limbic system (1-8) :( please note that these functions are separated here)

1-memory .

2-spatial orientation

(both are carried by the first circuit, the hippocampus-diencephalon – parahippocampus-retrosplenial network).

usually the memory here is from working memory>short term memory >long term memory ,from the declarative type and non declarative type

\*disorders of the first circuit: 1.alzheimer 2-amnesia.3-korsakoff syndrome.

in Alzheimer disease ,ACH have essential role ,with large portion going to the hippocampus.

\*Henry Molaison (H.M.), person who had temporal lobe seizure, he had surgical removal of the temporal lobes and hippocampus on both sides (for anterograde amnesia to occur there must be BILATERAL damage to the hippocampus), seizure had gone, but he developed anterograde amnesia, every thing before the surgery was remembered but he had amnesia for any event after the surgery, but the non-declarative memory was intact, so he learned many skills and handicraft. (the motor skills were not lost)

Also the hippocampus involved in the ***spatial and location orientation*** :

The cells of the hippocampus responsible for this function (spatial and location orientation) are the **grid cells**, which are active in a certain location, but inactive in the other location, through its connection with other parts of the limbic system, **head direction cells**, and the **border cells**. So patient with Alzheimer not only will have dementia but also with loss of the function of the hippocampus in the spatial processing.

\****Korsakoff syndrome***: those patients will have degeneration in both the hippocampus and the mammillary body but more in the mammillary body. Both short term and long term memory are lost, mostly come in alcoholics as a result of thiamine deficiency, they will have dementia and confabulation (putting fragments of memory who are unrelated together-like a synthetic memory-). In acute thiamine deficiency >> Wernicke psychosis will develop, if he receives thiamine psychosis will disappear but the learning disabilities and Korsakoff will not.

Continuous to the functions of the limbic system:

3-multimodal sensory integration

4-emotion processing

5-motivation and behavioral selection,

these three are carried by the second circuit, temporal-amygdala-orbitofrontal. (orbitofrontal part makes inhibition of emotion to do selection)

\*disorders of the second circuit:

**Semantic dementia** (in the verbal words), **language difficulties** ,

And **personality changes** with behavioral disturbances such as: klüber-bucy syndrome ,psychopathy, bipolar affective disorder (so he will not have inhibition from the cortex on emotions )

#Q asked by a student ?the difference between amnesia and dementia ,

**Amnesia**: problem in forming the memory ,without loss of consciousness or disorientation .but **dementia**: the patient have loss of consciousness and disorientation .

**\*klüber –bucy syndrome**:( as a result of bilateral amygdale ablation)

- Hyperphagia
- Hyperorality(recognize things by mouth)
- Hypersexuality
- Hypermetamorphosis(recognize things by metamorph)
- Visual,tactile and auditory agnosia(multisensation processing )
- Dementia

#continuous to functions of the limbic system:

6-self knowledge,emotion ,memory and pain .

7-reponse selection and action monitoring

8-default network ,

those three are carried by the default network(last circuit)and responsible for much of the psychiatric disorders mostly autism and depression )

Note from the Correction team :

in sheet #6 (lecture #7) → Page 2 → Medial Preoptic is larger in MALES than Females

***TRY AND TRY AGAIN , YOU WILL REACH SUCCESS .***