

# 海马掌记忆相关结构

{ 海马结构: CA1: { 位置编码: place cells.  
memory retrieval: pyramidal cells, 接 CA3, LEC 输入.

CA2: 社会记忆?

CA3: { receive memory inputs from Mossy's fibre from DG.  
通过 Schaffer 传递至 CA1.

DG: { 接受来自 Entorhinal cortex 的信息.

pattern separation, adult neurogenesis.

Entorhinal cortex { LEC: 接受嗅觉, 听觉, 视觉 pyramidal/stellate 组成.

MEC: cognitive map for memory-guided navigation.

精确定位, 路径规划 (grid cell).

Trisynaptic loop

LEC: 语境.  
DG: mossy path.  
MEC: spatial

perforant → DG → CA3 → CA1 ← Schaffer collaterals → neocortex

海马功能争议:

Standard model: 海马: providing index.  
cortex: support recall.

Multiple trace theory: 海马: needed for long-term recall of episodic memory.

记忆形成过程:

感知: sensory  
↓  
working: { mPFC  
海马(尤其是空间)

forming  
long-term: { 海马: CA1, CA3, DG.  
LEC, MEC

consolidate: { 海马 ←→ cortex  
NR

↓  
(是 spatial 似乎平移依赖海马 place cell 的 place field.)  
long-term: { mPFC(index) + neocortex, 此时可逐步脱离海马.

{ lately memory retrieval: 海马  
remote memory retrieval: 脱离海马, 依靠 mPFC.

Memory

Learn → encode → form → store → consolidate → recall

分类: { 功能 { declarative { semantic ⇒ neocortex.  
episodic: spatial 也算. { grid cell: 位于 MEC, 不仅 hexagonal 构建前述地图.  
place cell: 位于 CA1/3, 标记定位位置.  
DG: maze + pattern separation.

non-declarative: motor skill / association / priming cue / puzzle solving.

暂时: { immediate(ms-s):

short-term(s-min), working memory: (可用 Y-maze 测试).

相关脑区: prefrontal cortex (主要) mPFC.

long-term(h-year): mPFC / neocortex

相关机制: ① pattern separation:

DG, 将相似输入 → 不同输出.

防止 generalization.

② Engram: 储存记忆的神经元集合.

机制: CREB↑, 增加 excitability.

↓  
activated neuron 进入该 engram.

此后每相应回忆时 reactivation.

{ Ca<sup>2+</sup> / hyperpolarization 参与调节.

兴奋 → LTP → engram.