

OPEN PEER REVIEW REPORT 1

Name of journal: Neural Regeneration Research

Manuscript NO: NRR-D-20-00956

Title: Contribution of adult-born neurons to memory consolidation during REM sleep

Reviewer's Name: Tsz Kin Ng

Reviewer's country: China

COMMENTS TO AUTHORS

The authors provided a clear summary of their recent published work in Neuron. A couple of concerns need to be addressed before considering for publication:

1. This manuscript should include the research difficulties and challenges and future research directions in the area of memory consolidation.
2. As Figure 1 was composed of 3 parts, these 3 different parts should be better labeled and described in the manuscript as Figure 1A, Figure 1B and Figure 1C.
3. The authors should better give some response to the questions raised in "Peyron C, Rampon C. Young Neurons Tickle Memory during REM Sleep. Neuron. 2020 Aug 5;107(3):397-398."

OPEN PEER REVIEW REPORT 2

Name of journal: Neural Regeneration Research

Manuscript NO: NRR-D-20-00956

Title: Contribution of adult-born neurons to memory consolidation during REM sleep

Reviewer's Name: Kui Xie

Reviewer's country: New Zealand

COMMENTS TO AUTHORS

The paper "Contribution of adult-born neurons to memory consolidation during REM sleep" tried to review the role of ABNs in for memory consolidation during REM sleep, the main conclusion of this paper is "Sparse, theta phase-locked ABN activity may promote REM sleep-dependent contextual fear memory consolidation by influencing DB-GC activity."(Line 72), however, this idea has already discussed and published by Pablo Vergara et.al from University of Tsukuba, Tsukuba, Japan (doi.org/10.3389/fncel.2020.594401). In addition, the quality of this draft needs a huge improvement to meet the requirement of NRR.

1. The draft is superficial, no new idea or deep insight can be found. Most of the ideas is repeating what has already published by Kumar et.al in the article "Sparse Activity of Hippocampal Adult-Born Neurons during REM Sleep Is Necessary for Memory Consolidation".

The introduction is way too short, cannot give an "introduction" to the readers.

Line 23, the author wrote "a slow oscillation phase-specific mechanism", more information about the mechanism should be discussed here.

2. The second section "Synaptic plasticity during sleep" raised the hypothesis that spike timing dependent plasticity and theta oscillations in hippocampus is critical for memory consolidation, however, this idea has already been discussed by Pablo. In Pablo's review, a comprehensive discuss on synaptic plasticity during REM sleep has been done.

Moreover, the section "role of ABNs in memory consolidation during REM sleep"(Line 34) is quite similar to the the section of " Role of REM Sleep in ABN Synaptic Plasticity" in Pablo's publication. For example, In the current draft, it says "a subset of ABNs undergoes synaptic modifications in REM sleep to allow memory consolidation" (Line 50-51), you can find similar saying in Pablo's paper" Interestingly, a recent study of the motor cortex indicates that REM sleep selectively strengthens and maintains the fraction of learning-induced new spines that are relevant for a motor task while at the same time prunes non-relevant synapses to facilitate subsequent memory acquisition"

Line 39: "the small number of ABNs that are active in REM sleep are those that were active during learning", this is just a rephrase of "Interestingly, a subset of learning-activated ABNs reactivates during REM sleep", which is published by Pablo.

Line 41-42, similar statement has been address by Pablo.

Line 47, "silencing 4-week-old ABNs results in elongation of their spine necks", it's not hard to find the similar statement in pablo's paper "silencing ABN activity during REM sleep elongates their spine neck length".

In the conclusion section (Line 73), the author raised the that "Future research..." is needed, It would be better to give more detailed information on what kind of studies we can do.

3. Language

Line 7 "a mechanistic model for how" should be "a mechanistic model for illustrating/explaining how"

Line 11 "sleep stage associated" should be "sleep stage is associated"

Line 17-19 It's hard to understand

Line 25-26 need to rephrase this sentence

Line 28-30 Sentence needs rephrase

Line 31-33 Language suggestion: "Indeed, memory consolidation will be impaired if theta oscillations is blocked, suggesting that..."

Line 35 "unique in that"

Line 45 "Correspondingly" is not coherence here

Line 58 a comma is needed between "ABNs" and "as"

Line 59 grammar od this sentence is not correct

4. Others

Line 17

In the reference (Diekelmann and Born, 2010), no indication of "eliminate unnecessary synapses while keeping necessary ones" can be found. Actually, the reference is arguing "synaptic potentiation is increased in specific regions, while the activity of synapse reduced in cortical region"

It's overstatement to say "sleep promoting synaptic downregulation to eliminate unnecessary synapses", there is no evidence to support the point sleep is the cause. Actually, in the paper of (Tononi, G. and C. Cirelli, Sleep and synaptic homeostasis: a hypothesis. Brain Research Bulletin, 2003), they concluded that the synaptic homeostasis does not discuss what brain mechanisms might be responsible for the regulation of sleep duration.