OPEN PEER REVIEW REPORT 1

Name of journal: Neural Regeneration Research
Manuscript NO: NRR-D-21-00494
Title: Non-human primate pluripotent stem cells for the preclinical testing of regenerative therapies
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Reviewer's country: Germany

COMMENTS TO AUTHORS

This review comprehensively summarizes the state-of-the-art in the field of non-human primate pluripotent stem cells (PSCs), including embryonic stem cells (ESCs), induced pluripotent stem cells (iPSCs) and parthenogenetic pluripotent stem cells. Most relevant publications on generation of these cells and application of their derivatives for preclinical testing in the field of cardiovascular and neural regeneration are discussed. The manuscript is clearly written and concepts are well illustrated in figures. Although this review presents a broad coverage of the field, it could be further improved by considering the detailed criticism provided below:

1. In Chapter 2, the authors summarize the publications and their results on derivation and characterization of hon-human primate ESCs and iPSCs. However, only a little comparison of these results with those obtained with human ESCs and iPSCs is given. For understanding of how well non-human primate PSCs can replace human PSCs in preclinical testing, it would be helpful to provide in depth side-by-side comparison of their structural and functional characteristics (morphology, doubling time, differentiation potential, etc.). In addition, it would be also helpful to describe culture conditions employed for their maintenance in a more detail (e.g. what are the most frequently used media, growth factors, small molecules, extracellular matrix coating for feeder-free expansion, etc.). This could be done in form of a new Table or in a new Figure.
2. In the Chapter 2.4, it is not clear if un-differentiated non-human primate ESCs and iPSCs fulfil all the quality assessment criteria that their human counterparts are expected to fulfil in order to be considered a stable and fully pluripotent stem cell line. The authors should provide a short and critical discussion of this question.
3. Authors should include the critical comparison of the characteristics of cardiomyocytes and neural cells derived from non-human primate and human PSCs. Are these differentiated cells from these different species structurally and functionally comparable? If not, what are the differences? How do these differences affect the reliability of preclinical results and predictability for clinical situation?
4. The titles of Tables and Supplemental Tables should be placed above the tables and not beneath them. All descriptive information about the table content could be placed as a footnote beneath the table and should be properly marked.
5. Supplemental Tables contain important information and, if the format of the journal allows, they could be placed into the main manuscript to allow readers a direct access to the most relevant papers and the most relevant aspects of their research results.
6. The titles of the references listed in Supplemental tables 1 and 2 are superfluous and can be deleted because they are already listed in the reference list. The tables could include some more information about the studies that are listed there. For example, extra columns could be inserted to mention which differentiated cells were generated from non-human primate PSC in a particular study (Suppl. Table 1 and 2) or which somatic cells and reprogramming factors were used for generation of iPSCs (Suppl. Table 2).
7. The information about all available human ESCs and iPSCs is frequently accessible from different online PSC repositories, such as hPSCreg (https://hpscreg.eu/). These repositories represent a

very useful searchable resource for researchers who look for a suitable cell line for their project and are interested to find out more about the characteristics and availability of such a cell line. Are any such online databases available for non-human primate PSCs? If yes, the authors should mention and briefly describe these databases and provide their internet links in the manuscript.