Reviewer's report

Title: Magnesium administration provokes motor unit survival after sciatic nerve injury in neonatal rats

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Reviewer: Linda Greensmith

Reviewer's report:

General
This manuscript reports some interesting physiological findings on the neuroprotective effect of treatment with magnesium following neonatal nerve injury. The authors examine the time course of effects of nerve injury on a number of muscle functions and study the effect of magnesium treatment at each stage. The results show that axotomy of the sciatic nerve results in extensive loss of motor units innervating both soleus and EDL muscles. Treatment with magnesium resulted in a significant increase in motor unit survival, suggesting that Magnesium was indeed neuroprotective to injured motoneurons. The results also suggest that soleus and EDL muscles respond differently to both nerve injury and magnesium treatment. These are interesting results that support previous morphological results that indicate magnesium can rescue motoneurons from cell death.

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Major Compulsory Revisions (that the author must respond to before a decision on publication can be reached)

Presentation of the data should be changed, and all the Tables in the supplementary text should be referred to in the main body of the text. Figure 1 would be better if presented as a bar chart in which the error bars could be seen. I am surprised that no motor units are lost in the soleus muscle at P14 as it has been reported that a large proportion of motoneurons in the sciatic motor pool are already dead by this stage after injury. Table 1 is not referred to in the text. Table 2&3-Indicate that all the experimental groups have been axotomised ie at the moment the group simply says Adult. Table 5 - is difficult to understand. It is not clear that each of the 2 values given at each stage refer to TTP and HRT - no SD values are given. The data should be presented in 2 columns to clearly show what the values represent - at the moment it looks like a range.

Abstract: In the Results section of the abstract - the authors firstly refer to the level of motor unit loss, than to the extent of survival following treatment - they should report either the extent of MU loss for both or extent of survival for both!

ie: 80% loss EDL motor units after axotomy compared to ~60% loss after treatment.

Conclusions of Abstract: The authors do not show that Magnesium blocks MNDA receptors.

Background:
2nd paragraph: The authors state that fast muscle fibres are innervated by bigger nerve cells - the reference they cite does not show this and they need to include an alternative reference.
4th paragraph: They should clarify that they are talking about sciatic nerve injury and innervation of hind limb muscles.
last paragraph; Reference 10 does not show that magnesium crosses the blood brain barrier - they should cite alternative references eg: Hallak et al, 1992: Am J Obstet. Gynecol. 167, 1605-1610.

Methods:
Page 6 - line 8: the authors state here that reinnervation occurs at 10-12 days after injury. On bottom of P.6 they say reinnervation occured 7-9 days after injury.
Page 7, line 5: muscle were kept moist with warm .... what? krebs solution?
Results:
The results are presented in a confusing sequence ie Motor units followed by: muscle weights, then fatigue, then contractile characteristics and finally muscle force. It would be clearer if they were presented in the order they were collected: motor units, force, contractile characteristics, fatigue and finally weights.
All the tables in the supplementary material should be referred to in the appropriate section.

Conclusions:
It is not appropriate to refer to unpublished data in the conclusion as the reader cannot look at the data. Previous work (Ref. 10) has shown that sciatic motoneurons are rescued from cell death by treatment with magnesium and should be referred to here.

Spelling mistakes: 2nd para line 2 - acetylcholine; line 4 - receptors; line5 - results of paragraph 4 : this study does not show that magnesium blocks MNDA receptor - they should cite other work.

Overall, this is an interesting study presenting convincing data that should be published with these minor comments taken into account.

Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)

Discretionary Revisions (which the author can choose to ignore)

What next?: Accept after minor essential revisions
Level of interest: An article whose findings are important to those with closely related research interests
Quality of written English: Acceptable
Statistical review: No
Declaration of competing interests:
NONE