Reviewer's report

Title: Alterations in the vimentin cytoskeleton in response to single impact load in an in vitro model of cartilage damage in the rat

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Reviewer: Andrew C Hall

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Title: Alterations in the vimentin cytoskeleton in response to single impact load in an in vitro model of cartilage damage in the rat

Journal: BMC Musculoskeletal Disorders

Type of article: Research article

Authors: Frances M D Henson & Thea A Vincent

General Comments:
An understanding of the response of cartilage to traumatic injury is of interest, not only in order to follow the changes to chondrocyte biology, but also because of the possibility that an animal model might be useful for understanding the complex process of osteoarthritis (OA). As such the objectives of this study are worthwhile, however unfortunately I found this paper disappointing, as it was lacking and unconvincing in several major areas. In addition there are multiple small typographical and grammatical errors which were very irritating suggesting a rather unfortunate approach to the submission.

Major Points:
Animals: Are these skeletally mature animals? Is there any evidence for the growth plate?

Vimentin labelling: I am not convinced at all of the methodology for determining vimentin distribution. Has cell size been taken into account? For example example 1d shows a small cell with relatively high levels of fluorescence. What about differences in vimentin labelling of chondrocytes within the various cartilage zones? In which zone(s) was the vimentin studied? How thick are the cartilage samples? Was the vimentin scored blind?

Other experimental details:

Why were 4/36 control samples damaged? This could suggest that there were some animals already demonstrating cartilage failure or that there were problems with tissue preparation. More detailed comment on this is required.

p. 12. Why do the authors exclude simple leaching of proteoglycans from the damaged matrix as the cause for GAG loss – rather than activation of MMPs and/or ADAMs.

Graphs/Figures:
I found that the titles to the graphs (e.g. Fig. 2 ‘Rat femoral cartilage’; Fig. 3 ‘Graph to show…’) were relatively uninformative. Y-axis information missing on Fig 3.

Significant differences should be indicated in all graphs – e.g. Fig 3b this information is in the legend only, but should be indicated by asterisks on the graph itself in common with the other graphs.

In many cases the scale bars are not present despite a statement stating that they were – e.g. Fig. 2.

Typographical/grammatical errors:
Multiple spelling and typographical errors throughout the m/s – it would have benefitted from careful reading before submission.

p. 5 para 3 - text missing.

Significance of the animal model:
The authors should be extremely careful about a comparison between this in vitro rat model and human OA. The only suggestive evidence is chondrocyte clustering which to me is rather weak and preliminary.

The rapid increase in chondrocyte clustering (within 4hrs!) following SIL is worrying and not likely to be due to the stimulation of cell division – more likely a consequence of microfractures in the cartilage and the chondrocytes tending to gather.

p. 14 last 3 sentences. The authors should comment further on the disparity between the results of their studies and those of ref #11.

Minor Points:
A diagram to explain the impact loading equipment would be helpful.
Throughout - avoid starting a sentence with a number.

The description of OA as a ‘disease’ is inappropriate as this suggests a single cause which is unlikely. ‘Syndrome’ or ‘disorder’ is a more appropriate description.

The correct abbreviation for micro is µ please correct throughout.

Please put level of significance used in the Statistical Analysis section (and this remove from legends).

What next?: Reject because scientifically unsound

Level of interest: An article of limited interest

Quality of written English: Not suitable for publication unless extensively edited

Statistical review: No, the manuscript does not need to be seen by a statistician.