Reviewer's report

Title: Analysis of nuclear fiber cell compaction in transparent and cataractous diabetic human lenses by scanning electron microscopy

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Reviewer: Dr Daniel Boyle

Level of interest: A paper of considerable general medical or scientific interest

Advice on publication: Unable to decide on acceptance or rejection until the authors have responded to the compulsory revisions

Compulsory revisions
Specific comments

1) The conclusions drawn are not adequately supported by the data shown due to the lack of information on the specific nature of the specimens examined and the lack of discussion on the numerous variables and potential morphological artifacts associated with comparisons made between postmortem and surgically extracted lenses.

2) Background section: Since this manuscript might have general medical or scientific interest, I believe the authors need to include in the background either a reference(s) describing or define in more detail the general growth, shape and nuclei of the healthy human lens.

3) Background, Paragraph 2: Within the context of this manuscript, the authors need to define normal aging.

4) Background, Paragraph 2: Although referenced, the authors should cite what % change equals a slight increase and nuclear decrease (sentence 1). In addition, minor differences (sentence 2) and large hydration disparities (sentence 3) should be clarified. Please reference the information in sentence 4.

5) Background, Paragraph 3: Since the main emphasis of this manuscript is compaction in the lens, the author need to fully define compaction within the context of this manuscript. In sentence 2, do the authors mean transparent lenses with senescence? I would not consider a senescent lens to be "normal" since they are morphological and physiological different from a young adult lens.

6) Methods, Specimens: My major criticism of this manuscript lies specifically with the lack of critical information supplied to the
reader about the specimens use in this study to make an informed judgment about the conclusions. I feel it is critical that the reader be supplied with the following information:

a. Did any of the diabetic eyes undergo any previous laser or intraocular surgeries? Previous interventions to the eye might have affected lens morphology.

b. Were the extracapsular extractions done by the same surgeon?

c. Were the extracapsular lenses nuclei extracted using the same technique and handled in a similar manor after extraction (forceps, cryo, placed in formalin, placed on sponge then in formalin etc...)? This variable could have played a major role in the final morphology of the lens and could account for the differences between transparent diabetic postmortem lenses and extracaps.

d. With advances in cataract surgical techniques, why were extracapsular cataract extractions performed on nuclear cataracts from diabetic patients? Were these nuclei extremely hard? This information should be included in the manuscript. Was coherence laser interferometry used to determine the nuclear density?

e. Did any of the nuclear cataractous lenses have diabetic cataracts? If not, without knowing the history of the donor, would the authors please explain and reference what the difference is between the nuclear cataracts examined in this study and an age-related nuclear cataract.

f. How many hours postmortem were the NDRI lenses collected and how were they received (hours, temperature, in formalin, moist, dry etc...)?

g. How were the numerous variables and potential morphological artifacts associated with comparisons between postmortem and surgically extracted lenses minimized so that a relative morphological comparison could be made possible?

7) The authors refer one group of lenses as "diabetic nuclear cataractous lenses". I'm not aware of this classification of a diabetic nuclear cataract. The authors need to include a reference. Do the authors mean a nuclear cataract from diabetic patients?

**Competing interests:**

None declared.