Report on the paper *An axiomatic and contextual review of the Armitage and Doll model of Carcinogenesis* by Billings et.al.

This article investigates an important model of carcinogenesis by Armitage and Doll from a historical perspective. The authors elaborate on several assumptions of this model and speculate on whether they are mathematically and/or biologically motivated. In some cases, the authors show mathematically that some of these assumptions are not needed. Furthermore, they show that, taken together, these assumptions are inconsistent. Altogether, this is a valuable contribution and I recommend publication provided the authors consider the following (in the order of appearance):

- On page 1 and page 2 the word "decease" appears. Is this a typo for the word "disease"? The paper needs some editing for other possible typos (see below)
- Page 4 last paragraph. Could you please explain a little more what do you mean by "very special case"? Is it about having only one reversible state (i.e. X_2-to-X_1) or is it special due to some underlying biological assumption? Please also include a citation for the statement "There are vastly more general theorems...". The last phrase, " The interesting reader might wish to prove...", should read " The interested reader...". But I am not sure this phrase is appropriate. It sounds more like an entry in a textbook where the author invites the student to do an exercise. I think you can remove the phrase and simply leave the Theorem 3.2 as is.
- page 6 theorem 4.1. I understand the argument in the proof but it seems to me that this theorem is the most important contribution of this paper. If a rigorous proof is not difficult, as stated, perhaps it would be better to include it here.
- page 7. This might be a matter of taste but I would discard "Friends, have a theorem. You'll love it".
- page 8 second paragraph. Again, a careful check for language errors is needed: "sarcastically immune to cancer" I take it should read "stochastically immune to cancer"?

- The paper lacks a conclusions section which should be written even if it ends up being brief. The authors can include an example to illustrate why none of the models described in section (4) are a good fit for the elderly population. Maybe elaborate more on what could constitute the "correct" model, what assumptions, what mathematical challenges are likely, etc. In fact, the Introduction could also be more generous. Many readers, when surveying multiple papers, read only the introduction and the conclusions and these two sections should be clear on: what has been investigated, what is the main contribution and what are the implications for future research.