Reviewer's report

Title: PARP inhibitors in the management of breast cancer: current data and future prospects

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Reviewer: Sara Lopez-Tarruella

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The question posed by the authors is currently a hot topic in breast cancer developmental therapeutics and is perfectly focused from the introduction to their final conclusions. With the available data from phase I and II clinical trials, and after a first failure exemplified with the iniparib experience in translating early-phase results to the clinics, different parallel phase III clinical trials with at least 5 different compounds are ongoing in selected populations of breast cancer patients. The authors expose with a very updated and well-documented background the potential role of PARP inhibitors as a new class of drugs to fight breast cancer and also the rationale behind potential markers to select patients for this therapeutic approach. This aspect of patient selection in the personalized therapeutics era is fully reviewed for the readers.

The data review is comprehensive and well referenced; then a potential reader can easily go into deeper details by consulting the main sources of data outlined in the text. The writing is clear and to the point, which is, crucial for a general review oriented to multidisciplinary teams involved in cancer management not just for medical oncologists. For this reason I consider the manuscript adequate to be published in BMC Medicine. The authors’ particular discussion in the different steps of breast cancer natural history from the metastatic to the early setting also facilitates the understanding for the reader, finding specially adequate the considerations on the importance of the most common related toxicities of these agents depending on the stage of the disease.

Title, abstracts accurately convey the whole content of the review and the conclusions are fully appropriate after the whole review. Regarding the writing style is understandable and easy to read for the general public. Tables are also clear and provide a full overview of the trials discussed in the text.

I would like to underline a couple of discretionary reviews to this manuscript just in case the authors consider them interesting to be added.

- In the PARPs and DNA damage repair section of the manuscript may be the addition of a representative figure could help the author to visualize the role in an schematic form. In any case the explanation provided in the text is really focused in about 10 lines, this is just a suggestion for the manuscript to attract more readers with a visual scheme.

- In the candidate biomarkers discussion for predicting response to PARP
inhibition maybe adding a reference to the data just released at ASCO 2015 (Abst 1004) of GeparSixto and the HRD score predictive value in the neoadjuvant setting would be of value. I realize that the paper was written a while ago but once this review is out the GeparSixto data would be already available to be discussed for the scientific community. The PrECOG 0105 trial data were also reported in the same direction and the discussion could be enriched with this data.

**Quality of written English:** Acceptable

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

**Declaration of competing interests:**

I have received travel grants or honoraria/advisory role from Novartis, Roche, Celgene, GSK, MSD and Teva during the past five years.

I do not have any stocks, patents or any other kind of financial/ non-financial competing interests regarding the content of this paper.