Reviewer's report

Title: Are Liver and Renal Lesions in East Greenland Polar Bears (Ursus maritimus) Associated with High Mercury Levels?

Version: 1 **Date:** 6 March 2007

Reviewer: Sonja Fonfara

Reviewer's report:

General:

The manuscript “Are liver and renal lesions in east greenland polar bears associated with high mercury levels” investigates histopathological changes and mercury content of liver and kidney in polar bears. 59 liver and 57 kidney samples are investigated, which revealed a nice description of pathological findings. I think it is of interest to describe findings in liver and kidney of polar bears and also the mercury burden, but the connection between both is not convincing. It might be possible that these findings are completely incidental and you discuss and demonstrate infection and age as cause for the described lesions. The manuscript is acceptable for publication, my comments are possibly mainly for interest for me and understanding problems.

Polar bears, which live and grew up in an arctic environment with a high pollutant burden will adapt to an increased pollutant/mercury level. Therefore, they will be not/less impaired by this impact. Animals, which will not adapt, are likely to die/will not reproduce. It is possibly more surprisingly that polar bears are just minor/or not at all impaired. In particular animals with very high mercury content seemed not to have more severe lesions, which would indicate that the animals are well adapted to their environment. Do you know what changes are possibly “normal” in these animals?

Another point is the mentioned toxic threshold. Is it a threshold measured in terrestrial animals living in the same environment? It is assumable that the thresholds of animals living in a polluted area are higher. Therefore, a comparison with thresholds of animals living in different areas has to be done carefully.

For the pathological descriptions: These lesions might be normal in older bears (for example Line 194, the hyperplasia of the tubules. I do not know how significant it was, but possibly these changes are normal and not pathologic)? Do we know what is normal in polar bears (before we describe something as pathological finding)?

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

Line 260-262: I can not follow this conclusion. Why is portal bile duct proliferation/fibrosis associated with decreasing mercury? In decreased liver function, I would expect an increase in mercury. Additionally, why do you get reduced mercury concentration in liver injury?

Line 264-265: why?

Line 284-285: Why decreased mercury levels due to decreased metabolism/kidney function, when increased mercury levels are the result of accumulation?

Line 298-299: I am not convinced that the study shows associations between organ lesions and mercury levels.

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

Line 27: Abbreviation w.w. is not explained before.

Line 45-47: If you mention central nervous tissue toxicity an investigation of CNS/nerve tissue of polar bears

might have been of interest (just a comment).

Line 109-113: What does the numbers in the brackets mean? Why sometimes closed sometimes open brackets?

Line 114: which above?/refers to what?

Line 199-200: Is it possible that tubular hyaline casts develop after death of an animal (I do not know, it is just a thought)? How severe was it? Occasional casts are normal.

Line 202-203: That means that they are more likely infectious/inflammatory induced?

Line 206-218: It makes sense that mercury levels in subadults are lower than in adults as they will accumulate levels with age, which you have confirmed by the increase with age. Also that males might have higher mercury levels than females, as females will emit pollutants during lactation. Does that make sense? Any idea, why there is a significant difference between females and males in mercury kidney levels but not in liver levels (just for interest)?

Line 215-218: is slightly confusing, because you wrote before that there is a difference between males and females. In that case I possibly would not mix the data.
Is there also no difference in season, when you analyse the groups separately?

Line 222: Is it ok to pool the material?

Line 299-301: Is there any proven evidence that the polar bear health is impaired by pollution?

Discretionary Revisions (which the author can choose to ignore)

What next?: Unable to decide on acceptance or rejection until the authors have responded to the major compulsory revisions

Level of interest: An article of importance in its field

Quality of written English: Acceptable

Statistical review: Yes, but I do not feel adequately qualified to assess the statistics.