Reviewer's report

Title: Cycling and bone health: a systematic review.

Version: 4 Date: 7 June 2012

Reviewer: Kirsti Uusi-Rasi

Reviewer's report:

This is an interesting review, although the paper arises some comments. First of all, it is far beyond the evidence to speak about harmful or unsafe effect of cycling on bone health. Very few studies in Table 1 seem to report lower BMD in cyclists than in controls. Only when the bone mass is lower in the cyclists than in the non-active controls, then this kind of interpretation could be justified.

Major compulsory revisions

The authors have reported the results of included studies in Table 1, but I would like to see the grade of evidence connected to the quality assessment of the studies, or strength of evidence. The authors should discuss the limitations of the studies and the challenges to make conclusions based on the current evidence. At the least the obvious heterogeneity makes difficult to interpret and compare the results.

The great majority of the studies used DXA measurements, only Duncan et al. had MRI, and Wilks et al. used pQCT-technique to assess bone traits. It is also noteworthy that BMD is only one factor contributing bone strength. The limitations of DXA must be taken into account and discussed.

At least one work reporting bone structure in adult female athletes, including cyclists, is missing and should be added to the review. Nikander et al. (J Bone Miner Res 2005) reported body weight-, height- and age-adjusted BMD and bone structure and concomitant strength of the femoral neck of cyclists, among other athletes, showing no harmful association compared with the referents.

It is well-known fact the exercise loading differs greatly between the anatomic locations. Athletes especially in sports involving impacts or high forces can have a greater amount of bone mass in addition to better geometry compared with habitual exercisers. Heritability has been suggested to explain more of the individual variance in bone rigidity than the environmental factors, but even more important may be the possible self-selection bias, individual characteristics may influence the choice of sports. At any rate this does not simplify the comparison of different athlete groups with each other.

Substantial differences in training intensity and frequency between different athlete groups can also affect the results. is this taken into account in the interpretation?
I would like to see the authors discussing the specificity of the bone turnover markers.

Conclusions go far beyond the scientific data. The data does not justify the knockout of cycling as a good exercise. Rather the authors should recommend application of weight training as a complementary training to increase the skeletal loading.

Minor essential revisions

I would say that most studies included in this review are cross-sectional in design rather than case studies or case-control studies.

There is lot of spelling mistakes, a thorough proofreading is necessary.

Discretionary revisions

From 51 articles, 32 were included and 19 were excluded from the review. Please, list also the excluded articles and the reason for exclusion.

**Quality of written English**: Needs some language corrections before being published

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

**Declaration of competing interests**: 

I declare that I have no competing interests