Reviewer’s report

Title: Intravenous magnesium prevents atrial fibrillation after coronary artery bypass surgery: a meta-analysis of 7 double-blind, placebo-controlled, randomized clinical trials

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Reviewer: jeffrey kluger

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The authors report the result of a meta-analysis examining the effect of intravenous magnesium on the odds of developing POAF. Overall, the statistical methodology is sound; I do not believe this meta-analysis provides any new information to the medical literature. Specific concerns/suggestions are below:

1. Introduction, second paragraph. The authors list a variety of agents previously used to prevent POAF following CABG. They fail; however, to list amiodarone and statins, both which have been extensively studied for this purpose and found to be efficacious. I do not believe that digoxin or CCBs merit mention for prevention in POAF. Finally, the reference provided (#14) for this statement doesn’t seem to match.

2. Introduction, paragraph 3. The authors note a previous meta-analysis has been conducted on the topic that included 8 RCTS. Please provide some more detail as to why your meta-analysis is needed, if this one exists? How do your inclusion/exclusion criteria differ? How much overlap in studies exists? You results are nearly identical to those of this 2005 meta-analysis.

3. Introduction, paragraph 3. What is a “registered controlled trial”? Did you mean randomized?

4. Introduction, paragraph 3. The authors state “inconsistent and controversial” results have arisen from new studies. Please provide the references here for these studies. Also, reviewing the forest plots from this meta-analysis, I do not see any studies that reported “inconsistent or controversial” results. It appears that all included studies showed a reduction in POAF with IV magnesium (albeit some did not reach statistical significance). This appears to be a gross overstatement of the need for this meta-analysis.

5. Materials and Methods, first paragraph. The authors make no mention of whether valve surgery was allowed in this meta-analysis. Could studies enrolling patients undergoing CABG and valve surgery at the same time be included?

6. Materials and Methods, first paragraph. Was there an inclusion/exclusion criteria related to follow-up for POAF?

7. Materials and Methods, last paragraph (page 6). The authors say they use the I2 value to assess statistical heterogeneity; however, it appears that throughout the paper a heterogeneity p-value (Cochrane Q?) is reported instead. The I2 is
the preferred means of reporting in meta-analyses, and should take the form of a percent value between 0 and 100. Also, what was the threshold value for choosing a random- vs. fixed effect model? Was this value determined a priori?

8. Results, page 7. It appears the authors allowed 2 studies that had only one day of follow-up for AF into the meta-analysis. This seems a questionable decision to me since POAF (as the authors themselves note in the Introduction) most commonly occurs on days 2-3 post-op.

9. It is very difficult to assess the external validity of these results since the authors do not report any information/data regarding patients' risk for POAF (i.e., concomitant valve surgery, co-morbidities such as AF, HF, COPD, etc) or the use of other POAF prevention strategies (beta-blockers (a gold-standard) amiodarone, statins, etc). These need to be added to the tables.

10. The authors use Begg's test to assess for publication bias. Begg's will not give a robust result unless a minimum of 15-20 studies are included in a meta-analysis. I suggest removing it from the paper, using Egger's only.

11. Discussion section, first sentence. The author state that theirs is the second meta-analysis evaluating the effect of magnesium on POAF. However, a quick search of MEDLINE shows that at least 4 other meta-analyses (not including the one identified by the authors) have been published. This includes Henyan et al., Ann ThoracSurg 2005;2414-6; Burgess et al., Eur Heart J 2006;27:2846-57; and a Health Technology Assessment by Shepard and colleagues in 2008. Each gives appreciably the same result as this new meta-analysis (~30-40% reduction in POAF).