

# The Impact of Meta-analyses on Medical Decisions

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Evidence-based medicine has elevated meta-analyses to the status of key parameter in medical decision-making (Sigman, 2011; Humaidan & Polyzos, 2012; Walker *et al.*, 2008). Every year, over 6,000 meta-analyses are published in medical journals and submitted to the appreciation of physicians, who then have to analyze their conclusions and use them to support medical decisions. ART does not escape this rule, and meta-analyses concerning topics ripe with controversy – PGS (Preimplantation Genetic Screening), GnRH agonists vs. GnRH antagonists, endometrial injury, androgen therapy for women with poor ovarian response, etc. – are frequently published.

On the other hand, some meta-analyses have conclusions that periodically change with the addition of only one new prospective randomized trial; we could say it is on the borderline of statistical significance. This also adds to the uncertainty physicians are faced with because the idea of accepting or not the use of the methodology in question is periodically changing.

The following general principles may be useful:

1. Base your medical decisions on meta-analyses including at least five prospective randomized trials.

2. Refer to meta-analyses including at least 1,000 individuals, 500 in the case and 500 in the control group.

3. From the standpoint of statistics, in addition to the significance of the differences between case and control groups, heterogeneity cannot be significant and inconsistency (I<sup>2</sup>) should be kept at 50% or under. Excessive heterogeneity indicates issues such as divergent enrollment criteria, inconsistent definitions for the studied variables, etc.

4. Figure 1 shows the description of a meta-analysis (Dentali *et al.*, 2007) considered ideal to support medical decisions on the use of anticoagulants to prevent pulmonary embolism (statistically significant difference between case and control groups: chi-square=10.95; P=0.0009; non-significant Cochran's Q (heterogeneity); and I<sup>2</sup> = 0).

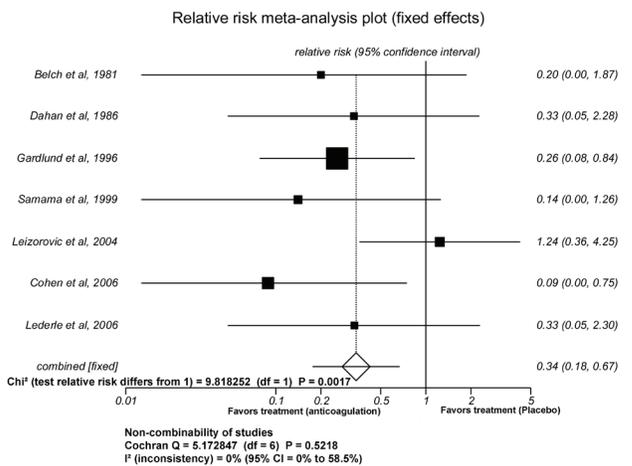
5. The credibility test may be used to assess the level of instability of the conclusions reported in the meta-analysis:

Present: the randomized removal of one or two papers does not affect the conclusion of the meta-analysis.

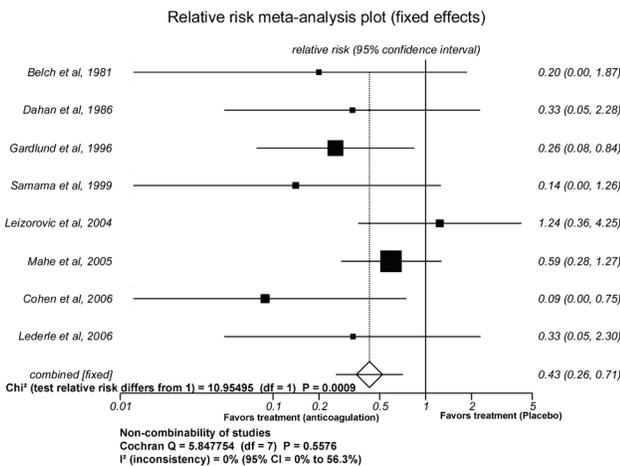
Absent: the randomized removal of one paper affects the conclusion of the meta-analysis.

Figure 2 shows conclusions of meta-analyses that remained unchanged after the removal of one (2A: Mahe *et al.*, 2005) and two papers (2B: Belch *et al.*, 1981; Dahan *et al.*, 1986); only inconsistency moved to a still low 7.7%.

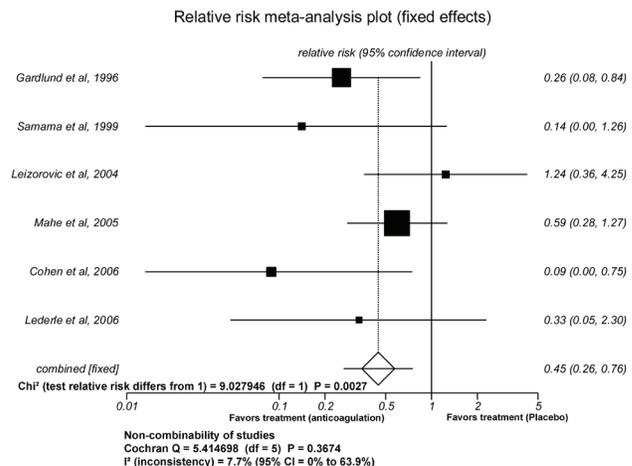
**Figure 2. Anticoagulation prevents lung embolism. Application of the credibility test. The withdrawal of some articles do not affect the conclusion of meta-analysis. 2A. Withdrawal of one article (Mahe *et al.*, 2005).**



**Figure 1. Anticoagulation prevents pulmonar embolism original meta-analysis (Dentali *et al.*, 2007)**



**2B. Withdrawal de two articles (Belch *et al.*, 1981; Dahan *et al.*, 1986).**



Finally, remember to study each of the papers included in the meta-analysis. They are the backbone supporting the conclusions used as references in medical decision-making. It is better to base your decisions on an excellent prospective randomized trial than on a meta-analysis reporting dubious conclusions.

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