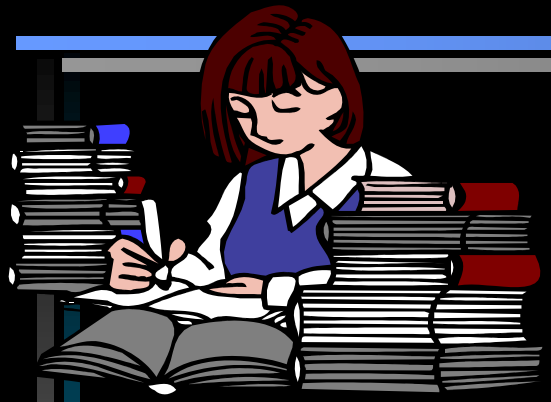


Evidence Based Dentistry

Quality of review articles

Asbjørn Jokstad
University of Oslo, Norway

The Review article

- An attempt to synthesise the results and conclusions of two or more publications on a given topic
- Editorials, working papers etc.

Reviews by any other name...

overview	comment
review	appraisal
consensus statement	guidelines
editorial	analysis
report	working paper
systematic review	meta-analysis

Reasons to read and use reviews

- Sheer volume of literature
- Save time doing exhaustive literature researches
- Minimise publication bias
- BUT - problems exist

The Review

- Usually
  - written by a single topic expert
  - based on their understanding of literature
  - no methodology given
  - usually broad based subject addressed

Limitations of the narrative review

- Personal Bias
- Selection Bias
- Cannot be reproduced independently
- Cannot easily check assumptions

Vitamin C and the common cold

- Pauling, 1986
  - Catching a cold and letting it run its course is a sign that you are not taking enough vitamin C
- Kleijnen et al, 1989
  - Even in gram quantities per day Vitamin C cannot prevent a cold
  - However if you already have a cold it may slightly decrease the duration and severity of your cold

Limitations of the narrative review: example: the common cold

- Pauling L. How to live longer and feel better. 1986
  - 30 trails all showing a positive effect on the common cold
- Kleijnen et al. 1989
  - Medline search - 22 trials
  - References - 15 additional trials
  - References of references - 9 more
  - Final check found 1 further study
  - 47 in total

Pitfalls of reviews

- Mulrow CD (1987). The medical review article: state of the science. Ann Int Med 106;485-8.

  Current medical reviews do not routinely use scientific methods to identify, assess, and synthesize information.

- Yusuf S et al. (1987). Proceedings of methodologic issues in overviews of randomized clinical trials. Stat Med 6;217-409.

  The scientific quality of healthcare review articles is poor

Pitfalls of reviews

- Antman EM et al. (1992). A comparison of results of meta-analyses of RCTs and recommendations of clinical experts. JAMA 268:240-8

  Unsystematically reviews have some times taken more than a decade to recommend treatments that a systematic review would have shown to prevent premature death, other treatments have been endorsed long after evidence from trials have suggested that they were useless or actually harmful
- Oxman A, Guyatt GH (1993). The science of reviewing research. Ann NY Acad Sci 703;125-34.

  The traditional review article is both non-reproducible and, as a scientific exercise, of low mean scientific quality.

Review articles: what is needed?

- better reviews
  - quality
  - reliable
  - relevant

  Scientific rather than subjective summarization of literature
- improved access to reviews
- readers more skilled in making sense of reviews

One solution: Systematic Review/ Overview

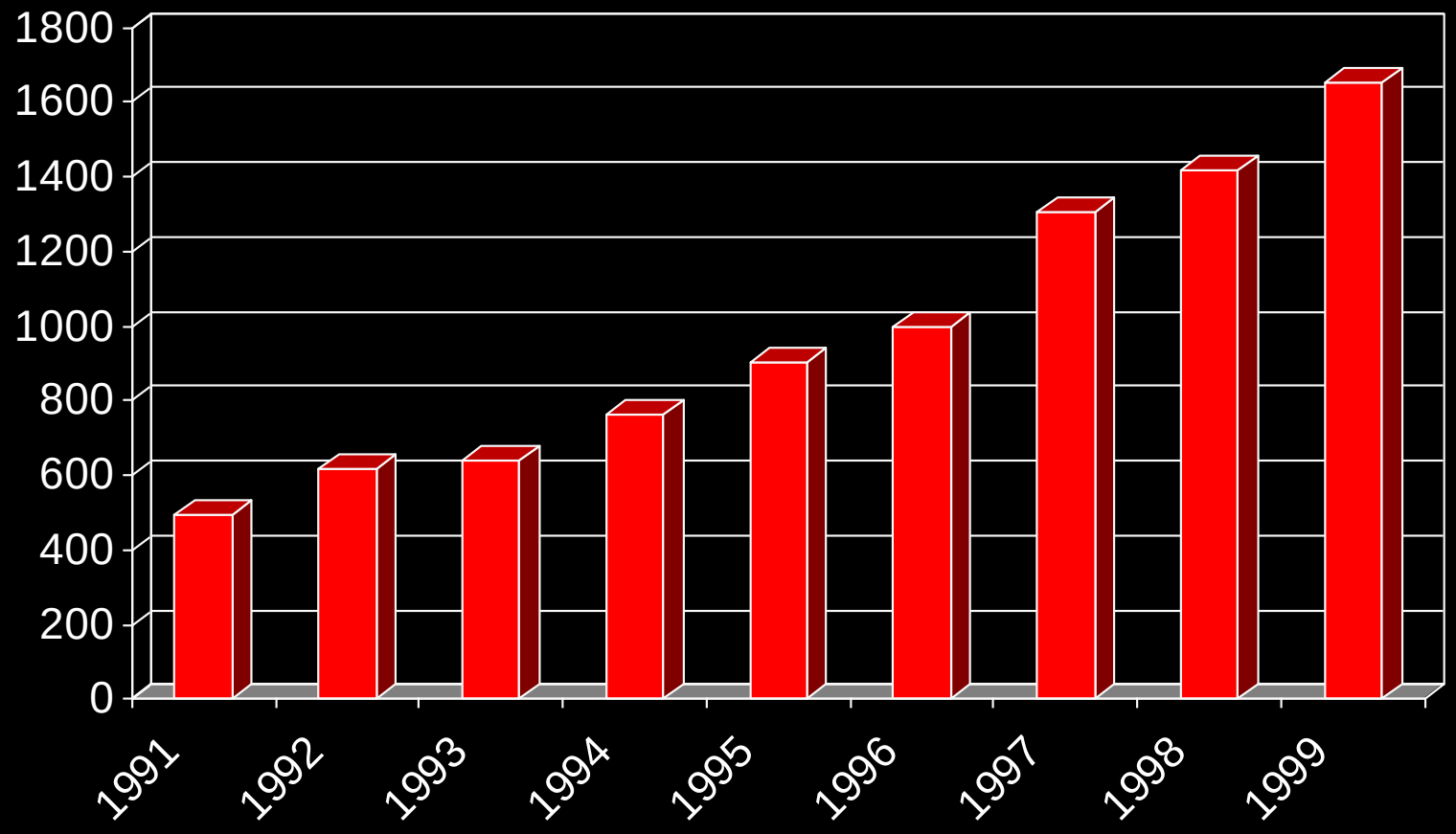
A review that strives to comprehensively identify and track down all the literature on a topic

Structured process involving several steps:

- Well Formulated Question
- Comprehensive Data Search
- Unbiased Selection and Abstraction Process
- Critical Appraisal of Data
- Synthesis of Data

Example: Cochrane Collaboration

Systematic Reviews in Medline



Cochrane Review

- Formulating the problem
- Locating and selecting studies
- Quality assessment of studies
- Collecting data
- Analysing and presenting results
- Interpreting results
- Improving and updating reviews

Key Stages in a Systematic Review

- Specify objectives
- Report all relevant primary studies
- Assess methodological quality
- Identify common definitions for outcomes
- Extract estimates of outcomes
- Meta-analysis where appropriate
- Narrative summary where data sparse or of too low quality
- Explore robustness of results
- Clear presentation of key aspects
- Appraisal of methodological limitations of primary studies and systematic review.

Advantages of Systematic Reviews

- Reduce quantity of data
- Plan research, purchasing and guidelines
- Make efficient use of existing data
- Ensure generalisability
- Check consistency
- Explain inconsistency
- Quantify with meta-analysis
- Improve precision
- Reduce bias

Meta-analysis

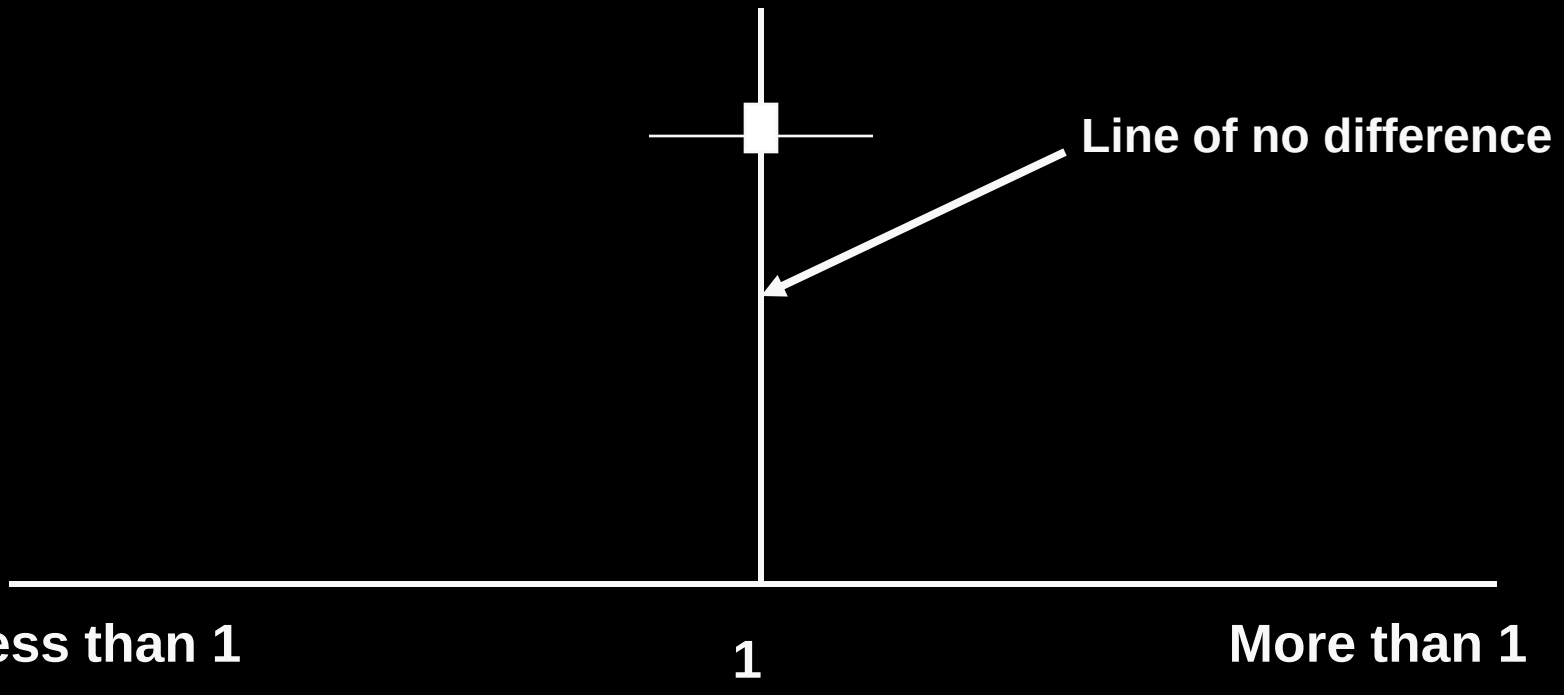
A specific statistical strategy for assembling all the results of several studies into a single numerical estimate

Meta-analysis

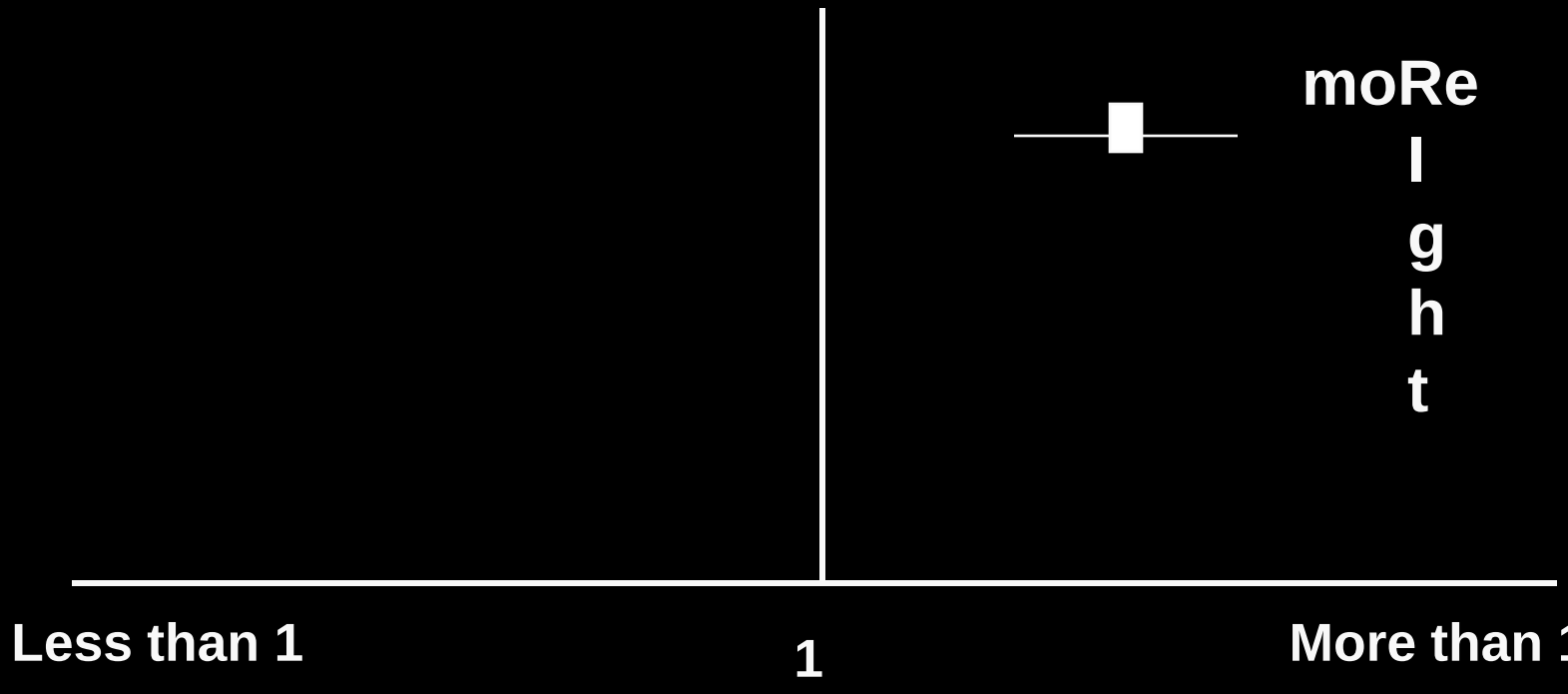
- An overview with a specific statistical technique which summarizes the results of several studies into a single estimate
- Weights studies according to their size
- Bias is more important than complex statistics in reading meta-analyses critically

Reviews
Systematic Reviews
Meta-analyses

Odds Ratio


Line of no difference
Less than 1
1
More than 1
Favours treatment
Favours control
Therapeutic gain

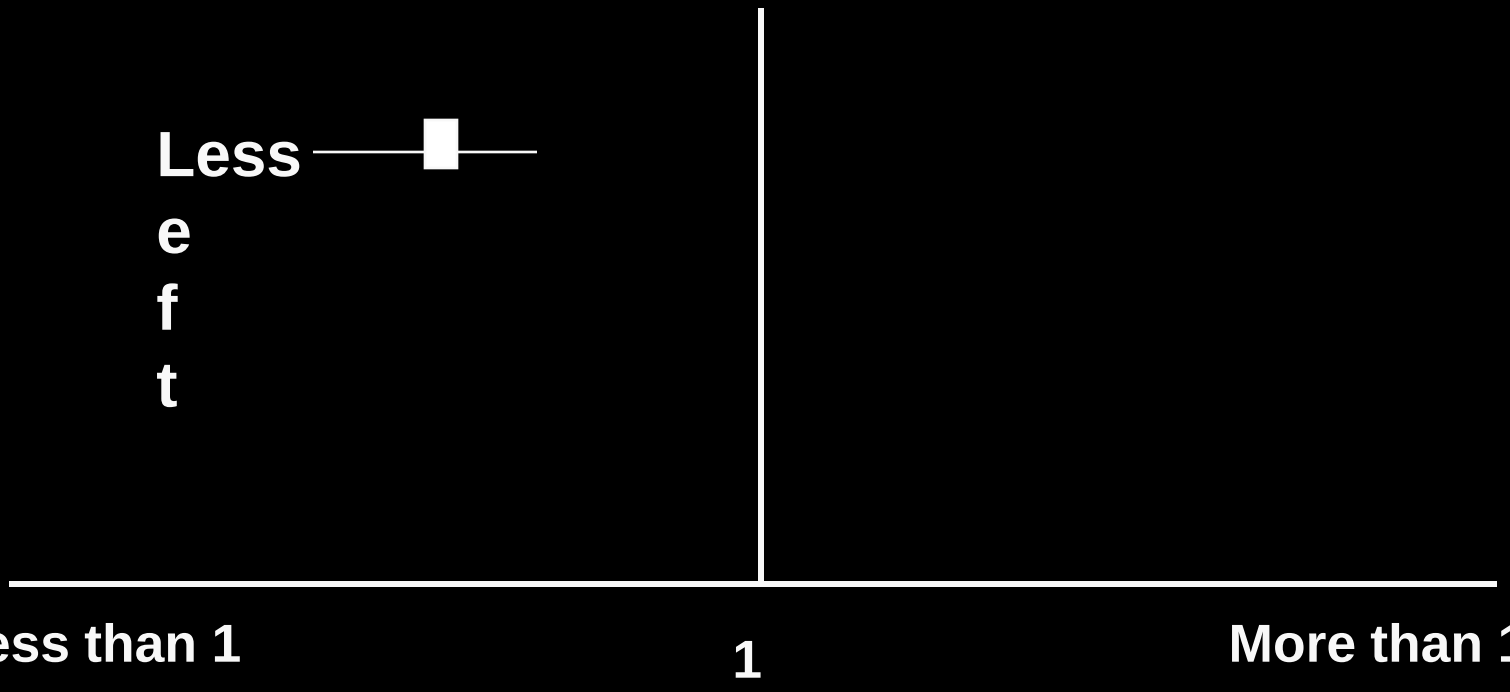
Odds Ratio



If you want more of something to happen, such as greater reduction in new cavities and the experimental intervention is successful

the results will show in the right-hand side

Odds Ratio

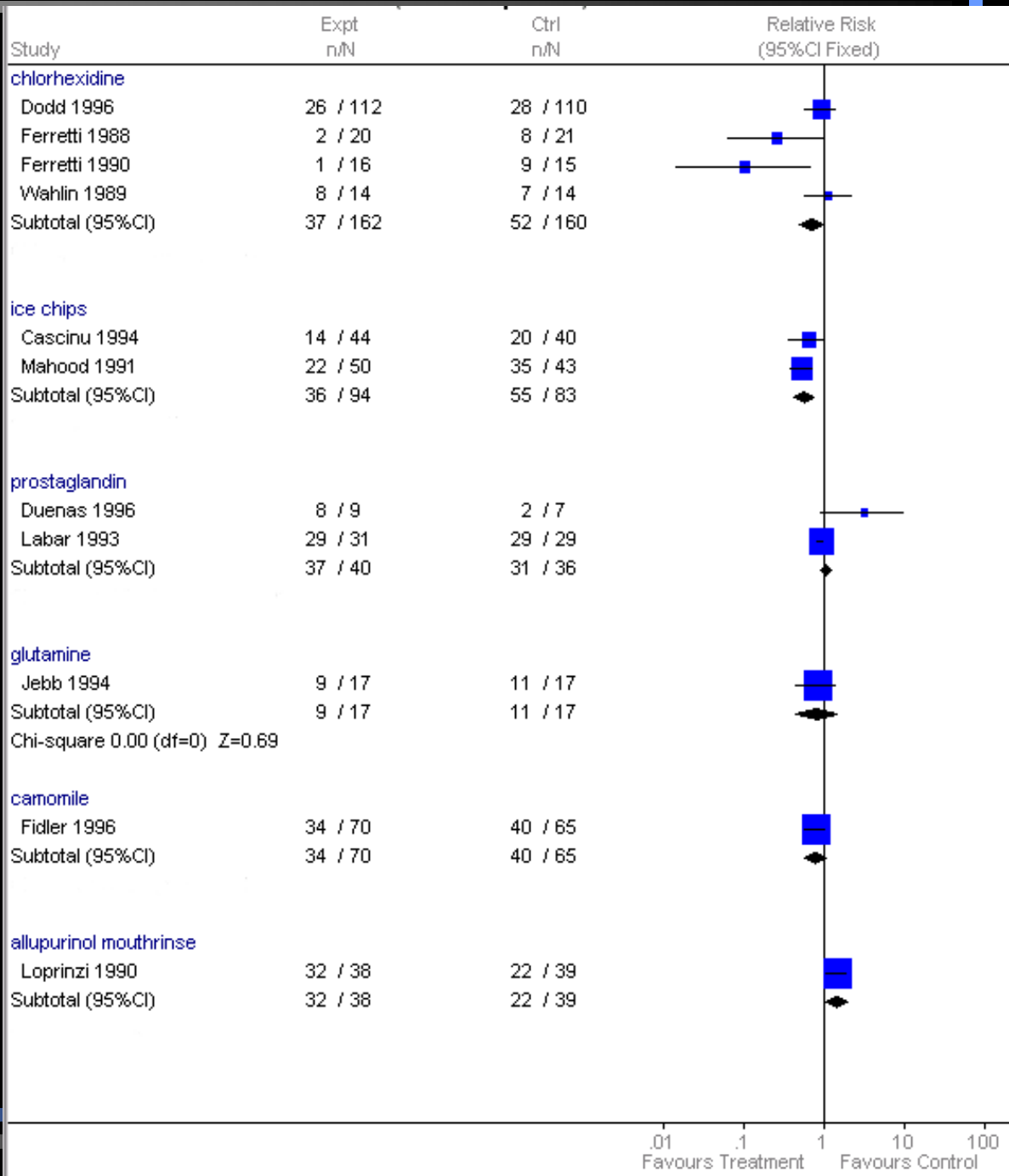


If you want less of something to happen, e.g less swelling following a minor surgical procedure if you prescribe a particular tablet and the experimental intervention is successful

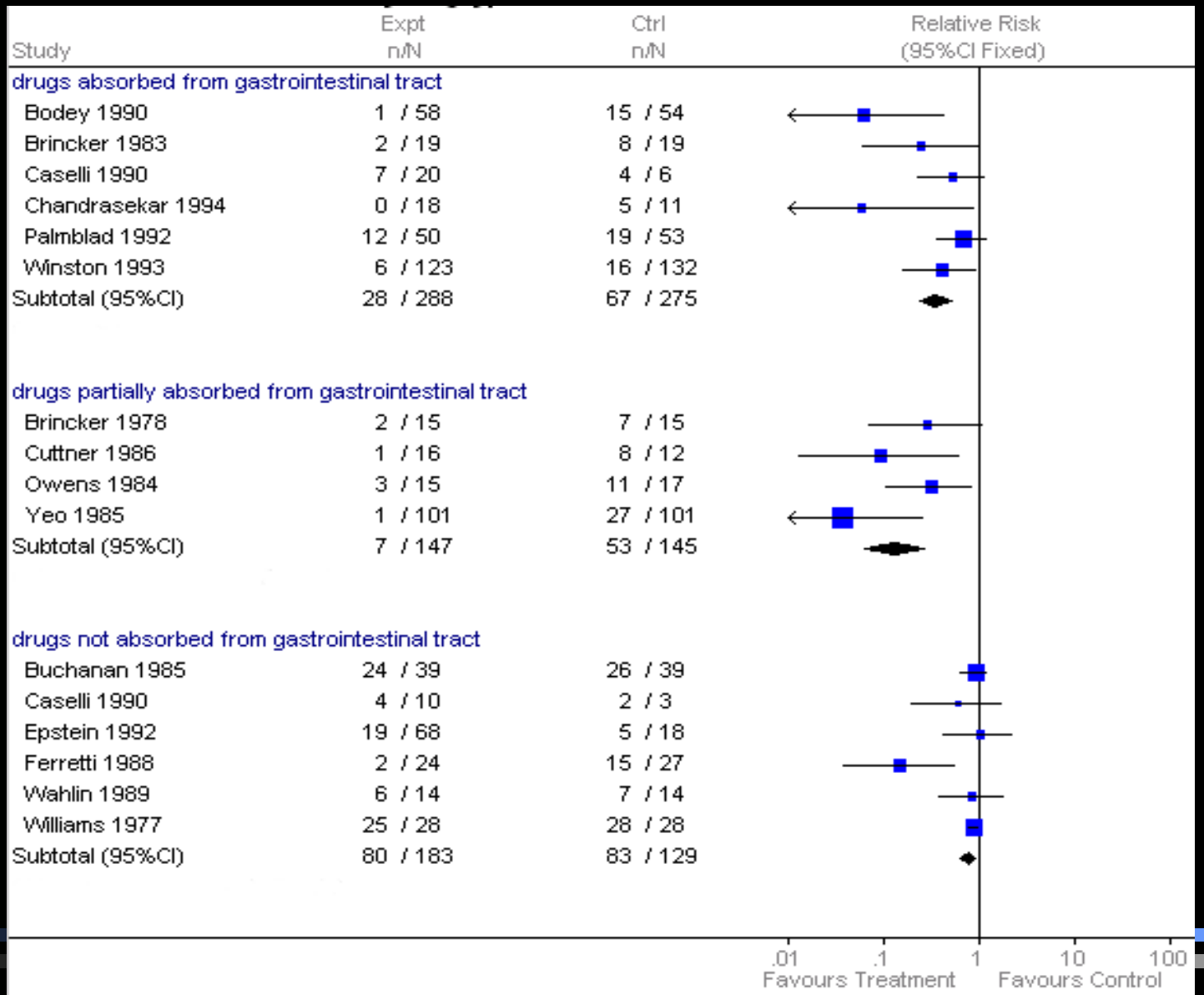
the results will show in the left-hand side

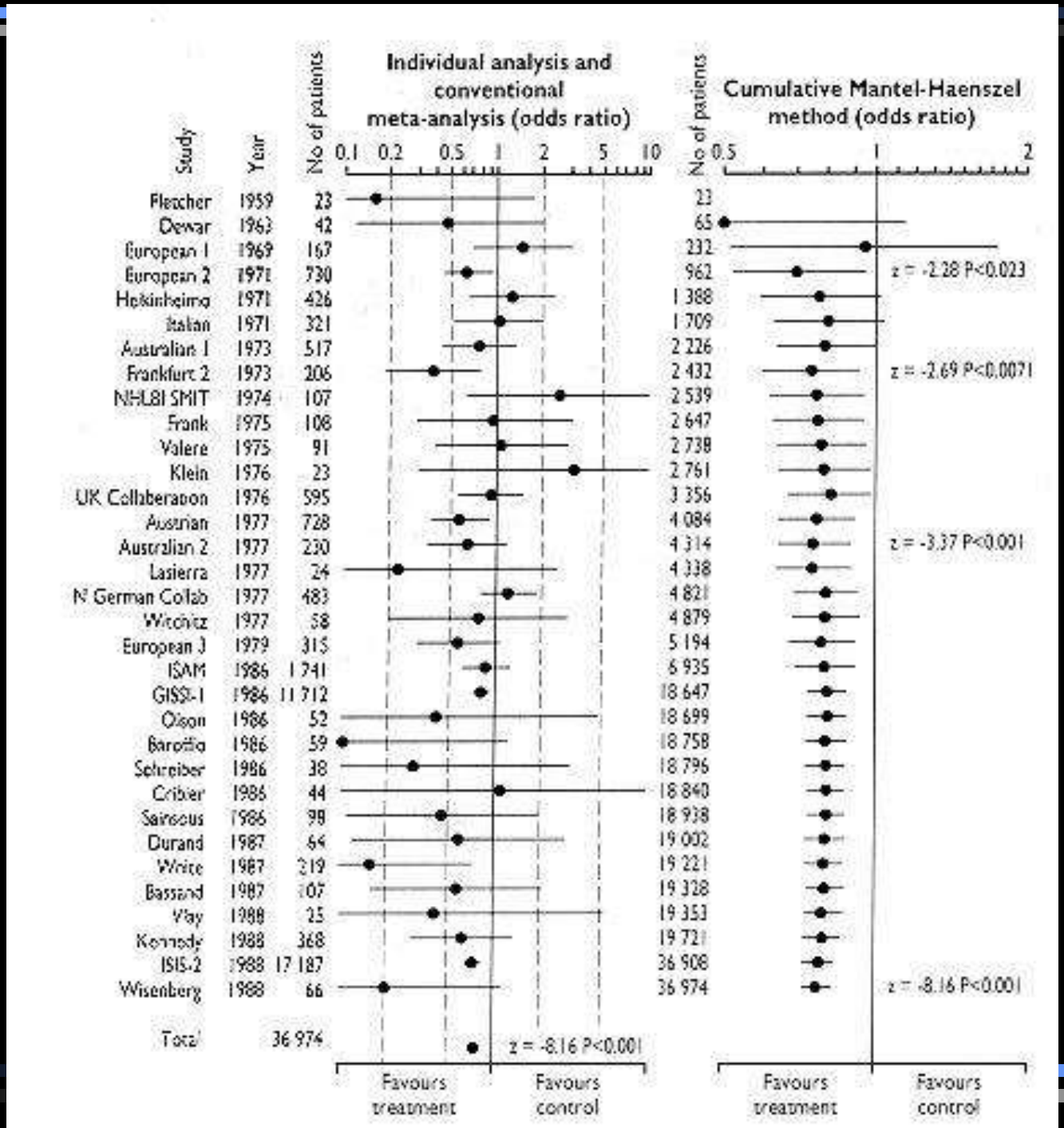
Clarkson I, Worthington H.

Prevention and treatment of oral mucositis and oral candidiasis for patients with cancer



Clarkson I, Worthington H. Prevention and treatment of oral mucositis and oral candidiasis for patients with cancer

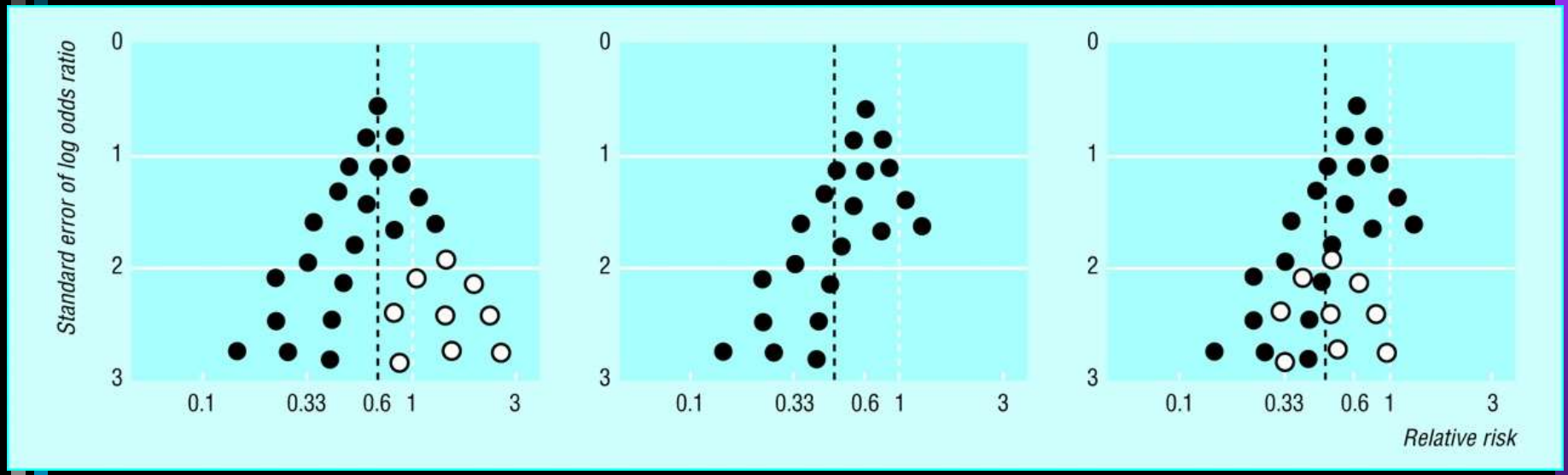



Study
Year
No of patients
Individual analysis and conventional meta-analysis (odds ratio)
0.1 0.2 0.5 1 2 5 10
Cumulative Mantel-Haenszel method (odds ratio)
0.5 1 2
Fletcher 1959 23 23
Dewar 1963 42 65
European 1 1969 167 232
European 2 1971 730 962 z = -2.28 P<0.023
Heikinheimo 1971 426 1 388
Italian 1971 321 1 709
Australian 1 1973 517 2 226
Frankfurt 2 1973 206 2 432 z = -2.69 P<0.0071
NHLBI SMIT 1974 107 2 539
Frank 1975 108 2 647
Valere 1975 91 2 738
Klein 1976 23 2 761
UK Collaborators 1976 595 3 356
Austrian 1977 728 4 084
Australian 2 1977 230 4 314 z = -3.37 P<0.001
Lasierra 1977 24 4 338
N German Collab 1977 483 4 821
Witchitz 1977 58 4 879
European 3 1979 315 5 194
ISAM 1986 1 741 6 935
GISSI-1 1986 11 712 18 647
Olson 1986 52 18 699
Barrollo 1986 59 18 758
Schreiber 1986 38 18 796
Cribier 1986 44 18 840
Sainsous 1986 98 18 938
Durand 1987 64 19 002
White 1987 219 19 221
Bassand 1987 107 19 328
Way 1988 25 19 353
Kennedy 1988 368 19 721
ISIS-2 1988 17 187 36 908
Wisenberg 1988 66 36 974
Total 36 974 z = -8.16 P<0.001
Favours treatment
Favours control
Favours treatment
Favours control

Dangers of Systematic Reviews

- Publication bias
  - Unpublished data
  - Covert duplicate publications
  - Limitation to positive findings
  - Language bias
  - Funding bias
- Study quality bias
- Retrieval bias - Form of “observational study”

Study Bias



Favours treatment | Favours control

No bias

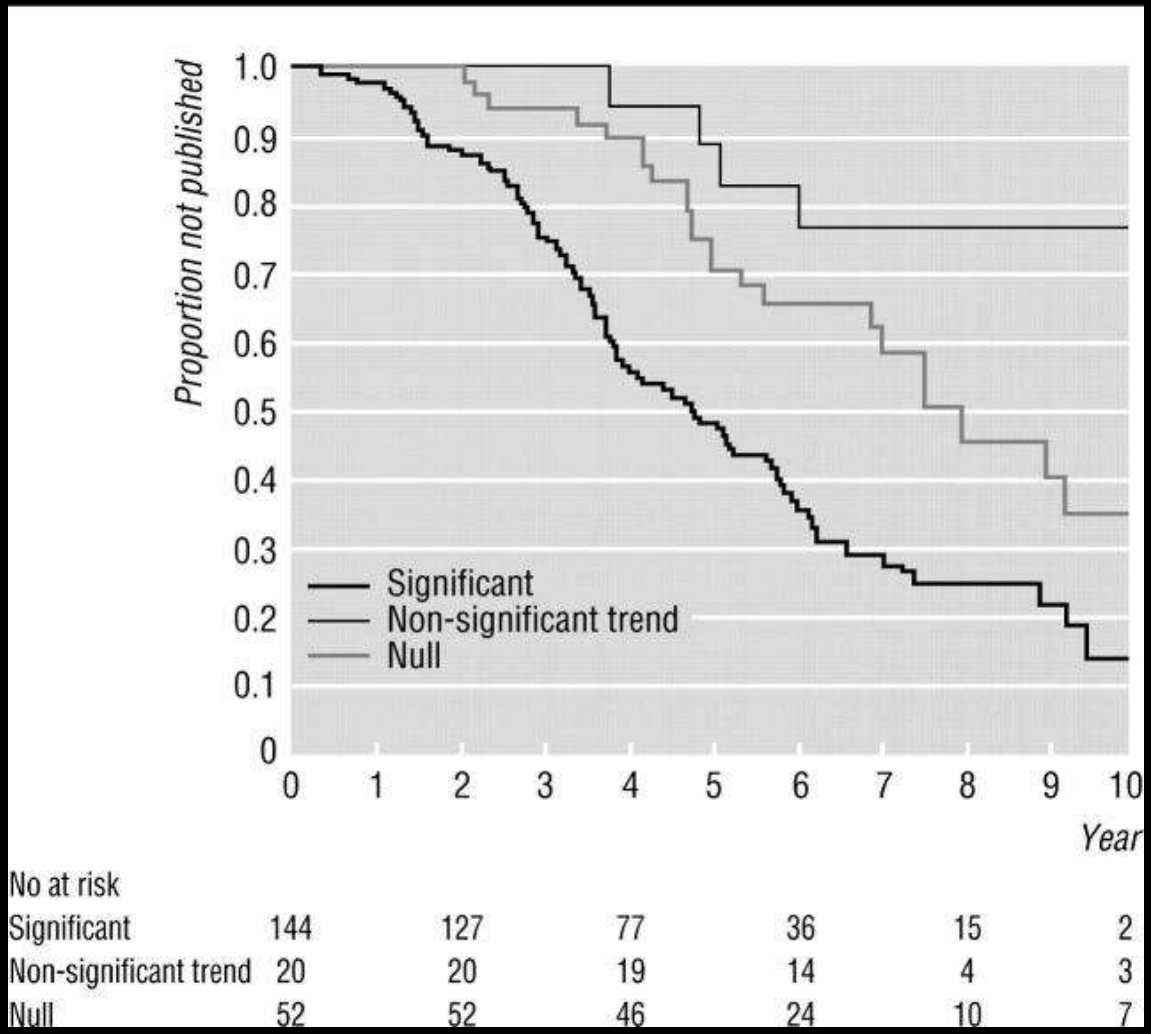
Publication Bias

Bias due to poor methodology

Reasons for Not Publishing

Reasons	%
Manuscript in the system" or published elsewhere	19
Non-significant results	15
Publication not aim of study	13
Incomplete analysis	11
Rejected manuscript	9
Too busy	9
Unimportant results	6
Funding source has the data	5

Dickersin & Meinert (1990)



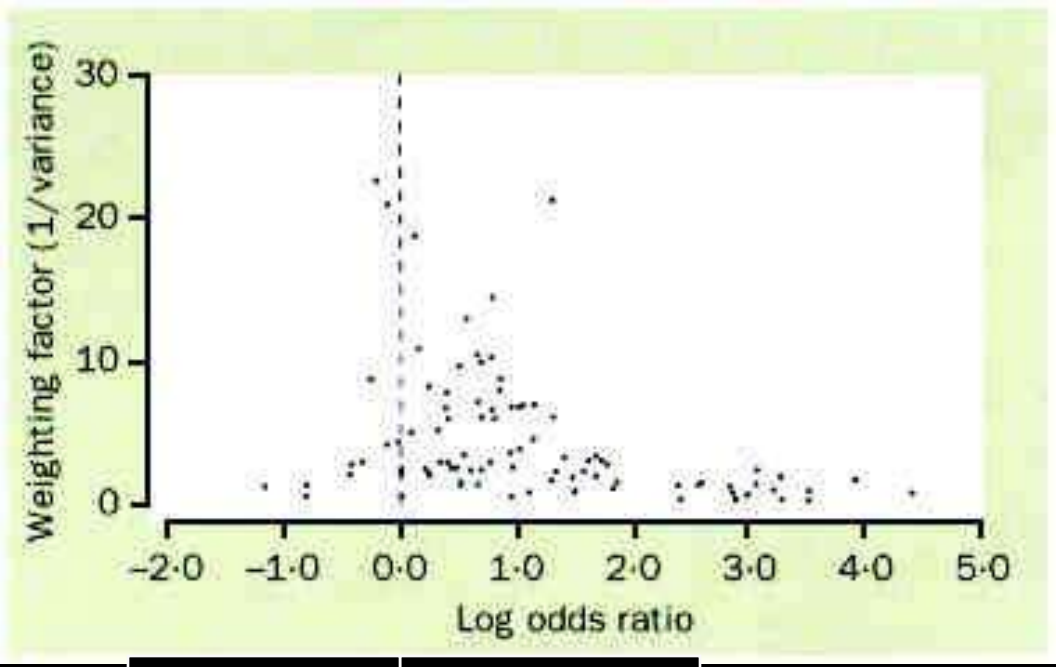
Stern JM, Simes RJ. Publication bias: evidence of delayed publication in a cohort study of clinical research projects. BMJ 1997; 315

Publication Bias

A tendency among investigators, peer reviewers and journal editors to allow the direction and statistical significance of research findings to influence decisions regarding submission and acceptance for publication.

Publication Bias

- Positive findings are published - regardless of size
- Negative findings less often published - especially if study is small



Funding Bias

Article Conclusion	No. (%) of Reviews: Tobacco-Affiliated Authors (n = 31)	No. (%) of Reviews: Non–Tobacco-Affiliated Authors (n = 75)
Passive smoking harmful	2 (6)	65 (87)
Passive smoking not harmful	29 (94)	10 (13)
Significance	$\chi^2_1 = 60.69$; $P<.001$	

Barnes & Bero. Why review articles on health effects of passive smoking reach different conclusions. JAMA 1998.

Cho & Bero. The Quality of Drug Studies Published in Symposium Proceedings . Ann Int Med, 1996.

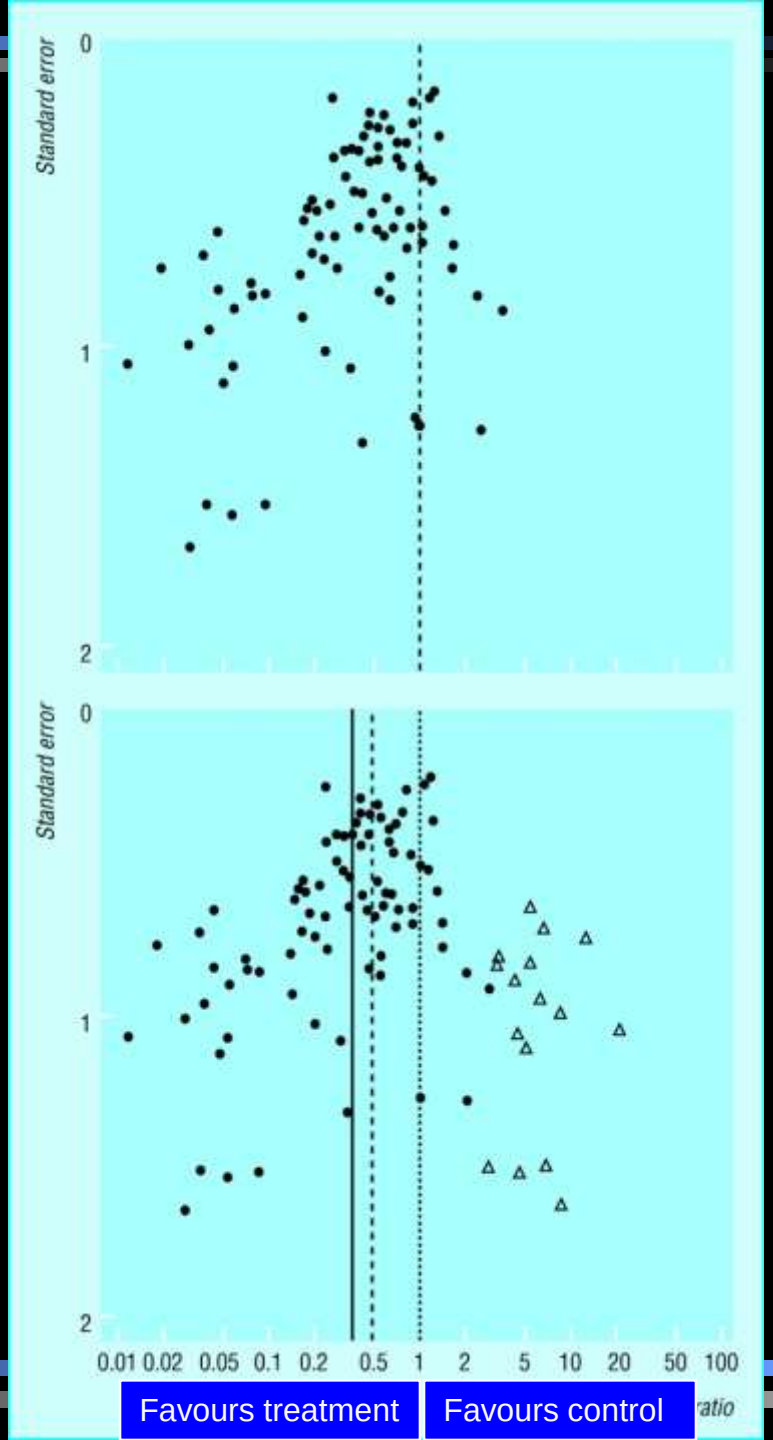
Outcome of Study	Studies Supported by a Drug Company (n = 40)	Studies Not Supported by a Drug Company (n = 112)
	n(%)	
Favorable	39 (98)	89 (79)
Not favorable	1 (2)	23 (21)

* The proportion of studies with favorable outcomes was significantly higher for studies supported by a drug company than for studies without drug company support ($P < 0.01$).

Why does study bias matter?

When bias leads to incorrect conclusions about the safety and efficacy of elements of clinical care, it raises not only scientific, but also ethical concerns.

Effects on meta-analytic averages



Linde et al. Homeopathic studies. Lancet 1997.

Retrieval Bias - What causes it?

- Selective reading
  - trials showing statistically significant differences more likely to be read in journals
- Selective indexing
- Selective citation
  - reports showing positive features of a drug or therapy are more likely to be cited than those casting doubt on its value or safety

Reviews: which to use?

"If one doesn't have some guidelines for assessing the reviews from which these recommendations are taken, deciding which review to believe is like deciding which toothpaste to use. It is a question of taste rather than a question of science."

Oxman and Guyatt, 1988

Questions when appraising a review

Three basic types of questions...

1. Is it trustworthy? – *Validity*
   screening questions
   detailed questions on methodology
2. What does it say? – *Results*
3. Will it help? – *Relevance*

Is this review valid?

1. Did the review address a clearly focused issue?

   An issue can be focused in terms

   - the population studied

   - the intervention given

   - the outcomes considered

2. Did the authors select the right sort of studies for review?

   The right sort of studies would

   - address the review's question

   - have an adequate study design

Is this review valid?

3. Do you think the important, relevant studies were included?

look for

- *which bibliographic databases were used*
- *checks from reference lists*
- *personal contact with experts*
- *search for unpublished as well as published studies*
- *search for non-English language studies*

Is this review valid?

4. Did the review's authors do enough to assess the quality of the included studies?

5. Were the results similar from study to study?

   Consider whether

   - *the results of all the included studies are clearly displayed*
   - *the results of the different studies are similar*
   - *the reasons for any variations in results are discussed*

What are the results of this review?

6. What is the overall result of the review?

Consider

- *If you are clear about the review's bottom line results*
- *What these are (numerically if appropriate)*
- *What units these results are expressed in*

7. How precise are the results ?

- *Are there confidence limits?*
- *What are they?*

Is this review relevant for me?

8. Can the results be applied to the local population?

   Do you think that the patients covered by the review are similar enough to your population?

9. Were all clinically important outcomes considered?

   If not, does this affect the decision?

10. Are the benefits worth the harms and costs?