Questions on the Independence and Reliability of Cochrane Reviews, with a Focus on Measles-Mumps-Rubella Vaccine

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ABSTRACT

The Oxford University-based Cochrane Collaboration had previously been dependent on British government funding. A change in funding completed by 2004 appears to leave Cochrane now more vulnerable to undue influence from commercial and government funding sources. Cochrane's 2005 published policies on commercial conflicts of interest do not address and appear ineffective to prevent conflicts over government funding and undue political interference.

The 2005 Cochrane review of measles-mumps-rubella (MMR) vaccine safety and effectiveness was published against a background of litigation in the UK over vaccine damage claims. The British government appears to have substantial financial interests in those litigation claims failing. There is evidence the British government was involved directly in a media and political campaign to discredit the expert medical evidence underlying those claims. There is also suggestive evidence that the British government may have used undue influence to stop statutory funding of the claims.

The conclusions of the Cochrane MMR review are not supported by, and contradict, the evidence presented in the review. Having found inadequate evidence of safety in the papers studied, the review's conclusion that the millions of doses of MMR vaccine administered worldwide are safe is not science based. It is based on the circular assertion without cited evidence that the vaccine is safe because millions of doses are administered.

The review also shows that studies into the extent of the adverse effects are too limited to say how extensive these adverse effects may be, and consequently to say whether the vaccine is "safe." The review provides no comparative evaluation of MMR vaccine safety and effectiveness against other measures, such as single vaccines, placebo, no vaccine, or modern treatment options. It provides no evidence to refute the Wakefield hypothesis of an association between MMR vaccine, regressive autism following previously normal development, and a novel form of inflammatory bowel disease.

The Cochrane review duplicates an almost identical paper published in 2003 by members of the same team, yet contains no reference to the earlier paper. According to a separate publication by one of the authors, duplicated publication can be considered unethical or fraudulent when the authors attempt to conceal the existence of duplicated publication from editors and readers.

The Cochrane Collaboration describes itself as "the reliable source of evidence in health care" and "an international non-profit and independent organization, dedicated to making up-to-date, accurate information about the effects of healthcare readily available world-wide."[1] It also refers to itself as "a highly devolved organisation that involves more than 10,000 people, in different capacities, worldwide."[2] Its major product is the Cochrane Database of Systematic Reviews, which it describes as "the definitive resource for evidence-based health care."[3] Since its establishment in 1993 Cochrane has gained an internationally respected reputation, and its reviews are used worldwide.

Cochrane's ability to appear above commercial conflicts of interest remains dependent on governmental funding[2] and particularly from British governmental sources. By early 2004 significant changes had taken place. British governmental funding was reduced considerably. Faced with potential reductions in productivity and staff redundancies, Cochrane had to consider commercial sources.[2] The changes were described thus by Cochrane author Professor Sir John Grimley Evans:[4]

"Over the next five years, the money to be provided to British Cochrane Groups by the Department of Health, ominously now called "core funding," will not be enough for survival. We will all therefore be looking for additional money from people or agencies interested in what we do. To put it in terms familiar to the shopkeepers who, as Buonaparte observed, rule this unhappy country, we have to sell our product."

Cochrane's policy on financial conflicts of interest concentrates on commercial, not government funding.[2,5] Never wholly independent of commercial or government funding, Cochrane now appears to be dependent on both.

Concern about Cochrane's independence existed prior to 2004, as exemplified by its albumin review, funded by the UK Department of Health (DoH).[6] In 2005, Cochrane published a safety review of the measles-mumps-rubella vaccine (MMR).[7] The review contained conclusions and statements that did not fit well with the evidence cited, but that support the British government's position on the vaccine.

Cochrane Policy on Conflicts and Funding

Commercial funding has been permitted since Cochrane's creation in 1993 and continues until 2010. "Indirect," "non-core" commercial funding continues after 2010.

The 2003 Cochrane internal consultation document "Conflict of interest on corporate sponsorship"[5] states:

"This has been a matter of concern to The Cochrane Collaboration since its formation in 1993."

"By 'sponsorship' of a review, we mean a sum of money given to an author or group of authors to prepare, or update, a Cochrane review. Such sponsorship could include…funding of a sabbatical period to work on a Cochrane review."

The document defines "firewall" to mean "a clear barrier or separation between a source of funding and the use to which that funding is put, so as to prevent any influence by the funding source on the outcome of, say, a Cochrane review."

Policy in effect since 2005[2] includes the following provisions:

"…[T]here should be no direct funding of Cochrane Centres…by commercial sources.…Direct funding…should be phased out over the next five years. Therefore, from April 2010, any direct funding…is prohibited. Non-direct funding of non-core activities…would, however, be permitted after 2010…

"…[S]ponsorship of a Cochrane review by any commercial source or sources (as defined above) is prohibited.

"Other sponsorship is allowed, but:

- "A sponsor should not be allowed to delay or prevent publication of a Cochrane review.

- "A sponsor should not be able to interfere with the independence of the authors of reviews in regard to the conduct of their reviews.
- "The protocol for a Cochrane review should specifically mention that a sponsor cannot prevent certain outcome measures being assessed in the review."

Accordingly, commercial "sponsorship" is permitted except for reviews. Direct funding of Cochrane Centres "as a principle" is not permitted, but indirect funding for "non core" activities is.

Now that the funding base for Cochrane has changed radically, will these demarcations ensure Cochrane reviewers' independence? Will they be adhered to? How easily are they avoided?

Cochrane policy is more relaxed about government financial influence:[2]

"Whilst government departments and not-for-profit medical insurance companies and health management organizations may find the conclusions of Cochrane reviews carry financial consequences for them, there is less concern about these sources of potential funding. Nor is there strong evidence of adverse influence by such sources."

The British government, however, appears to have direct financial interests in disclosures about the safety of MMR.

British Government Financial Interests in MMR

Underlying the 2005 Cochrane MMR review[7] is a history of litigation claims against the manufacturers, including allegations of an association between MMR, regressive autism following previously normal development, and a novel form of inflammatory bowel disease (the "Wakefield hypothesis").[8] The British government was obliged to fund the claims under a statutory scheme administered by the British Legal Services Commission (LSC).[9]

Pharmaceutical companies do demand financial indemnities from governments where risks of litigation are significant. The Wellcome Company, Beckenham, England, ceased vaccine production in 1990. The reasons cited by the head of its Biotech Division, Dr. A. J. Beale, were: "Too much litigation and too little profit."[10]

Legally privileged and confidential investigations by the MMR child claimants' lawyers revealed that British government financial protection against liability for MMR vaccine damage had been given when MMR was introduced into the UK in October 1988. That information was obtained independently of, and not directly or indirectly from, disclosures by parties to the British MMR litigation. The government financial protection benefited what has become the GlaxoSmithKline plc group ("Glaxo"). Until the full details are disclosed publicly, the extent of the British government's financial liability and hence motivation to stop the UK MMR vaccine damage litigation is unknown to the British public. If it was obliged to pay the MMR children's legal bills and all Glaxo's bills too, its liability if the children won, as will be seen, could have been severe. There is also the separate question of the British government's own liability in negligence for implementing MMR, especially if one or more manufacturers sought government financial protection from liability.

This writer's endeavors by Freedom of Information Act (FOIA) requests to obtain publishable details of the British government's financial arrangements with Glaxo are continuing. Those inquiries show the unusual position that Her Majesty's government has so far been unable to locate the 1988 written legal contract with the relevant Glaxo company for the supply of the Pluserix MMR. The same applies to the legal contracts for the supply of the other MMR vaccines at that time: Immravax and MMR II (C. Gilson, DoH, personal communication, 2006). Accordingly, DoH claims to being "unaware" of any government financial protection being provided (C. Gilson, DoH, personal communication, 2006) are colored by the contracts claimed to be missing. The absence of awareness of a fact is not a denial of the fact itself.

How Much Money?

The British vaccine damage compensation scheme was introduced in the 1970s. It is publicly funded. Vaccine suppliers refuse to contribute.

Unlike in the U.S., UK vaccine suppliers have no legal immunity from litigation. The economics of UK litigation, however, normally achieve the same result. Contingency fees are not permitted. Compensation is substantially less than U.S. awards. Individuals cannot fund such complex, lengthy litigation. UK "conditional fee" arrangements lack the returns for UK lawyers to invest in cases of this kind. Public funding is not universally available, and evidence implicating vaccines in damage great enough to meet the threshold to qualify is not readily available.

A debate on the vaccine damage compensation scheme took place in 2000 in the House of Lords during a campaign by a UK national newspaper, the *Daily Express*. The campaign was to increase compensation payments from the then-maximum, equivalent to approximately $18,500 in current dollars. Up to that time only death or disability greater than 80 percent qualified for compensation, and only one in 10 applicants were successful. Others received nothing unless they were able to bring and prove claims in court.

Figures given in that debate[11] estimated potential vaccine damage civil liability at between $2.5 billion and $4 billion if successful civil claims had been brought. Lord Brennan, who cited the figures, stated they were sums "the government could not afford to pay." Applying Lord Brennan's estimates to include MMR vaccine produces a figure between $7.5 billion and $12 billion.

Lord Brennan cited Smithkline-Beecham's "frank and firm refusal to do anything" to contribute and quoted the Association of British Pharmaceutical Industries (ABPI):

"The government implemented the vaccination program knowing in full detail what the possible side-effects were. They knew what they were taking on, the damage is therefore their responsibility, and they should compensate people accordingly."

He continued: "[T]hat sends an extremely tough message from commerce to government. Fortunately, government seek to represent the people and, in doing so, the pressure they bring on these companies over the next few years should be unrelenting."

It is telling there has been no "unrelenting pressure" from government. In contrast, the ABPI statement is clear. UK vaccine suppliers consider the British government and not themselves liable to compensate vaccine-damaged children. This suggests the British government may have other agreements to give financial protection—to more than one UK vaccine supplier and for more than one vaccine.

Did the British Government Stop the MMR Litigation?

Sir John Grimley Evans said:[4]

"As the witch-hunt over MMR illustrates, the mob goes for the man, not the ball…. Government research money is now heavily under political influence; it would be a brave academic hoping for future grants who used government funds to conclude that the latest Downing Street-trumpeted health service initiative was garbage."

And if that is the position with medical research, is the position regarding government influence and the LSC any different, and if so, how?

The LSC withdrew MMR litigation funding on Oct 1, 2003. The details are secret in court files.[12] It was alleged in open court[13] that an LSC official admitted the decision was taken by central government. The allegations were by parent Marion Wickens, who claims this occurred despite legal advice that her severely injured 13-year-old daughter's case was strong:

"Somebody very senior from the Legal Services Commission phoned me back…. [H]e said that the decision to stop the Legal Aid came from above. Now I said to him, what did you mean by above? He said (inaudible) that the decision to stop Legal Aid came from the government."

Another parent said,[14] "We have been dumped. Legal advice says Thomas has a strong case, but legal aid was mysteriously taken away."

Official involvement when legal funding was withdrawn included British health officials leaking confidential medical records without consent to the *Sunday Times* of London,[15] which supports Prime Minister Tony Blair's "New Labour" government.[16-18] On Feb 22, 2004, the paper claimed the story was the outcome of a "four month investigation,"[19] showing that the "investigation" started about the time the litigation funding was withdrawn.

The *Sunday Times* appears to have waited until the Sunday before an English judge was to deliver judgment on a legal challenge to the withdrawal of the MMR litigation funding. The paper's story personally attacked Andrew Wakefield, the British gastroenterologist who first raised concerns about MMR vaccine.[20] Prime Minister Blair also briefed the British press the same day.[21] The court ruled against the MMR vaccine-damaged children,[12] and the litigation has all but ground to a halt with a small number of determined parents pressing on, unfunded and against the odds.

British government involvement included giving Parliamentary time to political opponent Dr. Evan Harris, a Member of Parliament on Mar 15, 2004.[22] Dr. Harris continued attacking Andrew Wakefield. Dr. Harris did not explain whose interests he represented, nor why he sought the debate, nor did he disclose being a Glaxo-Wellcome-funded "Fellow Elect."[23] When queried,[24] a government official rapidly defended this opposition politician.[25]

In September 2004, legal funding was restored for 11 children, but denied to others with closely similar claims and symptoms. The latter also had autism diagnoses.[26] This suggests the LSC's funding decisions reflect the British government's interests in discrediting allegations of an MMR vaccine-autism association, and less so the facts of the individual cases and the legal framework within which such decisions should be made.

The Cochrane MMR Review

On Oct 19, 2005, the Cochrane Library published a review of 31 epidemiological studies on the MMR vaccine,[7] after rejecting approximately 5,000 papers. The review's objectives were to assess the MMR vaccine's effectiveness and safety.

The Cochrane review states that external funding was from the European Union Programme for Improved Vaccine Safety Surveillance (EUSAFEVAC). The internal funding was from Istituto Superiore di Sanita, Italy. One of the author's interests include having been a consultant to vaccine manufacturers lawyers in the British MMR vaccine damage litigation and founder of the Brighton Collaboration. The Brighton Collaboration is funded by the U.S. Centers for Disease Control and Prevention (CDC), the World Health Organization (WHO), the University Children's Hospital Basel (UKBB),[27] and EUSAFEVAC.

The review's body appears to set out a competent, thorough, critical, and objective assessment of the papers reviewed. That, however, changes in the discussion and conclusions. Further, the review synopsis states: "No credible evidence of an involvement of MMR with either autism or Crohn's disease was found." Stories based on this statement made headlines in the British press[28] and around the world. However, that statement is not based on the contents of the review. It does not appear in the body of the text, in the authors conclusions, or in the discussion. "Credible" appears once in the body, but not in the context of autism or Crohn's disease. What the authors stated in the body of the review was significantly different. In the "Discussion" section they said:

"We found only limited evidence of the safety of MMR compared to its single component vaccines from studies that had a low risk of bias."

In the "Conclusions" the reviewers stated: "The safety record of MMR is possibly best attested by its almost universal use." So, having set out to ascertain whether the millions of doses of MMR vaccine administered worldwide are safe—the authors of this review claim they are safe because millions of doses are administered worldwide. That is not science, nor is it based on the evidence in the review.

The reviewers also said:

- "The design and reporting of safety outcomes in MMR vaccine studies, both pre- and post-marketing, are largely inadequate."
- "We found problematic internal validity…and…biases… influenced our confidence in their findings."
- "Not all reports offered adequate explanations for missing data."
- "External validity of included studies was also low."
- "Descriptions of…populations, response rates…vaccine content and exposure…were poorly and inconsistently reported…. [I]nadequate and inconsistent descriptions of reported outcomes…limited observation periods…selective reporting of results contributed to our decision not to attempt pooling data by study design."

There are other unusual aspects of the widely reported Cochrane MMR review synopsis statement:

"No credible evidence of an involvement of MMR with either autism or Crohn's disease was found."

This statement leaves the Wakefield hypothesis[8] open and untouched.

"Involvement" is not a usual word in this context. Even elementary texts[29] teach that where the cause is unknown, epidemiologic investigations principally look for "associations" between disease and potential causes. The use of "involvement" instead of "association" in a paper by such experienced reviewers implies the authors were unwilling to disclaim that evidence of an association existed.

The claim that "no credible evidence…was found" is a statement about the quality of the evidence then available and considered by the reviewers. It leaves open that credible evidence may be found in the many avenues of investigation that remain ignored and unexplored by establishment researchers.

The reviewers also appear not to have taken into account the Bradford Hill guidelines.[30] Their statement is based on three cohort, two case-control, and one self-controlled trial study. No other evidence such as clinical or dechallenge or rechallenge evidence appears to have been considered. Over-reliance on epidemiological statistical significance testing is inappropriate.[6,31]

No Credible Evidence

For autism outcomes, the Cochrane MMR review relies on four papers for autism and one for pervasive development disorders (PDD). These are of populations of four Western countries (U.S., Denmark, Finland, and the UK), but none from the Third World. The papers included: a 2004 case-control study by DeStefano et al.,[32] a 2002 cohort study by Madsen et al.,[33] a 2002 cohort study by Makela

BOX 1: Comparison of Abstracts of Cochrane 2005 MMR Review[7] with 2003 EUSAFEVAC Review[39]

Text added for the 2005 review is italicized with deletions struck through:

"*Background*
"Public debate over the safety of the trivalent measles, mumps and rubella (MMR) vaccine, and the resultant drop in vaccination rates in several countries, persists despite its almost universal use and accepted effectiveness.

"Objectives
"We carried out a systematic review to assess the evidence of *effectiveness and* unintended effects ~~(beneficial or harmful)~~ associated with MMR ~~and the applicability of systematic reviewing methods to the field of safety evaluation.~~.

"Search strategy
"We searched the Cochrane Central Register of Controlled Trials (CENTRAL) (The Cochrane Library Issue 4, 2004), MEDLINE (1966 to December 2004), EMBASE (1974 to December 2004), Biological Abstracts (from 1985 to December 2004), and Science Citation Index (from 1980 to December 2004). Results from reviews, hand searching and from the consultation of manufacturers and authors were also used.

"Selection criteria
"Eligible studies were comparative prospective or retrospective trials testing the effects of MMR compared to placebo, do-nothing or a combination of measles, mumps and rubella antigens on healthy individuals up to 15 years of age~~,~~. *These studies were* carried out or published by 200~~3~~*4*.

"Data collection and analysis
"We identified ~~120~~ *139* articles *possibly* satisfying our inclusion criteria and included ~~22~~ *31 in the review*.

"Main results
"MMR ~~is~~*was* associated with a lower incidence of upper respiratory tract infections, a higher incidence of irritability, and similar incidence of other adverse effects compared to placebo ~~and is~~. *The vaccine was* likely to be associated with benign thrombocytopenic purpura ~~(TP)~~, parotitis, joint and limb complaints*, febrile convulsions within two weeks of vaccination* and aseptic meningitis (mumps*) (*Urabe strain-containing MMR).

"Exposure to MMR ~~is~~ *was* unlikely to be associated with Crohn's disease, ulcerative colitis, autism or aseptic meningitis (mumps) (Jeryl-Lynn strain-containing MMR). *We could not identify studies assessing the effectiveness of MMR that fulfilled our inclusion criteria even though the impact of mass immunisation on the elimination of the diseases has been largely demonstrated.*

"Authors' conclusions
"The design and reporting of safety outcomes in MMR vaccine studies, both pre-and post-marketing, are largely inadequate. The evidence of adverse events following immuniz~~s~~ation with MMR cannot be separated from its role in preventing the target diseases."

et al.,[34], a 2004 case-control study by Smeeth et al.,[35] and a 1999 self-controlled study by Taylor et al.[36] A 2001 cohort study by Fombonne and Chakrabarti[37] was considered but discounted in its entirety.

The only paper to deal with PDD[35] stated, "We were not able to separately identify the subgroup of cases with regressive symptoms to investigate the hypothesis that only some children are vulnerable to MMR-induced disease, and that this is always regressive." These children seem to be the category of children the Wakefield hypothesis addresses.[8] Being unable to comment on this point, the Smeeth paper then referred to the Fombonne 2001 and Taylor 1999 papers for support.

However, Cochrane discounts Fombonne as being impossible to interpret and states, regarding Taylor, that "[t]he absence of unvaccinated controls limits the inductive statements that can be made from this study." Additionally, the Taylor paper was criticized in testimony to the U.S. Congress by Professor Walter Spitzer, an emeritus professor of epidemiology from McGill University: "…[T]he use of the case series strategy of analysis is unconventional, not accepted by mainstream scientists, and leaves the paper at best as a hypothesis-generating study…."[38]

Others have complained about the Taylor data not being made available. This means peer review is impossible.

Duplicated Research

The 2005 Cochrane MMR review duplicates an almost identical review published in 2003[39] by members of the same team, yet contains no reference to the earlier work. That the duplication goes beyond the research is shown by the abstracts. The 2005 Cochrane MMR review abstract is a direct copy from the 2003 review (Box 1). The abstracted conclusions are also identical.

According to a separate publication by one of the Cochrane MMR review authors, duplicated publication can be unethical or fraudulent:[40]

"Redundant publication in biomedical sciences is the presentation of the same information or data set more than once.… Redundant publication can be considered unethical, or fraudulent, when the author(s) attempt to conceal the existence of duplicate publication from editors and readers.…The scientific community at large and governments should take urgent steps to safeguard the public from the possible effects of fraudulent multiple publications."

The 2005 review considered 31 papers of 139 short-listed ones, compared to the 22 papers selected from 120 short-listed ones in 2003: that is nine further papers culled from an additional 19.

The main difference between the two reviews is the claim that the later one investigated effectiveness in addition to safety. But there is no overall comparative evaluation of MMR vaccine safety and effectiveness against the safety and effectiveness of other measures, such as single vaccines, placebo, no vaccine, or modern treatment options. While the authors acknowledged that "we could not identify studies assessing the effectiveness of MMR that fulfilled our inclusion criteria," the reviewers simply conclude: "Given the existence of documented elimination of targeted diseases in large population by means of mass immunization campaigns however, we have no reason to doubt the effectiveness of MMR."

Again, this is not science. It is not based on any evidence presented, but supports often repeated official government statements. At best, the 2005 review should have been an update to the 2003 paper.

Body of Review Contradicts Conclusions

Contrary to its conclusions, the body of the 2005 Cochrane MMR review confirms the statements made by one of its authors, Dr. Thomas Jefferson, in 2002. When head of the vaccine division of the Cochrane Collaboration and board member of EUSAFEVAC, Jefferson was quoted as saying:[41]

"Most safety studies on childhood vaccines have not been conducted thoroughly enough to tell whether the jabs cause side effects…"

"…[T]he issue was the 'Cinderella' of public health research and…Government officials had failed to make it a high priority."

"There is some good research, but it is overwhelmed by the bad. The public has been let down because the proper studies have not been done."

"…[T]here was a 'dearth' of sound studies on the risks and benefits."

"…[I]nformation available on the safety of vaccines that are routinely given to babies and toddlers was 'simply inadequate.'"

He was especially concerned because "future vaccination programmes were likely to involve giving children five, six, even seven vaccines all at once."

"For people like me, it is becoming more and more difficult to tease out what problems may be due to an individual vaccine. It is almost becoming impossible to do this. We have to think very carefully about how we will monitor these vaccines. We have a responsibility to these children; they are our future. It is no use having a situation where someone suggests a possible harm and everyone runs around frantically trying to find bits of evidence. What is required is good-quality information that has been systematically collated and assessed."

Conclusions

The independence of The Cochrane Collaboration, which had been called into question previously, has been further compromised by recent funding changes.

The conclusions of the Cochrane review on the safety and effectiveness of MMR vaccine violate the standards of evidence-based medicine and are not supported by the body of the review. There are material concerns that the conclusions were influenced by efforts of the British government to avoid liability in claims brought on behalf of allegedly vaccine-injured children.

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REFERENCES

1. The Cochrane Collaboration. What is The Cochrane Collaboration? Available at: www.cochrane.org/docs/descrip.htm. Accessed Jun 20, 2006.
2. Commercial sponsorship and The Cochrane Collaboration. The Cochrane Collaboration's Policy on Commercial Sponsorship. Revised April 2006. Available at: www.cochrane.org/docs/commercialsponsorship.htm. Accessed Oct 18, 2006.
3. The Cochrane Collaboration—the reliable source of evidence in health care. Available at: www.cochrane.org. Accessed June 20, 2006.
4. Cochrane Dementia and Cognitive Improvement Group (CDCIG). *Newsletter* 2004 (March); Issue 10.
5. Neilson J, Clarke M, Clark K, et al. Conflict of interest on corporate sponsorship. Cochrane Collaboration Consultation Document 18/10/2006. Available at: www.cochrane.org/news/Conflict_of_interest_plus_authors_statements.doc. Accessed Oct 18, 2006.
6. Miller DW Jr, Miller CG. On evidence medical and legal. *J Am Phys Surg* 2005;10:70-71.
7. Demicheli V, Jefferson T, Rivetti A, Price D. Vaccines for measles, mumps and rubella in children. *Cochrane Database of Systematic Reviews* 2005;4:CD0044007.
8. Wakefield AJ, Montgomery SM. Autism, viral infection and measles-mumps-rubella vaccination. *IMAJ* 1999;1:183-187.
9. Dyer C. Commission withdraws legal aid for parents suing over MMR vaccine. *BMJ* 2003;327:640.
10. Marwick C. British firm halts vaccine manufacture, research. *JAMA* 1990;264:2370.
11. Brennan. Vaccine damage. *Hansard HL Debates* 2000;614:113:975-983.
12. Davis J. The Queen on the application of W v the Legal Services Commission. [2004] EWHC 564 (Admin).
13. Wickens M: Daily Transcript of Sayers v Smith Kline Beecham plc RCJ Queen's Bench No.S/01/0173 7/26/04, Court 76, page 87, lines 6-11.
14. Hope J. Bully boys. Parents' fury as drug firm tries to force them to drop MMR compensation cases. *Daily Mail* (London), May 12, 2004, p 15.
15. Harris E. MMR Vaccinations and autism. *Hansard HC Debates*. 2004;419:556:130.
16. Frankel G. As election looms, Tony Blair basks in warmth of the sun. *Washington Post Foreign Service*, May 4, 2005.
17. McSmith A. Former aide lifts lid on Blair's links with Murdoch. *Independent* (London), May 29, 2006.
18. Row over Blair's "Murdoch intervention." *BBC News*, Mar 27, 1998. Available at: news.bbc.co.uk/1/hi/uk/politics/70597.stm. Accessed Oct 25, 2006.
19. Deer B. Revealed: MMR research scandal. *Sunday Times*, Feb 22, 2004.
20. Wakefield AJ, Murch SH, Anthony A, et al. Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children. *Lancet* 1998;351(9103):637-641.
21. Hawkes N. Blair calls for end to MMR debate. *Times* (London), Feb 23, 2004.
22. Harris E. MMR Vaccinations and Autism. *Hansard HC Debates* 2004;419:556:128
23. Harris E. *Medicines (Advertising and Monitoring of Advertising) Amendment Regulations 1999. Delegated Legislation Committee Debates.* Ninth Standing Committee on Delegated Legislation, Apr 23, 1999. Available at: www.publications.parliament.uk/pa/cm199899/cmstand/deleg9/st990428/90428s02.htm. Accessed Oct 19, 2006.
24. Heptonstall JP. Parliamentary protection and open science. *BMJ Rapid Responses,* Apr 13, 2004. Available at: http://bmj.bmjjournals.com/cgi/eletters/328/7442/726-a#56497. Accessed Oct 19, 2006.
25. McCloskey BG. Parliamentary protection and open science. *BMJ Rapid Responses*, Apr 14, 2004 Available at: http://bmj.bmjjournals.com/cgi/eletters/328/7442/726-a#56634. Accessed Oct 19, 2006.
26. Fletcher PA. Legal case a total disaster. *BMJ Rapid Responses*, Oct 24, 2004. Available at: http://bmj.bmjjournals.com/cgi/eletters/329/7472/939#80961. Accessed Oct 19, 2006.
27. Brighton Collaboration. About us. Available at: www.brighton collaboration.org/internet/en/index/about.html. Accessed Jun 28, 2006.
28. Meikle J. Study gives MMR vaccine the all-clear. *Guardian*, Oct 19, 2005.
29. Coggon D, Rose G, Barker DJP. Ecologic studies. In: *Epidemiology for the Uninitiated*. Available at http://bmj.bmjjournals.com/epidem/epid.6.html. Accessed Oct 19, 2006.
30. Hill AB. The environment and disease: association or causation? *Proc R Soc Med* 1965;58:295-300.
31. Phillips CV, Goodman KJ. The missed lessons of Sir Austin Bradford Hill. *Epidemiol Perspect Innovations* 2004;1(3). Available at www.pubmedcentral.nih.gov/articlerender.fcgi?artid=524370. Accessed Oct 25, 2006.
32. DeStefano F, Bhasin TK, Thompson WW, Yeargin-Allsopp M, Boyle C. Age at first measles-mumps-rubella vaccination in children with autism and school-matched control subjects: a population-based study in metropolitan Atlanta. *Pediatrics* 2004;113:259-266.
33. Madsen KM, Hviid A, Vestergaard M, et al. A population-based study of measles, mumps, and rubella vaccination and autism. *New Engl J Med* 2002;347:1477-1482.
34. Makela A, Nuorti JP, Peltola H. Neurologic disorders after measles-mumps-rubella vaccination. *Pediatrics* 2002;110:957-963.
35. Smeeth L, Cook C, Fombonne E, et al. MMR vaccination and pervasive developmental disorders: a case-control study. *Lancet* 2004;364:963-969.
36. Taylor B, Miller E, Farrington CP, et al. Autism and measles, mumps, and rubella vaccine: no epidemiological evidence for a causal association. *Lancet* 1999;353:2026-2029.
37. Fombonne E, Chakrabarti S. No evidence for a new variant of measles-mumps-rubella-induced autism. *Pediatrics* 2001;108:E58. Available at: http://pediatrics.aappublications.org/cgi/content/full/108/4/e58. Accessed Oct 25, 2006.
38. Committee on Government Reform, U.S. House of Representatives. *Autism: Present Challenges, Future Needs—Why the Increased Rates? 106th Congress House Hearings*, Apr 6, 2000. Available at: http://www.access.gpo.gov/congress/house/house07ch106.html. Accessed Oct 25, 2006.
39. Jefferson T, Price D, Demicheli V, Bianco E. Unintended events following immunization with MMR: a systematic review. European Research Program for Improved Vaccine Safety Surveillance (EUSAFEVAC) Project. *Vaccine* 2003;21:3954-3960.
40. Jefferson T. Redundant publication in biomedical sciences: scientific misconduct or necessity? *Sci Eng Ethics* 1998;4:135-140.
41. Fraser L. Vaccines expert warns studies are useless. *Telegraph* (London), Oct 27, 2002.