

WATCH COMMITTEE PAPER		WATCH/2008/5	
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WATCH COMMITTEE

The risks of lung cancer and mesothelioma from relatively low-level exposures to different forms of asbestos

Report of progress

Issue

1. Report on progress of the exploration of what is known of the dose-response relationships for lung cancer and mesothelioma caused by exposure to different forms of asbestos, in particular, reassessing the evidence about the levels of historic exposures upon which quantitative risk models are based, and revising the risk models in the light of this assessment and updated information from the literature.

Timing Considerations

2. No particular timing issues.

Recommendation

3. WATCH is invited to consider the proposals in this cover paper and to respond to the action in paragraphs 16 and 17.

Background

4. At the WATCH meeting on 7 & 8th November 2007 WATCH made an initial exploration of what is known of the dose-response relationships for lung cancer and mesothelioma caused by exposure to different forms of asbestos. The ultimate aim is to identify what can (and can't) be discerned reliably about the risks at relatively low-level exposures.

5. At the WATCH meeting on 14 February 2008 a proposal for progressing this work was agreed which included 4 approaches:

- I. Strengthening the evidence about historical exposures in cohorts
- II. Revising the overall summary analysis of cohorts
- III. Assessment of specific occupational circumstances
- IV. "Reality checks" of Hodgson and Darnton models for various population subgroups

More details of each approach were provided in the cover paper (WATCH/2008/3).

6. An action was placed in HSE to plan an item on outcomes from approaches 1 and 2 and prepare an associated package for the June 2008 WATCH meeting.

Argument

7. Annex 1 reflects a reappraisal of the H&D analysis in the context of:

- (i) Identification of which are the more, and the less reliable individual studies in the H&D analysis in relation to the exposure information they contain; and
- (ii) Incorporation of additional studies that have appeared since the H&D analysis

8. Assessment of the underlying exposure data for the key cohorts by HSE and by Berman & Crump suggests a separation of studies into those where the exposure estimates are likely to be more or less reliable as shown in Table 8 of Annex 1.

9. In Table 1 and Figure 2 of Annex 1 one can identify those studies covered in the original H&D analysis, the additional “new” studies, and across both categories those studies deemed to be the more reliable in terms of exposure characterisation.

Key observations are:

- (i) An analysis based only on the results from the more reliable studies produces a pattern of results that fall along the same relationship as that in H&D, derived from all the studies covered.
- (ii) New studies, some of which can be regarded as containing relatively better quality exposure information, appear to support the mesothelioma and lung cancer risks per unit exposure (“ R_M ” and “ R_L ” values) derived in the H&D analysis.
- (iii) The original conclusions of the H&D analysis about the non-linear relationship between cumulative exposure and pleural mesothelioma risk (in which risk is proportional to cumulative exposure raised to a power less than 1) are supported by this updated analysis. However, the extent to which this non-linearity reflects a regression-to-the-mean effect, due to not accounting for the variability in the cumulative exposure estimates, rather than a genuine relationship has not been assessed.

10. Annex 1 also discusses whether or not, among all of the available studies, any one stands out as particularly robust and reliable in respect of exposure assessment. The conclusion is that although it is possible to group studies broadly as more or less reliable (as shown in Table 8 of Annex 1), that this is not the case. For every study, there are legitimate concerns about the reliability of the exposure information.

11. Annex 2 summarises and discusses how the exposure measurements which underpin the average cumulative exposures derived in the H&D analysis were carried out. The focus is on the pure fibre cohorts most relevant to the original H&D analysis (and the updated analysis presented in Annex 1). A number of key limitations are identified. In particular, the extent of data used for estimating air concentration over time, the representativeness of the data to historical conditions, the conversion of data to PCM equivalent fibre counts, and the relationship between the PCM fibre count at the date of sampling and current day PCM fibre count. The

review also suggests that there is very limited ability to re-assess the air concentrations and cumulative exposure estimates except in a subjective way.

12. The proposition put to WATCH is that the further analysis conducted thus far under Approaches 1 and 2 supports the validity of the dose-response relationships derived for lung cancer and mesothelioma produced by each of the three asbestos fibre types (croc, amos, chry), within the window of observed data. This window extends from 5 f/ml.years to 600 f/ml.years on the dose axis. The relationships for pleural mesothelioma are shown in Fig 2 of Annex 1.

Link to HSC Strategy

13. This work relates directly to HSC/E's statutory responsibilities in relation to asbestos; it also has potential relevance for the asbestos strand of the Cancer Project within HSE's Disease Reduction Programme.

Consultation

14. There has been no external consultation of this paper or peer review of the analysis set out in Annex 1.

European Context

15. The regulatory framework for asbestos is EU-wide and it is possible that the output of this work might have some EU applicability.

Action

16. WATCH is invited to consider this further analysis and to consider:

- whether or not it agrees with the proposition in paragraph 12
- if further work should be done under Approaches 1 and 2 in paragraph 5

17. At the June 2008 meeting WATCH will also be presented with proposals for how work under Approaches 3 and 4 might be progressed; and will be invited to consider the thinking and agree with HSE the future plan.

Attachments

Annex 1 Revising the overall summary analysis of cohorts – "Approach 2"

Annex 2 Update and assessment of the airborne exposure data used in the Hodgson and Darnton meta-analysis and its effects on the estimates of the cumulative exposure

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