Letter to the Editor

The Assessment of Titanium Dioxide Exposure

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We have read the paper submitted by Hext et al. (2005) with great interest.

The aim of their study was to make a comprehensive overview of the results obtained from extensive study programmes commissioned by TiO₂ manufacturers to investigate the toxicological and epidemiological aspects of TiO₂. In the ‘Epidemiology studies’ section the authors report the results of two relevant European and US multicentre studies (Fryzek et al., 2003; Boffetta et al., 2004) that examined exposure to TiO₂ and its effects on the health of workers. These studies included a relevant number of subjects: 27,522 workers from 11 factories and 5,713 workers from 4 factories for the European and US study, respectively. Hext et al. claimed that a comprehensive assessment of exposure was performed by experienced occupational hygienists in both these multicentre studies. Exposure to TiO₂ was determined by gravimetric measurements of airborne dust (Boffetta et al., 2003; Fryzek et al., 2003).

In industrial hygiene, it is common practice to measure occupational exposure to TiO₂ by total dust sampling, and this is confirmed by the fact that ‘the data available in the literature are reported as total or nuisance dust and not as TiO₂’ (Boffetta et al., 2003). However, more specific analytical methods such as ICP-MS, ICP-OS, spectrophotometry, X-ray diffractometry or fluorescence would provide a more accurate evaluation of TiO₂ exposure.

Furthermore, the US and European studies refer to data that do not specifically include exposure to titanyl sulphate, a substance present in some occupational areas such as Moore filtration in the sulphate process. It is not clear if any dust measurements have been used in the TiO₂ exposure reconstruction in these areas.

In their study, Hext et al. state that ‘only the long-term area samples for total TiO₂ dust were used in the US multicentre study’. In contrast, the study by Fryzek et al. clearly indicates that out of ~2,400 samples collected for a wide variety of substances, ‘914 personal full-shift or near full-shift air samples for total TiO₂ were used for the exposure estimates’. Therefore, personal sampling was used for the reconstruction of cumulative exposure in both the European and the US study. Overall there is a lack of error estimation in the exposure reconstruction.

Finally, Hext et al. point out that the US and European multicentre study researchers collaborated in order to make evaluations comparable in both studies. But Hext et al. claim that ‘it is not possible to directly compare the average cumulative exposure to TiO₂ of workers in the two multicentre studies’ and conclude, without quoting data, that ‘it is unlikely that there is a significant difference’.

For the above mentioned considerations, the exposure data used to reconstruct TiO₂ exposure fail to provide a real estimate of occupational exposure to TiO₂.

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