Short report from the Danish Working Environment Authority´s (AT) Occupational exposure limit quality committee. Evaluation of the assessment: Chromium(VI) compounds: Assessment of SCOEL/REC/386.

Members of the Quality committee: Anne Mette Zenner Boisen (Miljøstyrelsen); Anoop Kumar Sharma (DTU Fødevareinstituttet); Mette Lausten Hansen (Arbejdsmedicin AUH); Jesper Bo Nielsen (Institut for Sundhedstjenesteforskning, SDU); Vivi Schlünssen (NFA)

This report is based on a meeting 26th February 2019 at AT, where results from the NFA assessment were discussed after the authors presented the content of the report. The members of the quality committee had the chance to ask questions to the authors.

The assessment: Anne Thoustrup Saber, Nicklas Raun Jacobsen, Niels Hadrup, Ulla Vogel. Chromium(VI) compounds: Assessment of SCOEL/REC/386. The National Research Centre for the Working Environment (NFA) Jan 2019.

Overall evaluation of the report

This NFA assessment (hereafter the assessment) is an assessment of the SCOEL report (Hartwig et al. 2017), primarily based on critical evaluation of the SCOEL report, the dose-response assessment by the EU Risk Assessment Committee published by ECHA in 2013 (ECHA 2013), and the meta-analysis performed by Seidler and colleagues (Seidler et al. 2013).

In general, the assessment is well written and easy to follow, and the committee agree with the remarks and the conclusion in the NFA assessment, namely to follow the recommendations in the SCOEL report

After the meeting the 26th February 2019 the committee asked NFA to clarify two issues, and NFA provided the needed input:

1) Why common unweighted mean was used for the joint estimate for Baltimore and Painesville data as estimated in Siedler et al 2013 and used in Hartwig et al 2017. In Siedler et al it was stated that: "Concerning the uncertainty associated with calculating the slope of the exposure-risk relationships (b), an aggregation of the exposure-risk relationships from the different studies is problematic. We calculated the mean of the βs *betas* without any weighting. Regrettably, an unbiased and accurate aggregation of the data would only have been possible with the individual subject data. Nevertheless, the unweighted mean of the estimated betas serves as an estimate within the range of the βs obtained from the published studies". Based on size, info on tobacco use and numbers of measurements included in the exposure assessment the Baltimore data as used in the Park et al paper from 2004 (Park et al 2004) is of highest quality compared to the Painesville data (Crump et al 2003). The difference between the mean estimate and the Park et al estimate is limited. The quality committee therefore support to use the unweighted mean to estimate the risk.

2) The dust fraction used in the risk estimate is not completely clear. For both cohorts the exposure measurements are referred to as "airborne" concentrations indicating that there is no available specific information regarding size fractions for neither the Baltimore cohort nor the Painesville cohort (Gibb et al., 2000; Crump et al., 2003). For the Painesville cohort, the only available particle size data is that the median aerodynamic equivalent diameter of the in-plant airborne dust was 1.7 µm (Proctor et al., 2003). The NFA assessment group was not able to locate information on particle size for the Baltimore cohort. The committee judge the probably dust fraction to be "total dust", a dust fraction not well defined but with inclusion of particles larger than the respirable fraction (European Committee for Standardization 1993). Furthermore the current Danish OEL is based on total dust as well (AT 2017).

Setting an occupational exposure limit for Chrom VI

The quality committee recommend to follow the SCOEL risk estimates for Cr(VI) (Hartwig et al 2017):

Excess lung cancer incidence Cr(VI)	Air concentration (µg/m3)
1:1.000	0,25
1:10.000	0,025
1:100.000	0,0025

References

AT. Bekendtgørelse om grænseværdier for stoffer og materialer september 2017 (https://www.retsinformation.dk/eli/lta/2018/655)

Crump C, Crump K, Hack E, Luippold R, Mundt K, Liebig E, Panko J, Paustenbach D, Proctor D. Dose-response and risk assessment of airborne hexavalent chromium and lung cancer mortality. Risk Anal 2003;23:1147-1163.

ECHA. Application for authorisation: Establishing a reference dose response relationship for carcinogenicity of hexavalent chromium. RAC/27/2013/06 Rev.1. European Chemicals Agency. (ECHA), 2013.

European Committee for Standardization. European Committee for Standardization, Workplace Atmospheres - Size Fraction. Definitions for Measurement of Airborne Particles. Brussels. European Committee for Standardization, 1993. EN 481.

Hartwig A, Heederik D, Kromhout H, Levy L, Papameletiou D, Klein CL. Chromium(VI) compunds. SCOEL/REC/386. Recommendations from the Scientific Committee on Occupational Exposure Limits. Brussels: European Commision, 2017.

Park RM, Bena JF, Stayner LT, Smith RJ, Gibb HJ, Lees PS. Hexavalent chromium and lung cancer in the chromate industry: A quantitative risk assessment. Risk Anal 2004;24:1099-1108.

Seidler A, Jahnichen S, Hegewald J, Fishta A, Krug O, Ruter L, Strik C, Hallier E, Straube S. Systematic review and quantification of respiratory cancer risk for occupational exposure to hexavalent chromium. Int Arch Occup Environ Health 2013;86:943-955.