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## **Interrater agreement in the assessment of exposure to carcinogens in the offshore petroleum industry**

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### **Main messages**

- Expert agreement was well above the chance level and was higher than reported in comparable studies.
- Providing summary documents for expert assessment seems to be a time-effective, easily applied and reliable method for evaluating the likelihood of exposure.

### **Policy implication**

- Researchers who intend to use expert assessment of exposure should consider that providing limited quantitative measurement data might lead to more incongruence among raters.

## **ABSTRACT**

**Objectives:** To evaluate the reliability of an expert team assessing exposure to carcinogens in the offshore petroleum industry and to study how the information provided influenced the agreement among raters.

**Methods:** Eight experts individually assessed the likelihood of exposure for combinations of 17 carcinogens, 27 job categories and four time periods (1970–1979, 1980–1989, 1990–1999 and 2000–2005). Each rater was to assess 1836 combinations based on summary documents on carcinogenic agents, which included descriptions of sources of exposure and products, descriptions of work processes carried out within the different job categories and monitoring data. Interrater agreement was calculated using Cohen's kappa index and single and average score intraclass correlation coefficients (ICC (2,1) and ICC (2,8), respectively). Differences in interrater agreement for time periods, raters, IARC groups and the amount of information provided were consequently studied.

**Results:** Overall, 18% of the combinations were denoted possible exposure, and 14% scored probable exposure. Stratified on the 17 carcinogenic agents, the probable exposure prevalence ranged from 3.8% for refractory ceramic fibres to 30% for crude oil. The overall mean kappa was 0.42; ICC (2,1) was 0.62 and ICC (2,8) 0.93. Providing limited quantitative measurement data was associated with less agreement than for equally well-described carcinogens without sampling data.

**Conclusion:** The overall kappa and single score ICC indicate that the raters agree on exposure estimates well above the chance level. The levels of interrater agreement were higher than in other comparable studies. The average score ICC indicates reliable mean estimates and implies that more than enough raters were involved. The raters seemed to have enough documentation on which to base their estimates, but provision of limited monitoring data leads to more incongruence among raters. Having real exposure data at hand with its inherent variability apparently makes estimating exposure in a rigid semiquantitative way more difficult.