84 EXPOSURE ESTIMATION OF HISTORICAL EXPOSURE TO STATIC MAGNETIC FIELDS DURING DEVELOPMENT AND MANUFACTURING OF MRI SYSTEMS

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Objectives To develop a method for retrospective exposure assessment of workers engaged in MRI system development and production for a period of 25 years to study health effects of long-term occupational exposure to static magnetic fields (SMF) in an industrial cohort study.

Methods A multiplicative deterministic model was developed as the basis for estimating current and historical SMF exposure levels in a Dutch MRI production facility. Key model determinants were exposed field strength (based on maps of the spatial distribution of SMF around MRI systems), task duration and task frequency. Detailed information on tasks performed per job title and other determinants were acquired through face-to-face interviews with key persons (N=24). This, along with MRI systems production figures were used to derive estimates of current exposure levels. Exposure modifiers were then applied to adjust the estimated current exposure levels to historical exposure levels. The exposure modifiers were based on reported and recorded historical information on MRI system types, annual production figures, organisational changes and safety control measures. The model was subsequently validated using measurement data from different time periods.

Results The model was used to build a Job Exposure Matrix (JEM) by estimating annual SMF exposure for each job title in the cohort during the period 1984 – 2009.

Conclusions This JEM provides estimates of occupational exposure to SMF in a Dutch MRI production facility. The generic nature of the exposure model makes it universally applicable in other industrial epidemiological studies on the health effects of MRI-related SMF exposure.