

# Fetal death and congenital malformation in babies born to nuclear industry employees: report from the nuclear industry family study.

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**BACKGROUND:** There is some concern about the genetic effects of exposure to low-level ionising radiation, but the evidence is sparse and conflicting. Most work has concentrated on cancer in offspring and little has been done on adverse reproductive outcome. We aimed to assess whether the offspring of men and women who are occupationally exposed to ionising radiation are at increased risk of fetal death and congenital malformation.

**METHODS:** We analysed pregnancies reported by an occupational cohort of nuclear industry workers in the UK, employed at establishments operated by the Atomic Energy Authority, Atomic Weapons Establishment, and British Nuclear Fuels. Employment and radiation monitoring data supplied by employers was linked to each pregnancy.

**FINDINGS:** 11,697 men and 1903 women reported one or more singleton pregnancy conceived after first employment within the nuclear industry, the men reporting a total of 23,676 singleton pregnancies and the women 3585. The risks of fetal death and congenital malformation were not related to whether the father had been monitored before conception or to the dose of radiation received. Among pregnancies reported by women, the risk of early (<13 weeks of gestation) miscarriage was higher if the mother had been monitored before conception (odds ratio [OR] 1.3, 95% CI 1.0-1.6), but there was no trend with dose. The risk of stillbirth was also higher if the mother had been monitored before conception (OR 2.2, 95% CI 1.0-4.6), but the finding was based on only 29 cases (13 exposed). The risk of any major malformation, or of specific groups of malformations, was not associated with maternal monitoring, or dose received, before conception.

**INTERPRETATION:** We found no evidence of a link between exposure to low-level ionising radiation before conception and increased risk of adverse reproductive outcome in men working in the nuclear industry. Similarly for women there was no evidence of an association between monitoring before conception and malformation in offspring. The findings relating maternal preconceptional monitoring to increased risk of fetal death are equivocal and require further investigation.