

**Measurement of neonatal cochlear function following exposure to magnetic resonance imaging in utero**

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**Objective:** To establish whether fetal exposure to the operating noise of magnetic resonance imaging (MRI) causes cochlear injury and subsequent hearing loss in neonates.

**Methods:** Mothers of all newborn babies in England are routinely offered a test to screen for permanent congenital hearing impairment. One component of this Newborn Hearing Screening Programme (NHSP) is the otoacoustic emissions (OAE) test, which aims to detect the noise produced by a normal cochlea in response to an acoustic stimulus. Results of neonatal hearing tests were sought for all babies delivered in Sheffield who were known to have undergone fetal MRI. The incidence of congenital hearing impairment within this group of children was determined, and mean OAE results were also analysed within four discrete frequency bands.

**Results:** 94 neonates were identified who had undergone fetal MRI in Sheffield and who had completed NHSP assessment. 32 of these babies had been admitted to a neonatal intensive care unit (NICU) and there was one case of congenital bilateral deafness among them. The national incidence of congenital hearing impairment detected by the NHSP is approximately 0.1%, rising to around 3% in NICU graduates. The incidence detected in babies following fetal MRI was 1% (95% confidence interval 0.0-5.8%), which is in accordance with the incidence expected given the high proportion of NICU graduates. For babies who were not admitted to NICU, there was no significant difference between their mean OAE cochlear response and the mean of a reference dataset of over 2000 OAE results from healthy babies.

**Conclusion:** This study finds no significant excess clinical risk of permanent congenital hearing impairment as a result of magnetic resonance imaging during pregnancy. In addition, there was no evidence of impairment of frequency-specific cochlear response in healthy newborn babies who had been exposed to magnetic resonance imaging in utero.