A POPULATION-BASED CASE-CONTROL STUDY OF RADIOFREQUENCY EXPOSURE IN RELATION TO CHILDHOOD CANCER

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Background and Aims: The existing epidemiological evidence concerning the putative link between exposure to radiofrequency (RF) electromagnetic fields and cancer risk has been mostly acquired from studies of adult population; the cancer risk associated with RF exposure in children has not been adequately addressed. This study was conducted to investigate the relationship between environmental exposure to RF emitted from mobile phone base stations (MPBS) and risks of all cancers, leukemia, and brain tumors in children.

Methods: This is a population-based case-control study based on Taiwan's National Health Insurance inpatients claims. Cases were incident cases aged 15 or less and admitted in 2003-2007 for all cancers (ICD-9-CM: 140-239) (n=2,606) including 939 leukemia cases (204-208) and 394 cases of brain cancer (191). Controls were randomly selected from all non-cancer children insured in the same year of case's first-time admission, with frequency matched on age (+/- 5 years) and with a case/control ratio of 1:30. Annual cumulative power (ACP, watt-year) was calculated for each of the 71,185 MPBS in service between 1998 and 2007. Then the annual power density (APD, watt-year/km^2) of each township (n=367) was computed as a ratio of summation of ACP of all MPBS in a township to the area of that particular township. Each study subject's exposure to MPBS emitted RF was indicated by the averaged APD within the 5-year period prior to the cancer diagnosis calculated for the township where he/she lived. For those study subjects aged less than 5 years, the APD was only averaged for the time period between birth and child's age. Unconditional logistic regression model with generalized estimation equation was employed to calculate the relative risk estimates of childhood cancer in relation to RF exposure.

Results: Per 10 watt-years/km^2 increase in 5-year averaged APD was associated with a covariate-adjusted odds ratio (AOR) of 1.02 (95% confidence interval (CI)=0.96-1.08) for all cancers. The corresponding figures for leukemia and brain tumors were also not elevated at 0.97 (0.87-1.08) and 1.09 (0.95-1.25). A higher than median averaged APD (some 168 watt-years/km^2) was significantly associated with an increased AOR for all cancers (1.13; 95% CI=1.01-1.28), but not for leukemia (1.23; 95% CI=0.99-1.52) or brain tumor (1.14, 95% CI=0.83-1.55).

Conclusions: This study noted a positive but weak association between RF exposure to MPBS and risk of all cancers in children. The elevated risk was also seen for leukemia and brain tumors, but further inferences were limited by inadequate statistical power.