

Molecular Epidemiology of Childhood Leukemia

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Synopsis:

Despite advances in the survival of patients with childhood leukemia, the causes of childhood leukemia remain unknown. Current evidence suggests that genetic damage disrupts the normal differentiation process of lymphoid and myeloid progenitor cells. Genetic damage may be inherited, may occur in utero, or may occur after birth. Exposure to environmental carcinogens during any of these intervals is suspected to cause detrimental genetic change.

The objective of this case-control study is to investigate the relationship between environmental exposures and the risk of childhood leukemia, utilizing molecular biology techniques to characterize the presence of genetic changes, as well as considering possible effect modifiers. The timing of genetic changes will also be identified in cases and controls using archived newborn blood samples from birth and buccal cells obtained at interview. For the case group, the prevalence of specific molecular changes will be obtained from several specimen types (archived newborn blood, peripheral blood and bone marrow at time of diagnosis, and buccal cell DNA at time of interview) in order to determine the timing of genetic changes. These changes will be stratified by parental self-reported exposures to identify if genetic changes in children correlate with self-reported parental exposures prior to birth or during pregnancy. This will demonstrate if exposures correlate with genetic changes and the temporal nature of occurrence of these changes.

All newly-diagnosed cases of childhood leukemia (ages 0-14) which present at none of the four referral hospitals in the Greater San Francisco Bay Area between 1995-1998 will be eligible (n=200). Two matched controls groups will be obtained for each case: Friend controls and birth certificate controls will be chosen from California births that match the case with respect to age, sex, gender, country of birth, and ethnicity. Two questionnaires will be provided: a self-administered interview for parents to record dietary, occupational and residential histories three months prior to conception, during pregnancy, and up until diagnosis of index case. An in-person interview will then be scheduled to review data and collect additional information. Interviews will be in English and Spanish.

This study offers particular design advantages over earlier studies due to use of two control groups and in-person interview in two languages, and essentially a population-based case ascertainment for the Bay Area. However, the most important departure from other studies is the linking of the temporal aspect of genetic change with exposure that will lead to significant advances in understanding the etiology of childhood leukemia.