

## **STUDY OF IMMUNE EFFECTS IN CORN FARMERS WITHIN THE AGRICULTURAL HEALTH STUDY**

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When compared to the general population, farmers have an increased risk of non-Hodgkin's lymphoma (NHL). Factors that contribute to this excess risk have not yet been identified. While several epidemiologic studies have observed an increased risk of NHL among farmers who are exposed to certain pesticides (i.e., phenoxyacetic acids, organophosphates, organochlorines, and triazines), these studies have not been conclusive. In addition, a clear mechanistic association between farming or pesticide exposure and subsequent development of cancer has not been identified. It has been hypothesized that altered immune function may be an indicator of increased potential for the development of immunologically-based diseases such as NHL. Therefore, research into immunologic perturbations due to farming activities and exposures holds some promise in discerning disease mechanisms and in identifying specific etiologic agents for immunologically-based diseases such as NHL. Few such studies have been conducted. We have recently launched a study of immune effects in corn farmers within the Agricultural Health Study (AHS) cohort. The main objective is to evaluate the changes in immune function throughout the growing season. Farmers and control subjects will be contacted just prior to planting (March-April) to be enrolled in the study. Biological sampling before and after planting and application of preemergent pesticides including atrazine will allow examination of short-term biologic effects associated with specific pesticide exposures and general planting activities (e.g., tillage). The first postemergent application of chlorpyrifos will also be monitored, in order to evaluate short-term biologic effects associated with this organophosphate insecticide exposure. Mid-season, post-harvest, and off-season samples will be collected to allow evaluation of overall immune effects of farming activities during one growing season. Pesticide exposures (e.g., atrazine, organophosphates, and potentially 2,4-D or carbamates) will be primarily assessed by measurement of the parent compound or its metabolites in urine, and by empirical exposure modeling based on supplementary information on farming activities and work practices. Immune function will be assessed by means of multiple assays including complete blood cell- and differential cell counts, direct measurement of cytokines, immunoglobulins, and autoantibodies in plasma, and functional assays involving stimulation of cultured lymphocytes to measure proliferation and cytokine production. Farmers will serve as their own self-controls, and a selected control group will provide a means for external comparison. By presentation of our study design and preliminary field experience, we hope to stimulate discussion regarding effective conduct of such mechanistic studies in exposed populations.