1973 and Seligmann et al., 1973), generally however one must conclude that until very recently there was no convincing evidence for success. Recently, however, several encouraging results have been reported. For example, Metzgar and colleagues (Monhanakumar, Metzgar and Miller, 1974) have raised antisera in monkeys which appear to distinguish different leukaemic cells from each other and from normal cells. Baker and Taub (Baker, Ramachander and Taub, 1975) have raised antisera in mice rendered tolerant to normal lymphocyte antigens, which appear to have similar properties.

We have raised antisera in rabbits to acute lymphoblastic leukaemic (ALL) cells by injecting these cells coated with antibodies to normal lymphocytes. The binding of the antisera to various cell types has been studied using immunofluorescent reagents and the analytical capacity of the Fluorescence Activated Cell Sorter—1 (FACS—1) and their full characteristics are described fully elsewhere (Greaves et al., 1975; Brown, Capellaro and Greaves, 1975). In summary, after absorption with red cells, liver and tonsil lymphocytes, the anti-ALL sera do not react with normal resting or dividing foetal or adult lymphocytes and appear on the basis of absorption studies to define three leukaemia associated antigens.

1. A “weak” antigen shared with myelocytes, myeloblastic leukaemia cells and foetal liver (haemopoietic) cells.
2. A strong antigen shared with a subset of intermediate normoblasts found in normal bone marrow and early foetal liver, and
3. An antigen found so far only on non-T cell ALLs, which we regard as a strong candidate for a leukaemia specific antigen.

We have used antisera to ALL to distinguish between non-T ALL, T cell type ALL and other acute leukaemias in untreated patients and more recently have begun to screen patients considered to be in remission for rare leukaemic cells which might indicate residual disease and/or early signs of relapse. The results indicate that leukaemic cells are demonstrable in remission patients. Analysis of cell populations with antileukaemic sera may therefore have important diagnostic and prognostic potential.

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NEOPLASMS OF THE IMMUNE SYSTEM: CLASSIFICATION BY PRESUMED CELL OF ORIGIN

R. D. Collins, Vanderbilt University School of Medicine, Nashville, Tennessee.

Current classifications of malignant lymphomata were developed before the complexities of the immunological system were recognized, and are defective by not providing a conceptual approach to the relationship between lymphoid neoplasms and normal lymphocyte populations. Lukes and Collins (1974a, b) have recently outlined a classification of lymphoid neoplasms based on modern concepts of the immune system, as well as histological features (Table I). The basic tenet of this proposal is that malignant lymphomata, as neoplasms of the immune system, should be classified according to the kind of lymphocyte from which they arise. Although the clinical usefulness of this proposed classification has not been tested, preliminary studies indicate that most lymphoid neoplasms may be satisfactorily categorized by a combination of functional and structural investigations.

For example, in a recent study at Vanderbilt (Leech et al., 1974; Glick et al., 1974), cells
from lymphomata containing neoplastic follicular structures with one exception had surface Ig, and closely resembled follicular centre cells (FCC) ultrastructurally. Similar findings were described in those diffuse lymphomata containing, by light microscopy, cleaved FCC or a mixture of cleaved and transformed FCC. FCC lymphomata made up 58% of the 45 consecutive lymphomata studied. These studies further showed that many lymphomata previously diagnosed as “histiocytic” lymphoma were composed of cells which bore surface Ig, did not have the cytochemical reactions of histiocytes, and were similar to transformed lymphocytes by ultrastructural examination. A complex group of neoplasms of T cell origin, some arising in lymph nodes, was found.

On the basis of these and similar studies of a small number of cases, it seems likely that each sub-population of lymphoid cells may give rise to a distinct neoplasm, and that lymphoid neoplasms may be usefully classified by a combined functional and structural evaluation (Table I). The use of such classifications will significantly improve interchange of information about normal lymphoid populations with information about lymphoid neoplasms. By this approach, relationships between diseases with altered immunological functions and lymphoid malignancies will be more apparent, relationships between lymphoid neoplasms primarily affecting the

marrow and lymphoid neoplasms primarily involving the extramarrow tissues may be established, and perhaps most importantly, lymphoid neoplasms may be used more effectively to study the normal lymphoid apparatus.

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**METHODS FOR THE STUDY OF CELL DIFFERENTIATION IN ACUTE LEUKAEMIA**

D. Catovsky, M.R.C. Leukaemia Unit, Royal Postgraduate Medical School, London.

The aim of the study of cell differentiation in acute leukaemia (AL) is to improve our means of recognizing the different cell types involved in the neoplastic process and to establish a firm basis for a classification of the disease. This may help in the identification of groups that vary in response to treatment and in prognosis, and could lead to improved selection of patients for different types of treatment. Some of the methods used are:

1. **Cell morphology**

   On Romanowsky-stained films. A high standard of film spreading, fixation and staining permits the recognition of already well-differentiated cells in acute myeloid leukaemia (AML); i.e. cells containing azurophil granules, Auer rods, etc. Some distinct variants of AML, like promyelocytic leukaemia, may be diagnosed easily from these preparations.

2. **Cytochemistry**

   Myeloperoxidase and nonspecific esterase reactions do help in the assessment of early myeloblastic or monoblastic differentiation in