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# Blood Types in Relation to Depressions and Schizophrenia:

## A Preliminary Report

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**ABSTRACT**

**The distribution of the ABO, $A_1$, D, E, C, and Kell blood types in relation to selected psychiatric diagnoses was studied in over 700 consecutive admissions to a provincial mental hospital. Predicted relationships based upon recent work in other laboratories were supported by consistent trends approaching statistical significance. In addition, blood group O was found to be significantly associated with involutional melancholia.**

**SOMMAIRE**

**La répartition des groupes sanguins du système ABO, des groupes $A_1$, D, E, C et du système Kell par rapport à certains diagnostics psychiatriques sélectionnés a été étudiée sur plus de 700 entrées consécutives dans un hôpital provincial pour malades mentaux. Les relations qui avaient été prévues au cours de récents travaux effectués dans d'autres laboratoires se fondaient sur une tendance soutenue qui prend une signification notable sur le plan statistique. En outre, le sang du groupe O a pu être fréquemment relié à la mélancolie d'involution.**

ASSOCIATIONS between specific blood groups and certain physical illnesses are fairly well established. Some of these relationships were reviewed by Race and Sanger[1] and others were referred to recently by Sartor and Fraser[2] in this Journal. Considerably less is known regarding possible associations between blood groups or types and the various mental illnesses. The purpose of this report is to draw attention to this area of inquiry and to present preliminary results of on-going research aimed at cross-validating existing studies and extending the application of blood typing in interdisciplinary research.

The several early studies in this area have been reviewed by Thomas and Hewitt,[3] who pointed out that the deficiencies in materials and technique of the early period, coupled with the failure to apply statistical tests, reduce the scientific value of most of this extensive pioneering work. Since the review by Thomas and Hewitt relatively little work has been done in this particular field. However, in 1957, Lafferty, Knox and Malone[4] described a statistically significant association between group $A_1$ and schizophrenia, and in 1961, Parker, Theilie and Spielberger[5] showed significant associations between group O and manic-depressive psychosis; between group E and neurotic depressive reaction; and between Kell group and depression in general. In agreement with Kiloh and Garside,[6] we considered that such interesting leads should be cross-validated. This report presents the preliminary results of our on-going cross-validational studies, points out certain difficulties in such studies, and briefly describes current work directed toward reducing these and increasing the potential applications of such blood group data in interdisciplinary psychiatric research.

### Material and Methods

The sample population initially consisted of 734 consecutive admissions to a provincial mental hospital, the Saskatchewan Hospital, North Battle-

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TABLE I.—BLOOD GROUP BY PSYCHIATRIC DIAGNOSIS: ABO SYSTEM FREQUENCIES

| Diagnosis | Total No. studied | A | B | O | AB | Number of A and AB bloods tested for $A_1$ status | $A_1$+* / $A_1^+ + A_1^-$ |
|---|---|---|---|---|---|---|---|
| Manic-depressive psychosis | 46 | 32.6% | 10.9% | 45.6% | 10.9% | 18 | (66.7%) |
| Involutional melancholia | 34 | 20.6% | 5.9% | 61.8% | 11.8% | 10 | (90.0%) |
| Neurotic depressive reaction | 32 | 37.5% | 18.7% | 34.4% | 9.4% | 13 | (69.2%) |
| Other depressions | 4 | — | — | — | — | 2 | — |
| All depressions | 116 | 30.2% | 11.2% | 47.4% | 11.2% | 43 | 74.4% |
| Unspecified psychoses, excluding depression | 9 | — | — | — | — | 3 | — |
| Mental patients not suffering from schizophrenia, unspecified psychoses, or depression | 338 | 36.1% | 13.0% | 49.1% | 1.8% | 111 | 85.6% |
| Schizophrenia | 205 | 39.5% | 11.2% | 44.4% | 4.9% | 84 | 83.3% |
| Non-schizophrenics | 463 | 34.6% | 12.3% | 48.8% | 4.3% | 157 | 82.0% |
| Total (all mental patient admissions) | 668 | 36.1% | 12.0% | 47.5% | 4.5% | 241 | 83.0% |

* "$A_1^+$" includes both $A_1^+$ and $A_1^+B$; "$A_1^-$" includes both $A_1^-$ and $A_1^-B$.

ford; there were no restrictions as to age, sex, diagnosis, or previous admissions, but repeat data on patients admitted more than once during the study period were not used, and patients given concurrent multiple diagnoses were excluded from the present analysis. These restrictions reduced the study population to 668. The diagnoses were those routinely assigned to the patients by the clinical psychiatrist according to the International Classification of Diseases; they were available only after the blood specimens had been typed. All data were transferred to punched cards, verified and reduced on a modified IBM 402 accounting machine. Chi-square tests were used to evaluate the statistical significance of trends predicted from the literature (one-tailed tests) or observed in our present data but not predicted (two-tailed tests). Actual frequencies, not percentages, were used for all statistical analyses.

There are, of course, two basic approaches to the problem of control samples in this type of investigation, the intra-hospital control, and the general population control, each with its characteristic set of pitfalls, as outlined by Aird *et al.*,[7] Manuila,[8] and Chown and Lewis.[9] The intra-hospital patient-control approach seemed the more appropriate in the present work both because we are basically interested in the distribution or flow of incoming patients into the various diagnostic categories, and because a comparable population control group is extremely difficult to obtain; our mental hospital catchment area does not correspond well with areas for which blood group "norms" are available. A third type of approach, the sibship method recommended by Manuila,[8] could not be carried out in this setting.

## RESULTS

The data are reduced to Tables I and II, illustrating the distribution of ABO, Rh and Kell frequencies in relation to diagnostic categories. Entries have been converted to percentage form in order to facilitate scanning; subsample totals are provided so that frequencies can be calculated. The trends predicted and the degree of cross-validation or statistical reliability achieved thus far are summarized below. All probabilities are for chi-square tests, the subscript indicating whether a one-tailed or two-tailed test was used.

### 1. *Blood group A and $A_1$ would be associated with schizophrenia*

In the present series, the incidence of blood group A was higher in schizophrenics than in non-schizophrenics (incidence difference: 4.9 per 100, $p_1 = .11$). The incidence of group A and AB com-

TABLE II.—BLOOD TYPE BY PSYCHIATRIC DIAGNOSIS: RH AND KELL SYSTEMS FREQUENCIES

| Diagnosis | Total No. studied | $D^+$ | Subsample No. tested for E, C | $E^+$ | $C^+$ | Subsample No. tested for Kell status | $Kell^+$ / $Kell^- + Kell^+$ |
|---|---|---|---|---|---|---|---|
| Manic-depressive psychosis | 46 | 93.5% | 42 | 33.3% | 81.0% | 33 | 9.1% |
| Involutional melancholia | 34 | 79.4% | 32 | 40.6% | 59.4% | 22 | 13.6% |
| Neurotic depressive reaction | 32 | 81.3% | 26 | 42.3% | 69.2% | 21 | 4.8% |
| Other depressions | 4 | — | — | — | — | — | — |
| All depressions | 116 | 85.3% | 104 | 38.5% | 70.2% | 77 | 9.1% |
| Unspecified psychoses, excluding depression | 9 | — | — | — | — | — | — |
| Mental patients not suffering from schizophrenia, unspecified psychoses or depression | 338 | 83.1% | 296 | 33.4% | 62.5% | 232 | 4.7% |
| Schizophrenia | 205 | 82.4% | 190 | 33.2% | 68.9% | 138 | 4.3% |
| Non-schizophrenics | 463 | 83.4% | 406 | 34.2% | 64.5% | 314 | 5.7% |
| Total (all mental patient admissions) | 668 | 83.1% | 596 | 33.9% | 66.0% | 452 | 5.3% |

bined was also higher in schizophrenics than in non-schizophrenics (incidence difference: 5.5 per 100, $p_1 = .09$). The proportion of $A_1+$ bloods among the A and AB specimens was 83.3% in schizophrenics, 82.8% in non-schizophrenics.

2. *Blood group O would be differentially distributed among the subtypes of depression, would associate with manic-depressive psychoses, and would be relatively infrequent in neurotic depressive reactions.*

In this series, the incidence of group O was higher in patients with manic-depressive psychosis than in those with neurotic depressive reaction (incidence difference: 11.2 per 100, $p_1 = .16$), the neurotic group showing the lowest frequency of group O among the depressive diagnoses. While the incidence of group O bloods among the manic-depressive subgroup was higher than among the group with neurotic depressive reactions, its highest incidence (61.8%) was among the patients suffering from involutional melancholia. The incidence of group O in the involutional melancholia group was 20.3 per 100 higher than in all other depressions grouped together ($p_2 = .05$) and was 27.4 per 100 higher than in neurotic depressive reactions ($p_2 = .03$). Among depressives as a group, the blood group O frequency (47.4%) did not differ from that for the total sample of psychiatric admissions (47.5%).

3. *Blood type E would be differentially distributed among the subtypes of depression, and would associate with neurotic depressive reaction*

In the present study, the incidence of group E was highest in patients with neurotic-depressive reaction, both in comparison with other depressions and in comparison with all other diagnoses tabulated. These observed trends however, were of a low level of statistical reliability. A comparison of group E frequencies in neurotic depressive reaction with that in manic-depressive psychosis or in all admissions other than neurotic depressive reactions, yielded $p_1 = .23$ and $p_1 = .18$, respectively.

4. *Blood type Kell would associate with depressions in general*

Within the present sample of admissions, the incidence of Kell-type blood was found to be twice as high in depressive diagnoses as in non-depressives ($p_1 = .09$).

## COMMENT

Although these results are preliminary and generally fail to achieve conventionally acceptable levels of statistical significance, the fact that all the predicted directional trends were observed is encouraging, and suggests that the recent reports linking blood groups to certain mental illnesses may indicate important pervasive relationships. Much further work, now under way, is needed to cross-validate definitely these associations and to test the reproducibility of our tentative finding of a statistically significant association between involutional melancholia and blood group O. Examination of Tables I and II suggests additional associations between blood types and certain psychiatric diagnoses but these apparent trends will not be presented until a second study tests their reproducibility.

It is recognized that the relationships between blood type and psychiatric illness need to be analyzed in terms of sex-specific, age-specific, and race-specific frequency distributions, once a sufficient number of subjects is available. The analysis by age is particularly valuable where (as in psychiatry) several diseases are restricted to a certain age interval; combined analysis by both age and race or ethnic origin may be especially desirable in a region (like Saskatchewan) only recently settled by people from several nations.

We also recognize that the use of clinical diagnosis as the *sole* potential clinical correlate of blood group (or as the sole independent criterion variable for studies of blood-group frequencies) is undesirable, both because of the rather low agreement with respect to the routine diagnosis made under differing circumstances, and because the blood group may quite conceivably relate more closely to a symptom or sign which cuts across diagnostic boundaries.

Work now under way seeks to explore the correlations of blood types with specific tests or patterns of test results from the fields of psychology, psychiatry, psychiatric nursing, electroencephalography and biochemistry. Also, since the present data are derived from mental hospital admissions, they may not be entirely representative of the resident population of the mental hospital or of the total population of mentally ill. Results from a current "hospital cross-section" study should provide partial answers to this question, and treated by the methods of population dynamics, the combined data may more clearly delineate the flow patterns of blood group phenotypes through the mental hospital.

When sufficient numbers of additional patients have been typed, the relationships between schizophrenia or the depressions and blood groups will be reassessed. In addition, associations will be sought between the blood types and other psychiatric diagnoses, including psychoneuroses, alcoholism, behaviour and character disorders, and psycho-geriatric conditions.

## SUMMARY

Among 668 mental hospital admissions, blood groups A (and $A_1$), O, E, and Kell tended to associate respectively with schizophrenia, manic-depressive psychosis, neurotic depressive reaction, and depression in general. Although these trends only approached statisti-

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cal significance, they were all concordant with specific predictions based upon the literature. In addition, a significant association between group O and involutional melancholia was observed. Further work is required to assess these trends definitively.

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# Sudden Unexpected Death in Infancy: A Reassessment

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**ABSTRACT**

**Attention is drawn to the marked change in the pattern of infant mortality in Canada. The period of greatest improvement in the reduction of infant death, i.e. from the end of the first 28 days of life to the end of the first year, continues to present a challenge in the problem of sudden unexpected deaths (S.U.D.). Cases remain unexplained even after detailed autopsy examination. The principal theories of milk hypersensitivity and virus infection have been unsatisfactory, to date, in accounting for the deaths.**

**By enlisting the co-operation of parents and physicians, the Department of Preventive Medicine at Queen's University plans to carry out an epidemiological investigation of S.U.D. in infancy in Southeastern Ontario. Much could be added to our knowledge of S.U.D. by the examination of the sociomedical background of cases.**

**SOMMAIRE**

**L'auteur attire l'attention sur les changements profonds qu'accusent les courbes de mortalité infantile au Canada. La période où la mortalité infantile est le plus grandement réduite, soit de la fin des 28 premiers jours de la vie à la fin de la première année, continue d'être assombrie par le phénomène mystérieux des morts subites inattendues (M.S.I.). Ces décès demeurent inexpliqués, même après une nécropsie approfondie. Les principales hypothèses qui ont été avancées, hypersensibilité au lait et infection virale, ne sont pas parvenues jusqu'à présent à expliquer ces décès.**

**Faisant appel à la collaboration des parents et des médecins, le Département de médecine préventive de l'Université Queen, a l'intention d'entreprendre une vaste enquête épidimiologique sur les M.S.I. au cours de la première enfance dans le Sud-est de l'Ontario. L'auteur estime qu'on élargirait considérablement le cadre de nos connaissances sur le phénomène en étudiant le contexte socio-médical des cas en question.**

IN RECENT years in Ontario, as elsewhere in Canada, there has been a marked change in the pattern of mortality during infancy. Substantial reductions in the postnatal mortality rates—i.e. from the end of 28 days of life to the end of the first year (Table I)—and in the nature of the conditions from which infants die (Table II) are among the most striking features of this change.

It can be seen in Table I that whereas in 1930-1934, 21.8% of infant deaths occurred under one day, in 1960 the percentage had risen to 40. Similarly, for infants under one week the percentage was 41.7 and 63.2 in 1930-1934 and 1960, respectively, and for infants under 28 days the percentage was 54.9 and 70.6 in 1930-1934 and 1960, respectively. However, for infants aged 28 days to one year the percentage had dropped from 45.1 to 29.4 in the period from 1930-1934 to 1960.

The mortality rates for the years 1930-1934 and 1960 for each age (i.e. under one day, under one week, under 28 days, and from 28 days to one year) have shown reductions, this being most marked in the postnatal period. The infant mortality rates in

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