THE ACQUIRED IMMUNODEFICIENCY SYNDROME (A.I.D.S.)

Can laboratory screening tests identify blood donors at high risk of transmitting A.I.D.S?

A.I.D.S.

Introduction

The Acquired Immunodeficiency Syndrome (A.I.D.S.) is a serious disease new to the developed world and present in epidemic proportions in certain of its communities (1). Epidemiological studies based on criteria set out by the Centres for Disease Control, Atlanta (C.D.C. Surveylance Definition for A.I.D.S.) suggest strongly that an infectious agent is responsible for A.I.D.S. but this agent remains unidentified. Many of its likely characteristics are revealed by its epidemiology as observed in the U.S.A. Canada and certain of the countries of Europe. This predicts an agent, very probably a virus that is transmitted by sexual contact, blood and blood products (2). Studies of cases where single blood transfusions appear responsible emphasise the conclusions of the epidemiological studies, they also suggest a presymptomatic carrier state exists an observation of crucial importance to blood transfusion practice (3, 4).

Ignorant of the identity of this putative infectious agent it is impossible to screen directly for the carrier state. However, A.I.D.S. patients show evidence of a disordered immune system and past or present infection with a variety of agents, particularly venereally transmitted pathogens.

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(2) Similar abnormalities are found in many members of the groups shown to be at high risk of A.I.D.S. by epidemiological studies, particularly homosexual men. Various studies (5, 6) demonstrate these abnormalities and show similar findings in the U.S.A. and U.K. These studies suggest non specific tests which might be used in the laboratory to identify blood donors at risk of transmitting the putative infectious agent of A.I.D.S.

As A.I.D.S. is predominantly a problem of well defined 'at risk groups' it is possible to do much to contain it through health education.

The major threat to the community as a whole is through blood transfusion where the donors have come from 'at risk groups'. It may not be sufficient to rely on these donors excluding themselves from donation.

We propose using non specific laboratory tests to identify donors from 'at risk groups', based on the hypothesis that they will show the same abnormalities as established 'at risk groups'. This will be established by interviewing donors with abnormalities. At the same time we will establish the impact on donor availability if one or more of the tests studied were chosen as criteria for excluding blood donations.

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REFERENCES

1) Special Report 'Epidemiologic Aspects of the Current Outbreak of Kaposi's Sarcoma and Opportunistic Infections' C.D.C. Task force Report, N.E.J.M. 306 p. 248 (1982).

2) A.J. Pinching (1984) 'Acquired Immunodeficiency Syndrome' Hospital update 10 p. 117.

3) J.W. Curran et. al. (1984) 'Acquired Immunodeficiency Syndrome (AIDS) Associated with Transfusions' N.E.J.M. 310 p. 69.

4) J.R. Bove (1984) Editorial 'Transfusion - Associated AIDS - A Cause for Concern' N.E.J.M. 310 p. 115.

5) R. Detels et. al. 'Relation between Sexual Practices and T cell subsets in homosexual active men'. Lancet 1 p. 609.

6) A.J. Pinching et. al. (1983) 'Studies of cellular immunity in male homosexuals in London'. Lancet 2 p. 126.

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PLAN OF INVESTIGATION

We propose a study based on screening samples from blood donors for antibody to HBc. This antibody is present in most patients with A.I.D.S., A.I.D.S. related syndromes and members of 'at risk' groups particularly homosexuals and intravenous drug abusers 1). There is considerable experience of the use of a one step radio-immunoassay for its detection within two Regional Transfusion Centres (2, 3) which shows that this is practical as a screening test. It is important that the techniques used should be applicable to transfusion practice as they may become part of its routine in the future. Tests have been selected with this an important consideration. Currently reagents for anti-HBc screening are in limited supply, sufficient will be made available through the Central Public Health Laboratory for 50,000 screening tests. These will be performed at two Transfusion Centres, Bristol and Edgware, both new and old donors will be screened, donor sessions will be selected so as to reflect the full spectrum of communities within the British Isles.

Recent experience with anti HBc screening (4) suggests that many donors will not fall into an 'at risk group'. This consideration and the limit on the number of donors imposes important requirements on the investigation:

(1) A control group must be studied, age and sex matched control donors will be selected from each session screened.

(2) Follow up of positive donors and controls is necessary.

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Screening 50,000 donations should yield just under 500 positives (2,3). These will be traced and interviewed by medical staff based at each Transfusion Centre. Research medical staff will be required for this purpose. Experience of A.I.D.S. in a group at extreme risk, 6,800 homosexuals who have been followed in San Francisco since 1978 suggests that the yearly incidence of A.I.D.S. and A.I.D.S. related disorders is approximately 5% (5). This study is thus unlikely to reveal any A.I.D.S. or A.I.D.S. related cases. However, important circumstantial information will have been obtained if it can be shown that a significantly larger proportion of positive donors belong to 'at risk groups' when compared to controls. This information will only be obtained by active follow up of donors. Specimens for repeat testing and investigations not possible on samples obtained at routine blood donation will also be taken at follow up.

Other non specific tests will be performed on anti HBc positive donors and controls. As previously discussed we hypothesize that abnormalities may cluster in a way which better predicts membership of an 'at risk group'. Samples will be shared between participating laboratories for this purpose. 200 ul aliquots of both serum and plasma from donor pilot tubes will be frozen after screening and stored in vapour phase liquid nitrogen. They will be distributed as follows:

(a)	Check anti HBc	Middlesex Hospital
(b)	TPHA	Edgware R.T.C.
(c)	Alpha interferon	Edgware R.T.C.

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(d)	Circulating immune complexes	Bristol R.T.C.
(e)	Beta 2 microglobulin	Bristol R.T.C.
(f)	Immunoglobulins	Bristol R.T.C.
(g)	H.T.L.V. antibody	Middlesex Hospital

Lymphocyte numbers will be measured in each Centre at follow up. Research M.L.S.Os will be required at Bristol and Edgware to cope with the extra laboratory work that will be entailed.

Plasma from each donation will be separated and stored against the possibility of further investigation.

The fate of other blood components from these donations will not be influenced by the investigation.

The study will be conducted during a two year period.

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REFERENCES

1) A.J. Pinching (1984) 'Acquired Immunodeficiency Syndrome' Hospital update 10 p. 117.

2) A.C. Archer et. al. (1983) 'The value of screening blood donors for antibody to hepatitis B core antigen' J. Clin. Path. 36 p. 924.

3) Tedder R.S. et. al. (1980) 'Contrasting patterns and frequency of antibodies to surface core and e antigens of hepatitis B virus in blood donors and in homosexual patients' J. Med Virol 6 p. 323.

4) A.C. Archer. B.T.S. Bristol. Personal Communication.

5) J.E. Groopman, P.A. Volberding (1984) 'The A.I.D.S. epidemic: continental drift' Nature 307 p. 211.

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COSTINGS	Year 1	Year 2

STAFF

1) Medical Staff

Research Registrar, Bristol R.T.C.
to co-ordinate project and follow up cases in South Western Region.

	£10,969	£11,521

Medical Assistant

3 days/week. Edgware R.T.C.
to follow up cases in North West Thames Region.

	£4,581	£4,581
Travel	£1,000	£1,000

2) Laboratory Staff

Three Junior M.L.S.O. to assist in laboratory work,
two in Bristol, one at Edgware.

	£16,269	£16,455

3) Secretarial staff

Half time Secretary to help in record keeping and correspondence.

	£2,459.20	£2,459.20

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EQUIPMENT

1) Liquid nitrogen refrigerators X 2 for specimen storage £1,916.9

2) Computer equipment to aid record keeping and follow up £3,000

Disposable Laboratory Reagents.

	Year 1	Year 2
Anti HBc	£5,100	100
TPHA	-	-
Alpha Interferon	£1,620	£1,620
Circulating immune complexes	300	300
Beta 2 microglobulin	£1,350	£1,350
Immunoglobulin	100	100
HTLV	-	-

TOTAL	Year 1	Year 2
	£48,665.10	£39,486.20

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