their brain may replicate at a slow rate and spread by cell-cell contact, gradually involving larger portions of brain tissue in the course of the prolonged incubation period.

It is essential to compare carefully the character of the measles virus in SSPE material with a measles prototype virus, and to investigate whether a particular genetic trait associated with the virus itself may account for the disease syndrome or whether the virus host–cell relationship is determined solely by the reaction of the host.

Diagnostic studies of patient JAC were carried out at the Philadelphia Naval Hospital, and on patient LEC at the St Christopher's Hospital for Children, Philadelphia, Pennsylvania. Dr Lucy Balian Rorke carried out the neuropathological examination of the brain tissues. We thank Dr Volker ter Meulen of Universitäts-Kinderklinik und Poliklinik, Göttingen, Germany, for the immunofluorescence studies, and Dr Nicholas Gonatas of the Hospital of the University of Pennsylvania for sharing with them the fixed brain tissue of patient LEC. This work was supported in part by a US Public Health Service research grant from the National Institute of Neurological Diseases and Blindness.

ADDENDUM. Since submission of this manuscript, L. Horta-Barbosa *et al.* (*Nature*, **221**, 974; 1969) reported isolation of infectious measles virus from one line of SSPE brain cells in culture, and T. T. Chen *et al.* (*Science*, **163**, 1193; 1969) reported presence of the nucleocapsid-like structures in the same line of cells.

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[1] Connolly, T. H., Allen, I. V., Hurwitz, L. J., and Millar, J. H. D., *Lancet*, i, 542 (1967).
[2] Dayan, A. D., Gostling, J. V. T., Greaves, J. L., Stevens, D. W., and Woodhouse, M. A., *Lancet*, i, 980 (1967).
[3] Freeman, J. M., Magoffin, R. L., Lennette, E. H., and Herndon, R. M., *Lancet*, ii, 129 (1967).
[4] Katz, M., Rorke, L. B., Masland, W. S., Koprowski, H., and Tucker, S. H., *New Engl. J. Med.*, **279**, 793 (1968).
[5] Baublis, J. V., and Payne, F. E., *Proc. Soc. Exp. Biol. and Med.*, **129**, 593 (1968).
[6] Millonig, G., *J. Appl. Phys.*, **32**, 1637 (1961).
[7] Millonig, G., *J. Biophys. Biochem. Cytol.*, **11**, 736 (1961).
[8] Tawara, J., *Virology*, **25**, 322 (1965).
[9] Herndon, R. M., and Rubinstein, L. J., *Neurology*, **18**, 8 (1968).

Increase in Antigenicity of Permanent Tissue Culture Lines ICI 101, ICI 104 and ICI 202 established from Human Leukaemic Blood

SEVERAL permanent tissue culture lines have been established from the peripheral blood of leukaemic patients at this institute. New antigens have been demonstrated on human leukaemic cells, and antibodies directed against these antigens have been detected in the patients' sera[1]. We have recently shown that in ICI 101 the antigenicity detectable when the cells are first taken from the blood can still be detected after several months in culture[2]. We report here data suggesting not only that this antigenicity can be preserved, but that it can be increased by culturing the cells *in vitro*.

We used the permanent cell lines ICI 101, ICI 104A, ICI 104B, ICI 104C and ICI 202 from the peripheral blood of leukaemic patients and isolated them by a stationary suspension culture technique[3].

A frozen sample of peripheral blood from a 10 year old boy in the terminal phase of acute lymphoblastic leukaemia was put into culture and the ICI 101 line became established 65 days later. Lines ICI 104A, B and C all came from the blood of an 8 year old boy with acute lymphoblastic leukaemia in relapse—these cell lines appeared on the thirty-sixth day of culture. The ICI 202 line appeared on the thirty-fourth day of culture of a blood sample from a 48 year old patient with acute myeloid leukaemia.

Table 1. INCREASE OF AUTOANTIGENICITY SHARE BY LEUKAEMIC CELLS FOLLOWING *in vitro* CULTURE

	Fresh cells		After 4 months' culture		After 8 months' culture	
	IF	IA	IF	IA	IF	IA
ICI 101	0	1/64	+	1/1,280	NT	1/3,200
ICI 202	0	0	–	1/320	NT	NT

IF, Immunofluorescence; IA, immune adherence; NT, not tested.

Table 2. VARIATION IN THE ANTIGENICITY OF CLONES ARISING ICI 104 SUBLINE

	Fresh cells		After 7 weeks' culture	
	IF	IA	IF	IA
ICI 104A	0	1/10	0	0
ICI 104B	0	1/10	0	1/80
ICI 104C	0	1/10	0	0

Serological tests used were immunofluorescence for living cells[4,5] and immune adherence[1]. The antigenic activity of the cultivated cells was evaluated in the presence of the patient's serum, taken when the tissue cultures were set up, and stored at −20° C. This activity was compared with that in cells cultured in this serum. The results are summarized in Tables 1 and 2.

The ICI 101 line had increased antigenicity after 4 months in culture; the maximum titre of the serum in the immune adherence test rose from 1/64 to 1/1,280. This increase was accompanied by a positive immunofluoresence reaction when the cells were tested in the same serum. This antigenicity was still present after 8 months in tissue culture. After 4 months in culture line ICI 202 had not declined in antigenicity compared with the case when cells were freshly isolated from the patient. Lines ICI 104A, B and C all came from the same sample of blood, but only ICI 104B had increased antigenicity when tested after 7 weeks in culture.

The mechanism for the increase in the "neoantigenicity" of permanent culture cell lines established from human peripheral blood is unknown. There are several possible hypotheses: (*a*) *in vitro* selection of a clone that is initiated by the behaviour of the ICI 104B line; (*b*) an increase in the density of antigenic determinants on the cells adapted to the culture conditions; (*c*) unmasking of antigenic sites after several divisions in culture. This last hypothesis was suggested by Old and his colleagues[6]. For reasons varying from the simple masking of antigenic sites on the tumour cells by antibody[7] to the suppression by antibody of the synthesis of antigen, of which antigenic modulation is an extreme example, it is unlikely that fresh, isolated tumour cells are a good source of antigens.

The establishment of permanent leucocyte cultures from the peripheral blood of leukaemic patients would seem to be valuable in immunological investigations of these patients.

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[1] Dore, J. F., Motta, R., Marholev, L., Hrsak, Y., Colas de la Noue, H., Seman, G., De Vassal, F., and Mathe, G., *Lancet*, ii, 1396 (1967).
[2] Belpomme, D., Seman, G., Dore, J. F., Venuat, A. M., Berumen, L., Le Borgne de Kaouel, C., and Mathe, G., *Europ. J. Cancer*, **5**, 55 (1969).
[3] Le Borgne de Kaouel, C., Belpomme, D., Dore, J. F., Aubert, C., and Granjon, D., *Rev. Fr. Et. Clin. Biol.*, **14** (1969).
[4] Moller, G., *J. Exp. Med.*, **114**, 415 (1961).
[5] Klein, E., and Klein, G., *J. Nat. Cancer Inst.*, **32**, 547 (1964).
[6] Old, L. J., Boyse, E. A., Geering, G., and Oettgen, H., *Cancer Res.*, **28**, 1288 (1968).
[7] Motta, R., *Rev. Fr. Et. Clin. Biol.*, **13**, 713 (1968).