THE LUPUS ERYTHEMATOSUS CELL AND ITS SIGNIFICANCE*

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While it is accepted that the lupus erythematosus cell (L.E. cell) can be demonstrated in the blood of most patients with systemic lupus erythematosus, it remains uncertain whether L.E. cells can be demonstrated in patients with various other diseases.

This report deals with three years' experience of L.E.-cell tests in patients with systemic lupus erythematosus and other diseases. Our results are compared with those of other workers, and various aspects of the literature are reviewed.

Methods

We have used two techniques for demonstrating the L.E.-cell phenomenon. For the first, and preferred, method defibrinated blood from the patient is incubated for two and a half hours at 37° C., then centrifuged, and smears are made from the leucocyte layer. The second method is convenient when multiple tests are being run together or when only serum is available. For this test, fresh normal leucocytes are suspended in the patient's serum, incubated for two and a half hours at 37° C., then centrifuged, and smears are made from the leucocyte button. Both of these methods have been fully described by Dacie (1956).

With sensitive and easily repeated peripheral-blood techniques available, methods involving marrow biopsy hardly seem justifiable and are probably less sensitive because of the presence of anticoagulant.

Certain practical points are worthy of comment.

Incubation Time.—The L.E. cell requires a considerable interval of time for its formation. By counting the number of L.E. cells per 1,000 polymorphs after varying incubation times we have found two and a half hours to be optimal. After this period the number of L.E. cells is maximal and degenerative changes in the leucocytes are not conspicuous.

Effect of Anticoagulants.—Similar counts of the number of L.E. cells produced in specimens of blood with and without anticoagulants confirm the findings of Zimmer and Hargraves (1952) that anticoagulants depress L.E.-cell formation. Even a moderately positive test with a clotted-blood technique may be matched by negative or weakly positive results when citrate, heparin, oxalate, or sequestrene is present.

Interpretation of Films

In Romanowsky-stained films the L.E. cell is usually a neutrophil polymorph containing within its cytoplasm the L.E. body, a homogeneous, purple-staining spherical inclusion of variable size, but usually large enough to displace the cell nucleus to the periphery. The L.E. body is completely homogeneous, with no evidence of nuclear struc-

ture. Occasionally the inclusions are multiple. Rarely inclusions occur in eosinophil or basophil polymorphs and in monocytes.

Only the finding of a fully developed L.E. cell can support a diagnosis of systemic lupus erythematosus. The finding of free homogeneous bodies or rosettes—that is, clusters of polymorphs surrounding one of these bodies, and preparing to engulf it—is a suggestive but not conclusive finding, and should stimulate further scrutiny for typical L.E. cells and, if necessary, repetition of the test. Since occasional cases of systemic lupus erythematosus show very few L.E. cells it is important to study each film carefully. In the present study all films were examined for at least 10 minutes under the 1/3-in. (8-mm.) objective before a negative report was given. Special attention was paid to the edges of the film, where L.E. cells tend to accumulate, and all suggestive cells were examined under a higher magnification.

Difficulties of interpretation may arise from confusion with three structures.

(1) *The "Tart" Cell, or Nucleophagocytosis.*—This is a monocyte or polymorph which has ingested a free nucleus and the nuclear structure of the inclusion is blurred to a variable degree by autolysis. The differentiation from the true L.E. cell depends upon finding some residual nuclear structure within the "tart" cell inclusion. Sometimes the centre of the inclusion may appear homogeneous, but a dark rim of condensation may betray its true identity. Nucleophagocytosis has no particular significance, as it is seen in many samples of blood from normal and diseased people. Nucleophagocytosis seems to occur more frequently in preparations using the defibrinated blood technique, and is said to be especially common in association with drug-hypersensitivity reactions (Meyler, 1954).

(2) *Erythrophagocytosis.*—This should be fairly easy to distinguish from the L.E. cell because the phagocytosed erythrocyte retains to a variable degree the pinkish colour of haemoglobin. It is the size of a red cell and smaller than the usual L.E. cell inclusion.

(3) *Platelet Aggregations.*—In preparations using the serum method, aggregations of platelets may form free globular bodies, often with surrounding rosette formation. These aggregations have a granular appearance, tend to stain blue rather than purple, and are rarely ingested.

A difficulty not encountered in this study is due to amyloid bodies (Trubowitz, 1950). In amyloidosis bone-marrow smears stained with Romanowsky stains may show inclusion phenomena indistinguishable from the L.E. cell. These inclusions are said not to stain with Feulgen's reagent but to give most of the reactions which characterize amyloid infiltrations in other situations: they are clearly not L.E. cells.

During the past four years we have examined 699 specimens from 514 patients, and in our experience the L.E. cell has proved almost specific to systemic lupus erythematosus.

Results of L.E. Tests on Patients with Systemic Lupus Erythematosus

Of 19 patients diagnosed on clinical grounds as suffering from systemic lupus erythematosus (5 cases were subsequently confirmed at necropsy), the blood from 18 showed the L.E.-cell phenomenon, and in the remaining patient it had been demonstrated at another hospital prior to cortisone therapy, though at the time of our single test it was negative.

It seems to be generally agreed that, while most cases of systemic lupus erythematosus show the L.E.-cell phenomenon at some stage in the disease, occasional clinically and histologically typical cases have shown no L.E. cells despite repeated tests. Furthermore, L.E. cells may not be constantly demonstrated. In one of our patients the tests were negative during an initial typical systemic episode. The disease then remitted, and, apart from mild cutaneous manifestations, the

*Part of the material in this report was taken from an M.D. thesis submitted by one of the authors to the University of Cambridge.

patient remained well for a period of three years until a further systemic episode, when abundant L.E. cells were demonstrable. Table I shows the incidence of positive L.E. tests in several reported series of cases of systemic lupus erythematosus.

TABLE I.—Incidence of the L.E.-cell Phenomenon in Published Cases of Systemic Lupus Erythematosus

Author	No. of Patients Tested	Patients L.E. Positive		Technique of Test
		No.	%	
Dubois (1953)	70	48	68	Heparinized blood
Gold and Gowing (1953)	15	6	40	Heparinized blood or serum + donor W.B.C.s
Harvey <i>et al.</i> (1954)	96	79	82	Heparinized blood
Haserick (1951)	23	23	100	Anticoagulated blood or plasma + donor W.B.C.s
Lee (1951)	25	24	96	Clotted blood
Shearn and Pirofsky (1952)	31	29	94	Plasma + normal bone marrow
Snapper and Nathan (1955)	21	20	95	Clotted blood + dead leucocytes
Soffer <i>et al.</i> (1954)	32	32	100	Not stated
Suksta and Conley (1951)	21	14	67	Blood or marrow + anticoagulant
Total	334	275	82	

Haserick (1951) suggested that the intensity of L.E.-cell production is related to the severity of the disease; this is certainly not invariable. On two occasions we have encountered patients severely ill with untreated systemic lupus erythematosus in whom the L.E. test was only weakly positive. Furthermore, an exacerbation of the disease process in any case is not necessarily associated with a shower of L.E. cells.

It has been reported that during steroid therapy of systemic lupus erythematosus the L.E.-cell phenomenon may sometimes disappear (Macdonald and Simmon, 1950; Shearn and Pirofsky, 1952), persist though often to a lesser degree (Soffer *et al.*, 1954), or be unaffected (Fallet *et al.*, 1955). The most extensive work on this aspect comes from Dubois (1956), who observed the effect of steroid therapy on 54 patients and found that a reduction or disappearance of L.E. cells was usual.

Of the present series of cases, nine had multiple L.E. tests which could be related to their treatment. In seven patients the effect of adequate hormonal treatment was to cause a marked reduction in the number of L.E. cells demonstrable in their peripheral-blood specimens—for example, Fig. 1—but in all cases a few L.E. cells (fewer than

FIG. 1.—Effect of cortisone therapy on L.E.-cell production.

3 per 1,000 polymorphs) persisted either constantly or intermittently for periods up to three years of follow-up. Two patients continued to show moderate numbers of L.E. cells during treatment despite good clinical control of the disease.

Results of L.E. Tests in Diseases Other Than Systemic Lupus Erythematosus

During the period of study 578 blood specimens from 495 patients with diseases other than systemic lupus erythematosus were tested for the L.E. cell phenomenon, and only in two cases were L.E. cells found (see Table II). The first

TABLE II.—Results of L.E. Tests on Peripheral Blood from Patients with Various Diseases Other than Systemic Lupus Erythematosus

Disease	No. of Patients Tested	No. of Patients L.E. Positive	No. of Tests Done
Chronic discoid L.E.	9	0	16
Rheumatoid arthritis	106	0	132
Other collagen diseases	12	0	21
Drug and serum reactions	20	0	20
Cirrhosis	44	1	51
Acquired haemolytic anaemia	17	0	24
Myelomatosis	2	0	3
Glomerulonephritis	10	0	12
Miscellaneous	275	0*	299
Total	495	1	578

* One patient on one occasion showed a single cell resembling an L.E. cell.

case was that of a young woman with portal cirrhosis, which is described later. The second patient presented a complex problem of myasthenia gravis treated by thymic irradiation with subsequent development of hypothyroidism. She was clinically unlike a case of systemic lupus erythematosus, and since only one abnormal cell was found on a single occasion we hesitate to call this a definite false-positive result. In every other case the test was negative. Table III shows the results of several similar studies of the L.E.-cell test in diseases other than systemic lupus erythematosus.

TABLE III.—Reported Results of L.E. Tests on Patients with Diseases Other than Systemic Lupus Erythematosus. The Figures Include a Small Number of Tests on Normal Subjects

	No. of Patients Tested	No. of Patients L.E. Positive
Barnes <i>et al.</i> (1950)	95	0
Berman <i>et al.</i> (1950)	11	3
Dubois (1953)	215	0
Harvey <i>et al.</i> (1954)	580	0
Haserick (1951)	95	0
Holman (1951)	30	0
Lee (1951)	300	1
Marten and Blackburn (1953)	93	7
Mathis (1951)	18	0
Snapper and Nathan (1955)	80	0
Suksta and Conley (1951)	94	0
Walsh and Egan (1952)	21	0
Watson <i>et al.</i> (1951)	59	0
Weisberger <i>et al.</i> (1952)	35	0
Weiss and Swift (1955)	231	9
Total	1,957	20

At this point it is convenient to discuss some of the diseases in which false-positive L.E. tests have been reported.

Chronic Discoid Lupus Erythematosus

A number of workers have now reported the occurrence of scanty L.E. cells in a few cases of discoid lupus erythematosus, and Rasponi (1954) found this association in the surprisingly high proportion of 9 out of 20 sufferers from chronic discoid lupus erythematosus, most of whom were sensitive to sunlight. It is well recognized that the borderline between cutaneous lupus erythematosus and the systemic disease may be indistinct and that the former condition may in rare cases develop systemic manifestations, sometimes after exposure to sunlight. Recent studies (Marten and Blackburn, 1956; Dubois, 1956) have emphasized this close relationship between the two conditions, and it would seem reasonable to describe any case of lupus erythematosus showing bona-fide L.E. cells as a systemic disease. We have not found L.E. cells in cases of discoid lupus erythematosus, but our experience is too slight to be of significance.

Rheumatoid Arthritis

L.E. cells have been reported in three groups of patients suffering from rheumatoid arthritis.

Slocumb (1953) has reported the appearance of a transitory panmesenchymal reaction, sometimes associated with a demonstrable L.E.-cell phenomenon, occurring when patients with rheumatoid arthritis were maintained on large

doses of cortisone and then reduced to a smaller dose. This reaction consisted of fatigue, myalgia, arthralgia, fever, and sometimes pleurisy, pneumonia, or pericarditis. Apart from the demonstration of the L.E.-cell phenomenon in 14 such cases, Slocumb found an increased sedimentation rate, sometimes false-positive serological tests for syphilis, and three patients showed biopsy or post-mortem evidence of arteritis. Hargraves (1954) also mentions finding L.E. cells in a few cases of rheumatoid arthritis on cortisone treatment, but makes no reference to alterations in dosage.

In the present series, cases have been seen with what appears to be an exacerbation of rheumatoid arthritis after a reduction of steroid dosage, and five such patients had L.E. tests with negative results. It seems possible that Slocumb's panmesenchymal reaction is no more than a rather florid exacerbation of the underlying disease, precipitated by cortisone reduction or withdrawal. Furthermore, it is quite possible that some of his cases showing the L.E.-cell phenomenon were in fact cases of systemic lupus erythematosus unmasked by the cut in steroid therapy, for this condition does occasionally masquerade as rheumatoid arthritis. In the present series four patients were considered to have rheumatoid arthritis for periods up to three years before the true diagnosis became obvious.

The second group of patients are those described by Ogryzlo (1953) as "diffuse systemic rheumatoid disease," rare but severe cases of rheumatoid arthritis with visceral involvement such as pleurisy, myocardial fibrosis, interstitial pneumonia, and necrotizing arteritis. These patients often progress rapidly to a fatal termination. Ogryzlo has reported four such patients with positive L.E. tests.

The presence of a severe deforming arthritis and the absence of histological evidence of lupus erythematosus makes such a diagnosis unlikely. However, such advanced cases of rheumatoid arthritis may be complicated by amyloidosis, and the so-called L.E. cells may in fact be amyloid-containing cells. It would be interesting to know more detailed staining properties of these cells.

Finally, L.E. cells have been reported in a few cases of typical rheumatoid arthritis (Weiss and Swift, 1955), and in one case of Sjögren's syndrome with arthritis (Maclean and Robinson, 1954).

The present study includes 132 tests on the peripheral blood of 106 patients with rheumatoid arthritis without a single positive result.

Other Collagen Diseases

Collagen diseases other than rheumatoid arthritis and systemic lupus erythematosus claimed to be associated with a positive L.E. test include polyarteritis nodosa (Lincoln and Ricker, 1954), dermatomyositis (Ogryzlo, 1955), scleroderma (Voplé and Hauch, 1955), and one case of "probable collagen disease, type undetermined" (Berman *et al.*, 1950). We failed to demonstrate the L.E.-cell phenomenon in the blood of 12 such cases (6 of polyarteritis, 3 of scleroderma, and 3 of dermatomyositis), which agrees with the results of most other workers.

Drug Reactions

A positive L.E.-cell phenomenon has been reported in patients suffering from various drug reactions. The most interesting of these is hydralazine (Dustan *et al.*, 1954), which when given over several months, usually in heavy dosage, causes in a few patients an arthritic syndrome temporarily indistinguishable from rheumatoid arthritis or even systemic lupus erythematosus. The more severe instances of this reaction may be associated with a positive L.E. test, but symptoms usually remit immediately the drug is discontinued.

We have tried to produce this syndrome in rabbits but without success, although Comens (1956) has recently succeeded in dogs.

Other drug reactions said to be associated with a positive L.E. test include penicillin, phenylbutazone, hydantoin, and

antitetanus serum. Many of these reports are unconvincing, being supported by illustrations which resemble "tart" cells rather than L.E. cells. Also it is claimed that cases of systemic lupus erythematosus are unusually prone to develop drug sensitivity, so it may be that some of the reported cases suffer from this combination. Certainly one of the cases reported by Walsh and Zimmerman (1953) is now running a course compatible with systemic lupus erythematosus (Jacobs, 1955).

We have examined the blood of 20 patients suffering from various drug (chlorpromazine, mersalyl, carbimazole, penicillin, phenylbutazone, and streptomycin) and serum reactions, but have found no L.E. cells.

Cirrhosis

Joske and King (1955) reported the L.E.-cell phenomenon in the blood of two patients with active chronic hepatitis, and three further cases have been described (Bettley, 1955; Bearne *et al.*, 1956; Heller and Zimmerman, 1956).

In the present study, moderate numbers of L.E. cells were found in three out of four tests on the peripheral blood of a young woman with portal cirrhosis. The abnormal cells (see Fig. 2) were found with both defibrinated blood and

FIG. 2.—Typical L.E. cell found in the blood of a patient with portal cirrhosis.

serum techniques, and when stained with Feulgen, Unna-Pappenheimer, and Romanowsky stains the cells were indistinguishable from those seen in systemic lupus erythematosus. This patient also suffered from spontaneous hypothyroidism (adequately treated when L.E. cells were found), and she presented unusual endocrine features such as a moon-face, hirsutism, acne, amenorrhoea, abdominal striae, and a strikingly high serum gamma-globulin, similar to the group of young female cirrhotics described by Bongiovanni and Eisenmenger (1951). At subsequent post-mortem study the portal cirrhosis was confirmed, but no evidence of systemic lupus erythematosus was found.

Out of 51 tests on 44 patients with portal or biliary cirrhosis only the three tests on the above-mentioned patient were positive.

Why a few patients with portal cirrhosis should exhibit the L.E. cell phenomenon is quite unknown. While systemic lupus erythematosus commonly causes abnormalities of the empirical liver-function tests, it rarely causes anatomical changes in the liver (Kofman *et al.*, 1955). The possibility that these patients were suffering from a hepatic form of systemic lupus erythematosus is therefore unlikely. The absence of other clinical, laboratory, and, in two of the above published cases, histological evidence of systemic lupus erythematosus makes the coincidence of this disease similarly improbable. It

seems likely that the apparent L.E.-cell phenomenon in these cases is somehow related to the cirrhosis. It cannot be due simply to the presence of a high serum gamma-globulin, for the L.E.-cell phenomenon is due to a particular protein fraction which electrophoretically moves with gamma-globulin rather than to the total amount of gamma-globulin present. Under highly artificial conditions proteins may be precipitated to form globules which after phagocytosis may resemble L.E. cells (Inderbitzin, 1953), but these inclusions do not stain with Feulgen's reagent (Marmont, 1955).

Joske and King (1955) speculated on the possibility that the L.E.-cell phenomenon in systemic lupus erythematosus and in cirrhosis has an immunological basis, that it is in fact an equivalent of the Coombs test on leucocytes. Unfortunately, leucocyte suspensions are unsuitable for this test because they invariably clump when washed with saline. While anti-human leucocyte sera produced in animals are able to cause nucleophagocytosis and it has been claimed that they sometimes cause inclusion phenomena indistinguishable from the L.E. cell, no author has yet produced a convincing illustration of this point.

Haemolytic Anaemia

Barman *et al.* (1950) and Lee *et al.* (1951) reported a case of haemolytic anaemia in which the L.E.-cell phenomenon was demonstrated. These were regarded as false-positive results, especially since the spleen of the latter case did not show histological evidence of systemic lupus erythematosus. However, Dubois (1952) later reported three cases of systemic lupus erythematosus which presented with haemolytic anaemia. Also Dubois (1953) mentions that the case of Lee *et al.* later developed the typical picture of systemic lupus erythematosus. This sequence is now well recognized.

Despite 24 tests on 17 patients with acquired haemolytic anaemia, a positive L.E. test was not encountered, but two further patients presented with acquired haemolytic anaemia and had other manifestations suggestive of systemic lupus erythematosus. Both patients gave a positive L.E. test. Although actual haemolytic anaemia is uncommon in systemic lupus erythematosus a number of cases do show a positive Coombs test. This was noted in 6 out of 34 cases mentioned by Harvey *et al.* (1954) and in 5 out of the 10 tested in the present series.

Amyloidosis and Myelomatosis

As already mentioned, cells containing amyloid deposits may closely resemble L.E. cells when stained with Romanowsky stains, and similar cells may be found in marrow preparations from patients with myelomatosis complicated by amyloidosis (Trubowitz, 1950; Lee *et al.*, 1951; Weiss and Swift, 1955). We have not encountered such cells.

Glomerulonephritis

Nephropathy is a common complication of systemic lupus erythematosus, and this diagnosis must be considered in any case of renal disease showing the L.E.-cell phenomenon (Parelhoff, 1953). Two cases reported by Parelhoff were examined at necropsy without revealing any histological evidence of systemic lupus erythematosus. Only one of these cases is described in detail, and the illustration which accompanies it shows a rosette and not an L.E. cell as its legend implies. But for this unfortunate illustration the case sounds a convincing example of a false-positive L.E. test.

Miscellaneous Conditions

The L.E.-cell phenomenon has been recorded in single cases of pernicious anaemia, leukaemia, Hodgkin's disease, dermatitis herpetiformis, miliary tuberculosis, moniliasis, and pemphigus. None of these reports includes a convincing illustration of the L.E. cells found.

Constituents and Mechanism of the L.E.-cell Phenomenon

The morphological events involved in the production of the L.E. cell are relatively undisputed. Supravital and microcinematographic studies have shown first a swelling and blurring of the nuclear pattern of one or more lobes of a polymorph nucleus (Rohn and Bond, 1952, 1953). As this nucleolysis occurs, the cell membrane ruptures, setting free a homogeneous mass which is seen in stained smears as the L.E. body. This body, presumably because of chemotactic influences, becomes surrounded by leucocytes, forming the rosette. Finally the homogeneous body is completely ingested by a leucocyte, producing the L.E. cell. There are thus two stages to the L.E.-cell phenomenon—namely, nucleolysis and phagocytosis—and it is important to realize that in the L.E.-cell phenomenon nucleolysis precedes phagocytosis, whereas in the formation of the "tart" cell nucleolysis occurs after the inclusion has been ingested, and is always incomplete.

It is commonly agreed that there are at least three constituents in the L.E.-cell phenomenon—namely, a source of nucleoprotein to be transformed into the inclusion body, a factor present in the serum and plasma of patients suffering from systemic lupus erythematosus which causes nucleolysis, and, finally, an active phagocyte. For convenience these are considered individually.

The Nucleoprotein Substrate

The L.E.-cell inclusion stains strongly with Feulgen's reagent and weakly with methyl green, from which it may be deduced that it consists of partially depolymerized deoxyribonucleic acid (Gueft, 1950). The "tart" cell inclusion stains the same way but is not completely homogeneous. The L.E.-cell inclusion can result from the nucleus of any cell, but the mature polymorph appears to be more susceptible to the action of any L.E. factor present in the surrounding medium. As Snapper and Nathan (1955) have emphasized, the L.E. factor probably attacks only the nuclei of dead cells. This is supported by the work of Zinkham and Conley (1956), who showed that rotation of a specimen of blood with glass beads to traumatize the leucocytes will increase the yield of L.E. cells.

The L.E. Factor

This is a protein or protein-bound substance present in all the body fluids and exudates and in the urine of patients with systemic lupus erythematosus. Placental transmission of the L.E. factor has been shown by its transient presence in the blood of the newborn child of a patient suffering from systemic lupus erythematosus (Bridge and Foley, 1954). It is associated with, though immunologically distinct from, normal gamma-globulin (Haserick and Lewis, 1950). In systemic lupus erythematosus the serum gamma-globulin is generally raised, but probably only a small part of this increase can be attributed to the L.E. factor, for repeated L.E. tests on a single specimen of serum cause a gradual loss of potency, without much change in the gamma-globulin content.

The L.E. factor keeps indefinitely if frozen, but is destroyed by heating to 65° C. (Haserick, 1950).

The L.E. factor is quite distinct from the Coombs factor present in the serum of some patients with systemic lupus erythematosus, for, as Pisciotto *et al.* (1951) showed and we have confirmed (Table IV), this antibody globulin eluted

TABLE IV.—L.E. and Coombs Tests on Peripheral Blood and on Red-cell Eluates from the Same Blood Samples of Two Patients Suffering from Systemic Lupus Erythematosus

Patient	Peripheral Blood		Red-cell Eluates	
	L.E. Cells/1,000 Polymorphs	Direct Coombs Test	L.E. Cells/1,000 Polymorphs	Indirect Coombs Test
M.R. ..	1	+++	0	++++
F.S. ..	14	++	0	+

from the erythrocytes of patients with systemic lupus erythematosus is incapable of provoking the L.E.-cell phenomenon, though still able to give a positive indirect Coombs test.

Since L.E. cells are rarely encountered *in vivo*, and are less frequent in the blood with anticoagulants than in specimens of clotted blood, Hargraves (1954) suggested that the L.E. factor is inactive *in vivo* but is activated during coagulation. However, L.E. cells can be demonstrated in blister fluid (Watson *et al.*, 1951), in capillary blood after the circulation has been obstructed by a tourniquet (Sickley *et al.*, 1955), and on one occasion L.E. cells have been demonstrated in direct blood smears from a patient in the terminal stages of systemic lupus erythematosus (Chomet *et al.*, 1953). It seems more likely, as Snapper and Nathan (1955) suggest, that the L.E. factor is active only against dead cells, and these are likely to be present in the above situations.

How the L.E. factor causes depolymerization of nucleoprotein remains uncertain. Kurnick *et al.* (1953) have produced evidence favouring an enzymatic process. They suggest that normal leucocytes contain an inhibitor which prevents the interaction of intracellular desoxyribonuclease and desoxyribonucleic acid and that the L.E. factor somehow releases this inhibition, allowing depolymerization of desoxyribonucleic acid to occur.

On the other hand, many authors favour an auto-antibody mechanism. In favour of this are the occurrence of the L.E.-cell phenomenon in hydralazine and possibly other drug-hypersensitivity reactions, the commonly associated positive Coombs test and false-positive serological tests for syphilis, and the high serum gamma-globulin. Unfortunately the inclusion phenomena induced as a result of experimentally produced antinuclear antibodies resemble "tart" cells rather than L.E. cells (Zimmerman *et al.*, 1953).

The frequent occurrence of the L.E.-cell phenomenon and the chemically related haematoxylin bodies in systemic lupus erythematosus does suggest a rather fundamental relationship to the pathogenesis of the condition.

The Phagocytic Leucocyte

Here there is general agreement that the phagocyte which ingests the L.E. body is usually a neutrophil polymorph, but on rare occasions L.E. bodies are ingested by eosinophils, basophils, myelocytes, and monocytes. Although Berman *et al.* (1950) and Ogryzlo (1955) reported L.E. inclusions within lymphocytes, we have never observed such a phenomenon. Indeed, this finding would be rather surprising, since the lymphocyte is not usually regarded as a phagocytic cell.

Summary

The L.E.-cell phenomenon was demonstrated in 18 out of 19 patients with systemic lupus erythematosus.

Steroid therapy caused a striking reduction in the number of L.E. cells demonstrable in seven out of nine cases studied.

L.E. tests were performed on 495 patients with diseases other than systemic lupus erythematosus, and only one patient with portal cirrhosis gave a positive result. A post-mortem examination on this patient revealed no evidence of systemic lupus erythematosus.

The literature dealing with false-positive L.E. tests is discussed, and it is concluded that the L.E.-cell phenomenon, if properly interpreted, is almost specific, but rare false-positive results are seen in patients with hydralazine reactions and cirrhosis.

The mechanism of the L.E.-cell phenomenon is discussed.

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The National Council for the Unmarried Mother and Her Child has issued its thirty-seventh annual report, covering the period from May, 1956, to April, 1957. The report discusses generally the problem of the unmarried mother, and in particular the foreign unmarried mothers in the U.K. An analysis of the new applications dealt with in the case department for the year under review is included. The report also considers the work of the homes and hostels affiliated to the council, and the difficulties of adoption; a detailed financial statement of both donations to the council and grants made by the council is given. Also included in the report are the addresses of affiliated homes and hostels; the number of live births registered in the U.K., and the infant mortality, for each year since 1919; the number of yearly affiliation orders made since 1925; the balance-sheet for the year ended April 30, 1957; and the names of council members. A list of publications of the council is appended, all of which may be obtained from the National Council for the Unmarried Mother and Her Child (Inc.), 21, Coram Street, London, W.C.1.