

ULTRASTRUCTURE OF SYSTEMIC LUPUS ERYTHEMATOSUS

Dermal Connective Tissue

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Abstract. Dermal changes were studied in 20 patients with systemic lupus erythematosus. Most specimens showed mucinous changes. Elastic fibres consisted of bands of matrix and dense, spike-like fibrils, though collagen fibril changes were scarce. One biopsy showed fibrin precipitates with neutrophilic leucocytes in the outer dermis. Filamentous bodies ("hyalin bodies") were found in some specimens. Virus particles were located in fibrin masses, but never in mucinous areas.

Previous histochemical studies have revealed mucinous edema in the dermis of systemic lupus erythematosus (SLE), while fibrinoid deposits have rarely been observed (1). Fibrin has been identified in the dermo-epidermal junction by fluorescence microscopy (3, 10). Electron microscopical studies have demonstrated an altered dermo-epidermal junction (6). Dermal changes are reported in the present paper.

MATERIAL AND METHOD

The same 20 SLE patients studied previously (6) were examined for changes in skin connective tissue. The preparation technique for electron microscopy was the same.

OBSERVATIONS

In 19 patients loose bundles of normal collagen fibrils were separated by wide spaces. In the bundles, a few thin and bent collagen fibrils were seen intermingled with normal fibrils. Elastic fibres were usually coated by dense granular material and consisted of longitudinal bands of matrix material and dense spike-like elastic fibrils (Fig. 1). Fifteen specimens contained numerous

acid glycosaminoglycan (GAG) microfibrils with knobs in the spaces between collagen fibril bundles (Fig. 2). Nine evidenced the same microfibril type within the bundles (Fig. 3). Four specimens showed considerable numbers of infiltrating cells and scanty GAG microfibrils between or within the collagen fibril bundles. No definite relationship was demonstrated between a mucinous dermis and an altered dermo-epidermal junction. Virus particles were not seen in mucinous areas.

In one patient, fibrin precipitates were seen in the outer corium, either compactly filling out the spaces between dermal fibres or in spots between sparse collagen fibrils of sizes varying between 30 and 65 nm (Figs. 4, 5). Neutrophilic granulocytes showing either disintegrated or concentrated cytoplasm and melanin-containing macrophages were predominant cell types (Fig. 4). Fragments of basal lamina and irregularities of the basal lamina proper were demonstrated as covering the fibrin precipitates, in which virus particles were frequently found.

Filamentous bodies were found in the outer corium of six biopsy specimens (Figs. 6, 7). They appeared solitarily in mucinous areas, close to balls of abnormal anchoring fibrils (6), in the fibrin precipitates, and/or in the infiltrates of inflammatory cells. The bodies faced the surrounding dermal fibres direct and some appeared encircled by cytoplasmic protrusions of macrophages (Fig. 6). The individual bodies had no enclosing membrane and were composed of filaments with round cut-surfaces, 8 nm in diameter, in a vortical arrangement. Some bodies contained fibrin (Fig. 6) or virus particles (Fig. 7).

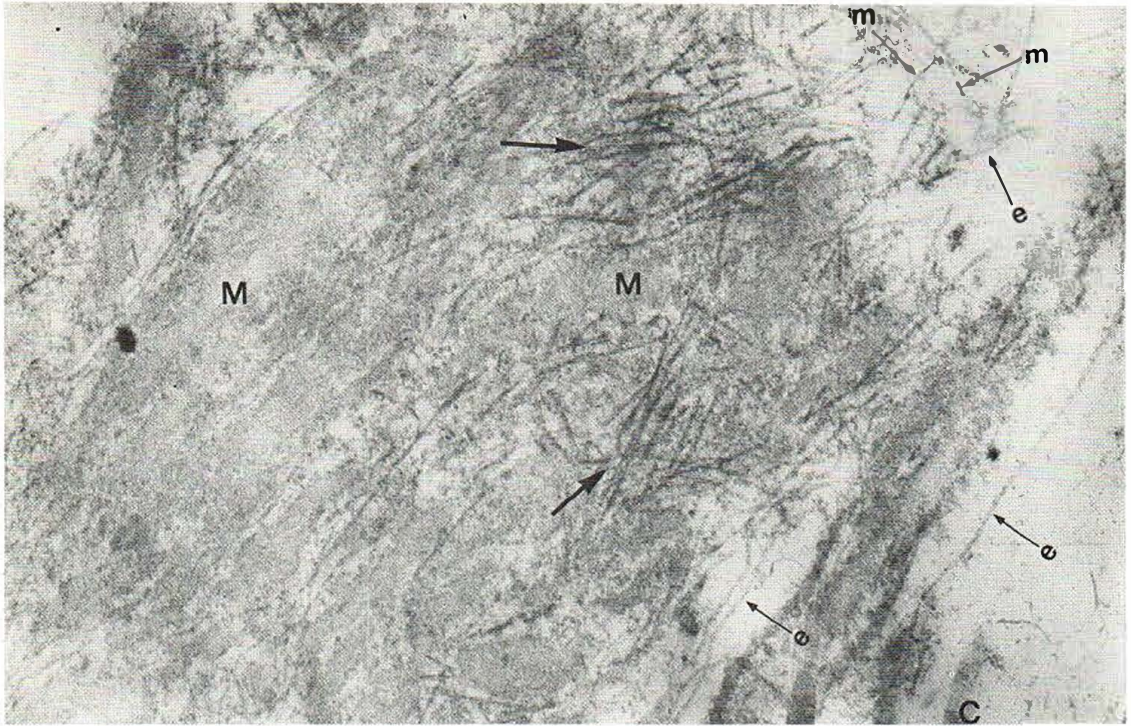


Fig. 1 An elastic fibre shows dense spike-like fibrils (thick arrows) and band-shaped areas of matrix (M). Normal elastic fibrils (thin arrows with e). Microfibrils with knobs (thin arrows with m). Collagen fibrils (C). $\times 45\,000$.

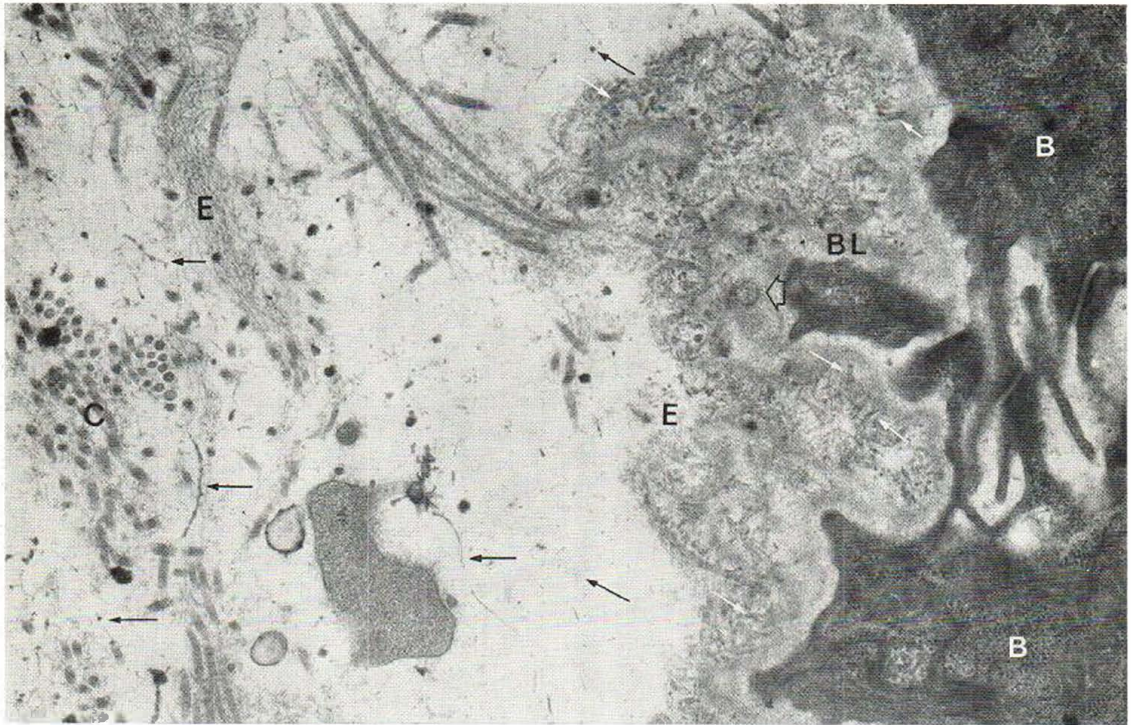


Fig. 2. Widened space around collagen bundles below an altered dermo-epidermal junction. The space contains numerous microfibrils with knobs (thin arrows); collagen fibrils (C); elastic fibrils (E). The dermo-epidermal junction shows a multilayered basal lamina (BL) and numerous anchoring fibrils (white arrows). Basal epidermal cell (B). A virus particle is indicated by a framed arrow. $\times 22\,500$.

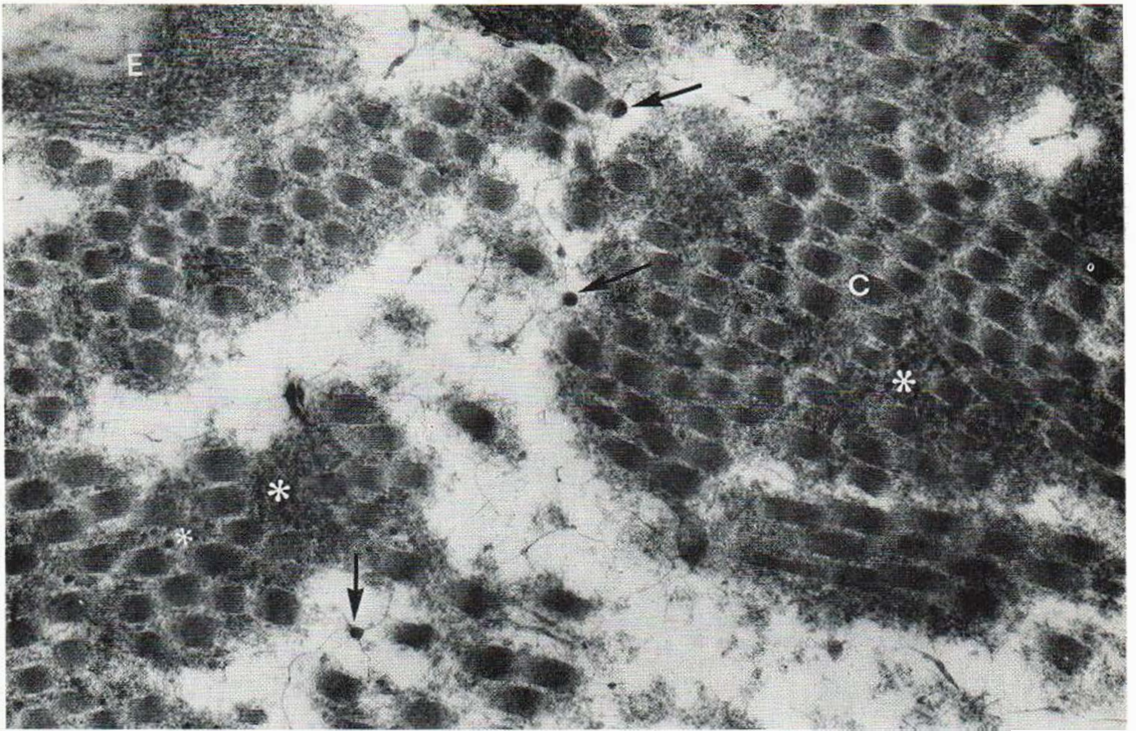


Fig. 3. Numerous microfibrils with knobs between collagen fibril bundles and within the bundles (asterisk). Normal elastic fibre (E) and collagen bundle (C). $\times 45\,000$.

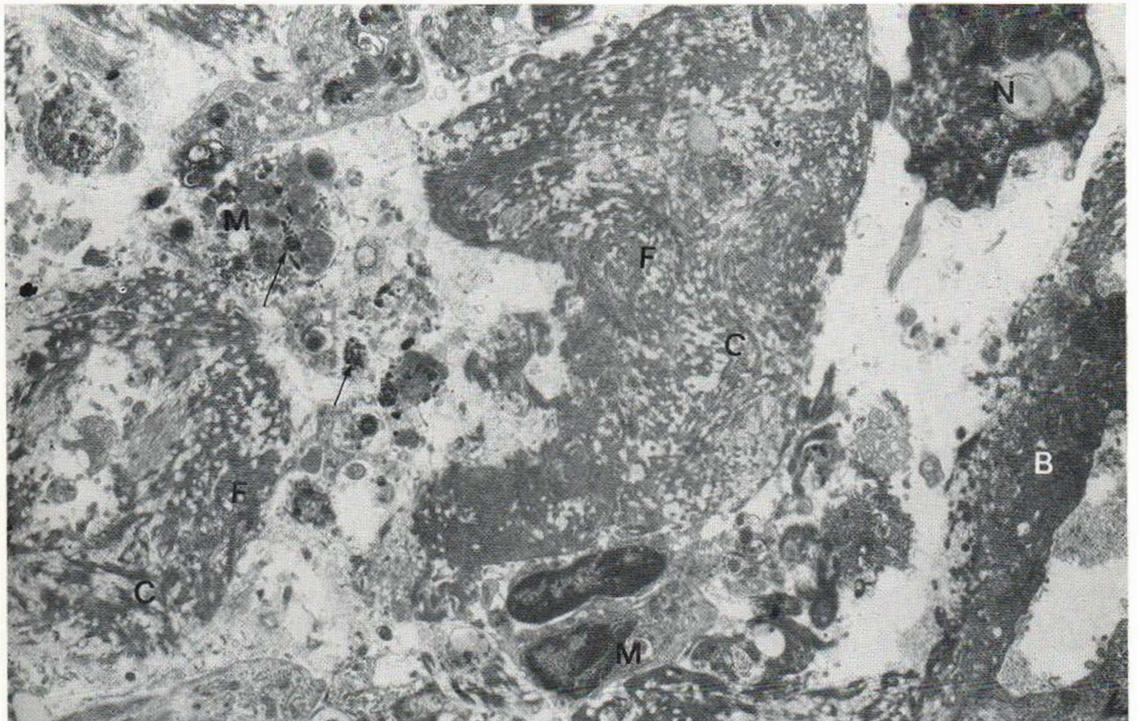


Fig. 4. Massive fibrin (F) precipitates in collagen bundles. Neutrophil (N) and macrophages (M) are seen in the wide space between fibril bundles (C). Melanin granules (thin arrows). Basal epidermal cell (B). $\times 6\,750$.

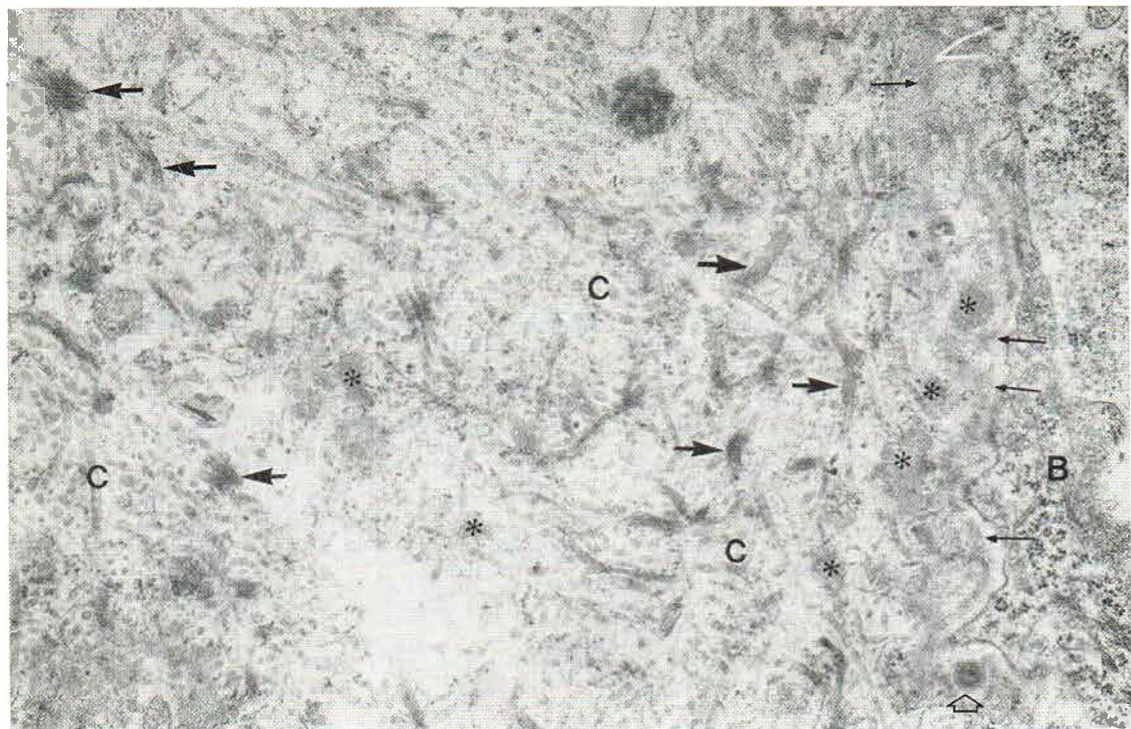


Fig. 5. Fibrin masses (thick arrows) and fragments of basal lamina (asterisks) between collagen fibrils of various thicknesses (C). Basal epidermal cell (B). Virus particle (framed arrow). Irregular basal lamina proper (thin arrows). $\times 22\,500$.

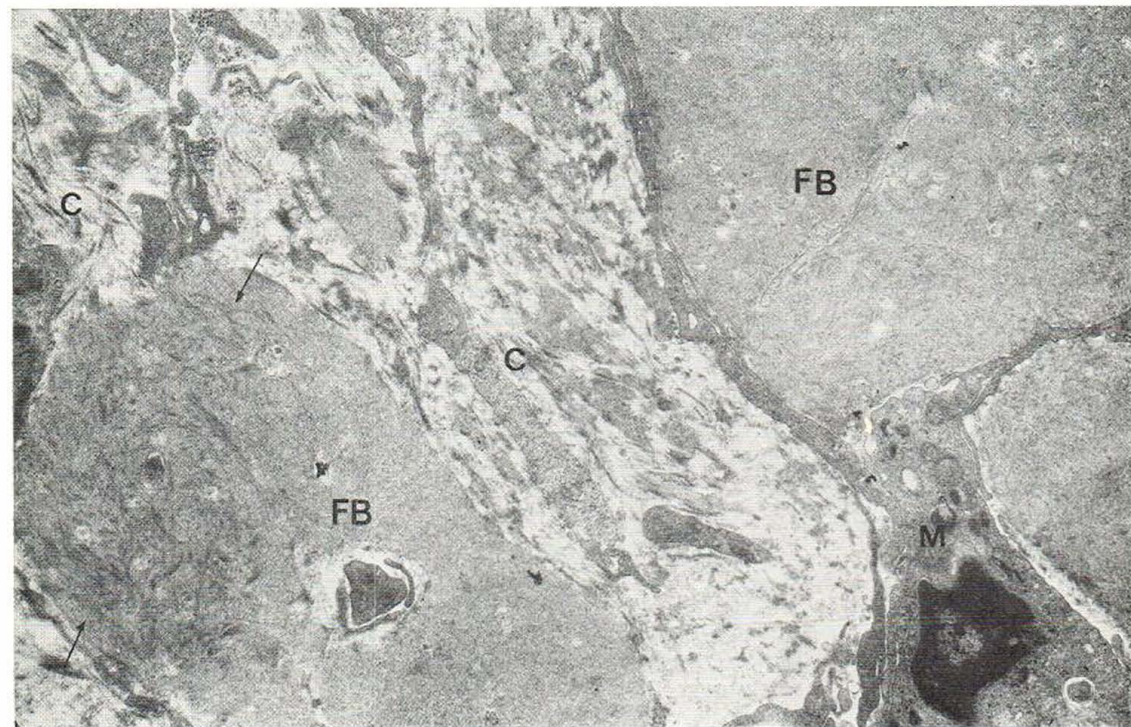


Fig. 6. Filamentous bodies (FB) between collagen fibril bundles (C). The bodies have no enclosing membrane and are partially encircled by cytoplasmic protrusions of macrophages (M). Arrows indicate fibrin in a body. $\times 11\,250$.

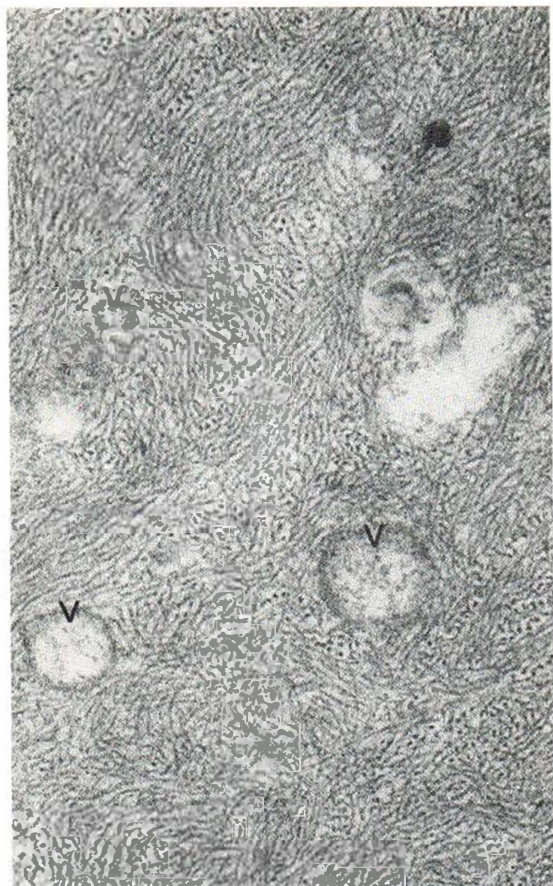


Fig. 7. Filamentous body showing a vortical arrangement of the individual filaments. They have a round cut-surface of 8 nm diameter. Three virus particles (V) are seen. $\times 45\,000$.

DISCUSSION

Electronmicroscopically, the acid glycosaminoglycans occurred as microfibrils with knobs (5). Abundant figures of this type represent mucinous changes of the connective tissue. Similar changes have previously been noticed in pseudoxanthoma elasticum (2), localized scleroderma (7), myxedema (8) and umbilical cord (8). The degenerate, spike-like elastic fibrils were most conspicuous and identical with those previously described in localized scleroderma (7).

In the electron microscope, fibrinoid appears as diffuse or nodular thickenings in the dermo-epidermal (6) and vascular (4) basal lamina. In the present study, no definite fibrinoid figures could be demonstrated. Infrequent findings of

fibrin and neutrophilic leucocytes similar to the present findings have been reported earlier (4). In the Arthus (13) and Schwartzman (11) phenomena the occurrence of fibrin and neutrophils has been interpreted as an early stage of an immune reaction in the dermal connective tissue.

Some authors have mentioned some round bodies in the outer dermis of normals and SLE patients, called globus elasticus, hematoxylin body and hyalin body. According to Pinkus et al. (9), globus elasticus is a variant of the subpapillary elastic plexus. Although no electron microscopy has been done to confirm this, it seems to be formed by normal elastic fibres. Although rarely, hematoxylin bodies have been described in the outer dermis of SLE (1). They are made up by disintegrated nuclei and contain desoxyribonucleic acid. Hyalin bodies have been demonstrated in the outer dermis in several skin diseases, i.e. besides lupus erythematosus, in dermatomyositis, acrosclerotic scleroderma, lichen planus, fixed drug eruption and mycosis fungoides (12). They contain gamma globulin and occasionally fibrin (12). Their size, round shape, fibrin content, and location suggest that hyalin bodies are identical with the filamentous bodies of the present paper and previously seen by the present authors in localized scleroderma (7).

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