

A NUCLEUS WITH CYTOPLASMIC FEATURES

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Intranuclear cytoplasmic structures in cells have been occasionally reported. In most cases, the question has arisen on "pseudoinclusions" (1): i.e., by invagination of the nucleus, portions of the cytoplasm are seemingly enclosed within this structure although they are entirely extranuclear. In such cases, the matter is easily settled by observing that such "nuclear pseudoinclusions" are delimited from the nucleoplasm by the double-walled nuclear envelope. However, intranuclear mitochondria have been reported in leukemic cells (2), and in a recent publication (3) Bucciarelli described intranuclear cisternae, resembling structures of the Golgi complex, in nuclei of an intracranial Rous sarcoma. The observed structures showed no evidence of being surrounded by a nuclear envelope and thus appeared to be truly intranuclear.

In a study of the normal cow liver capsule, a connective tissue cell (fibroblast ?) nucleus was observed which appeared to be more cytoplasmic than nuclear (Fig. 1). To the best of the author's knowledge, such a phenomenon has not been reported earlier in the literature. Hence, this fact, together with the fact that the present observations were made on supposedly normal connective tissue cells, would seem to justify this brief report.

The nucleus of this connective tissue cell is well defined and surrounded by a characteristic nuclear envelope in which nuclear pores are present. The chromatin of the nucleus is finely granular in texture and reduced to a marginal zone. The central

portion of the nucleus seems to be occupied by cytoplasm in which can be seen rough-surfaced endoplasmic reticulum, mitochondria, vesicular structures—possibly of Golgi nature—and a centriole. Numerous free RNP-particles are also present. The cisternae of the endoplasmic reticulum are widely distended and seemingly filled with a semi-electron-opaque material. Nowhere are these cytoplasmic structures separated from the nucleoplasm by a nuclear membrane, and they, therefore, seem to be truly intranuclear. It should also be mentioned that the cytoplasm of the observed cell shows very much the same appearance as the nucleus with distended cisternae of the ER and numerous large, but perfectly normal-looking mitochondria. Hitherto, no other similar nuclei have been observed.

Naturally, one can only speculate as to the origin of these intranuclear cytoplasmic structures. Bucciarelli (3) observed, in places in a Rous sarcoma cell, a connection between the intranuclear Golgi-like structure and the inner nuclear membrane. He discusses, among other things, the possibility that the structures observed by him could represent invaginations or detached sacs formed by a pathologically altered nuclear membrane. Such an explanation can hardly apply to the present observations, especially since other cytoplasmic organelles are also present. It has been suggested (2, 4) that cytoplasmic structures may be included within the nucleus during an abnormal mitosis. Such an explanation seems plausible also for the

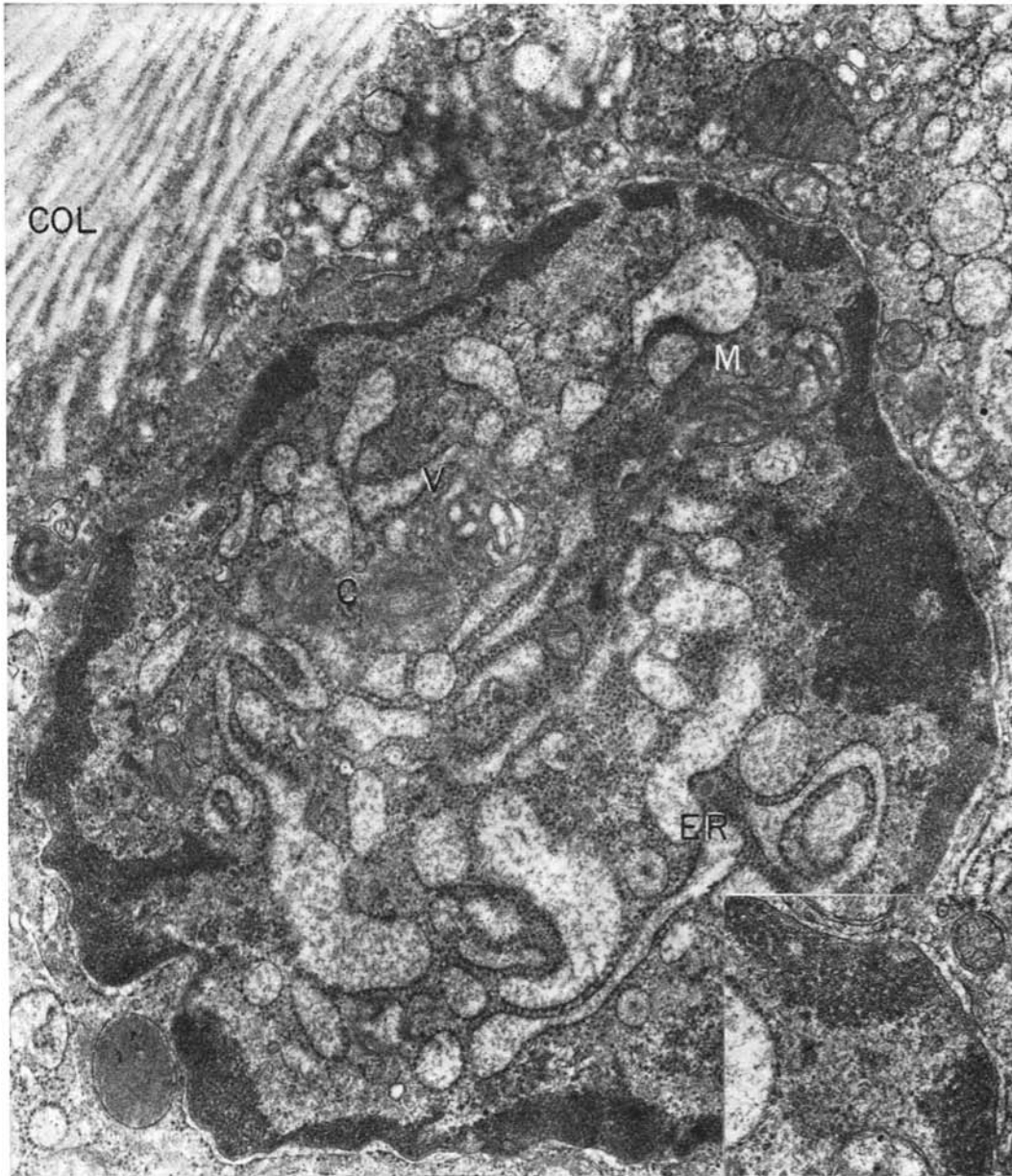


FIGURE 1 Abnormal nucleus in a connective tissue cell (fibroblast ?) from the liver capsule of a cow. Intranuclear cytoplasmic structures such as endoplasmic reticulum (*ER*), mitochondria (*M*), vesicles and vacuoles (*V*), and a centriole (*C*) are seen. The vesicles and vacuoles resemble such structures normally observed within the Golgi region. The cell is surrounded by bundles of collagen fibrils (*COL*). Glutaraldehyde-osmium tetroxide fixation. Epon embedding. Stained with uranyl acetate and lead citrate. $\times 26,000$. Inset: Enlarged portion of nucleus (upper, right part) showing lack of an intervening membrane between nuclear membrane and intranuclear cytoplasmic structures. $\times 50,000$.

present observations, especially since several different characteristic cytoplasmic structures appear simultaneously throughout the nucleus.

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