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Malignant Fibrous Histiocytoma of the Renal Capsule

Light and Electron Microscopic Study of a Rare Tumor

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Summary. This light microscopically pleomorphic tumor, which occurred in the renal capsule of 35-year-old female was diagnosed as a malignant fibrous histiocytoma. Ultrastructurally, the tumor showed two major components; fibroblast-like and histiocyte-like cells. This report stresses the rarity of such neoplasm in the kidney and also the usefulness of electron microscopy in establishing the diagnosis.

Key words: Kidney neoplasm – Sarcoma – Histiocyte – Fibroblast.

Sarcomas of the kidney are rare (Farrow et al., 1968 a, 1968 b, 1968 c) and there are no reported cases of fibrous histiocytomas of the kidney (Kempson and Kyriakos, 1972; O'Brien and Stout, 1964). Because of their rarity, diagnostic difficulties have occasionally been encountered, especially when the histologic appearance is pleomorphic. This report deals with the light and electron microscopic features of a malignant fibrous histiocytoma occurring in the renal capsule. Special emphasis will be focused on the usefulness of electron microscopy in establishing the diagnosis.

Case History

The patient was 35-year-old Japanese female who was admitted to Isehara Kyodo Hospital for evaluation and treatment of an abdominal tumor accompanied by abdominal pain. On admission, an ill defined tumor was palpated at the right upper quadrant. Abdominal X-ray suggested the presence of a renal tumor and she underwent right nephrectomy on the 14th hospital day. Her

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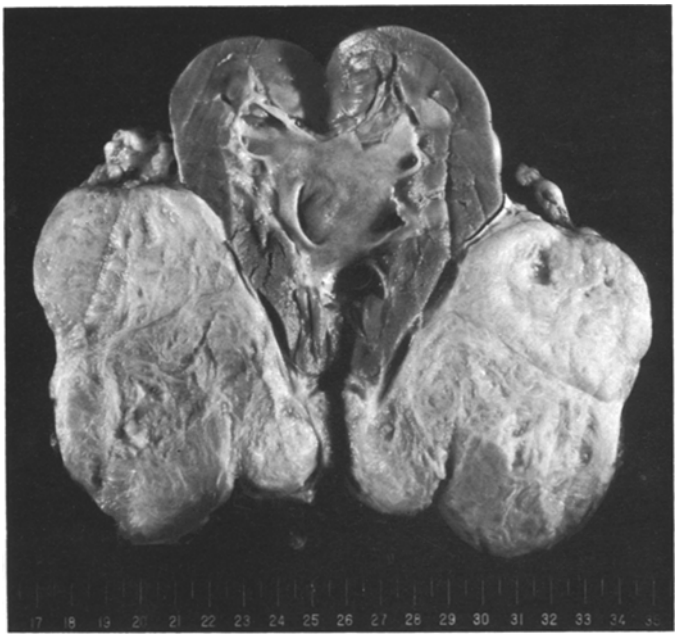


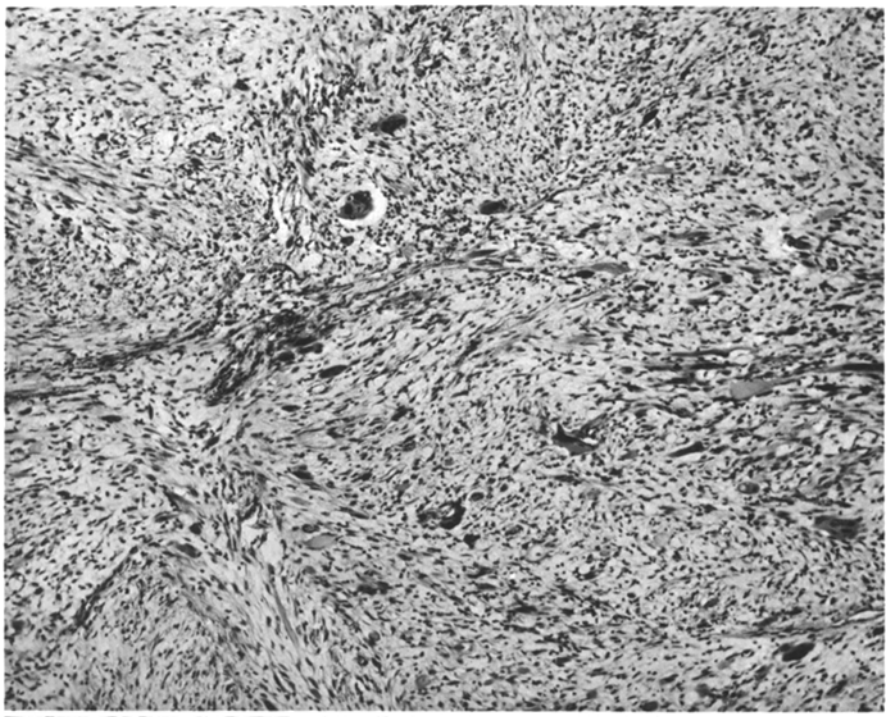
Fig. 1. Gross appearance of the tumor. A well demarcated $11 \times 8 \times 7$ cm tumor was attached to the kidney. Cut surface resembled that of leiomyoma

postoperative course was uneventful and she was last seen 6 months after the operation, when she showed no evidence of recurrence or metastasis of the tumor.

Pathological Findings

Gross Features. The resected right kidney revealed a $11 \times 8 \times 7$ cm firm tumor attached to the upper pole. The cut surface of the tumor was white to grey, firm and fibrous and resembled that of a uterine leiomyoma (Fig. 1). It was well encapsulated and was clearly demarcated from the unremarkable renal parenchyma. One of the remarkable gross features was the transition between the tumor and the adjacent renal capsule. There was no invasion of the tumor into the adjacent kidney.

Light Microscopic Features. The tumor was composed of an admixture of abundant interlacing spindled fibroblast-like cells accompanied by abundant collagen fibers and scattered, often multinucleated giant cells (Fig. 2). The spindle shaped tumor cells were arranged in parallel arrays and contained enlarged nuclei with prominent nucleoli and moderate numbers of mitoses. These cells frequently revealed intracytoplasmic filaments. Multinucleated or mononucleated giant cells showed abundant foamy cytoplasm and markedly enlarged hyperchromatic nuclei. Occasionally, the giant cells contained phagocytized debris in their abundant foamy cytoplasm (Fig. 3). Frequently cells intermediate between the above two major types were observed. Infrequent foam cells were also noted. The histologic sections were also stained with Mallory, reticulin, PTAH and Oil red O stains. Some tumor cells contained abundant lipid globules. No definite cross striations were observed in any tumor cells.



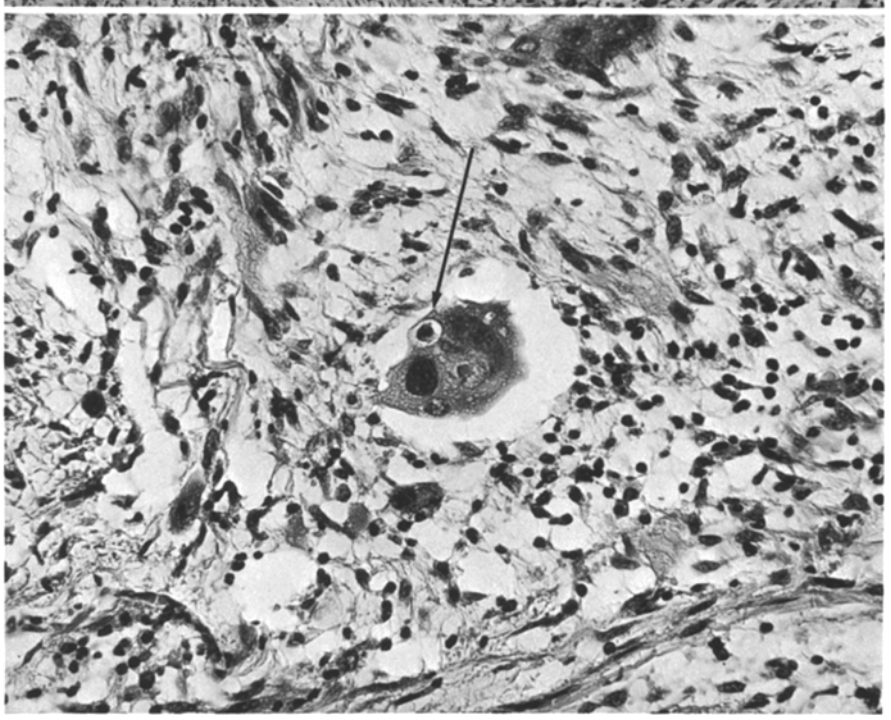
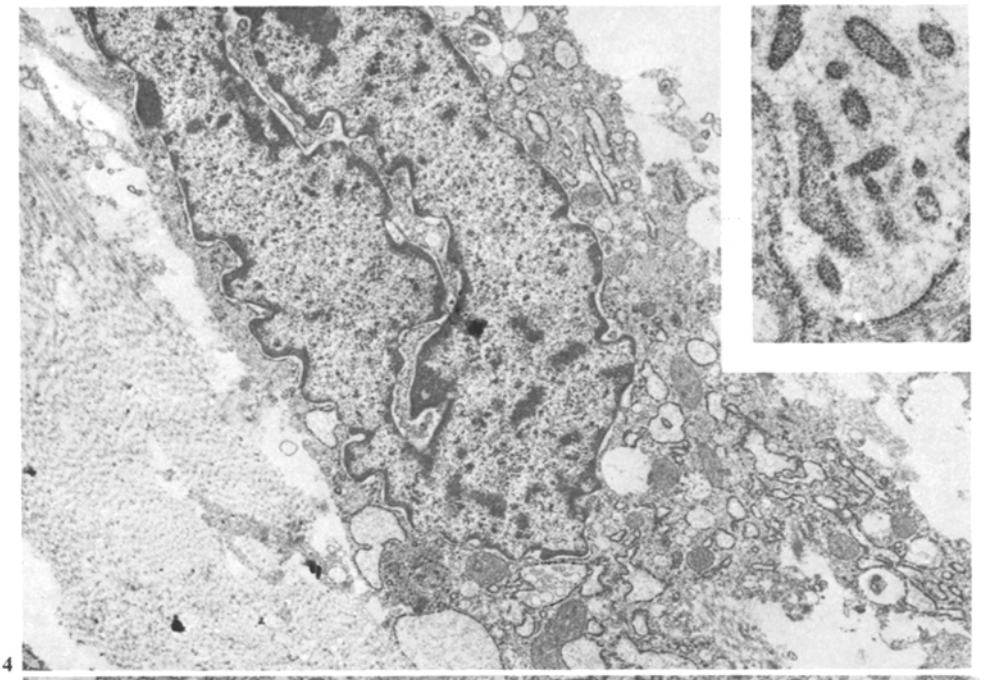


Fig. 2. Low power view of the tumor showing two major types of tumor cells, spindled cells and plump giant cells. The spindled type cells tended to form storiform pattern (Hematoxylin and Eosin $\times 75$)

Fig. 3. Occasional multinucleated giant cells contained phagocytized debris in the cytoplasm (*arrow*) (Hematoxylin and Eosin $\times 300$)



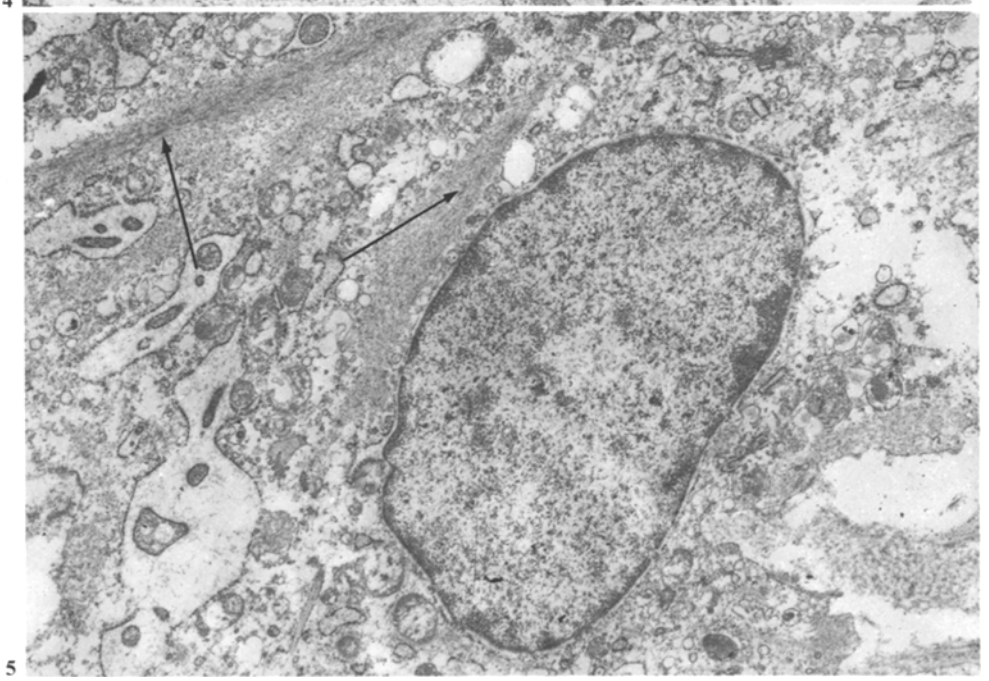


Fig. 4. Fibroblast-like cells. This type of tumor cells contained prominent rough endoplasmic reticula, some of which are cystically dilated. This type of tumor cells showed intimate relationship to the adjacent collagen fibers ($\times 5000$) *Inset:* Fibroblast-like cells. The dilated prominent rough endoplasmic reticula frequently showed papillary projections ($\times 10{,}000$)

Fig. 5. Intracytoplasmic filaments in the fibroblast-like cell sometimes showed parallel arrangement with periodic condensations resembling dense bodies of smooth muscle cells (*arrows*) ($\times 500$)

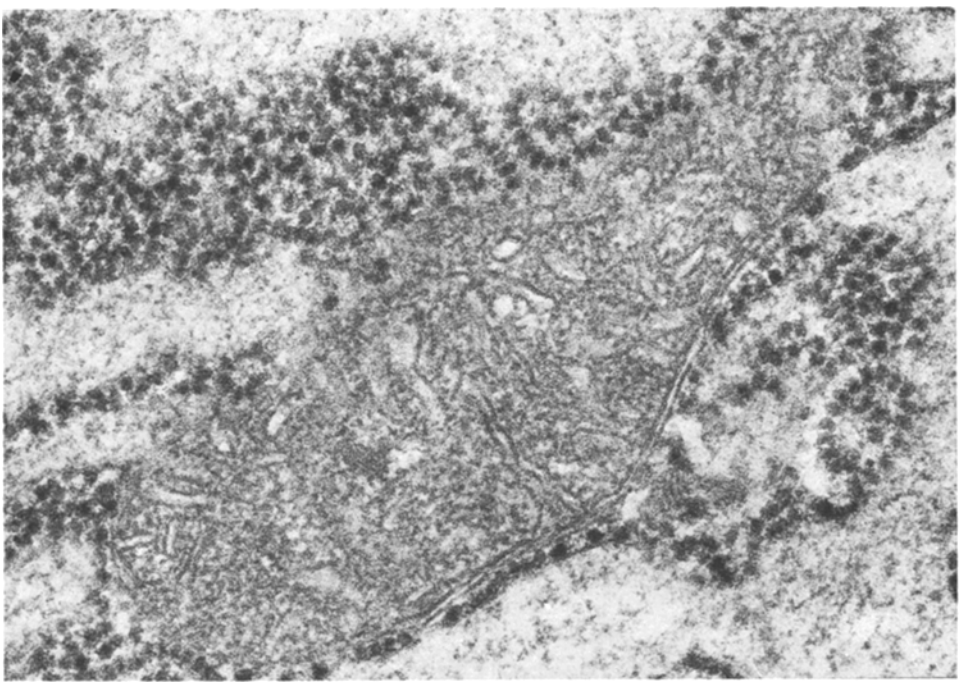
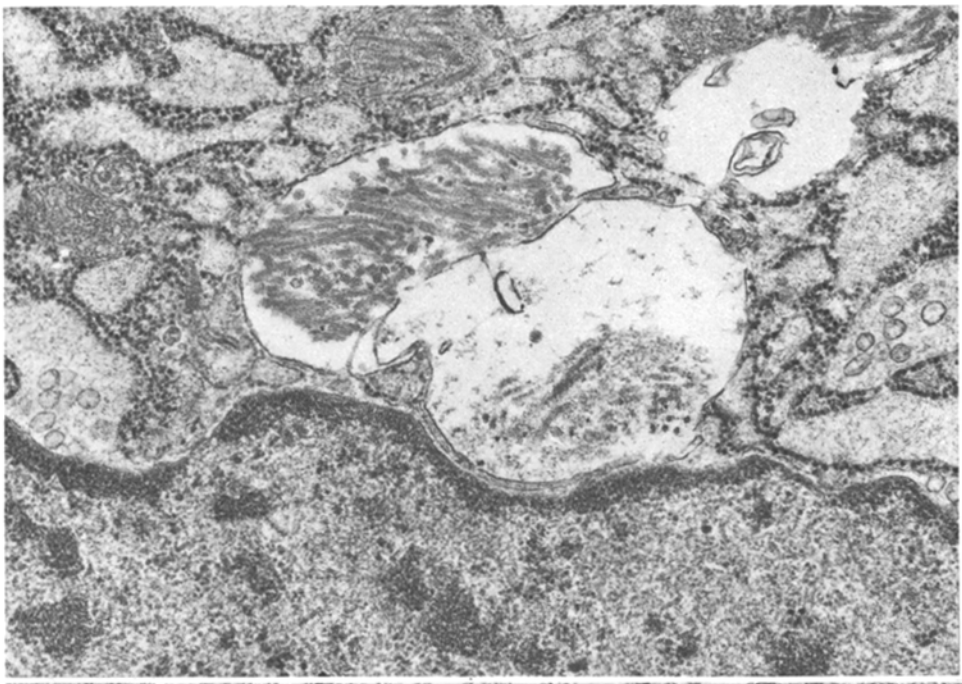


Fig. 6. Intracytoplasmic inclusions. The fibroblast-like cells occasionally contained intracytoplasmic inclusions composed of aggregated tubular structures (× 50,000)

Electron Microscopic Features. Small fragments of the tumor, which was initially fixed in 10% neutral formalin, were processed for electron microscopy. Ultrathin sections were stained with lead uranyl solutions and examined with a JOEL C100 electron microscope. The ultrastructural examination confirmed the light microscopic features. Several cell types were recognized (1) fibroblast-like cells (2) histiocyte-like cells (3) xanthoma cells. The fibroblast-like cells revealed very prominent rough endoplasmic reticula (Fig. 4) some of which were cystic and even showed papillary projections (Fig. 4 inset). The tumor cells also contained free ribosomes, scattered mitochondria and abundant intracytoplasmic fibrils. These fibrils were occasionally in parallel array and showed periodic condensations (Fig. 5). Aggregates of cytoplasmic microtubular structures with a diameter of 230 Å (Fig. 6) and perinuclear accumulation of fibrillar structures with a diameter of 2,900 Å were also seen (Fig. 7). No periodicity was present in these fibrils. The histiocyte-like multinucleated cells were characterized by ruffled cytoplasmic membrane, and numerous intracytoplasmic cystic vesicles, vacuoles, many mitochondria and scattered infrequent primary lysosomes (Fig. 8). They did not reveal myogenic filamentous structures. The xanthoma cells contained many lipid globules occupying most of the cytoplasm which otherwise showed scanty nonspecific organelles. Some fibroblast-like cells contained a variable amount of lipid.



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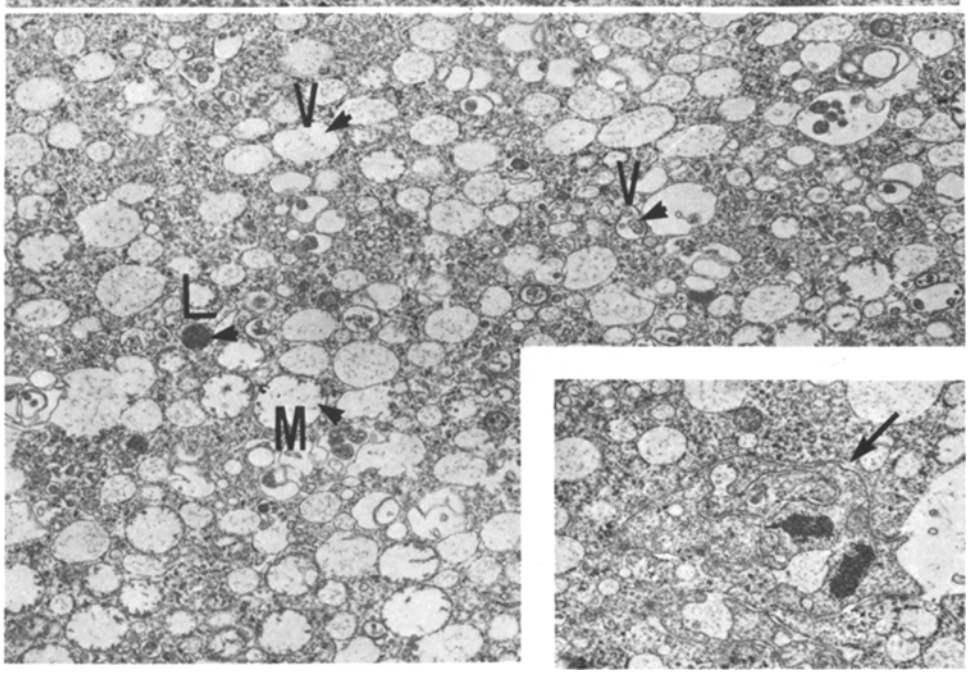

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Fig. 7. Perinuclear fibrils. The fibroblast-like cells infrequently contained clustered fibrils in the perinuclear regions (× 20,000)

Fig. 8. Histiocyte-like cells. High power view of the multinucleated giant cells show many vesicles or vacuoles (*V* and *arrow heads*), mitochondria (*M* and *arrow head*) and occasional primary lysosomes (*L* and *arrow head*). (× 11,500). *Inset*: This type of tumor cells frequently possessed ruffled cytoplasmic membrane (*arrow*). (× 11,500)

Discussion

From its location and gross appearance, it seemed appropriate that this tumor was originated from the renal capsule. The pleomorphic histologic appearance raised the possibility of a variety of sarcomas including liposarcoma, rhabdomyosarcoma, leiomyosarcoma and fibrous histiocytoma (Taxy and Bettifora, 1977). The presence of phagocytosis by a few pleomorphic tumor cells and of xanthoma-type tumor cells suggested the possibility of a histiocytic tumor.

The electron microscopic features were helpful in establishing the fibrohistiocytic nature of the tumor and in excluding the other possibilities. Fibroblast-like and histiocyte-like cells were the main types seen. These cell types have been reported in all ultrastructural studies of fibrous histiocytomas (Fu et al., 1975; Kahn, 1973; Merkow et al., 1971; Papadimitriou and Matz, 1967; Taxy and Bettifora, 1977). Some cells filled with many lipid vacuoles resembled xanthoma cells. The presence in the tumor giant cells of many vesicles, probable autophagic vacuoles and scattered primary lysosomes was indicative of a histiocytic origin (Fu et al., 1975; Kahn, 1973; Merkow et al., 1971; Taxy and Bettifora, 1977).

Sarcomas of the kidney are rare. Farrow et al., 1968a, 1968b, 1968c) reported 25 cases of renal sarcomas of various types. More than half of these tumors were localized in the capsule. To the best of our knowledge, fibrous histiocytoma of the kidney has not been reported in the literature.

Intracytoplasmic tubular inclusions have been reported in fibrous histiocytomas (Fu et al., 1975; Taxy and Bettifora, 1977). The nature of this material and its diagnostic significance remain to be determined, although the possibility that it might be altered endoplasmic reticulum was proposed by (Fu et al., 1975). Intracytoplasmic fibrillar inclusions in the fibroblast-like cells have not been reported in the literature, and we consider that the material represents some proteinaceous product of the fibroblastic cells. The infrequent parallel filaments with periodic condensations in the fibroblast-like cells resembled myofilaments. This suggested that these cells might be the myofibroblasts reported in the granulation tissue and in several neoplastic conditions (Gabbiani et al., 1971; Taxy, 1977; Taxy and Bettifora, 1977; Wirman, 1976).

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