—Preliminary Note—

The fine structure of intracranial neoplasms induced in dogs with Rous Sarcoma Virus

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The need for a nonhuman primate model of cerebral tumors for study by computed tomography has been obvious.

An experimental transplantable canine brain tumor model with the advantages of rapid tumor growth within 10 days and relative safety for the investigator is presently available. The tumor is produced by intracerebral inoculation of cultured cells derived from a canine brain tumor induced by the Schmidt-Ruppin strain of the Rous-Sarcoma virus (SRRSV)¹⁻³⁾. It has potential use as a model in experiments designed to evaluate the effectiveness of chemotherapy and radiotherapy with serial computerized tomography scans. However, characterization of the induced tumor is essential. Ideally, it should have features attributable to glioma and/or neuroectodermal tumors. Utilizing the technique of intracerebral inoculation of cells cultured from the original dog brain tumor induced by SR-RSV, Salcman et al. identified the tumor they induced in brains of mongrel puppies as a glioma by light microscopic criteria⁴⁾.

The purpose of our study was to further characterize this experimental tumor by electron microscopic and immunohistochemical techniques. Tumor was induced in 6 mongrel puppies. Some intracerebral tumor showed in the temporal lobe extending to the subarachnoid space.

Stains of the tumor for immunohistochemical reactivity to glial fibrillary acid protein, S-100 protein and 210 K neurofilament protein were all negative. With the light microscope, the intracerebral tumor cell showed highly cellular fascicular pattern and nuclear atypism. With the electron microscope, the intracerebral tumor cells were mostly undifferentiated. They had a few cell processes, occasional punctate adhesions (arrows) (**Fig. 1 A**) and some microvilli-like structure (**Fig. 1 B**). The tumor cell nucleus was usually oval shaped and sometimes had nuclear indentations. The cytoplasm contained abundant free ribosomes, some rough endoplasmic reticulum and mitochondria.

Some intracerebral tumor cell and endothelium of tumor capillary showed a crystalline array²⁾ (arrows) in the cytoplasm (**Fig. 2**). Collagen fibers and basal lamina were not observed in the intercellular spaces. The capillaries within the tumor were characterized by proliferation of immature endothelial cells which were non-fenestrated⁵⁾. Virus particles

Fig. 1 A

Fig. 1 B

Fig. 2

were not observed in the tumor. Junction complex were not observed between tumor cells and neuropil. These brain tumors of dog showed identical morphological features which were substantiated by light and electron microscopy as well as immunohistochemical study. In conclusion, this experimental tumor was too undifferentiated to express features suggestive of gliomatous or neuroectodermal differentiation.

As based on these morphological findings, this experimental model has many advantages including, reproducible morphology and a short survival time for neuro-oncology research.

References

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(Received for publication, June 21, 1985)