The tumor tissue was homogenized with the same volume of 0.154 M KCl, 1 mM EDTA, and 20 mM Tris-HCl buffer (pH 7.4) solution and centrifuged at 105,000 X g for 60 min. On the supernatant thus obtained, electrophoresis with cellulose acetate membrane and the assay for aldolase activity were performed as reported previously (5). As controls, normal brain and other organs of the same mouse strain were subjected to aldolase analysis.

RESULTS AND DISCUSSION

Fig. 1 represents the aldolase isozyme patterns of the normal mouse brain and of the transplanted tumor. In the normal brain, C-type aldolase is present together with A-type aldolase and their hybrids. In the transplanted tumor, the hybrids between C-type and A-type aldolases are markedly stained in addition to A-type aldolase. Furthermore, C-type aldolase band is also present in the transplanted tumor. In the organs other than the brain, neither C-type aldolase nor hybrids corresponding to those in the tumor were detected, although traces of A X C hybrids were detected in the kidney of the same strain mouse. The aldolase activity of the tumor for fructose 1,6-diphosphate and the activity ratio for fructose 1,6-diphosphate and fructose 1-phosphate were 33 and 17 units/g protein, respectively; these values are very close to the values of the normal brain which were 47 and 15 units/g protein. Accordingly, this subcutaneously transplanted tumor was very close to the normal brain tissue not only in the aldolase isozyme pattern but also in the activity, and clearly distinguished from other normal organs or other

SUMMARY

Aldolase C was detected together with aldolase A and their hybrids in a transplantable murine brain tumor, the primary tumor of which was diagnosed as glioblastoma. The pattern of aldolase in this tumor was very similar to that of a normal brain. The phenotype of aldolase isozyme was maintained, although its histological appearance was hard to diagnose as glioblastoma after successive transplantations. The usefulness of such an aldolase study in the identification of cells is emphasized.

INTRODUCTION

Molecular species of aldolase in mammalian tissues are divided into 3 types, i.e., type A in the muscle, type B in the liver, and type C in the adult brain (3, 4, 6). In rapidly growing experimental hepatomas of the rat, B-type aldolase disappears and instead A-type aldolase appears, while in slowly growing hepatomas B-type aldolase still remains in addition to A-type aldolase (1, 5, 7–9). We have also reported that C- and A-type aldolases and their hybrids are present in human brain tissue and in some brain tumors called gliomas, which have the same ectodermal origin as nerve cells, but that only A-type aldolase is detected in the brain tumor group called meningioma, which is thought to be mesodermal origin (10). In this communication, the maintenance of C-type aldolase in a strain of experimental murine brain tumor transplanted subcutaneously is reported.

MATERIALS AND METHODS

The tumor used was one of the brain tumor strains which were originally induced by the insertion of methylcholanthrene pellets into brains of male C57BL strain mice and have been maintained by subcutaneous transplantation into the same strain of mice (2). The histological diagnosis of the original tumor was reported as glioblastoma. At the 14th generation of the transplanted tumor, aldolase and histological examinations were performed.

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Fig. 1. Aldolase isozyme patterns of normal mouse brain and of transplanted tumor.
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experimental tumors. These data strongly suggest that the cells of this tumor originate from the normal brain tissue and that the character of the brain tissue partly remains even after the tumor is successively transplanted. In Fig. 2, the microscopic appearance of the transplanted tumor used in this experiment is shown. The tumor has become homogeneous in cell composition and the identification of the cell type was impossible from only a histological study.

A study of aldolase isozyme pattern may be generally useful in identification of the cells which are difficult to identify solely from a histological examination. Other biochemical characters of this tumor are now under investigation.

REFERENCES


Fig. 2. Microscopic appearance of transplanted tumor.
Aldolase C in Experimental Brain Tumor

Shigeaki Sato, Takashi Sugimura, Sadao Kawai, et al.


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