mediated immunological mechanisms. On the other hand, the fact that in Heymann's experiments autoimmune nephrosis was also occasionally elicited by liver points to the fact that the non-kidney-specific antigen described in this study may also be involved in this disease.

Summary. Rabbits were immunized with a rabbit kidney suspension incorporated into complete Freund adjuvants; guinea pigs were immunized similarly with guinea pig kidney. The rabbits formed 2 types of autoantibodies, one kidney-specific and the other devoid of organ specificity. The guinea pigs formed only antibodies of the second type. The possible role of the 2 corresponding antigens in eliciting experimental autoimmune nephrosis was discussed.

The authors gratefully acknowledge the technical assistance of Miss Ruta Millers and Mrs. Margaret Catanzaro.

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Received April 27, 1964. P.S.E.B.M., 1964, v116.

Comparison of Enzyme Activity in Malignant and Adjacent Uninvolved Tissue.* (29435)

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The aim of the present study is identification of the site of origin of 3 serum enzymes (lactic dehydrogenase(LD), malic dehydrogenase (MD), and enolase), which are elevated in cases of adenocarcinoma of the colon(1).

There are several possible explanations for the elevated serum activities of these enzymes. First, the increase may be due to elevated production of the enzymes by the tumor mass itself. Second, the elevated activity could be caused by the stimulation of enzyme production in other tissues through systemic effects of the tumor. Third, necrosis of the tumor tissue, or of the tissue invaded by the tumor, might cause increased release of the enzyme into circulating body fluids. Finally, alterations in permeability of malignant cells, or normal cells, could account for the elevated enzyme activity in the serum. Each of these mechanisms may act alone, or in concert with the others, in producing the elevated serum enzyme levels.

This study is limited to the measurement of LD, MD, and enolase activity in tumors

* This investigation was supported by N.I.H. grant, the Saul Singer Foundation, and the Charles H. Silver Fund. The data are taken from a thesis presented in partial fulfillment of the requirements for the degree of Master of Science at New York Univ.

TABLE I. Enzyme Activity in Tumor and Uninvolved Cells.

Surgical No.	Age	Sex	Lactic dehydrogenase		Malic dehydrogenase		Enolase	
			Tumor	Uninvolved	Tumor	Uninvolved	Tumor	Uninvolved
117835	72	♀	1044	609	756	417	87	43
118255	51	♂	708	270	462	343	34	48
118256	69	♂	599	470	537	510	41	46
118328	76	♂	1714	440	1000	387	56	30
118350	68	♂	850	563	833	489	48	31
118698	73	♂	1000	819	1760	819	92	67
118734	70	♀	1192	178	1231	256	71	10
118810	58	♀	1316	83	1053	97	63	7
118857	65	♀	792	568	1000	824	92	69
119049	60	♂	174	114	227	133	15	11
119261	56	♂	1429	364	1667	218	129	18
119310	68	♀	1071	548	1500	698	118	48
119318	65	♂	268	263	366	531	27	39
119358	77	♀	1917	1000	1667	909	158	76
119362	65	♂	975	157	883	272	110	20
119439	55	♂	1145	364	1066	580	112	40

One unit of activity is equal to a change of 0.001 in optical density at 3400 Å per mg of tissue dry wt per min.

and adjacent uninvolved tissue, since assay of enzyme activity of other organs is not possible in human patients. The data collected bear upon an evaluation of the first of the above hypotheses.

Materials and methods. Samples of tissues removed by surgical procedures from 16 patients suffering from adenocarcinoma of the colon were used in this study. There were 10 females and 6 males in the group; the range in age was 51 to 77 years, with a mean age of 66 years. A portion of the tumor and a sample of the surrounding uninvolved tissue were frozen within 15 minutes after surgical excision. Tissues were assayed within one week after surgery was performed. In each case the uninvolved tissue was a portion of the colonic mucosa, which appeared to be normal on gross and histological inspection. Diagnoses of adenocarcinoma were confirmed by pathological examination.

Prior to assay the tissue was allowed to thaw at room temperature and weighed. A 10% homogenate was prepared in iced glass-distilled water in a Waring Blendor. The homogenization was carried out in a cold room (10°C). Large particles of tissue were removed by filtration through fine cheesecloth. In the enolase assay 10% homogenates were employed, while 1% homogenates were used in the assays for LD and MD. Homogenates were kept in an ice bath and used within 10 minutes after preparation.

In each of the determinations measurement of enzyme activity was based upon rate of oxidation of reduced diphosphopyridine nucleotide (DPNH). This reaction was followed in a model DU Beckman spectrophotometer equipped with a tungsten light source. Ambient temperatures ranged between 24 and 28°C. Dry weight determinations were performed on each of the homogenates, and the enzyme activity expressed in units that represent a change of 0.001 in optical density at 3400 Å per milligram of tissue dry weight per minute. The procedures employed have been described(2-5).

Results. The data for LD are summarized in Table I. The activity of this enzyme in homogenates prepared from 16 malignant colonic tumors varied from 174 to 1917 units with a mean activity of 1012 units. The LD activity in homogenates of the 16 adjacent uninvolved tissue samples varied from 83 to 1000 units with a mean activity of 413 units. There was a great deal of variability in the LD activity in both the neoplastic and uninvolved tissue homogenates, but in every case the activity of the enzyme in the tumor homogenate was higher than that in the homogenate of surrounding cells. Fisher's

"t" was calculated and P determined to be less than 0.001.

Table I summarizes the data obtained for MD activity in the tissue homogenates. The activity of this enzyme in human colonic adenocarcinoma and uninvolved tissue was within the same range as that observed for LD. MD activity in 16 tumor homogenates varied from 227 to 1760 units with an average activity of 1001 units, while the activity in the 16 samples of adjacent tissue from the organ involved varied from 97 to 909 units with a mean activity of 468 units. In 15 of the 16 sets of tissue samples assayed the activity of MD in the carcinoma was higher than that in the uninvolved tissue. The difference between the MD activity in the tumor and in the neighboring cells is significant at the 0.001 level.

The data obtained for enolase are also summarized in Table I. In homogenates of both adenocarcinoma of the colon and adjacent intestinal mucosa the activity of enolase was much lower than the activities of both LD and MD in the uninvolved tissues. The activity of this enzyme varied from 15 to 158 units with an average activity of 78 units in the homogenates of the malignant tissue samples. Enolase activity in the uninvolved colon tissue homogenates varied from 7 to 76 units with a mean activity of 38 units. In the tissues of 13 of the 16 patients studied, the activity of enolase was higher in the neoplastic tissue than in the uninvolved tissue. The difference in enzyme activity between the 2 groups is significant at the 0.001 level.

Summary. Homogenates of the neoplastic and adjacent non-malignant tissues from patients with adenocarcinoma of the colon were prepared and assayed spectrophotometrically for LD, MD, and enolase. Significant differences in enzyme activity were observed between the tumor homogenates and the homogenates of the uninvolved tissue. The activities of LD, MD, and enolase were significantly higher in the tumor preparations than in the preparations of adjacent mucosal tissue. These results are consistent with the hypothesis that the tumor proper is one of the sources of the elevated serum levels of the 3 enzymes.

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Received April 29, 1964. P.S.E.B.M., 1964, v116.

Identification of WM1 as LDH Virus, and Its Recovery from Wild Mice in Maryland. (29436)

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Wild house mice in Queensland, Australia, were found commonly to be infected with an obscure mouse-pathogenic agent (WM1) which could be recognized only by production of low grade chronic splenic hyperplasia (1,2). The infectious process in experimental mice was unique in several respects, namely, the lifelong persistence of virus in tissues and serum at titers of about 10^4 ID_{50} per gram, and the lack of antigenicity for mice, rats, guinea pigs, and rabbits. WM1 virus is ether-sensitive and heat labile (56°C 30 min).

Since these various characteristics closely resembled those of the lactic dehydrogenase

* On leave from Queensland Inst. of Med. Research, Brisbane, Australia. This work was conducted during the tenure of a fellowship from Rockefeller Foundation.