when tested by the tissue-culture method. The germicides may now be placed in the following order on the basis of their toxicity indices: iodine 0.09; iodine trichloride 0.40; mercuric chloride 2.8; Hexylresorcinol 3.0; Metaphen 12.7; phenol 12.9; potassium mercuric iodide 13.3; Merthiolate 35.3; Mercurochrome 262.0.

8627 P

Cysteine in Jensen's Sarcoma.

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With the stimulating effect of cysteine and other sulphydryl compounds upon tissue growth in mind, it was felt that dilutions of these compounds injected into rapidly growing neoplastic tissue might serve as a sufficient stimulation to accelerate maturity and subsequent death of cells. To evaluate the effect of sulphydryl radicals upon the growth of tumor-cells *in vivo*, a group of 6 rats was chosen which had been inoculated with Jensen's sarcoma from 10 to 21 days previously. These tumors varied in size from 4 to 9 cm. in diameter and all were in a normal state of growth, none showing necrosis or evidence of regression. Twenty mg. of a freshly prepared solution of cysteine hydrochloride was injected into the center of each of 5 of these tumors at 2-day intervals for 4 doses. The sixth was kept as a control. Forty-eight hours after the first dose, some tenseness and edema was observed with a subsequent and rather rapid necrosis of tissue in the center of the tumor in each case which subsequently progressed to the periphery. In every instance, all of the tumor-tissue died as the necrotic tissue was extruded, after which the skin healed normally over the ulcerated area. Six months have elapsed since the initial injections and there is no sign of tumor-recurrence.

This experiment has been repeated on 4 groups of animals with the same result following injection of sarcomatous tumor-tissue with cysteine hydrochloride. In each group, except the first, 5 rats were injected and 2 animals maintained as controls. In each case, the control-group showed the usual rate of tumor-growth with no evidence of regression and gradual, progressive enlargement of the tumors until the animals died from them, while the injected tumors regressed and disappeared. No reasonable explanation for this regressive action is at hand.

A series of other substances at the same pH as cysteine are being run. Many of them have caused necrosis but none to date has caused complete regression. The complete results will be reported later.

Lumsden[1] and other investigators have found that certain agents known to cause regression of malignant tumors in animals would also confer an immunity after the tumor has regressed. He remarks that a satisfactory mode of treatment of animal tumors must not only serve as a destroyer of the growth but also as an immunizer. To date, surgery and radiation have more or less satisfactorily served as a means of removal but they have little if any power to invoke an immunity. Conversely, auto-vaccination treatment by inoculation is an excellent method of incurring immunity but it is not easy to maintain a concentration of antibodies in the tumor-area sufficient to destroy all the tumor-cells. He has found formalin to be a reagent which stands between antiserum and the physical methods. It is, however, an obviously unsatisfactory chemical with which to work.

We have found that any recession of a tumor, whether induced or spontaneous, is followed by an immunity such as Lumsden describes. There has been so far, no relation to the age or size of the growth; a young tumor, regressing early, confers the same immunity as an old tumor in a practically moribund animal. Excepting physical agents of removal, such as excision and X-ray, the sequence is consistent. It is apparently related in no way to the substance used but seems more to be dependent upon the absorption of tumor-tissue by the host.

While using cysteine recently as a regressive agent in Jensen's sarcoma of rats, it was noted that in animals where the tumors had disappeared after treatment, reinoculation was not possible. To check this apparent induced immunity, a group of 5 rats was taken which had previously been inoculated with Jensen's sarcoma and which had in turn been treated with cysteine hydrochloride successfully. There had been a complete tumor-regression in each case. Approximately 3 weeks after the tumors had disappeared, these animals were all reinoculated with the same strain of Jensen's sarcoma in the usual way. The inoculation was unsuccessful in each case. A similar group of 4 animals was subsequently subjected to the same treatment and with identical results.

Conclusions: (1) Cysteine hydrochloride, when injected directly into Jensen's sarcoma in the white rat, will cause necrosis

[1] Lumsden, Thomas, *Am. J. Cancer*, 1931, **15**, 563.

and tumor-regression. (2) Animals in which tumor-regression has occurred after the use of cysteine hydrochloride are immune to further inoculation of the same strain of rat sarcoma.

8628 C

Nitrogen Distribution in Human Placental Globulin.*

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(Introduced by R. A. Gortner.)
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It seemed desirable to analyze placental globulin to determine its chemical composition by nitrogen values. Harding and Fort[1] have reported such an analysis of the whole placenta but this contains several proteins as well as other materials which may alter the proportion of nitrogenous fractions as determined by the Van Slyke method.

To prepare the globulin, mature, normal placentas were collected in sterile containers, washed, cut up, and each extracted with

TABLE I.

	Drage and Sandstrom, Placental globulin	Cavett,[3] Serum-pseudo-globulin	Widdowson[7] serum-globulin	Banzhaf, Suguira and Falk[2] Normal serum-globulin	Anti-tetanic serum-globulin	Anti-diphtheric antiserum globulin	Harding and Fort,[1] whole placenta
Humin N	2.64	2.44	0.53	2.0	2.5	2.8	3.17
Ammonia N	8.40	8.85	9.35	6.00	7.4	7.7	6.40
Basic N	26.32	26.93	24.61	28.6	25.5	24.2	35.18
Arginine N	10.23	10.76	10.67	10.8	9.7	9.8	24.00
Cystine N	1.02	0.72		3.0	2.5	3.3	1.43
Histidine N	4.90	2.95	4.21	3.7	2.3	2.0	2.43
Lysine N	10.29	12.95	9.78†	11.1	11.0	9.1	7.31
N in filtrate from bases	61.32	62.87	61.32	64.40	66.5	66.3	51.72
Amino N	60.12	58.53	57.75	61.4	64.4	64.2	48.35
Non-amino N	1.20	4.34	3.57	3.00	2.1	2.1	3.37
P.T.A. Humin N	1.11						
Total recovery (% N)	99.79	101.09	99.33	101.0	101.9	101.0	99.84

† Lysine plus cystine.

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1 Harding, V., and Fort, C., *J. Biol. Chem.*, 1918, **35**, 29.

2 Banzhaf, E., Suguira, K., and Falk, K. G., *J. Immunol.*, 1916, **2**, 125.