hyperplastic epidermis is an important feature in this experimentally induced precancerous condition.

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SURVIVAL OF NORMAL CELLS IN PENICILLIN SOLUTIONS LETHAL TO MALIGNANT CELLS

STUDIES at the Wistar Institute of Anatomy and Biology, made possible through the kindness of Dr. M. R. Lewis and Dr. W. H. Lewis,[1] have revealed a selective lethal effect of penicillin upon rat and mouse sarcoma cells, of which a full account will be published later.

In roller tube cultures, untreated sarcoma cells, grown with normal fibroblasts derived from explants of muscle from the same strain of tumor host, grow fully as vigorously as the normal cells. However, upon addition of penicillin (Squibb's sodium salt of penicillin), the sarcoma cells were selectively damaged. With proper choice of the dosage level, it was found possible to kill all the sarcoma cells without damaging the normal fibroblasts. Higher dosage damaged the non-malignant cells, but the dose required was two to three times that required to produce an equivalent injury in malignant cells.

Damage was arbitrarily classified as incipient (granularity of 50 per cent or more of the cells, and a faintly withered appearance of the cell membrane), marked damage (rounding, coagulation or disintegration of the cells, short of 100 per cent), and lethal (no living cells visible). Table 1 shows the totals of

TABLE 1

NUMBERS OF EXPLANTS OF SARCOMA CELLS AND OF NORMAL FIBROBLASTS SHOWING DIFFERENT GRADES OF DAMAGE. COMBINED TOTALS OF ALL EXPERIMENTS.

	None	Incipient	Marked	Lethal	Totals
Normal	112	37	57	0	206
Sarcoma	0	29	156	78	263

explants classified according to damage shown. These results include four induced rat tumors and one induced mouse tumor. Another induced mouse tumor, not included in the data of Table 1, did not show a definite selective response.

In twenty-five experiments, the treated tumor cultures were implanted into rats of the corresponding 100 per cent-susceptible strain. All cultures graded as "lethal damage," and most of those graded as "marked damage" failed to produce tumors, whereas the untreated cultures produced tumors.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A RAPID, QUANTITATIVE METHOD FOR THE DETERMINATION OF PENICILLIN

THE following assay method affords a rapid, convenient and relatively accurate method of determining the potencies of antibiotic substances in terms of suitable standards. Since assays may be completed during the course of a working day, the method is particularly useful as a guide to the time of maximum production of penicillin, for the control of isolation procedures of various antibiotic agents, in the determination of the amount of deterioration and for related problems.

Earlier experiments[1] on the use of filter paper as a matrix to support mold growth led to the development of the present assay method in which the antibiotic substance to be assayed is placed on sterile, absorbent paper discs on the surface of inoculated nutrient agar. The function of the paper is to act as a reservoir from which the antibiotic substance diffuses into the agar where it inhibits the growth of the test organism. This results in a clear zone surrounding the disc. It was found that the diameter of this zone of inhibition is proportional to the amount of antibiotic substance present and, for practical purposes, may be considered a straight-line function of the log concentration.

The following example illustrates the simplicity of the assay. Nutrient agar,[2] approximately pH 7.0, was seeded with *B. subtilis* spore suspension[3] so as to contain approximately 2×10^5 spores per cc and 25 cc portions of this medium were pipetted into 90 mm petri dishes (depth of the agar approximately 4 mm). Four sterile, filter paper discs, diameter 15.3 mm,[4] were evenly spaced upon the agar. By means of a

[1] We are indebted to the Carnegie Institution of Washington Department of Embryology and to the International Cancer Research Foundation, as well as to the Wistar Institute of Anatomy and Biology, for aid in carrying out this work.

[1] M. B. Sherwood, *Jour. Bact.*, 43: *Proc.*, 779, 1942.

[2] G. L. A. Ruehle and C. M. Brewer, *U. S. Dept. of Agriculture Circ.* 198, 1929.

[3] J. W. Foster and H. B. Woodruff, *Jour. Biol. Chem.*, 148: 723, 1943.

[4] Discs were cut from E. and D. No. 615 filter paper with a sharpened cork borer.