When a pen^r strain of *S. aureus* was used in identical experiments no difference could be observed between light scattering curves in the presence or absence of the antibiotic.

We specifically chose penicillin for this initial study because of its potent inhibition of cell wall synthesis, an effect which leads to gross morphological changes in growing populations. But the extreme sensitivity of differential light scattering to small physical changes suggests that it will be useful for other drug studies as well.

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¹ Greenwood, D., and O'Grady, F., *Science*, **163**, 1076 (1969).

² Wyatt, P. J., *Applied Optics*, **7**, 1879 (1968).

³ Wyatt, P. J., *Nature*, **221**, 1257 (1969).

⁴ Wyatt, P. J., *Nature*, **226**, 277 (1970).

Radiation Stimulated Incorporation of ³H-Thymidine into Diplotene Oocytes of the Guinea-pig

UNSCHEDULED synthesis of DNA has been observed in the nuclei of HeLa cells at some stage of the cell cycle other than the S-phase when cells are exposed *in vitro* to ultraviolet light or X-ray irradiation¹. It has since been confirmed for several other cell types²⁻⁵. Part of the synthesis defined in terms of the uptake of ³H-thymidine — which was detected in HeLa cells as the result of large doses of ultraviolet irradiation — was non-semiconservative (repair replication), corresponding to the insertion of DNA precursors into extant parental DNA strands. Here I present evidence that X-irradiation of a 1 day old female guinea-pig with 5,000 rad is followed by a small but autoradiographically detectable incorporation of ³H-thymidine into the DNA of diplotene oocytes. In the guinea-pig, the mouse and most other mammals the premeiotic DNA synthesis occurs during embryonic life⁶. After birth the oocytes have all entered prophase of meiosis during which no DNA synthesis is normally observed.

Three 1 day old female guinea-pigs received 5,000 rad of X-rays (6 meV, dose rate 385 rad/min). The animals were injected intraperitoneally immediately before irradiation with 50 µCi/g of ³H-thymidine (5.0 Ci/mmol, Radiochemical Centre, Amersham) and with the same amount of precursor 15 min later in order to be sure that ³H-thymidine was available during and shortly after the irradiation. Three animals served as controls and received ³H-thymidine only. The animals were killed 1 h after the last injection. The histological sections of the ovaries from the experimental group and the control group were stained by the Foulgen technique, coated with Ilford 'K2' liquid emulsion, exposed for 8 or 12 weeks and developed together.

In the autoradiographs a few grains were observed over the oocyte nuclei from the irradiated as well as from the control animals. The number of grains over each oocyte nucleus was counted and the number of grains over an area of exactly the same size just beside the nucleus (representing the background labelling) was subtracted.

The grain counting over areas of equal size was performed by placing a glass slide with an engraved circle the size of an average oocyte nucleus in the ocular of the microscope. The specimens were coded before counting so that the observer was unaware of whether the specimens originated from irradiated or control animals.

Table 1. MEAN GRAIN COUNTS OVER OOCYTE NUCLEI CORRECTED FOR BACKGROUND LABELLING

	Experiment 1 5,000 rad	Control	Experiment 2 5,000 rad	Controls
Number of animals	1	1	2	2
Number of oocytes	241	203	197	185
Mean grain count (oocyte/background)	2.92 ± 0.20 (s.e.)	—0.21 ± 0.14 (s.e.)	1.87 ± 0.16 (s.e.)	0.09 ± 0.05 (s.e.)

In both experiments the mean grain count over the oocyte nucleus in irradiated animals is significantly higher than the background count (Table 1). In the control animals there is no significant difference. These results indicate that there is a small but significant incorporation of ³H-thymidine into DNA of diplotene guinea-pig oocytes after irradiation with 5,000 rad of X-rays. By comparing the number of grains over the oocyte nuclei with the number of grains over the follicle cells that were in normal S-phase at the time of ³H-thymidine injection, the radiation stimulated incorporation of ³H-thymidine was roughly estimated as being less than 10 per cent of the amount incorporated during normal replication of DNA. This result is of the same order of magnitude as was observed in the radiation stimulated incorporation of DNA precursor in human blood lymphocytes *in vitro*⁴.

Whether some of the ³H-thymidine incorporated into guinea-pig oocytes after irradiation is the result of repair replication is not yet clear. Painter and Cleaver⁵, however, have examined several kinds of cultured mammalian cells after exposure to ultraviolet light. They found that all kinds of cells in which unscheduled DNA synthesis was observed also exhibited repair replication, and there seemed to be a rough correlation of the extent of the two phenomena suggesting that they both are manifestations of the same process. The guinea-pig oocytes seem to be much more resistant to irradiation than oocytes of mice and rats⁷. The question therefore arises whether the unscheduled DNA synthesis observed after irradiation can be correlated with the higher resistance to irradiation of guinea-pig oocytes compared with oocytes of rats and mice. In a few experiments the incorporation of ³H-thymidine into mouse oocytes was investigated after irradiation with 200 rad of X-rays, which kill almost all oocytes in less than 24 h. There was no autoradiographically detectable incorporation of ³H-thymidine into mouse oocytes, which is in accordance with the suggestion of a correlation between the extent of unscheduled DNA synthesis and repair synthesis, and the survival of the oocytes after irradiation.

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¹ Rasmussen, R. E., and Painter, R. B., *Nature*, **203**, 1360 (1964).

² Rasmussen, R. E., and Painter, R. B., *J. Cell Biol.*, **29**, 11 (1966).

³ Hill, M., *Intern. J. Radiat. Biol.*, **13**, 199 (1967).

⁴ Evans, R. G., and Norman, A., *Nature*, **217**, 455 (1968).

⁵ Painter, R. B., and Cleaver, J. B., *Radiat. Res.*, **37**, 451 (1969).

⁶ Peters, H., and Crone, M., *Arch. Anat. Microsc. Morphol. Exp.*, **56**, 160 (1967).

⁷ Ioannou, J. M., cited by Beaumont, H. M., *Effects of Radiation on Meiotic Systems*, 71 (IAEA, Vienna, 1968).

Sarcoma Blockade *in vivo* : Rabies-Rous System in Chickens

A RECENT review¹ describes the systems involved in inhibition of viral oncogenesis by non-oncogenic viruses and emphasizes the possible use of attenuated viruses as anti-neoplastic agents. This communication describes the total *in vivo* blockade of the tumour produced by