While males and females did not differ notably in the weight of fat, relative to the total weight the sex difference was marked. The percentage of fat was estimated as 23.7 for the females and 16.8 for the males: on the basis of these figures, the females were approximately half again as fat as the males. Again, since female subcutaneous fat thicknesses were generally greater, but total fat was not notably different, it follows that the sex difference in the proportion of outer and inner fat is considerable. Women carry more fat on and less in their smaller frames.

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Chemical Protection against X-radiation Death in Primates: a Preliminary Report

The ability of a wide range of biochemically active compounds to offer protection to the animal organism against x-radiation death has prompted a great deal of investigation in this direction within the past few years. Such compounds as β-mercaptoethylamine, 2,3-dimercaptopropanol, S2, β-aminoethylisothiuronium · Br · HBr (AET), and numerous others have shown a remarkable degree of protection in mice (*1*).

Outstanding among these compounds is AET. This drug is known to provide 100-percent survival at 30 days against a dose of whole body x-radiation which is 100-percent lethal in untreated mice. It has also been shown to offer more effective protection to mice than does β-mercaptoethylamine on an equimolar basis (*2*).

Considering the increased interest in the prevention of radiation death and the high degree of protection afforded the lower animals by AET, it seemed mandatory that further studies should be carried out in primates. This is a preliminary report (*3*) of work in progress to determine the protective effect of this drug in the monkey.

AET in doses ranging from 100 to 400 mg/kg of body weight has been given intraperitoneally to *Macaca mulatta* monkeys prior to the administration of a dose of whole-body x-radiation. At dose levels above 250 mg/kg, the toxicity of the drug is prohibitive when it is administered intraperitoneally as a single dose. However, the monkey can readily withstand 250 mg/kg in a single dose, if lower doses are administered over a period of a few days, and the doses are gradually increased from 100 to 250 mg/kg. A Westinghouse Quadrocondex 240-kv therapy machine with 1.0 mm Al plus 1.0 mm Cu filters was used for radiating the monkeys. At 240 kv, 15 ma, and a half-value layer (HVL) of 2.0 mm Cu, the machine delivers 13.25 r/min at 100-cm target distance. The animals were secured in a wooden chair which was rotated 4 times per minute in the x-ray beam.

Paterson (*4*), using *M. mulatta,* has found that 100 percent of the animals die as a result of 600 r of whole-body x-radiation administered in a single dose. The dose level of 650 r employed in this experiment, therefore, appears to be well above the LD_{100} and has resulted in the death of 100 percent of the untreated radiated control monkeys in this laboratory.

One animal was injected intraperitoneally on successive days with the following doses of AET: 100, 150, and 200 mg/kg of body weight. Three days after the 200-mg injection, the animal was given 250 mg/kg and was immediately radiated with 650 r of whole-body x-radiation. This animal is surviving at 280 days postirradiation and is apparently normal. A second monkey was injected intraperitoneally with 100 mg of AET per kilogram of body weight and 4 days later was given 150 mg/kg. Two days after the 150-mg injection, the animal received 200 mg/kg and was immediately radiated with 650 r of whole body x-radiation. This animal was surviving and apparently normal at 124 days when it was sacrificed for histological examination.

Peripheral blood studies of the two animals were indicative of the protective ability of the drug. By the fourth day postirradiation in both animals, the number of circulating blood cells was greatly reduced and remained at a low level until the 18th day. On the 18th day postirradiation, the circulating reticulocytes showed a dramatic steep increase in number, with an increase also in the number of circulating leucocytes. The increase in reticulocytes was followed in 4 to 6 days by a return of the hematocrit toward normal. The influx of reticulocytes began to subside by the 30th to 32nd days, and the entire peripheral blood picture had returned to normal by 65 days. In neither case did the peripheral blood picture reach the low levels observed in unprotected control animals that were irradiated at the same dose level.

These preliminary studies indicate that AET in doses of 200 to 250 mg/kg of body weight is capable of protecting the primate from x-radiation death when it is administered prior to irradiation. Expansion of this study is in progress both with regard to the toxicity of the drug and to its radioprotective ability.

Note added in proof. Since this paper was submitted, four monkeys have reached 30-day survival after having received 150 mg of AET per kilogram of body weight in a single dose prior to administration of 650 r of whole-body x-radiation. Peripheral blood studies of these four animals bear out the findings up to 30 days described in this report.

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References and Notes

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Control of Certain Forms of Zooplankton in Mass Algal Cultures

The most common difficulty experienced in growing phytoplankton on a large scale, in tanks of several-thousand-liter capacity, is the invasion of the cultures by various forms of zooplankton. In our cultures (*1*), the common offenders are crustaceans, especially the members of the subclass Copepoda. Upon entering cultures of such forms as *Chlorella,* these pests rapidly multiply to such an extent that they consume most of the plant cells, rendering the cultures worthless.

We have tried a number of measures to prevent contamination with zooplankton of open-air algal cultures or to free the cultures from these animals after they become established. However, this was usually impossible to achieve because some eggs, juveniles, or adults were either left behind or quickly reintroduced. Other workers (*2*) have reported contamination in their open-air algal cultures and also that attempts to exterminate the undesirable forms were practically unsuccessful.