tion possessed approximately 7% of the total activity (Table 1). Since the slight activity of the mitochondrial and supernatant fractions can probably be attributed to contamination by submicroscopic particles, the data suggest that the lactonase activity is an exclusive function of microsomes. It is possible that other systems may also be entirely localized in these tissue particles (see, for example, *6, 7*).

The present data, which were obtained in the course of investigations on polyketo acids, are presented in the belief that they may be of interest to those concerned with the study of cellular particulates. The finding of localization of enzymatic activity in the submicroscopic particle fraction should be considered in the light of the suggestion (*8*) that these submicroscopic particles are formed as a result of mitochondrial disintegration.

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Membrane Resistance Changes in the Course of Axonal Spikes Modified by Low Na^+ Concentration[1]

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The size, duration and propagation velocity of the axonal spike are known to be altered by changing the environmental Na^+ concentration (*1*). This means of reversibly altering the properties of the spike affords an opportunity to study the course of the correlated resistance changes of the excitable membrane during activity of the nerve fiber.

The resistance change was measured on cleaned giant axons of the squid (*Loligo pealii*) essentially as was done by Cole and Curtis (*2*). Transversely oriented external Ag-AgCl electrodes, although not as satisfactory as the platinum-platinum black electrodes of Cole and Curtis, were used. The measuring electrodes were slightly misaligned. Therefore, in addition to the a-c bridge signal, they also recorded a derivative of the spike. It was deemed desirable to carry out all the measurements at room temperature (25°–26° C), at which the axons nevertheless remained functional for as long as 5 hr. At these high temperatures the spike is brief, and the a-c bridge was therefore supplied with a 25-kc sine wave input, to provide good resolution of the resistance changes. The detector was a differential amplifier flat to 50 kc (6 db down at 150 kc), driving one beam of a dual cathode-ray oscillograph. The second beam carried a simultaneous record of the first differential of the spike.

Fig. 1 illustrates the membrane resistance changes observed during activity of one axon, successively bathed in sea water or in artificial sea water in which 40% or 60% of the NaCl had been replaced by choline chloride. Despite the slower, smaller, and broader spikes in the Na^+ poor media the onset of the resistance change occurs in the same phase of the spike—namely, approximately at the maximum of the first differential of the latter. The shift occurs rapidly and reversibly on changing the bathing medium.

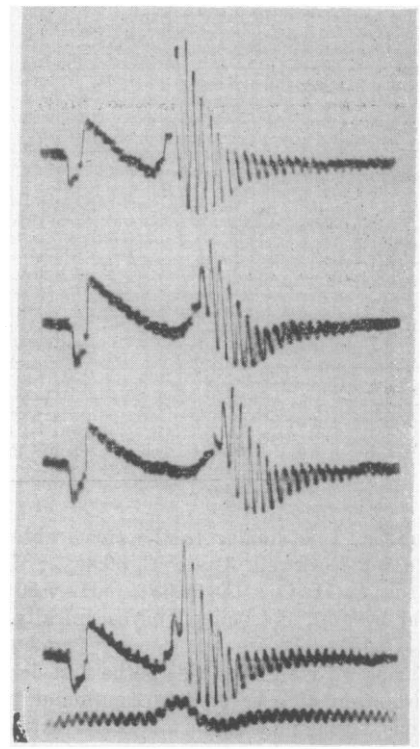

FIG. 1. The resistance changes of the active axonal membrane in relation to modifications of the spike form produced by altering the external Na^+ concentration. The first 4 traces represent resistance measurements in sea water, in artificial sea water containing only 60% and 40% Na^+, and again in sea water. The lowest record shows the diphasic spike recorded in sea water and at low amplification from electrodes on each side of the impedance measuring pair. A 25-kc signal is superimposed. The initial base lines of the upper 4 records show that the a-c Wheatstone bridge was balanced for the resting nerve fiber. After the stimulus artifact (lasting approx 70 μsec) and the electrotonic potential, there is seen the onset of the propagated spike. Before this has reached its crest, the membrane resistance falls, and the resulting bridge imbalance is signalized by the appearance of the 25-kc carrier. The maximum resistance changes from above downward are 3.2%, 2.1%, 2%, and 2.7%.

[1] This work was carried out at the Marine Biological Laboratory, Woods Hole, Mass., partly under a grant to one of us (H. G.) from the U. S. Atomic Energy Commission under contract AT (30-1)-1076.

The greatest changes measured with our cell were approximately 3% of the total resistance. This value, of course, represents the much greater fall of the membrane resistance, shunted by the invariant low resistance of the fluid. Cole and Curtis obtained for the same measurement values as high as 7%, but their higher values can be ascribed to the smaller amount of shunting fluid in the measuring cells used by them. A few experiments using oil as the bathing medium gave much higher values. The resistance changes were largest for sea water and progressively smaller, but reversibly so, for the progressively Na^+ poorer solutions. On the other hand, there was a steady decrease of the amount of the measured resistance change with time.

The experiments reported here indicate that the membrane resistance change is a consequence of other events in the axonal membrane. They also constitute a further demonstration of the importance of the Na^+ component of the local circuit, first because the correlated temporal courses of the spike and of the resistance change are both functions of the external Na^+ concentration and, second, because of the magnitudes of both the spike and of the resistance change are also functions of the external Na^+ concentration. The latter correlation is of special importance to theoretical concepts of the processes involved in excitation and propagation.

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Blood Transfusion in Irradiation Hemorrhage[1]

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Among the postirradiation findings characteristic of near-lethal (LD_{50}–LD_{100}) exposures to ionizing radiation are spontaneous abnormal bleeding and anemia. Because of the prominence of thrombocytopenia and anemia in the abnormal bleeding syndrome of irradiation sickness, it is natural to assume that the frequent administration of fresh whole blood transfusions might be of considerable therapeutic value in the control or prevention of this type of hemorrhage. In spite of the logical nature of this anticipation, there are no experimental or clinical data to support the contention that blood transfusions will be of value in irradiation injury other than in the treatment of initial shock or in the prevention of anemia. Since no American doctor entered either Hiroshima or Nagasaki short of 4 weeks after the bombing, early laboratory data from these disasters are, for all practical purposes, nonexistent. In the absence of human data, our only recourse is to establish the pathologic picture and a therapeutic program based on observations carried out on the experimental animal.

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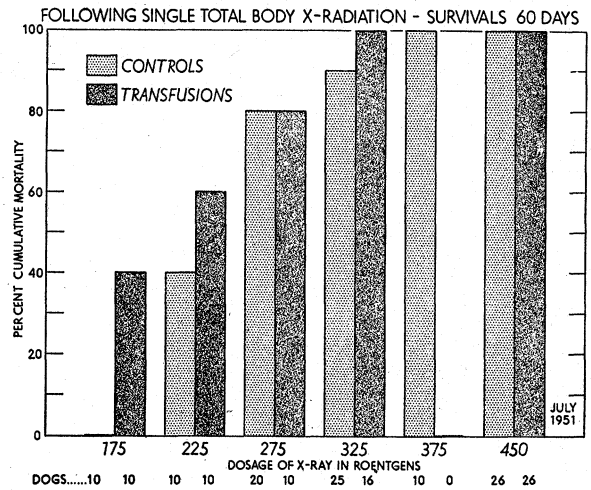

FIG. 1. Cumulative mortality in transfused and nontransfused dogs after exposure to x-radiation.

This is a study of the therapeutic value of blood transfusion given, without antibiotics, to determine whether this procedure will prevent irradiation hemorrhage and/or improve the survival rate in the x-irradiated dog. The dog was chosen because in many respects its response to total-body irradiation is similar to man. This animal differs in one important respect in that its blood types are much less well defined. As seen below, the results obtained from transfusion alone are the reverse of those anticipated.

One hundred and seventy-three dogs were exposed to single doses of total-body x-irradiation at the following dosage levels: 175, 225, 275, 325, 375, and 450 r. The animals were divided into two groups; one group of 101 dogs served as controls, and the other group of 72 was transfused with citrated fresh whole blood 3 times a week beginning on the fourth postirradiation day. Five ml/kg of body weight was administered on each day the animal was transfused. In addition to this blood the animal also received a volume of blood equivalent to the amount withdrawn for study just prior to each transfusion. No other treatment was administered.

For comparative purposes the experiment was so arranged that animals receiving blood were paired with control animals of approximately the same size, which were irradiated under similar conditions on the same day. All were mongrels, and both male and female dogs were used.

Total-body exposures were administered, placing the unanesthetized dog in a canvas sling suspended before the energy source, a GE Maximar 250-kv,