muscle (5) were chromatographed on a mixture of silicic acid and Celite (6) (3:1 by weight). The cardiolipin was adsorbed on the column from benzene, and the column was developed with chloroform containing ethanol (5 percent by volume). The column was extruded, and the zones were made visible by streaking with an alkaline permanganate solution (7). The zones were cut and eluted with ethanol, and the eluate was concentrated to dryness under reduced pressure at room temperature. Approximately 50 percent of the cardiolipin was retained at the top of the column and could not be moved down the column with 5 percent ethanol in chloroform. The top zone was therefore rechromatographed, with 20 percent ethanol (by volume) in chloroform as the developer, and then gave additional zones.

Each of the cardiolipin preparations could be separated into a number of fractions. The exact number of fractions, however, was not the same for each preparation and varied from four fractions found in one case to eight in another. All fractions were biologically active (3). In every case approximately 20 percent of the material placed on the column was not moved from the top of the column under the conditions of development, and hence there is no reason to suppose that additional fractions could not have been obtained.

Three zones, containing approximately 50 percent of the material placed on the column, were found to be present in each of our preparations. These zones were found in approximately the center of the column when the column was developed with (i) four column lengths (8) of chloroform containing 5 percent ethanol (zone 1); (ii) four column lengths of chloroform containing 20 percent ethanol (zone 2); (iii) eight column lengths of chloroform containing 20 percent ethanol (zone 3).

In an attempt to identify the individual acids which might be expected to be present in the cardiolipin of zones 1, 2, and 3, each zone was reduced in ether solution with excess lithium aluminum hydride; after treatment with water in the usual manner, the ether phase was concentrated to dryness, and the resulting oil, which should contain the alcohols corresponding to the acids originally present in the zone, was fractionated by distillation at a pressure of 10 μ.

In each case, only one such alcohol was found in any one zone. The alcohols distilled at the following temperatures: zone 1, 83 to 85°C; zone 2, 118 to 120°C; zone 3, 132 to 135°C. When the three alcohols were mixed together, it was still possible to separate them by fractional distillation. The fractions distilled in the same temperature range.

The undistilled alcohol from each zone was also examined chromatographically. Only one zone was found in each case. A mixture of silicic acid and Celite was used as the adsorbent, and the column was developed with benzene containing 1 percent *t*-butyl alcohol (by volume).

On the basis of carbon and hydrogen analyses, the ultraviolet absorption spectrum, the reaction with maleic anhydride, and the melting point of the alcohol obtained after reduction with hydrogen in the presence of a platinum catalyst (9), the alcohols obtained from zones 1 and 2 were tentatively identified as 1-dodecanol (corresponding to lauric acid) and 9,12,15-octadecatrienol (corresponding to linoleic acid), respectively. The alcohol from zone 3 was not identified. Analysis indicated the presence of more than one hydroxyl group.

The results are such as would be expected if the usual preparations of cardiolipin were mixtures in which the components differed in their fatty acid moiety.

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Protective Effect of a Colchicine Derivative in Mice Exposed to X-radiation

The profound effect of colchicine upon mitotic activity has been described in abundant detail (1). Results of numerous cytological studies of a combination of colchicine treatment and x-irradiation have also been reported (1, 2). We find no references to effects of colchicine on survival of mammals given whole body irradiation, possibly because adverse rather than protective action is anticipated.

Table 1. Data on survival of mice given an intraperitoneal injection of 1 mg of trimethyl colchicinic acid methyl ether *d*-tartrate 24 hours prior to x-irradiation.

Irradiation (r)	No. of mice per group	Percentage that survived (28 days)	
		Control	Treated
900	40	70	98
950	20	25	75
1100	15	0	80
1100	20	0	45
1100*	16	0	56

* 0.5 mg of the colchicine derivative.

The primary object of the study described in this report was to alter the sensitivity of bone marrow to x-irradiation. The provisional assumption was made that the sensitivity of these cells would be reflected in survival of the animal. In principle this appears to be a vast oversimplification, although in practice the neutralization of other variables may leave the desired association in evidence. A less distant relationship may be one between marrow sensitivity and peripheral leucocyte count (3).

There does not seem to be convincing evidence that cells in colchicine-induced metaphase are more sensitive to radiation than cells in their normal state, and our expectation slightly favored an increase rather than a decrease in resistance. The mere fact of an increase in survival would not, of course, indicate a specific increase in resistance of colchicine-treated cells in preference to any of a number of other processes which might be responsible, but the first step was to determine whether or not survival would be altered by pretreatment with colchicine.

The present brief report is preliminary in nature. The mice used were (BALB/c × DBA/2) F_1 females 12 to 15 weeks old, kept in individual cages. A Van de Graaff generator, operating at 2.5 Mev; 0.6 ma; HVL, 1 cm of lead; TSD, 1 m; and dose rate, 250–300 r/min was used for irradiation (4). [Further details are to be found in (5).] The colchicine derivative used was trimethyl colchicinic acid methyl ether *d*-tartrate (N.C.I. No. 1136), some of the characteristics of which have been described by Leiter and his associates (6). This was given as an intraperitoneal injection of 1 mg per 20 to 25-g mouse in 0.2 ml of saline, 24 hours prior to irradiation.

As shown in Table 1, survival was considerably better in mice that had been given the colchicine derivative than in controls, the maximum difference being

roughly equivalent to a dose reduction of 20 percent. In five experiments (75 mice), no untreated mice survived as long as 2 weeks after exposure to 1100 r, and in four experiments, only one of 90 mice survived 1000 r. In the experiments described in this report, treatment with the colchicine derivative was more effective than treatment with bacterial endotoxin (*5*), although exact optimal dosages have not been established for either compound.

Selective alteration of sensitivity to x-irradiation is of great interest. A determination of whether or not such selective alteration has been accomplished in the experiments described here awaits further study, as does the question of an association between effect on mitosis of marrow cells and survival.

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Localization of Generator Structures of Electric Activity in a Pacinian Corpuscle

In a large number of sense organs the afferent nerve ending is enclosed in an adventitious structure, the end organ. The question of what the end organ's function is goes back to the early days of sensory physiology. Is it a link in the chain of events which transduce stimuli into nerve impulses, or does it merely play a passive role in reception? The question is here asked for the case of the Pacinian corpuscle. The end organ of Pacinian corpuscles—namely, the capsule—is large enough to allow its dissection. It consists mainly of a peripheral zone (mean transversal diameter 650 μ) with concentrically arranged lamellae and a thin, more compact inner core (transversal diameter about 25 μ) with bilaterally arranged lamellae enclosing the nonmyelinated nerve ending (*1*). The peripheral zone could be peeled off by dissection under a microscope with dark-field or phase-contrast illumination while the receptor's ability for producing generator and propagated potentials in response to mechanical stimulation was tested. Single Pacinian corpuscles of the cat's mesentery were isolated, and these, together with a length of afferent axon, were set up in a bath containing an oxygenated Krebs solution. Mechanical stimulation of the corpuscle was provided by the finely graded deflections of a piezoelectric crystal (*2, 3*). The arrangement for recording of the receptor's electric activity has been described in previous papers (*3, 4*).

When the capsule's peripheral zone is progressively removed, an increase in threshold for producing propagated impulses in response to mechanical stimuli is usually observed. But otherwise no significant changes in the mechanoreceptor properties of the corpuscle are found. The capsule can be peeled off, leaving the inner core exposed without causing impairment of the receptor's ability to produce generator and propagated potentials. It would appear therefore that the peripheral zone, which amounts to about 99 percent of the corpuscle's entire structure, is not required for mechanoreception (Fig. 1).

Due to the intimate relation between the inner core and the nerve structures, it was not possible to remove entirely the former without causing damage to the nerve ending. Small fragments of the core could, however, be cut out, or incisions could be made into the core tissue, without the preparation losing its characteristics as a mechanoreceptor.

In a capsule in which the peripheral zone is stripped off, myelinated or nonmyelinated parts of the axon which ordinarily lie inside the capsule can be compressed, selectively, while their mechanoresponsiveness is being tested. A fine steel hook, driven by a micromanipulator, was used for compression. If the region of the first node of Ranvier (ordinarily intracorpuscular) is compressed, the production of regenerative potentials in response to mechanical stimuli is abolished. Generator potentials can, nevertheless, still be detected. The effect is reversible if low pressures are employed.

Functioning of the nonmyelinated nerve ending is required for the production of generator potentials. After 36 hours of Wallerian degeneration of the corpuscle's afferent axon *in situ*, no generator potentials can be detected in response to mechanical stimulation. In addition, support for the foregoing statement comes from compression experiments. The nonmyelinated terminal stretch is long enough (600 μ) to be compressible, in part, or along its entire length, by a steel hook. Upon compression of the entire ending, all sign of generator potential disappears. However, production of electric activity does not require that the ending be intact. When a distal portion of the ending is compressed, this portion, only, becomes irresponsive. The intact central stump continues, nevertheless, to give generator potentials when stimulated mechanically. The effect is reversible, if low pressures are used. Furthermore, a distal portion of the corpuscle, including a fragment of capsule and nerve ending, can be amputated without immediate loss of the mechanoreceptor properties of the corpuscle's central remains. It is concluded that the regenerative potential is set up at the first intracorpuscular node of Ranvier (*5*) and that the generator potential arises at various active membrane sites distributed along the nonmyelinated nerve ending.

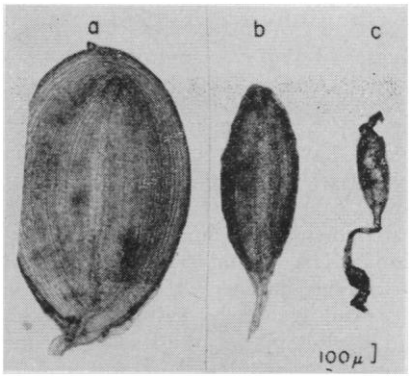

Fig. 1. Phase-contrast photomicrographs of an unstained living Pacinian corpuscle of which the capsular structure has been progressively removed. (*a*) Corpuscle before dissection; (*b, c*) two stages of the dissected corpuscle. Note that in *c* practically only the inner core—that is, about 1 percent of the corpuscle's entire structure—is left over, intact. The corpuscle's ability to produce impulses in response to mechanical stimuli remained unimpaired at all stages of dissection shown.

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