then becomes evident that 10 μg/ml of isonicotinic acid hydrazide has the same effect on oxygen uptake as has 1000 μg/ml of 1-isonicotinyl-2-isopropylhydrazine.

Conclusions. 1. The oxygen consumption and catalase activity of both virulent and attenuated strains of tubercle bacilli was reduced significantly by isonicotinic acid hydrazide from 2 different laboratories while the activity of succinic dehydrogenase was unaffected. 2. 1-isonicotinyl-2-isopropylhydrazine slightly inhibited the oxygen consumption of both virulent and attenuated strains of tubercle bacilli, but did not modify the action of succinic dehydrogenase of these cultures. However, the catalase activity of the attenuated BCG strain was significantly reduced, while the catalase activity of the virulent strains was unaffected.

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Effect of Age on Wallerian Degeneration in the Rat.* (19589)

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If a peripheral nerve is cut that portion of the nerve distal to the point of section undergoes a series of changes characteristic of Wallerian degeneration. Previously it has been shown that in cat sciatic nerve degenerating after nerve section there is an increase in the concentration of nucleic acid (1) related to cellular proliferation, and a decrease in the concentration of phospholipid (2) related to the destruction of the myelin sheath. Similar changes occur in the sciatic nerve of the rat, although the degeneration process is speeded up considerably(3). In experiments preliminary to those described in the above paper it became apparent that in the sciatic nerve of the rat the concentration of both nucleic acid and phospholipid varied with the age of the animal. Since it has been frequently stated that Wallerian degeneration proceeds more rapidly in younger animals(4), it was decided to study the effect of age on the concentration of nucleic acid and phospholipid both in normal nerves and in the peripheral stump of nerves degenerating after nerve section.

Methods. The sciatic nerve on one side of each of 2 groups of male Sprague-Dawley rats was sectioned high in the thigh. One group of rats was 60 days old (body weight = 205 $\pm$ 5 g) and the other was 160 days old (body weight = 419 $\pm$ 8 g). Both groups were maintained on an adequate synthetic diet. After either 8 or 16 days the animals were killed and the distal degenerating segment of nerve removed. In none of the animals was there postmortem evidence of regeneration. A similar length of sciatic nerve was taken from the opposite side to serve as a control. Phospholipid was determined in a lipid extract of the nerve(2). Nucleic acid was determined by ultraviolet absorption using a hot trichloroacetic acid extract of the residue remaining after the extraction of lipids and acid-soluble compounds(1). Details of the operation, analytical procedures, and the method of recording the results have already been published(3).

Results. Nucleic Acid. Table I shows that the concentration of nucleic acid in the sciatic nerves of the 60-day rats was significantly ($P < 0.001$) greater than that in the nerves

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TABLE I. Effect of Age on Concentration of Nucleic Acid in Sciatic Nerve of the Rat. (mg P/100 g wet wt.)

		60-day group	160-day group	Mean difference	P*
Intact nerve	Mean	19.3± .57† (16)‡	11.7± .21† (16)‡	7.6± .61†	<.001
8 days after section	Mean	51.8±2.59 (8)	36.7± .96 (5)	15.1±2.76	<.001
	Mean increase (0-8 days)	32.5±2.65	25 ± .98	7.5±2.83	<.01
16 days after section	Mean	56.3±2.66 (8)	48.8±1.66 (10)	7.5±3.14	<.05
	Mean increase (8-16 days)	4.5±3.71	12.1±1.92	−7.6±4.18	>.05
	Mean increase (0-16 days)	37 ±2.72	37.1±1.67	− .1±3.19	>.9

* Significance of mean difference between 60-day group and 160-day group by 't' test.
† Standard error of mean. ‡ No. of animals in group.

TABLE II. Effect of Age on Concentration of Phospholipid in Sciatic Nerve of the Rat. (mg/100 mg wet wt.)

		60-day group	160-day group	Mean difference	P*
Intact nerve	Mean	8.14±.17† (16)‡	7.66±.13† (17)‡	−.48±.21†	<.05
8 days after section	Mean	4.90±.30 (8)	6.48±.25 (6)	1.58±.39	<.01
	Mean decrease (0-8 days)	3.24±.35	1.18±.28	−2.06±.45	<.001
16 days after section	Mean	2.97±.19 (8)	3.43±.11 (10)	.46±.22	>.05
	Mean decrease (8-16 days)	1.93±.36	3.05±.27	1.12±.45	<.02
	Mean decrease (0-16 days)	5.17±.26	4.23±.17	−.94±.31	<.01

* Significance of mean difference between 60-day group and 160-day group by 't' test.
† Standard error of mean. ‡ No. of animals in group.

of the 160-day animals. As found previously for both the cat(1) and the rat(3), there was an increase in the concentration of nucleic acid during the period 0-8 days after nerve section. The table also shows that for this period the mean increase for the 60-day animals was significantly ($P < 0.01$) greater than that for the 160-day animals. It will be noted that the increase in the concentration of nucleic acid over the 0-16 days period was not significantly different in the two groups. The nucleic acid entered the nerve more rapidly in the younger animals.

Phospholipid. Table II shows that, as for nucleic acid, the concentration of phospholipid was significantly ($P < 0.05$) greater in the nerves of the 60-day rats than in the nerves of the 160-day animals. In confirmation of previous findings(3), there was a decrease in the concentration of phospholipid during both the periods 0-8 days and 8-16 days after nerve section. Table II shows that during the period 0-8 days the mean decrease for the 60-day animals was considerably ($P < 0.001$) greater than that for the 160-day group, whereas during the period 8-16 days the decrease for the 160-day animals was greater than that for the 60-day group ($P < 0.02$).

Discussion. These experiments show that the concentration of both nucleic acid and phospholipid in the sciatic nerve of the rat is greater in younger animals than in older. After nerve section the more rapid increase in the concentration of nucleic acid in the younger animals probably represents a more rapid cellular proliferation, and the more rapid decrease in the concentration of phospholipid probably represents a more rapid loss of myelin material. This confirms previous histological studies(4) showing that Wallerian degeneration proceeds more rapidly in younger animals.

In the younger animals the more rapid increase in the concentration of nucleic acid is

accompanied by a more rapid decrease in the concentration of phospholipid. This finding is consistent with the hypothesis that the proliferating cells provide enzymes for the chemical destruction of the lipids of the myelin sheath. Results similar to those reported above have been obtained with other groups of animals kept under a wide variety of dietary conditions.

Summary. The sciatic nerves of a group of rats 60 days old contained a higher concentration of both nucleic acid and phospholipid than the nerves of similar rats 160 days old. After section of the nerve there was an increase in the concentration of nucleic acid and a decrease in the concentration of phospholipid in both groups. These changes occurred more rapidly in the younger animals.

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Effect of Estrogens on Serum Lipids and Low Density Lipoproteins in Men and Women.* (19590)

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Gofman *et al.*(1) have demonstrated significant sex differences in the concentration of the Sf 12-20 beta-lipoproteins, in that women (25-40 years of age) showed about 25% less of these lipoproteins in their blood than men of similar age group. Since these lower values correlate well with the lower incidence of atherosclerosis in young women it seemed important to observe the effect of administering the sex steroid hormones on the serum lipids and lipoproteins in both sexes. Such observation might help to explain the observed sex differences in atherosclerosis. Eilert(2) did report that estrogens induced a sharp reduction in the ratio of total serum cholesterol to phospholipid because of a rise in phospholipid and a fall in total cholesterol. These findings are contrary to the observations being reported in this study.

Our clinical observations were derived from the study of 16 males and 15 females (whose ages range from 55-65 years) who were given estradiol† in variable physiologic doses of 0.25-0.75 mg daily for periods of 2-4 months. Blood specimens were taken before and at monthly intervals after the start of estrogen administration for the determination of the total serum lipids, cholesterol, cholesterol esters, phospholipids, cholesterol/phospholipid ratio, as well as the serum low density lipoproteins.‡

TABLE I. Average Values of Blood Lipids in Males and Females after Estrogen Therapy.

	Cholest.	Phospho-lipids	Ratio C/P*	Sf 10-20
		Females		
Before therapy	285	12.9	22.4	51
1 mo	290	12.7	23.1	52
2	282	11.4	24.7	55
3	282	12.6	22.4	51.4
		Males		
Before therapy	248	10.9	23	55.2
1 mo	244	9.7	25.1	49.4
2	270	11.1	24.2	52.8
3	266	10.5	25.3	54.7

* Ratio of cholesterol to phospholipids.

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‡ All ultracentrifugal determinations were performed at the Donner Laboratory, University of California, Berkeley.