It will be observed that the animals receiving the irradiated rations to which no cod liver oil was added made greater gains than those which were given the cod liver oil additions. It would seem, therefore, that the growth stimulation in the animals receiving the cod liver oil was the result of the antirachitic property of the cod liver oil, and not of the Vitamin A contained in the oil.

The gains per week of all the animals receiving the cod liver oil additions are approximately the same. In the group receiving the cod liver oil irradiated by the solar rays, the males gained an average of 9.3 grams per week, while those on the non-irradiated oil gained only 8.5 grams per week. The females, however, receiving the non-irradiated oil made slightly better growth, 7.7 grams as against 7.2 grams in the sun irradiated group. These variations are within the range of error of the method employed. The minimum and maximum gains in all the cod liver oil groups are comparable, but less than that of animals receiving optimum rations or of those on the irradiated rachitic ration. These results are in accord with those of previous workers who have shown that the irradiation of cod liver oil does not increase its antirachitic potency.

[1] McCollum, E. V., Simmonds, N., Parsons, H. T., Shipley, P. G., and Park, E. C., Ration No. 2249, *J. Biol. Chem.*, 1920, xlv, 333.

[2] Price, W. A., *Am. J. Dis. Child.*, 1927, xxxiii, 78.

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Influence of Feeding Mixture on the Antirachitic Potency of Cod Liver Oil Concentrate.

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By suitable methods the radio-active substance of cod liver oil can be separated from the oil, and prepared in concentrated form for therapeutic purposes. Recent work by Hart, Steenbock and Hoppert[1] has suggested that such concentrates under certain conditions may fail to be effective. In a study of calcium and phosphorus balances it was observed that the addition of cod liver oil to the ration of milking goats increased the calcium retention.[2] The cod liver oil concentrate (non-saponified fraction), however, was without effect unless it was previously dissolved in oil. The results with the concentrate administered dissolved in oil were comparable to those with the non-saponified cod liver oil.

Since goats are habitually herbivora, taking little or no fat, as such, in their food, it seemed probable that quite different results might be obtained with the omnivora. Drawing conclusions from the work of Hart and Steenbock with goats, one is led to question the availability to the human organism of a concentrate unless given in oil, or in close proximity to a meal which carries fat.

In the study herein reported we have fed young rats a rachitic[4] ration which supplied fat only as it was present in the various cereals of the mixture. To this was added a cod liver oil concentrate equivalent to 1 per cent of cod liver oil. With one group the concentrate was pulverized and dissolved in corn oil (2 per cent of the ration). A second group received the same amount of the concentrate, which was mixed with water and incorporated in the ration. Control animals were given the ration to which was added 1 per cent cod liver oil mixed with corn oil. The rate of growth of the animals on these various food mixtures is summarized in the following table:

TABLE I.

Growth of rats on rickets ration with cod liver oil concentrate.

Ration	Average initial wt. gm.		Ave. wt. 8 weeks gm.		Ave. gain per week gm.		Range of gain gm.		Remarks
	♂	♀	♂	♀	♂	♀			
Rickets Control	46	50	62	65	0.2	0.6	0	46	
Rickets 1% cod oil	64	65	134	127	8.5	7.7	46	88	Cod liver oil mixed with 2% corn oil
Rickets Cod oil con. Equiv to 1% cod oil	58	63	127	123	8.5	7.5	46	76	
Rickets Cod oil con. Equiv to 1% cod oil	70	70	170	139	12.5	8.5	64	122	Con. mixed with 2% corn oil One ♂, 4 young

The animals receiving the cod liver oil and the cod liver oil concentrate mixed with water have averaged the same gain per week, while those receiving the concentrate dissolved in an innocuous oil have made considerably better gains, the males averaging 12.5 grams per week and the females 8.5 grams. On the concentrate mixed with water the males gained only 8.5 grams per week and the females 7.5 grams. The greater gains in the animals receiving the concentrate dissolved in oil, cannot be due to the corn oil, since those receiving the cod liver oil also were given corn oil.

From these results as well as those reported by Hart and Steenbock, it would seem that the most effective method of administering a cod liver oil concentrate is to dissolve it in oil.

This is a complete report.

[1] Hart, E. B., Steenbock, H., and Hoppert, C. A., *J. Biol. Chem.*, 1921, xlviii, 33.

[2] Hart, E. B., Steenbock, H., Kletzien, S. W., and Scott, H., *J. Biol. Chem.*, 1927, lxxi, 271.

[3] Dubin, H. E., and Funk, C., PROC. SOC. EXP. BIOL. AND MED., 1924, xxi, 458.

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Effect on White Blood Cells in Rabbit by Ligation of Common Bile Duct.*

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Jones and Minot[1] have reported that in infectious jaundice, in human beings, the monocytes of the circulating blood are definitely increased in number. Using the supravital technique of Sabin[2] these findings have been corroborated in several cases in the Vanderbilt University Hospital of infectious jaundice. It has further been observed that while the monocytes found in these cases are qualitatively different from those found in the blood of patients having tuberculosis, they nevertheless show more cytoplasmic activity than is customarily the case with the monocytes of the normal individual. The three etiological explanations of these blood changes which seem most probable are: (1) that the rise in monocytes is a direct effect of the invading organism; (2) that it is a specific effect from the retained bile; and (3) that it is a result of some disturbance which has been produced in the liver. If the etiological factor in these changes is dependent upon injury to the liver, the immediate cause may lie either in the production of some injurious agent as a result of the injury to the liver cells, or to disturbed metabolic activity. The following observations are the result of an effort to determine if a specific injury to the liver, caused by a non-infectious process, will produce an increase in the number of the circulating monocytes.

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