

## ANTIRACHITIC PROPERTIES OF COD LIVER OIL CONCENTRATE 51

The table gives a summarized statement of some of the experiments.

TABLE I.

Date of autopsy	No. of rats	Test material added to diet	Histological Findings
5/27/26	4	2% crude U. V. oil and 3% cottonseed oil	Advanced healing
"	2	3% cottonseed oil (controls)	No healing
7/2/26	6	0.1% cholesterol-free U. V. oil	Moderate healing
"	6	0.2% recrystallized irradiated cholesterol	No healing
"	5	controls	No healing
7/19/26	5	0.3% crude U. V. oil and 3% cottonseed oil	Advanced healing
"	5	0.3% cholesterol-free U. V. oil and 3% cottonseed oil	Advanced healing
7/23/26	6	controls	No healing
8/2/26	5	3% cottonseed oil (controls)	No healing
9/26/26	4	ether extract of digitalin	No healing
"	2	0.3% cholesterol-free U. V. oil and 3% cottonseed oil (stored 2 months)	Advanced healing
"	2	controls	No healing

<sup>1</sup> Hess, A. F., Weinstock, M., and Sherman, E., *J. Biol. Chem.*, 1925, lxxvi, 145; *ibid*, 1926, lxxvii, 413.

<sup>2</sup> Rosenheim, O., and Webster, T. A., *Biochem. J.*, 1926, xx, 537.

<sup>3</sup> Nitzescu, I. I., and Popoviciu, G., *Compt. rend. Soc. biol.*, 1926, xciv, 1301.

<sup>4</sup> Shear, M. J., and Kramer, Benjamin, *PROC. SOC. EXP. BIOL. AND MED.*, 1926, xxiv, 51.

<sup>5</sup> Kramer, Benjamin, *Am. J. Dis. Child.*, 1926, xxxii, 466. (Society Transactions).

<sup>6</sup> Hess, J. H., *ibid*.

3225

### Antirachitic Properties of Cod Liver Oil Concentrate.

BENJAMIN KRAMER, S. D. KRAMER, D. H. SHELLING AND  
M. J. SHEAR.

*From the Harry Caplin Pediatric Research Laboratory, The Jewish Hospital  
of Brooklyn, N. Y.*

Cod liver oil causes retention of lime salts and also cures and prevents rickets when administered orally. The assumption, therefore, was made that the beneficial effects of this agent result from its acting directly on the mucosa of the gastro-intestinal

tract. Thus, Zucker and Matzner<sup>1</sup> were unable to obtain healing in rachitic rats with a subcutaneous injection of an extract of cod liver oil, although when administered orally it was invariably potent. Similarly, Lesne and Vogliano<sup>2</sup> failed to cure rickets in rats when cod liver oil was injected hypodermically. On the other hand, Soames<sup>3</sup> reported moderate healing of rickets when cod liver oil was injected either subcutaneously or intraperitoneally. Hess, Weinstock and Hellman<sup>4</sup> were successful in curing rickets with an aqueous suspension of irradiated cholesterol administered subcutaneously; and Wilkins and Kramer<sup>5</sup> have shown that an ether solution of a concentrate of cod liver oil is capable of curing severe rickets in children.

The experiments briefly reported here may shed some light on the discrepancies in the literature just mentioned. The results of these experiments, in which 60 rats were used, are as follows:

1. The unsaponifiable fraction\* of cod liver oil from which most of the cholesterol had been removed (crude concentrate) cured experimental rickets within 14 days when injected subcutaneously in ether solution. The same result was obtained when it was incorporated in cottonseed oil and added to a rickets-producing diet. The curative dose was equivalent to 2 cc. of cod liver oil.

2. When entirely freed from cholesterol by means of digitonin precipitation, an active concentrate was obtained which cured experimental rickets both when fed, and when injected in ether solution. The curative dose was equivalent to 2 cc. of cod liver oil.

3. When palmitin was used instead of ether as the vehicle for injection, healing did not occur when the same dose was administered.

The table gives a summary of some of the experiments.

These observations indicate that the antirachitic substance is as potent when injected subcutaneously as when given orally, provided a suitable vehicle is used.

This potent cholesterol-free concentrate was tested with the aniline hydrochloric acid reagent. It gave a decidedly positive reaction.

---

\* Supplied through the courtesy of Dr. Harry E. Dubin of H. A. Metz Research Laboratory.

TABLE I.

Date of autopsy	No. of rats	Test material	Histological Findings
7/23/26	5	Non-sapon. fraction of cod liver oil, +3% olive oil; in diet	Advanced healing
"	5	Crude extract; injected in ether solution	Advanced healing
"	5	Controls	No healing
9/12/26	5	Cholesterol-free extract; injected in ether solution	Advanced healing
"	2	Controls; injected with ether	No healing
"	6	Cholesterol-free extract; injected in palmitin	No healing
"	3	Controls; injected with palmitin	No healing
"	6	Controls; no injection	No healing
"	6	Cholesterol-free extract, +3% cottonseed oil; in diet	Moderate healing
"	6	Controls; 3% cottonseed oil in diet	No healing

<sup>1</sup> Zucker, T. F., and Matzner, M. J., *Proc. Soc. Exp. Biol. and Med.*, 1924, xxi, 186.

<sup>2</sup> Lesne, E., and Vaglianos, M., *Compt. rend. Acad. d. Sc.*, 1924, clxxvii, 711.

<sup>3</sup> Soames, K. M., *Biochem. J.*, 1924, xviii, 1349.

<sup>4</sup> Hess, A. F., Weinstock, M., and Hellman, F. D., *J. Biol. Chem.*, 1925, lxxiii, 305.

<sup>5</sup> Wilkins, L., and Kramer, B., (unpublished work).

3226

### Antagonism of Barium Chloride and Glandular Extracts on Chromatophores by Epinephrin and Ephedrine.

J. ERNEST NADLER. (Introduced by William Salant.)

*From the Department of Physiology and Pharmacology, Medical Department, University of Georgia, Augusta, Georgia, and the Marine Biological Laboratory, Woods Hole, Mass.*

In the course of a comparative study of the effect of ephedrine and epinephrin on the chromatophores of the Squid, *Loligo Pealii*, it was observed that these drugs antagonize the stimulating action of barium chloride, the extracts of the parathyroid and anterior as well as the posterior lobe, pituitary gland. Epinephrin is not effective as a rule after barium chloride in mammals. Roth<sup>1</sup> described a good case of such action in the frog. Fawcett, Beebe, et al.,<sup>2</sup> found that the stimulation by the extracts of