

# SCIENTIFIC PROCEEDINGS.

ABSTRACTS OF COMMUNICATIONS.

One hundred and thirty-seventh meeting.

*Presbyterian Hospital, February 20, 1924.*  
*President Jackson in the chair.*

113 (2345)

Intarvin in phlorhizinized dogs.

By ETHEL M. BENEDICT and RANDOLPH WEST.

*[From the Department of Medicine, Presbyterian Hospital, Columbia University, New York City.]*

These experiments were undertaken to determine whether intarvin—glyceryl margaric ester—yields extra sugar in the completely phlorhizinized dog. Ringer<sup>1</sup> has shown that propionic acid is quantitatively converted into dextrose in such dogs, and if the  $\beta$  oxidation of saturated normal fatty acids holds, one might expect each molecule of margaric acid to yield one molecule of propionic acid during oxidation in the body. In the phlorhizinized animal this should appear as sugar. 26.8 gm. of intarvin, if pure, could yield 10 gm. of dextrose, assuming that one molecule of the fat would yield one molecule of glycerol and three molecules of propionic acid, and that the glycerol and propionic acid could yield two molecules of dextrose. This calculation takes into consideration the 12 per cent mineral oil added to intarvin but does not allow for the fact that the fat probably is a mixture of about 85 per cent margaric acid and 15 per cent stearic acids combined with glycerol.

Phlorhizin was administered either in olive oil twice a day, or in 1.2 per cent  $\text{Na}_2\text{CO}_3$  every eight hours, subcutaneously. Dogs were fasted for three days before phlorhization, and urine discarded until a constant D:N ratio was obtained for a 24 hour control period, then the animal was fed intarvin or butter mixed with lean meat hash and the urine followed for the following 24 hours or until the D:N ratio returned to the figure obtained for

---

<sup>1</sup> Ringer, A. I., *J. Biol. Chem.*, 1912, xii, 511.

the control period. Toluene or NaF (1 per cent) were the preservatives used, nitrogen was determined by Kjeldahl's method, sugar by the Allihn method, total acetone bodies by the VanSlyke method, and organic acids by the method of Van Slyke and Palmer. The dogs were most irregular in acetone body formation, and the results in this field are not felt to be of much value.

The results of attempts to introduce intarvin by stomach tube were discarded as it was found that some dogs gave "extra sugar" and marked rises in D:N ratio on merely introducing water by stomach tube, a process accompanied by some struggling. Attempts to use phlorhizinized dogs depleted of glycogen by epinephrin were also discarded, as such dogs gave D:N ratios of about 3.0 and in one such animal 10.0 gm. dextrose subcutaneously yielded but 5.5 gm. extra sugar in the urine. One dog yielded about 5 gm. extra sugar following 55 gm. intarvin and 200 gm. lean meat hash eaten, but this dog when fed the same hash and 55 gm. butter yielded about the same amount of extra sugar, so the extra sugar could not be interpreted as coming from intarvin. Before interpreting extra sugar as coming from intarvin the intarvin and meat must be eaten, not given by stomach tube, must be absorbed from the intestine, and the same dog must not give extra sugar on eating butter and meat. There must be a D:N ratio of about 3.70, as the epinephrinized dogs may not excrete sugar quantitatively, while in a dog with control period ratio of 3.59, 10.0 gm. dextrose subcutaneously yielded 9.64 gm. extra sugar—a fact long known.

Bearing these points in mind we report the results on two dogs which fulfill the above requirements. We have not been able to demonstrate extra sugar, nor any rise in acetone bodies nor in organic acids in the urine, but these last facts mean little as butter also failed to give the expected rise in acetone. Although we know that the intarvin disappeared from the intestine, we cannot be certain whether it was burned or stored, though the former seems probable in a phlorhizinized dog on the sixth day of a fast. It is a possibility that larger amounts of intarvin fed, and urinary studies extended for more than 48 hours after the feedings might show extra sugar. Such experiments are being carried out.

We are indebted to Prof. Ralph McKee for a supply of glyceryl margaric ester without mineral oil, for margaric acid, and for intarvin.

Dog 6. Male. 9.5 Kg. Last food November 16, 1923. Phlorhizin in olive oil. Toluene Preservative.

| Date 1923 | Hour       | Phlorhizin | Urine Volume | N          | Urine Dextrose | D:N Ratio | Total acetone | Remarks.   |
|-----------|------------|------------|--------------|------------|----------------|-----------|---------------|--|
|           |            | gm.        | cc.          | gm. per l. | gm. per l.     |           | gm.           |  |
| Nov. 19   | 5 p. m.    | 0.5        |              |            |                |           |               |  |
| 20        | 9 a. m.    | 1.0        |              |            |                |           |               |  |
|           | 5 p. m.    | 1.0        |              |            |                |           |               |  |
| 21        | 5 a. m.    | 1.0        |              |            |                |           |               |  |
|           | 1 p. m.    | 1.0        |              |            |                |           |               | Dog voided. Discarded.   |
|           | 5 p. m.    | 1.0        | 662          | 9.42       | 33.8           | 3.59      | 0.397         | Catheterized.  |
| 22        | 9:30 a. m. | 1.0        | 180          | 8.55       | 32.5           | 3.80      | 0.103         | Catheterized.  |
|           | 1:10 p. m. |            |              |            |                |           |               | Dog ate 32 gm. glyceryl Margaric ester and 100 gm. lean meat hash. |
|           | 1:50       |            |              |            |                |           |               | Catheterized.  |
|           | 5:00       | 1.0        | 652          | 13.3       | 48.5           | 3.64      | 0.280         | Catheterized.  |
| 23        | 9:30 a. m. | 1.0        | 150          | 8.59       | 29.3           | 3.41      | 0.274         | Catheterized. A little vomitus in urine, no visible fat.           |

1:45 p. m. Dog killed. Gastro-intestinal tract below diaphragm dissected out, all contents removed and found to contain 1.9 gm. fat. No stools during experiment.

Dog 8. Male. 13.6 Kg. Last food December 31, 1923. Phlorhizin in olive oil. Urine preservative NaF, final conc. 1 per cent.

| Date 1923 | Hour        | Phlorhizin | Urine Volume | N          | Dextrose   | D:N Ratio | Acetone bodies | Organic acids | Remarks  |
|-----------|-------------|------------|--------------|------------|------------|-----------|----------------|---------------|--|
|           |             | gm.        | cc.          | gm. per l. | gm. per l. |           | gm.            | cc.0.1 N HCl  |  |
| Dec. 2    | 5 p. m.     | 1.0        |              |            |            |           |                |               |  |
| 3         | 9 a. m.     | 1.0        |              |            |            |           |                |               |  |
|           | 5 p. m.     | 1.0        |              |            |            |           |                |               |  |
| 4         | 10 a. m.    | 1.0        |              |            |            |           |                |               |  |
|           | 12:30 p. m. | 1.0        |              |            |            |           |                |               |  |
|           | 5           | 1.0        | 978          | 10.0       | 39.7       | 3.97      | 0.427          | 1392          | Catheterized. Discarded  |
| 5         | 9 a. m.     | 1.0        | 160          | 9.43       | 34.9       | 3.71      | 0.139          | 184           | Catheterized. Dog ate 54 gm. glyceryl Margaric ester and 200 gm. lean meat hash. |
|           | 12:30 p. m. |            |              |            |            |           |                |               |  |
|           | 4:40 p. m.  | 1.0        | 1710         | 8.56       | 33.8       | 3.94      | 0.049          | 780           | Catheterized.  |
|           | 9 a. m.     | 1.0        | 250          | 5.42       | 21.9       | 4.05      | 0.021          | 330           | Catheterized. Dog ate 55 gm. butter and 200 gm. same hash.                       |
| 6         | 12:30 p. m. |            |              |            |            |           |                |               |  |
|           | 9 a. m.     | 1.0        | 1730         | 8.04       | 30.8       | 3.83      | 0.085          | 802           | Catheterized. Dog ate 55 gm. butter and 200 gm. same hash.                       |
| 7         | 9 a. m.     | 1.0        | 275          | 5.42       | 21.2       | 3.91      | 0.050          | 434           |  |