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Antiscorbutic Properties of Methyl-2-Keto-Gluconate.

A. E. SIEHRS, PAUL GOTTARDO, F. G. BRAZDA AND C. O. MILLER.
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From the Department of Physiological Chemistry, Northwestern University Medical School.

The antiscorbutic properties of various substances related structurally to ascorbic acid have been investigated and reported. We have investigated the antiscorbutic properties of methyl-2-keto-gluconate.

Sixteen guinea pigs, between 250 and 300 gm. in weight, were placed on a modified Dutcher scorbutic diet[1] consisting of rolled oats, white wheat flour, and alfalfa flour. They were fed 3 cc. of orange juice daily for 7 days before the start of the test experiment. During this time they showed a constant daily gain in weight. They were divided into 6 groups.

Group 1. Three animals. All showed loss of weight in 10-15 days, followed by the appearance of scorbutic symptoms. One was fed 3 cc. of orange juice at the 23rd day, but died of scurvy at the 26th day. The other 2 were fed 50 mg. and 70 mg. daily of methyl-2-keto-gluconate starting at the 23rd day, after which they quickly gained weight, lost their scorbutic symptoms, and grew steadily. At the 41st day the supplement was removed, and they gradually lost weight, developed scurvy, and died at the 53rd and 55th day, respectively.

Group 2. Two animals. Began to lose weight at the 10th day, and had developed gross scorbutic symptoms by the 15th and 16th days. On the 20th day one animal was started on 100 mg. of supplement daily, but died on the 23rd day. The other was given 70 mg. of supplement daily starting at the 20th day. At the 27th day this was increased to 100 mg., and the animal began to gain

[1] Dutcher, *Ind. Eng. Chem.*, 1924, **16**, 1070.

weight. At the 36th day, when the animal was in good condition, the dose was cut down to 50 mg. daily, and finally discontinued at the 41st day. Scorbutic symptoms developed on the 44th day, and the animal died on the 52nd day.

Group 3. Two animals. Fed 20 mg. of supplement daily until the 38th day, during which time they gained steadily in weight and were in good condition. After removal of supplement, they developed scorbutic symptoms at the 45th day and died of scurvy at the 59th and 60th days.

Group 3. Two animals. Fed 40 mg. of supplement daily to the 38th day and were in good condition and gaining weight. Following removal they developed scorbutic symptoms on the 47th and 50th days, and died of scurvy on the 55th and 60th days, respectively.

Group 4. Two animals. Fed 50 mg. of supplement and gained weight satisfactorily. On the 47th day supplement was removed, and they developed scorbutic symptoms on the 57th day, and died of scurvy at the 66th and 69th days.

Group 5. Two animals. Fed 70 mg. of supplement daily. One showed a satisfactory gain in weight, then became ill and lost weight, and died in 19 days. Autopsy showed no gross pathological signs of scurvy. The other animal gained weight steadily, and the supplement was removed at the 49th day. The animal developed scorbutic symptoms on the 87th day and died on the 103rd day.

Group 6. Two animals. Fed 100 mg. of supplement daily. Both animals gained weight satisfactorily. Supplement was removed at the 47th day, and gross scorbutic symptoms developed at the 51st and 57th days. The animals died of scurvy at the 59th and 74th days, respectively.

In another feeding experiment, one animal was fed the Dutcher diet plus a daily supplement of 70 mg. of the methyl ester for 33 days, during which time it gained weight satisfactorily. The supplement was then removed, and at the 40th day the animal began to lose weight and develop gross scorbutic symptoms. On the 45th day, supplement feeding was resumed, and the animal soon recovered, showing no scorbutic symptoms, gained weight constantly, and at the 110th day was still free of scorbutic symptoms, and was still gaining weight.

Our experiments show that methyl-2-keto-gluconate protects guinea pigs against scurvy when fed at the levels of 20, 40, 50, 70 and 100 mg. per day. In 4 animals it acted curatively in doses of 50, 70, and 100 mg. per day.