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Comparative study of the sugar concentration in arterial and venous blood during insulin action.

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It has been shown by Cori, Cori and Goltz¹ and by Frank, Nothman and Wagner² from the Minkowski Clinic that by comparing the sugar concentration in the femoral artery and femoral vein of rabbits starved for 24 hours, an increased disappearance of sugar from the blood into the muscles can be demonstrated during insulin action. In view of these results it seemed desirable to investigate whether animals receiving glucose plus insulin would not show a stronger intake of sugar by the muscles than animals which received the same amount of glucose but no insulin. As a standard dose 5 gm. glucose per kgm. was given by stomach tube to rabbits previously starved for 48 hours. The insulin was injected intravenously in a dose sufficiently large to prevent a rise in bloodsugar after the glucose ingestion. Blood samples were taken simultaneously from the femoral artery and femoral vein of unanesthetized animals in half hour intervals, 1 to 6 blood samples before the experiment was started and 4 to 8 blood samples after giving either glucose alone or glucose plus insulin. In order to minimize the individual variability of the test animal several comparative experiments, first with sugar alone and then with sugar plus insulin, were performed on subsequent days on the same rabbit. In another group of experiments this was reversed so that first sugar plus insulin and then sugar alone was given to the same rabbit. The data are summarized in Table I. The figures represent the difference in sugar concentration between femoral artery and femoral vein that were observed at the time intervals noted after giving either glucose alone or glucose plus insulin. The figures of each vertical column represent one individual experiment. An average difference between arterial and venous blood sugar for each observation time

¹ Cori, Cori and Goltz, *J. Pharm. Exper. Therap.*, 1923, xxii, 355.

² Frank, Nothmann and Wagner, *Klin. Wochenschr.*, 1924, iii, 581.

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was calculated from the horizontal columns. It will be noted that the average differences for the series with glucose plus insulin are for all observation times greater than those of the series with glucose alone. This would mean that more sugar disappears from the blood into the muscles in the former series than in the latter, or that rabbits receiving insulin plus glucose show a larger intake of sugar by the muscles than rabbits receiving glucose alone.

TABLE I.

The differences between arterial and venous blood sugar that were observed 30, 90.....240 minutes after giving either glucose alone or glucose plus insulin are recorded and the average differences for each observation time are calculated.

Minutes	(A.) Glucose alone		(B.) Glucose plus Insulin	
	Difference F. A.—F. V.	Average difference F.A.—F.V.	Difference F. A.—F. V.	Average difference F.A.—F.V.
	mgm.	mgm.	mgm.	mgm.
30	9; 20; 20; 32; 20; 21;	20.3	18; 27; 23; 31; 27; 27; 27;	25.7
60	4; 11; 28; 18; 4; 7;	12.0	17; 24; 25; 25; 21; 16; 29;	22.4
90	18; 13; 14; 19; 15; 20;	16.5	17; 25; 21; 25; 25; 22; 19;	22.0
120	6; 27; 26; 19; 13;	18.2	23; 23; 20; 35; 29; 21; 24;	25.0
150	4; 6; 19; 20; 12;	12.2	7; 26; 19; 20; 27;	19.8
180	22; 11; 12; 13; 1;	11.8	24; 16; 22; 14; 18; 20;	19.0
210	3; 9; 15; 10;	9.2	20; 12; 9; 13; 20;	14.8
240	2; 5; 1;	2.7	19; 8;	13.5