that before hydrolysis. After short tetanic stimulation the glucose content of the gastrocnemius more than doubled, the average being 28 mg. %. Stimulation was, however, without effect on the maltose content of muscle or on the fermentable sugar content after acid hydrolysis. Apparently, intermediates between glycogen and glucose such as disaccharides do not accumulate in muscle as a result of stimulation. Heart muscle contained about as much glucose as stimulated skeletal muscle and did not contain an appreciable quantity of maltose.

Summary.—The increase in fermentable sugar content of muscle following tetanic stimulation is due to an accumulation of glucose. Maltose does not accumulate as a result of contraction.

7927 P

Cataract in Rats Fed on Galactose.

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A previous publication[1] reported the occurrence of cataractous changes in the eyes of all rats fed on rations containing lactose as the chief source of carbohydrate. Negative results with other carbohydrates tested led to an investigation of galactose as the next logical step. This sugar was fed to young rats at 35% and 25% levels corresponding to the galactose available from the 70% and 50% lactose rations fed in previous experiments.

Four rats on the 35% galactose ration developed mature bilateral cataract in 12, 14, 14, and 37 days respectively (average 19 days), whereas those on the 25% galactose ration were somewhat more delayed. The average time for the development of mature bilateral cataract in 49 rats fed the 70% lactose ration was 10 weeks, approximately 4 times as long. Controls fed on the 70% starch ration showed no eye changes.

The rations used in the experiment are shown in Table I.

Growth was subnormal on both galactose and lactose rations but galactose caused no diarrhea, a consistent result from lactose feeding. Galactosuria was more severe on galactose than on lactose rations. The calcium content of cataractous eyes was of the same

[1] Mitchell, H. A., and Dodge, W. M., *J. Nut.*, 1935, **37**, 37.

TABLE I.

	35% Galactose	25% Galactose	70% Lactose	70% Starch
Casein	15	15	15	15
Starch	35	45		70
Lactose			70	
Galactose	35	25		
Crisco	9	9	9	9
Salt Mixture	4	4	4	4
Cod Liver Oil	2	2	2	2

Brewers' yeast 0.2 gm. fed daily to all animals.

magnitude on the 2 sugars but the increase apparently took place in a shorter time in the rats fed galactose. The calcium content of all eyes showing mature cataract was 3 to 4 times that of eyes from older rats on the 70% starch ration.

TABLE II.
Calcium Content of Cataractous and Normal Eyes.*

Ration Group	Av. Age of Rats (days)	No. of Eyes Analyzed	Condition of the Eyes	Mg. Ca per 100 gm. of eyes (dry weight)
70% lactose	135	14	mature cataract	111.5
70% ''	175	19	'' ''	122.4
70% ''	125	14	immature ''	38.8
35% galactose	32	6	mature ''	105.0
70% starch	185	10	normal	32.1

*Calcium determinations were made by Dr. Helen Sternberger through the courtesy of Dr. Icie G. Macy of "The Children's Fund of Michigan."

A more complete and rapid absorption of galactose from the alimentary canal when the sugar was fed as such than when derived from hydrolytic cleavage, and a slow glycogenesis, may well account for the slightly high blood sugars and galactosuria noted in these rats. The latter finding would also indicate that some of the blood sugar was galactose. Kirby *et al.*[2] found the dextrose concentration of aqueous humor to be parallel to that of the blood. Assuming that galactose in the blood would also be found in the aqueous humor, the lens epithelium would be exposed not only to higher than normal sugar concentration but to the foreign sugar galactose. The work of Kirby *et al.*[3] on tissue cultures of lens epithelium *in vitro* has indicated in a striking manner that galactose is toxic to these cells in much lower concentrations than either glucose or fructose. If the capsular membrane undergoes even slight degenerative changes in the presence of galactose it is not difficult to conceive of an increased permeability of this membrane to the various inorganic

[2] Kirby, D. B., and Wiener, R. v. E., *Trans. Am. Acad. Ophthalmology and Otolaryngology*, 1932, **37**, 165.

[3] Kirby, D. B., Estey, K., and Weiner, R. v. E., *Trans. Am. Acad. Ophthalmology and Otolaryngology*, 1932, **37**, 196.

ions in the surrounding fluids, and a resulting disturbance in colloidal structure of the lens.

Cataract has been associated with parathyroid tetany and a low serum calcium resulting in a change of inorganic ions in the eye fluids which supposedly disturb the colloid equilibrium in the crystalline lens.

It would seem that the perfect transparency of the normal lens must be maintained by an extremely constant balance of inorganic ions and that any interference with the inorganic equilibrium might disturb the colloidal solution and cause some of the proteins of the lens to precipitate.

A number of questions arise as a result of these observations and hypotheses. What other blood and tissue changes are associated with lactose and galactose metabolism? What deficiencies or excesses, if any, will aggravate or hasten cataract development? Is there any food constituent or metabolic product which will protect the capsular membrane against sugar injury?

7928 P

Effect of Rapid Infusion on Venous Pressure: A Test of Cardiac Reserve.

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The response of the heart to increased work is an indication of its reserve strength. This response is measured clinically in various exercise tests, with observation of pulse and respiratory rate changes. These tests operate, at least in part, by increasing the return of venous blood to the heart. A similar mechanism is brought into action by increasing the volume of the venous return to the heart by injecting fluids intravenously. If such fluids are injected rapidly and in large volume, an increased load is put on the right side of the heart.

Since the introduction and widespread use of simple methods of infusion, there has been much discussion of the proper rate of injection of such fluids. In the investigation of this problem, observation of the venous pressure before, during and after the infusion offers the most direct physiological evidence of the ability of the