nerve. The average was 64.1 cu. mm. The rate of carbon dioxide production fluctuated between 17.3 and 176.0 cu. mm. per gm. per hour with an average of 59.2. The apparent respiratory quotients averaged 0.92.

Calculation of the oxygen tension necessary to supply these nerves by Fenn's[1] or Gerard's[2] formula indicated that in all cases sufficient oxygen was present to prevent asphyxia. This has been tested directly in a few experiments.

The influence of carbon dioxide upon the respiration of one of a pair of matched nerves has been studied in 24 experiments. The rate of oxygen consumption decreases in approximately a linear manner to 50% of the control value in the presence of 150 mm. Hg carbon dioxide tension. Above 150 mm. Hg carbon dioxide tension, the rate of oxygen consumption decreases more slowly to about 40% of the control at 300 mm. Hg. The rate of carbon dioxide production is depressed to a slightly greater extent than the rate of oxygen consumption. Above 150 mm. Hg carbon dioxide tension the rate of carbon dioxide production was not constant although in 4 of 5 experiments a depression was present.

5768

Excretion of Xylose.

ELLA H. FISHBERG AND L. FRIEDFELD.

From the Chemical Laboratory of the Beth Israel Hospital, New York City.

The constancy of the rate of disappearance of xylose from the blood of animals[1] and the change in the rate of elimination after experimental damage to the kidney membrane[2] suggested the possibility of its use as a delicate indicator of damaged renal function. The present availability of xylose would render it an excellent substance for kidney function tests in analogy to the liver function tests which employ such sugars as galactose, levulose, etc. Xylose is particularly suited for this purpose since its elimination is practically independent of the liver.

On the oral administration of 50 gm. of xylose, 25±5% is elim-

[1] Fenn, W. O., *J. Gen. Physiol.*, 1926, **10**, 767.

[2] Gerard, R. W., *Am. J. Physiol.*, 1927, **82**, 381.

[1] Fishberg, E. H., *J. Biol. Chem.*, 1930, **86**, 665.

[2] Fishberg, E. H., and Dolin, B. T., *Arch. Int. Med.*, 1930, **46**, 321.

TABLE I.
Normal excretion after oral administration of 50 gm. of xylose.

Time (Hours)	Volume (cc.)	% Reducing Substance	Gm. Reducing Substance
1	36.5	1.7	0.6
2	41.0	3.2	1.3
4	102.0	4.5	4.6
6	172.0	2.9	5.0
8	98.5	1.8	1.8
11	60.0	1.3	0.8
24	151.0	0.2	0.3
Total	661.0		14.4

inated by a normal man within 24 hours (Table I) in the urine. The normal kidney can concentrate this substance up to at least 25% within 2 hours. In the blood the non-fermentable reducing substance rises to 80 mg. % within 3 hours, and after 6 hours the normal value of 28 mg. % is approached. (Table II.) These determinations were carried out by the method of Somogyi.[3]

TABLE II.
Excretion of xylose in nephritic patient.

Time (Hours)	Volume (cc.)	% Reducing Substance	Gm. Reducing Substance
1	65.0	Neg.	Neg.
2	37.0	0.1	0.04
5	46.0	0.2	0.10
8	40.0	0.15	0.06
11	115.0	0.3	0.3
24	325.0	0.4	1.3
Total	628.0		1.80

TABLE III.
Concentration of non-fermentable reducing sugar in blood.

Time Hr.	Normal Non-ferm. Red. Subst. Mg./%	Nephritic Non-ferm. Red. Subst. Mg./%
0	28	29
1.5	61	80
3.0	80	114
5.0	42	136

On the other hand, in cases of kidney damage the non-fermentable reducing substance in the blood keeps on rising, so that after 6 hours there may be 125 or more mg. % of non-fermentable reducing substance in the blood. The elimination in the urine is much lower, so that figures of 1 to 2 gm. total excretion in 24 hours instead of the

[3] Somogyi, M., *J. Biol. Chem.*, 1927, **75**, 33.

normal 12-13 gm. are encountered. The inability of the damaged kidney to concentrate the xylose is particularly striking, so that in cases of severe impairment of renal function, instead of the normal 3% concentration of reducing substance in the urine after 2 hours, we find 0.10% or even less.