

8129 P

Metabolism of Tissues in Cerebrospinal Fluid and Other Media.

J. E. DAVIS AND A. B. HASTINGS.

From the Lasker Foundation for Medical Research, Department of Medicine, University of Chicago.

Artificial media, approximating the normal fluid environment of cells, are widely used for the study of the metabolism of excised tissues. In the differential method of Warburg¹ it is possible to employ a solution which has the physiologically normal calcium ion concentration of 1 millimol per liter at pH 7.4. The composition of the solution which we refer to as our "standard" solution of reference is given in Table I.

TABLE I.
Metabolism of Tissues in Various Media.

Composition of solutions:

- I. Standard solution. NaCl, 114 mM/L; NaHCO₃, 25mM/L; KCl, 6 mM/L; CaCl₂, 1.4 mM/L; Na₃Citrate, 0.7 mM/L; Na₂HPO₄·NaH₂PO₄, 1.0 mM/L; Glucose, 0.2%. (Ca⁺⁺ = 1.0 mM/L, pH = 7.4.)
 II. Solution I plus sodium indigo disulfonate, 0.1 mM/L, and without Na₃Citrate.

Tissue	Medium	No. of Ex- periments	Metabolism		
			Q _{o₂} emm./mg./hr.	% Change	Q _{co₂} ^{o₂} emm./mg./hr.
Rat liver	Solution I	5	10.2	—	0.0
" "	Cerebrospinal Fluid	5	14.9	+46	0.0
" "	Solution II	5	17.7	+74	0.8
Mouse liver	Solution I	5	12.4	—	2.0
" "	Cerebrospinal Fluid	5	14.4	+16	1.0
" "	Solution II	5	17.3	+40	2.8

Serum has been used successfully by Warburg² as a medium for the study of the metabolism of excised tissue. The complication in technique which arises from the buffer action of the serum proteins has been one of the drawbacks to its widespread use in the differential method, however. On the other hand, cerebrospinal fluid has all the biological advantages of serum and, in addition is protein-free. This permits its direct use as a fluid medium for excised tissues. Through the cooperation of the Department of Neurology, we have had an opportunity to compare the metabolism of tissues in cerebrospinal fluid with that in our standard salt solution medium. The results are given in Table I. In every instance the oxygen con-

¹ Warburg, O., *Biochem. Z.*, 1924, **152**, 51.

² Warburg, O., *Biochem. Z.*, 1925, **164**, 481.

sumption has been *higher*, and the aerobic glycolysis has, when present, been *lower*, in the cerebrospinal fluid than in the standard salt solution.

The reason why the cerebrospinal fluid should thus appear to be a superior medium for the metabolism of mouse liver is not known, although we are not inclined to attribute its superiority to differences in concentrations of inorganic ions.

An example of one way in which the metabolism of tissues may be markedly increased by the presence of organic substances—in this instance a reversibly oxidizable dye, indigo disulfonate—is also shown in the table.

8130 C

Blood Purine Derivatives in Migraine.

JAMES BEAZELL AND LATHAN A. CRANDALL, JR.

From the Department of Physiology and Pharmacology, Northwestern University Medical School, Chicago, Illinois.

In an effort to uncover any possible abnormality in purine metabolism, the blood of 12 patients who suffer from migraine headaches was analyzed for adenine nucleotide nitrogen, purine nitrogen, and uric acid.

Methods for the determination of these substances in blood have, in the past, been unreliable. So-called normal values varied considerably according to the method used. Although the method employed in this study appears to be a distinct improvement on those formerly used, its reliability in the hands of different investigators remains to be established. Since its introduction no published reports of its use have appeared. Because the values obtained by this method cannot be compared with those obtained by other methods it was necessary to study the blood of normal subjects for comparative purposes.

The blood was obtained from 3 of the migraine patients during attacks. From the remaining 9 it was obtained during the interval between attacks. The determinations for adenine nucleotide nitrogen, and purine nitrogen were made according to the methods of Kerr and Blish¹; those for uric acid according to Benedict's method.² All determinations were made in duplicate on fasting blood.

¹ Kerr and Blish, *J. B. C.*, 1932, **98**, 193.

² Benedict, *J. B. C.*, 1931, **92**, 161.