but that raising the venous pressure to about 24 cm. of blood will, at least sometimes, open up sufficient collateral circulation to prevent infarction.

9702 P

Relation Between B.M.R. and S.D.A. of Proteins.

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The specific dynamic action of proteins and certain amino acids has been reported to be greater than normal in conditions where a reduced basal metabolic rate prevails, *viz.*, in undernutrition[1] and fasting.[2] On the basis of data obtained in routine class experiments on unselected subjects, this same inverse relationship between specific dynamic action and basal metabolic rate seems to apply to persons in a presumably normal nutritional state. The subjects were 13 male and 9 female university students selected at random from a class of 40. They came to the laboratory in the early morning in a post-absorptive state and underwent the following routine:

	Min.
Rest	30
Metabolism Test†	10
Protein Meal‡	35-50
Rest	30
Metabolism Test	5
Rest	25
Metabolism Test	5
Rest	25
Metabolism Test	5

Table I gives the oxygen consumption before the protein meal and at 30, 60, and 90 minutes after. The subjects are listed in order of their relative basal rates. A comparison of the greatest percent of increase recorded at any test period with the basal rates reveals a consistently high negative relationship between the S.D.A.'s and B.M.R.'s. We have made rank-order comparisons of the data

* Acknowledgment is made to Mary L. Smull for assistance in the experiments.

1 Mason, E. H., *J. Clin. Invest.*, 1927, **4**, 353.

2 Wilhelmj, C. M., and Mann, F. C., *Am. J. Physiol.*, 1930, **93**, 69.

† Sanborn closed circuit machine.

‡ The subjects continued to recline while they were fed an amount of cooked lean beef equivalent to 200 gm. per square meter of body surface.

TABLE I.

Subject	Age	Surface Area, sq.m.	B.M.R.	Oxygen Consumption						
				Before Meal, cc./min.	After Meal					
					30 min.		60 min.		90 min.		Greatest % Increase
					cc./min.	% Increase	cc./min.	% Increase	cc./min.	% Increase	
♂											
C.B.	23	1.75	+ 3	264	245	—7.2	273	3.9	292	10.6	10.6
E.N.	28	1.75	+ 3	245	261	6.5	252	2.9	281	14.7	14.7
E.M.	22	1.86	— 2	250	297	18.8	272	8.8	267	6.8	18.8
A.M.	27	2.05	— 6	283	316	11.6	322	13.8	337	19.1	19.1
C.P.	22	1.82	— 8	226	240	6.2	244	8.0	289	27.9	27.9
R.C.	21	2.09	— 8	266	309	16.2	324	21.8	351	31.9	31.9
C.A.	24	2.07	—10	260	288	10.8	295	14.6	312	20.0	20.0
I.H.	21	1.93	—15	220	269	12.2	290	31.8	317	44.1	44.1
C.F.	22	1.70	—18	192	192	3.7	246	30.9	275	43.2	43.2
E.S.	23	1.90	—20	201	264	31.3	287	38.4	273	35.8	38.4
E.D.	26	2.00	—23	210	245	16.7	245	16.7	286	36.2	36.2
R.P.	20	1.94	—28	190	201	5.8	287	46.3	270	42.1	46.3
W.H.	25	2.03	—32	193	239	23.8	299	49.9	395	104.6	104.6
♀											
A.R.	21	1.54	+14	223	248	11.2	236	5.8	236	5.8	11.2
V.D.	19	1.62	— 2	204	206	1.0	208	2.0	257	23.0	23.0
I.M.	20	1.58	—10	183	230	23.5	200	9.3	207	13.1	23.5
M.D.	19	1.59	—13	175	197	12.6	176	0.6	211	20.3	20.3
E.P.	19	1.75	—14	192	206	7.3	214	11.5	224	16.7	16.7
C.E.	22	1.63	—15	170	216	27.1	186	9.4	197	15.9	27.1
C.M.	19	1.78	—20	191	263	38.2	222	16.2	274	43.5	43.5
S.M.	21	1.70	—21	168	194	15.6	219	30.4	250	48.8	48.8
C.L.	22	1.42	—23	140	179	27.9	175	25.0	197	40.7	40.7

in Table I and find that for the male subjects the correlation§ between high B.M.R. and low S.D.A. is +.92. For the female subjects the correlation is +.80, and for the entire unselected group, +.86.

9703 P

Path of Escape of Vital Dyes from the Lymphatics into the Tissues.

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The way in which substances of large molecule and fluids move through the tissue is unknown. To learn something of this we have studied the passage of vital dyes through living tissues, under varying physiological and pathological conditions.

Two dyes, pontamine sky blue and patent blue V, of widely different diffusibility, when introduced directly into the lymphatics of the ears of living mice[1, 2, 3] eventually pass out in greater or less part from the channels at situations far from the site of the injection. Their escape and subsequent spread through the tissues have been watched at high magnification with the Ultropak microscope. The dyes do not pass out in a colored cloud from the lymphatics of normal ears, but first appear as very fine, irregular, bristling or wavy lines of color, extending outward from the wall of the vessel. With a micro-probe these colored lines can be bent and twisted and with the removal of pressure they spring back to their original positions. The dye appears to be fixed either between or upon preformed tissue elements. Within a few minutes of this first evidence of escape the extravascular coloration becomes more intense, the lines wider, and their margins less sharp, as though dye were diffusing from them. Manipulation still demonstrates that the dye cannot be dislodged. But soon, with the onset of the mild edema which these dyes induce in the tissues, the coloration becomes diffuse and pressure with the micro-probe modifies its intensity and forces it from

§ $\rho = 1 - \frac{6(\Sigma d^2)}{N(N^2 - 1)}$

1 Hudack, S. S., and McMaster, P. D., *J. Exp. Med.*, 1932, **56**, 223.
2 McMaster, P. D., and Hudack, S. S., *J. Exp. Med.*, 1932, **56**, 239.
3 McMaster, P. D., and Hudack, S. S., *J. Exp. Med.*, 1934, **60**, 479.