The glycogen content of the tissues of newborn and adult rabbits

Tissue	Glycogen fractions	Newborn			Adult		
		No.	mg/100 g wet weight	%	No.	mg/100 g wet weight	%
Heart muscle	Total glycogen	18	755 ± 57		6	398 ± 101	
	TCA soluble glycogen		578 ± 32	76		269 ± 55	67
	Bound glycogen		177	24		130	33
M. long. dorsi	Total glycogen	17	1468 ± 59		6	843 ± 142	
	TCA soluble glycogen		1181 ± 26	80		545 ± 96	65
	Bound glycogen		287	20		299	35
M. abdominis	Total glycogen	18	573 ± 31		6	280 ± 49	
	TCA soluble glycogen		364 ± 31	64		186 ± 36	66
	Bound glycogen		209	36		94	34
M. biceps femoris	Total glycogen	5	913				
	TCA soluble glycogen		720	79			
	Bound glycogen		193	21			
Liver	Total glycogen	14	917 ± 171		6	4042 ± 1165	
	TCA soluble glycogen		751 ± 68	82		3646 ± 1032	90
	Bound glycogen		166	18		396	10
Lung	Total glycogen	10	376 ± 16		5	99 ± 3	
	TCA soluble glycogen		228 ± 23	61		58 ± 7	58
	Bound glycogen		148	39		41	41

Zusammenfassung

Es wird das Verhältnis von gebundenem und trichloressigsäurelöslichem Glykogen in verschiedenen Muskeln, Leber und Lunge von neugeborenen und ausgewachsenen Kaninchen bestimmt und auf einen Zusammenhang zwischen Glykogenspiegel und Resistenz gegenüber Sauerstoffmangel hingewiesen; ferner auf Änderungen im Glykogenspiegel bei akutem Sauerstoffmangel und Hunger.

The Effect of Amphetamine on Food Intake in Rats with Hypothalamic Hyperphagia

The increasing evidence implicating hypothalamic centers in the regulation of food intake raises the possibility that these centers may be the site of action of appetite-depressing drugs. Recently, BROBECK *et al.*[1] reported increased electrical activity in the medial portion of the hypothalamus, but not in adjacent regions, following the parenteral administration of amphetamine derivatives in anesthetized cats. Utilizing the concept of a lateral feeding center and a medial inhibitory (satiety) center[2], these authors speculated that "amphetamine excites the medial portion of the hypothalamus which contains an inhibitory part of a 'feeding centre' ". If this is true, the appetite-depressing action of amphetamine should be lessened or abolished in animals made hyperphagic by the bilateral destruction of the ventromedian nucleus of the hypothalamus, which is generally considered to be the inhibitory center.

Methods.—The ventromedian nucleus was destroyed bilaterally in albino rats (Sprague-Dawley strain) by means of the Krieg stereotaxic instrument. Nine of 19 rats operated on became definitely hyperphagic as evidenced by a daily food intake in excess of 40 g per day at a time when the control animals were eating approximately 20 g per day. All animals were maintained in air-conditioned quarters on an *ad libitum* intake of food (ground Purina Laboratory Chow) and water. The hyperphagia had reached its peak and had begun to decline when the administration of amphetamine was started, but no decrease in the excessive rate of weight gain was in evidence.

Powdered amphetamine was thoroughly mixed in the ground food, by means of a Henry velocity mixer, in a dosage of 0·2 mg of drug per g of food. Rats were fed the amphetamine-containing food for a period of one week, preceded and followed by control weeks on normal food. In a second series of experiments, the drug was administered subcutaneously (5 mg/kg, at 5:00 P M daily) for one week in order to eliminate the possibility that the taste of the drug in the food might influence the food intake. The results were similar in the two series.

Results.—The results are summarized in the Tables I and II. It is apparent that the hyperphagic rats are hypersensitive to the action of amphetamine. Rat No. 5 refused all food for a period of 6 weeks following amphetamine injections and then gradually resumed eating. In addition, one hyperphagic animal (not included in the series) died after the subcutaneous administration of the drug for 5 days; no gross lesions were found at autopsy. The difference in sensitivity of the two groups of animals is especially marked when the drug is administered parenterally, probably due to the maintenance of drug dose despite declining food intake.

Discussion.—According to the concept of interacting lateral feeding and medial satiety centers in the hypothalamus, an agent which decreases food intake might do

[1] J. R. BROBECK, S. LARSSON, and E. REYES, J. Physiol. *132*, 358 (1956).

[2] B. K. ANAND and J. R. BROBECK, Yale J. Biol. Med. *24*, 123 (1951). – J. M. R. DELGADO and B. K. ANAND, Amer. J. Physiol. *172*, 162 (1953).

Table I

Influence of orally-administered amphetamine on the food intake (g/day) of normal and of hyperphagic rats

Normal animals				Hyperphagic animals			
Rat. No.	Pre-treatment week	Treatment week	Post-treatment week	Rat No.	Pre-treatment week	Treatment week	Post-treatment week
I	20·9	16·8	23·2	1	43·4	23·9	34·5
A	21·7	18·7	26·1	5	32·7	5·3	0·0
B	22·6	17·8	25·5	6	38·7	24·1	44·8
C	24·7	19·2	23·6	7	44·5	5·8	27·9
F	22·9	16·7	25·0	16	40·5	29·7	38·5
Average	22·6	17·8	24·7	Average	40·0	17·8	29·1

Table II

Influence of subcutaneously-administered amphetamine on the food intake (g/day) of normal and of hyperphagic rats

Normal animals				Hyperphagic animals			
Rat No.	Pre-treatment week	Treatment week	Post-treatment week	Rat No.	Pre-treatment week	Treatment week	Post-treatment week
A	24·3	22·7	22·8	1	33·2	14·8	36·0
B	23·1	19·9	24·7	6	32·9	10·7	29·6
D	27·6	21·8	21·6	16	43·3	26·1	36·3
Average	25·0	21·5	23·0	Average	36·5	17·2	34·0

so either by stimulating the satiety center or by inhibiting the feeding center. The evidence presented in this report favors the latter view. It would be of interest to know whether the increased electrical activity recorded in the medial portion of the hypothalamus following the parenteral administration of amphetamine (BROBECK *et al.*[1]) would also occur in animals whose ventromedian nucleus (satiety center) had been bilaterally destroyed.

F. R. STOWE, Jr. and A. T. MILLER, Jr.

Department of Physiology, University of North Carolina Medical School, Chapel Hill, N. C., November 5, 1956.

Zusammenfassung

Amphetamin vermindert die Nahrungsaufnahme von durch beidseitige Zerstörung des ventromedialen Nucleus des Hypothalamus hyperphagisch gemachten Ratten. Es scheint den Appetit durch die Hemmung des lateralen Nahrungsaufnahmezentrums, nicht aber durch Reizung des medialen Sättigungszentrums herabzusetzen.

Activité gonadotrope d'un extrait d'urines de femmes en ménopause*

Dans une première communication[1], nous avons pu mettre en évidence l'effet de gonadostimulines provenant de l'urine de femmes en ménopause, sur le testicule du rat impubère hypophysectomisé. Avec 8 mg de la préparation «HMG–A» employée alors – dose équivalente à 3,2 unités[2] – nous avons obtenu non seulement le rétablissement morphologique et fonctionnel des cellules interstitielles avec sécrétion d'androgènes (démontrée par la croissance de la prostate ventrale), mais également une spermatogenèse allant jusqu'à la formation de spermatozoïdes. A la même époque, nous avons injecté des doses équivalentes du même extrait à des rates impubères hypophysectomisées sans obtenir une augmentation des poids ovariques ou utérins. A l'examen histologique, les ovaires ne montraient ni une maturation des follicules ni la formation de corps jaunes. Nous n'avons pas pu examiner l'effet biologique de doses plus élevées de la même préparation en raison de leur toxicité.

Par adsorption sur permutite, JOHNSEN[3] a obtenu récemment, à partir d'urines de femmes en ménopause, des extraits gonadotropes très actifs et peu toxiques, avec un rendement d'environ 5 mg/l. Nous communiquons dans ce travail les effets biologiques obtenus avec une de ces préparations, nommée HMG–J_2[4].

* 2e Communication: Effets sur les ovaires de rates impubères hypophysectomisées.

[1] R. BORTH, B. LUNENFELD et H. DE WATTEVILLE, Exper. *10*, 266 (1954).

[2] Selon un accord de plusieurs laboratoires européens (2nd Meeting of the Gonadotrophin Club, Birmingham, 17 au 19 août 1955), une unité de gonadostimulines hypophysaires urinaires humaines a été définie provisoirement comme égale à l'activité gonadotrope contenue dans 1,0 mg de la préparation HMG–20A qui a été préparée par la Maison Organon à Newhouse en Ecosse, à partir d'une grande quantité d'urine provenant de très nombreuses femmes en ménopause (*H*uman *M*enopausal *G*onadotrophin). Cette préparation sert actuellement comme standard de référence pour le dosage des gonadotrophines urinaires humaines en dehors de la grossesse. Cf. J. A. LORAINE et J. B. BROWN, J. clin. Endocrin. *16*, 1180 (1956).

[3] S. G. JOHNSEN, Acta endocr. (Kbh.) *20*, 101 (1955).

[4] Nous remercions vivement le Dr S. G. JOHNSEN (Copenhague) qui a bien voulu mettre à notre disposition des échantillons de cet extrait.