Fig. 2. Relationship between neutral plasma DNase activity and BAIBA urinary excretion. A, endogenous BAIBA (10 mice for each point); B, radioactive BAIBA 3 h after intravenous injection of tritiated DNA (5 mice for each point). $\times$, XLII; Δ , C_3H .

These results lead to three main conclusions:

(1) BAIBA is a catabolite of DNA thymine; nevertheless it can only account for a small fraction of it (5–10 per cent). Thymine may take other metabolic pathways or perhaps BAIBA itself may undergo catabolic degradation.

(2) Though the DNase activity of plasma regulates the initial degradation of intravenously injected DNA (ref. 1), it does not determine all the transformations from DNA thymine to BAIBA. These transformations are controlled by many other enzymes the activities of which are regulated at levels near those of neutral plasma DNases, but differing from one strain to the other.

(3) The rate of BAIBA elimination in urine depends on the intensity of exogenous DNA catabolism and affords a possible means of expressing it.

On the other hand, these results suggest that this conclusion might be extended to normal elimination of BAIBA which could be an index of the intensity of cell DNA degradation, and so would give a criterion for an easy biochemical evaluation of cellular turnover. This elimination is probably, as in man², under genetic control, and its variations are not due to renal influences, since preliminary results show that the plasma-level of BAIBA is higher in XLII than in C_3H strain mice.

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Dilution of the Diet and Feed Intake in the Mouse

Mice were fed from 3 to 6 weeks of age (weaning to mating) on diets made up by diluting a normal diet with different levels of an indigestible filler (cellulose). A greater range of diets, and younger animals, were used than in earlier work¹. The error (and labour) associated with separating waste feed and faeces when feeding pelleted food was overcome by feeding ground diets, so that waste feed could be sieved from the faeces.

The animals used in the present experiments were from a random bred strain previously fed normally. The

change to each experimental diet was made abruptly after normal weaning at 3 weeks of age. The diets used are denoted by the percentage dilution with cellulose of the normal diet.

Experiment 1. The mice used in this experiment were litter mates from litters adjusted to 4 of each sex at birth. Only those of one sex from each litter were used on each diet. Data were from 4 litter mates per cage and 3 cages of each sex per diet (Table 1).

Table 1. WEIGHT GAIN AND FEED INTAKE FROM 3 TO 6 WEEKS

Sex	Diet dilution (%)	No.	Gain/head/day (g)	Dry matter intake/head/day (g)	Dry matter intake (g)/gain (g)	Gut wt. (g)/body wt. (g)
M	—	12	0.67	3.82	5.70	0.16
	30	12	0.73	5.64	7.73	0.19
	50	12	0.66	7.70	11.67	0.23
	70	8	0.06	5.94	99.01	0.31
F	—	12	0.44	3.76	8.55	0.16
	30	12	0.48	5.35	11.15	0.19
	50	12	0.51	6.98	13.69	0.24
	70	—	—	—	—	—

The mice on the 70 per cent diluted diet had difficulty in dealing with this diet in the ground form. The same diet in the pelleted form was fed successfully to similar mice in the laboratory. All the female mice on this diet died and the 8 male survivors gained so little weight that the intake per g of gain was exaggerated.

Mice were killed at 6 weeks of age and the fresh weight of the intestinal tract was recorded. This clearly reflected the compensatory 'gut-fill' of the animals on the highly diluted diets.

The dry-matter intake per head per day was doubled on the 50 per cent diluted diet, and then dropped in the males at the higher level of dilution.

Experiment 2. In this experiment males only were used. Litters which had been adjusted to 4 mice of each sex at birth were bulked at weaning, and then randomized to each treatment. This was simpler, but gave results as reliable as the method in exp. 1. Data were from 4 mice per cage with 6 cages per diet (Table 2).

Table 2. WEIGHT GAIN AND FEED INTAKE FROM 3 TO 6 WEEKS

Sex	Diet dilution (%)	No.	Gain/head/day (g)	Dry matter intake/head/day (g)	Dry matter intake (g)/gain (g)	Gut wt. (g)/body wt. (g)
M	—	24	0.81	3.95	4.88	0.16
	30	24	0.68	4.99	7.34	0.18
	50	24	0.60	6.34	10.57	0.22
	70	16	0.48	4.16	8.67	0.30

As in exp. 1, dry matter intake per head per day increased up to a dilution of 50 per cent and then declined. This is similarly reflected in intake per g of gain, and the response to dilution is also shown in the 'gut-fill' of the animals on each treatment.

It is apparent that the compensation mechanism of the animal breaks down after about 50 per cent dilution. The 70 per cent diluted diet again caused the death of some animals. Up to a dilution of 50 per cent the mice appeared normal, but at 70 per cent dilution they were under stress.

It can be concluded that dilution of the diet brings about a definite compensatory response by the animal, increasing the total dry-matter intake. This takes place immediately after weaning and breaks down at levels of dilution about 50 per cent. Further work is required to investigate the efficiency of utilization of the digested nutrients of the diets, to measure the true effect of the increased intake on the animal.

Before dietary dilution can be used in animals as a means of controlling nutrient intake, the compensation response of the animal, and the effect which increased intake has on digestibility of the diet, must be known over a wide range of dilutions.

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