TABLE 1. *Comparison of the electrically evoked increase in efflux from brain slices of seven naturally occurring amino-acids with their concentrations in whole brain and their effects when applied to cortical neurones*

Amino-acid	Concentration in brain* (μ-mole/g)	Increase in efflux on stimulation (× resting release)	Effect when applied† to nerve cells
Glutamate	7·6	2·64‡	↑ ↑
Aspartate	2·4	1·77	↑
GABA	1·9	3·11‡	↓ ↓
Glycine	1·0	1·53	↓
Serine	0·9	1·21	—
Alanine	0·6	1·06	↓
Threonine	0·2	1·44	—

↑, Excitant. ↓, Depressant. * Whittaker (1968). † Curtis & Watkins (1965). ‡ Significant at $P<0·01$.

GABA, which have the most powerful effects when applied to nerve cells, are also those which are most effectively released from brain slices by the electrical stimulation used.

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Effect of probenecid on dopamine metabolites in pigeon brain

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In many animal brains the concentrations of dopamine (DA) and of its metabolite homovanillic acid (HVA) are not very different, but in the brain of the mouse and the rat HVA is present in much smaller concentrations than DA. This suggested that in these species HVA was removed by an active transport mechanism, and this was confirmed by the finding (Sharman, 1967; Werdinius, 1967) that there is a large rise in tissue HVA after administration of probenecid, an inhibitor of transport of acidic substances from brain and kidneys. No such rise is obtained in animals in which HVA concentration is high. In pigeons, the ratio DA/HVA is 4 : 1 (Juorio & Vogt, 1967), which is intermediate between that of the two groups of mammals, and we therefore studied the effect of probenecid on the concentration of HVA and of the other acid metabolite of DA, dihydroxyphenylacetic acid (DOPAC), in this species. The brain region used was that containing the highest concentration of DA and called nucleus basalis (Juorio & Vogt, 1967). The metabolites were estimated spectrophotofluorimetrically. Probenecid was injected intramuscularly.

The amount of HVA in the nucleus basalis was $0·80 \pm 0·04$ μg/g (mean ± S.E.M.). Probenecid (200 mg/kg) increased the HVA concentration in 1·5 hr to about threefold

and in 6 hr to about fivefold. After 17 hr the HVA content was normal again. These increases are even larger than in the small rodents. The DOPAC concentration was about 1/5 of the HVA content. Probenecid treatment increased this metabolite also, but a dose of 200 mg/kg only doubled the DOPAC content in 4 hr.

We also studied the combined effect of probenecid and reserpine, because in contrast to the response in other species reserpine causes a fall in HVA concentration in pigeon brain (Juorio & Vogt, 1967). This effect was confirmed; 6 hr after reserpine the concentration of DOPAC was also slightly lowered. Four hours after probenecid (200 mg/kg) the HVA in the brain of a group of pigeons was $3{\cdot}47 \pm 0{\cdot}19$ μg/g, whereas if reserpine (2 mg/kg) had been injected 2 hr before the probenecid the value was $1{\cdot}77 \pm 0{\cdot}22$ μg/g. The combination of reserpine and probenecid also appeared to cause a small decrease in the DOPAC concentration.

The results indicate that there is an active transport mechanism for removal of HVA and possibly of DOPAC from pigeon brain. The effect of reserpine on the metabolism of dopamine seems to be different in pigeons and mammals, since in mammals there is an increase in the concentration of HVA after reserpine, and this increase is further enhanced by probenecid treatment.

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The effects of two inhibitors of catecholamine synthesis on the content of noradrenaline and dopamine of the rat brain

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Two inhibitors of catecholamine synthesis have been used to investigate changes in the noradrenaline and dopamine content of the brains of male albino rats, estimated by the method of Brownlee & Spriggs (1965).

3-iodo-Tyrosine (3IT), a competitive inhibitor of tyrosine hydroxylase (Goldstein & Weiss, 1965; Ikeda, Levitt& Udenfriend, 1965) at a dose of 200 mg/kg subcutaneously reduces brain levels of noradrenaline and dopamine. Sodium diethyldithiocarbamate (DDC) inhibits dopamine-β-hydroxylase (Goldstein, Anagoste, Lauber & McKereghan, 1964) and DDC (500 mg/kg subcutaneously) decreases noradrenaline levels to a greater degree than 3IT, while increasing dopamine content. The doses chosen show maximal effects at the single dose level.

As was expected, simultaneous administration of DDC and 3IT at the above doses reduced dopamine levels, but at a slower rate than 3IT alone. Surprisingly, it was found that the combination of the two inhibitors reduced the noradrenaline content of the brain to a significantly lower degree ($P<0{\cdot}05$) than DDC alone. The possibility that DDC and 3IT when given together caused less depletion by mutual