

The ontogenesis of cerebral dopamine metabolism in the pig

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Abnormal oral behaviour, attributed to oral deprivation (Stephens, 1974), can occur in early weaned calves, lambs or pigs. Similar behaviour can be induced in these species by apomorphine which is thought to stimulate cerebral dopamine receptors. Sharman & Stephens (1974) suggested

that central dopaminergic neurons might be involved in abnormal oral behaviour such as that seen after early weaning.

We have estimated the concentrations of dopamine and of its acidic metabolites 3,4-dihydroxyphenylacetic acid (DOPAC) and homovanillic acid (HVA) in six different parts of the brain of the young pig to obtain an index of the functional activity of the major cerebral dopaminergic neuron systems during the first eight weeks of life. In this way, those regions of the brain showing the most rapid changes in the development of dopaminergic neuronal activity could be determined since these might prove to be of particular importance in the development of abnormal oral behaviour seen after early weaning.

The concentration of dopamine in the caudate nucleus increased greatly and in the putamen showed a small decrease, over the eight week period. In the other regions there was little change in the dopamine concentration. Figure 1 shows the changes in the concentrations of DOPAC and HVA in the three brain regions where large changes in the concentrations of these acidic metabolites occurred. In the caudate nucleus, the concentration of DOPAC appeared to increase as the concentration of HVA increased, whereas in the putamen and nucleus accumbens the concentration of DOPAC was reduced. Some possible implications of these differences will be discussed.

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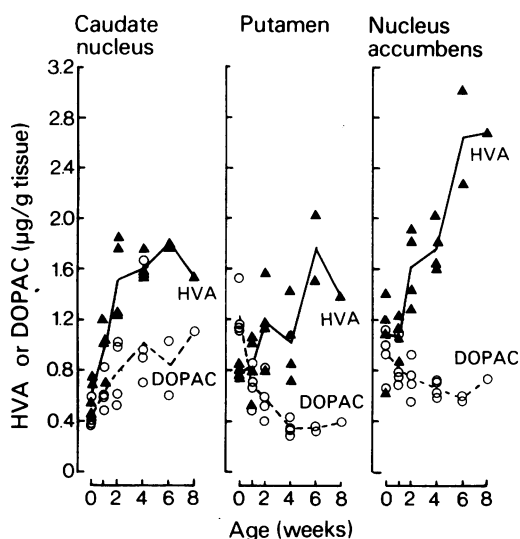


Figure 1 The concentrations of 3,4-dihydroxyphenylacetic acid (DOPAC) and homovanillic acid (HVA) in different regions of the brain of the pig during the first eight weeks of life. The analyses were made on animals taken from the same two litters over the eight week period.

References

- SHARMAN, D.F. & STEPHENS, D.B. (1974). The effect of apomorphine on the behaviour of farm animals. *J. Physiol., Lond.*, **242**, 25-27P.
- STEPHENS, D.B. (1974). Studies on the effect of social environment on the behaviour and growth rates of artificially-reared British Friesian male calves. *Anim. Prod.*, **18**, 23-24.