Rat Cerebellar Grafts Have ^{125}I -Vasoactive Intestinal Peptide Binding Sites

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Neuropeptides and their receptors may play a role in the growth and/or differentiation of fetal brain transplants. Previously, we found that gastrin releasing peptide (GRP) receptors develop on fetal cortex grafts transplanted into the adult rat cortex, spinal cord or 4th ventricle /1,2/. Here we investigated the presence of vasoactive intestinal peptide (VIP) receptors in rat fetal brain transplants.

Rat fetal cerebellum was transplanted into the cisterna magnum as described previously /1/. After 1 month the rat was sacrificed and the brain removed. Sections (12 μm) were derived from fresh frozen rat brain. The slices were incubated in incubation buffer comprised of 130 mM NaCl, 5 mM MgCl_2 , 5 mM KCl, 1 mM EGTA, 1 mg/ml of bacitracin and 1% bovine serum albumin in 10 mM HEPES.NaOH plus 0.2 nM ^{125}I -VIP (1100 Ci.mmol) at 22°C in the presence or absence of competitor for 3 h. Free ^{125}I -VIP was then removed by 3 washes in incubation buffer for 15 min each at 22°C. The sections which contained bound peptide were placed on Ultrafilm for 2 weeks at -80°C and the film developed. Previously, using *in vitro* autoradiographic techniques, we found that ^{125}I -VIP binding sites were present in the adult rat cortex, striatum, hippocampus, pineal, nucleus tractus solitarius and cerebellum /3/. Also, when the E16 rat cortex was transplanted into the 4th ventricle, some ^{125}I -VIP binding sites were present in the transplant after 4 weeks whereas a high density of GRP receptors developed /1/. Here ^{125}I -VIP binding sites were present in the E18 rat cortex and cerebellum. When E18 rat cerebellum was transplanted into the rat, the transplant developed between the rat cerebellum and hindbrain. A high density of ^{125}I -VIP binding sites was present on the transplant and

host cerebellum and nucleus tractus solitarius. In contrast, high grain densities for (^{125}I -Tyr⁴) bombesin (GRP receptors) were present on the nucleus tractus solitarius but not the transplant, and high grain densities for ^{125}I -physalaemin (substance P receptors) were present on the nucleus tractus solitarius and cerebellar lobule 10 but not the transplant. These data indicate that VIP but not GRP or substance P receptors develop on rat cerebellar transplants. The distribution of ^{125}I -VIP grains in the transplant was irregular being highest in areas derived from the cerebellar cortex. Densitometry analysis indicated that specific ^{125}I -VIP binding to the transplant was inhibited with high affinity by VIP ($\text{IC}_{50} = 5 \text{ nM}$). Similar data were obtained using the host cerebellum and nucleus tractus solitarius. These data suggest that VIP receptors develop in fetal cerebellar transplants and that the pharmacological properties of the transplant receptors are similar to those observed in the adult rat brain. Because VIP is a potent vasodilator, the transplant VIP receptors may regulate blood flow to the graft.

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