Distribution of Dopaminergic Fibers and Terminals in Rat Brain as Revealed by an Improved Immunohistochemical Technique using Monoclonal Antibody to Dopamine

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As described in the preceeding paper, our improved immunocytochemical technique has permitted to obtain reproducible results in localizing dopamine-like immunoreactivity (DA-LI) in the brain. The results were roughly compatible with those obtained in previous studies of the mesocortical, mesolimbic and nigrostriatal DAergic systems. Furthermore, a new observation was added not only in several parts of the forebrain but also in the hindbrain of the rat.

In the cerebral cortex outside the prefrontal area DA-LI fibers were found in deep layers of the frontoparietal regions in particular. In the diencephalon a large number of small sized positive varicosities were scattered in many places of the hypothalamus. DAergic innervation in the habenular nuclei was not only restricted to the medial part of the lateral nucleus but did take place also in the medial nucleus. In the mesencephalon, pons and medulla oblongata, there existed also a considerable number of DA-LI terminals that were rather confined in some portions of the brain stem. These included the paragigantocellular reticular nucleus, the nucleus of the facial nerve, the spinal nucleus of the trigeminal nerve and the dorsal nucleus of the vagus nerve. It seems very important that most of aminergic neurons localized in the brain stem were densely innervated by DAergic terminals.

The DA-LI fibers and terminals observed in the forebrain were all remained unaltered after denervation of ascending noradrenergic pathway. It was therefore supported that DA localized in terminals of noradrenaline neurons has not been demonstrable in the rat brain by this method.

Antibody movement in glomerular extracellular matrices

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The mechanism of subepithelial immune complex (IC) formation in glomerulonephritis was studied in a nephrotoxic model, where the ICs are formed in the subepithelial space as a result of administration of antibody directed against core protein of heparan sulfate proteoglycan (HS-PG),(J Clin Invest 77: 142,1986). Rats were injected with anti-HSPG and sacrificed from 5 min to 7 days later. Thin sections from Lowicryl K4M embedded kidney were incubated with anti-rabbit IgG conjugated with colloidal gold and gold particles were counted. At early time points, more antibody bound to lamina rara interna (LRI), became almost equal in LRI and externa (LRE) in middle time points, and much steeper decrease in LRI in late time points. The concentration of antibody in the mesangial matrix increased 3rd day onwards. This differential and constant residence of the antibody in subendothelial space may be responsible for the formation of ICs in this region, with antibody acting as a core-nidus on which ICs lattice evolves subsequently.

Effect of Swine Cu-Zn-superoxide dismutase (SOD) on ATPase Activity of Gastric Gland

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To assess our working hypothesis that SOD (superoxide oxidoreductase, EC 1.15.1.1) may alter the activity of Na-K-ATPase on cell membrane of parietal cells of gastric gland which secrete HCl, SOD(Toso, Tokyo) from swine erythrocytes was administered orally, subcutaneously and intravenously to rats and both Na-K-ATPase and H-K-ATPase were cytochemically localized in the parietal cells. As controls, saline without SOD was similarly administered. To compare SOD with other free radical scavengers, catalase was also given to other group of animals. Direct addition of SOD to incubation medium for ATPase was also compared with that of DMSO to see if SOD could activate ATPase activity of homogenates of stomach. Cytochemically both Na-K-ATPase and H-K-Atpase were localized on the inner side of microvilli on the apical surface of gastric gland and also on free surface of intracellular canaliculi of parietal cells. The localization of ATPase was not appreciablly altered by SOD administration, though fine structure of parietal cells was variably changed with different way and dose of administration of SOD. Direct addition of SOD(3900 or 1950 unit/ml) to the incubation medium for ATPase could activate the ATPase only little, if any.

Combination Therapy of Microwave Hyperthermia and Photodynamic Therapy on Squamous Cell Carcinoma in Vivo

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We examined microwave hyperthermia and a sensitization effect of hematoporphyrin derivative (HpD) for microwave action on the squamous cell carcinoma (SCC) tissue transplanted under the skin of C3H mice. Microwave irradiation at 43 °C 72 hr after i.p. injection with Hp oligomer produced the strongest effect to the tumors.

Furthermore, we investigated therapeutic effect of microwave hyperthermia in combination with photodynamic therapy (PDT) utilizing an argon-dye laser system at 83 hr after the oligomer injection. It was resulted that (1) in the group of microwave hyperthermia (1hr) followed by PDT(35.8J/cm^2), the tumor disappeared on the 3rd-11th day after irradiation; (2) in the reverse sequence of (1), the tumor did not disappear; (3) in the group of microwave hyperthermia (0.5hr) followed by PDT (71.6J/cm^2), the tumor disappeared on the 15th day after irradiation; (4) in the reverse sequence of (3), the tumor disappeared on the 7th day after irradiation. It was concluded that the anti-tumor growth effect was strong when high dose therapy was used as the first choice of therapy, irrespective of microwave irradiation or PDT.