in prolonging the survival of 1000 R whole body irradiated animals. The DRF in this group was 1.05.

As Feuer et al.[5] pointed out, the deproteinized parathyroid extract lost its calcium mobilizing activity, but enhanced the vitamin A level in rats serum, proving the activity of the extract. Accordingly it can be excluded that the ratioprotective effect is the consequence of calcium mobilization from the bones or other Ca^{++} reservoirs. It seems reasonable to conclude that the PF-PTE contains some as yet unknown water-soluble bioactive agent responsible for the radioprotective effect. The elucidation of the chemical structure and properties of this bioactive agent including the synthesis will certainly permit a better understanding of the radioprotection of PF-PTE described in this paper.

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Effects of 6-hydroxydopamine on rat carotid body chief cells[1]

J. Hansen and T. Ord

Department of Anatomy, University of Texas Health Science Center, 7703 Floyd Curl Drive, San Antonio (Texas 78284, USA), 20 March 1978

Summary. Administration of 6-hydroxydopamine (6-OHDA) in concentrations high enough to cause degeneration of perivascular adrenergic nerve terminals has no morphological effect on the catecholamine-storing cells of the rat carotid body. Uptake of 6-OHDA by carotid body chief cells may be more selective than that exhibited by small-intensely-fluorescent cells and other catecholamine-storing cells which are affected by 6-OHDA. Alternatively, the sustentacular cells which envelope the chief cells may provide an effective barrier against the uptake of 6-OHDA.

The carotid body is one of several groups of arterial chemoreceptors which is sensitive to changes in blood pO_2, pCO_2 and pH. Although much is known concerning the cardiovascular and respiratory reflexes initiated by the arterial chemoreceptors, little is known about the identity of the actual receptor element or how this specialized organ functions as a chemoreceptor.

Recent investigations have suggested that the carotid body chief cells may function as interneurons, similar to the small-intensely-fluorescent (SIF) cells of the superior cervical ganglion[2]. Others suggest that the chief cells are sensory paraneurons which themselves represent the chemoreceptor element[3,4]. Additionally, a possible endocrine role for the chief cells has not been excluded[2,4]. Regardless of the function of the carotid body chief cells, most investigators agree that they contain one or more biogenic amines. Specifically, it has been demonstrated by fluorescence histochemistry[5], mass fragmentography[6], autoradiography[4,7], and biochemical analysis[8] that the carotid body chief cells contain dopamine, norepinephrine and serotonin. However, dopamine appears to be the predominant biogenic amine. Dopamine also has been demonstrated to be the primary biogenic amine of SIF cells[9].

The biogenic amines of the chief cells are stored within electron-dense cytoplasmic vesicles. The storage of biogenic amines in dense-cored vesicles is characteristic of a number of amine-containing cells including adrenergic nerve terminals, SIF cells, adrenal medullary cells, paraganglion cells and aortic body chief cells. Release of the carotid body chief cell biogenic amines appears to be intimately related to the function of these cells in chemoreception.

6-Hydroxydopamine (6-OHDA) has been shown to cause degeneration of the terminal portions of adrenergic and dopaminergic neurons as a result of its selective uptake and concentration in these terminals. Administration of 6-OHDA has resulted in similar morphological alterations in SIF cells of the paracervical ganglion[10] and adrenomedullary cells of young animals[11]. Hess[12] has demonstrated a decrease in catecholamine fluorescence of the carotid body following 6-OHDA treatment. However, Poullet-Krieger[13] has used 6-OHDA as an aid in identifying postganglionic sympathetic nerve terminals in the toad carotid labyrinth with no apparent effect on the amphibian's amine-containing labyrinth cells. The following study was initiated to investigate the ultrastructural effects of various dosages of 6-OHDA on the rat carotid body.

Materials and methods. Female Long-Evans rats weighing 200–250 g were administered single injections or 3 injections of 6-OHDA (100 mg/kg i.p.; Regis Chemical Co.) and sacrificed at the end of 1 week (single injection) or 48 h after the last injection (3 injections/week). All animals were anesthetized with Nembutal (50 mg/kg, i.p.) and perfused through the left ventricle with a solution of 3% glutaraldehyde, 1% paraformaldehyde in 0.1 M phosphate buffer at pH 7.2. The carotid bodies were post-fixed in 1% osmium tetroxide – 1.5% potassium ferrocyanide, en bloc stained in uranyl acetate, dehydrated in a graded series of ethanols, passed through propylene oxide and embedded in Epon-Araldite. Thin sections exhibiting light gold interference colors were stained with lead citrate and examined in a Siemens 1A electron microscope.

Another group of rats were given identical dosages of 6-OHDA and sacrificed for fluorescence histochemistry. Carotid bodies were frozen in liquid propane, freeze-dried, gased for 1 h in formaldehyde vapor generated from paraformaldehyde powder, and embedded in paraffin. 10 µm sections were mounted in Entellan-xylene and examined in a Leitz fluorescence microscope.

Results and discussion. Carotid body chief cells are characterized by an abundance of cytoplasmic vesicles which exhibit electron-dense cores and represent the storage sites for biogenic amines (figure 1). The perivascular nerve terminals within the carotid body exhibit several round mitochondria and an abundance of small dense-cored vesicles measuring approximately 40–50 nm in diameter (figure 2). Occasionally, a large dense-cored vesicle and several small electron-lucent vesicles also are observed within the terminals. However, the perivascular nerve terminals of rats which received a single or multiple injections

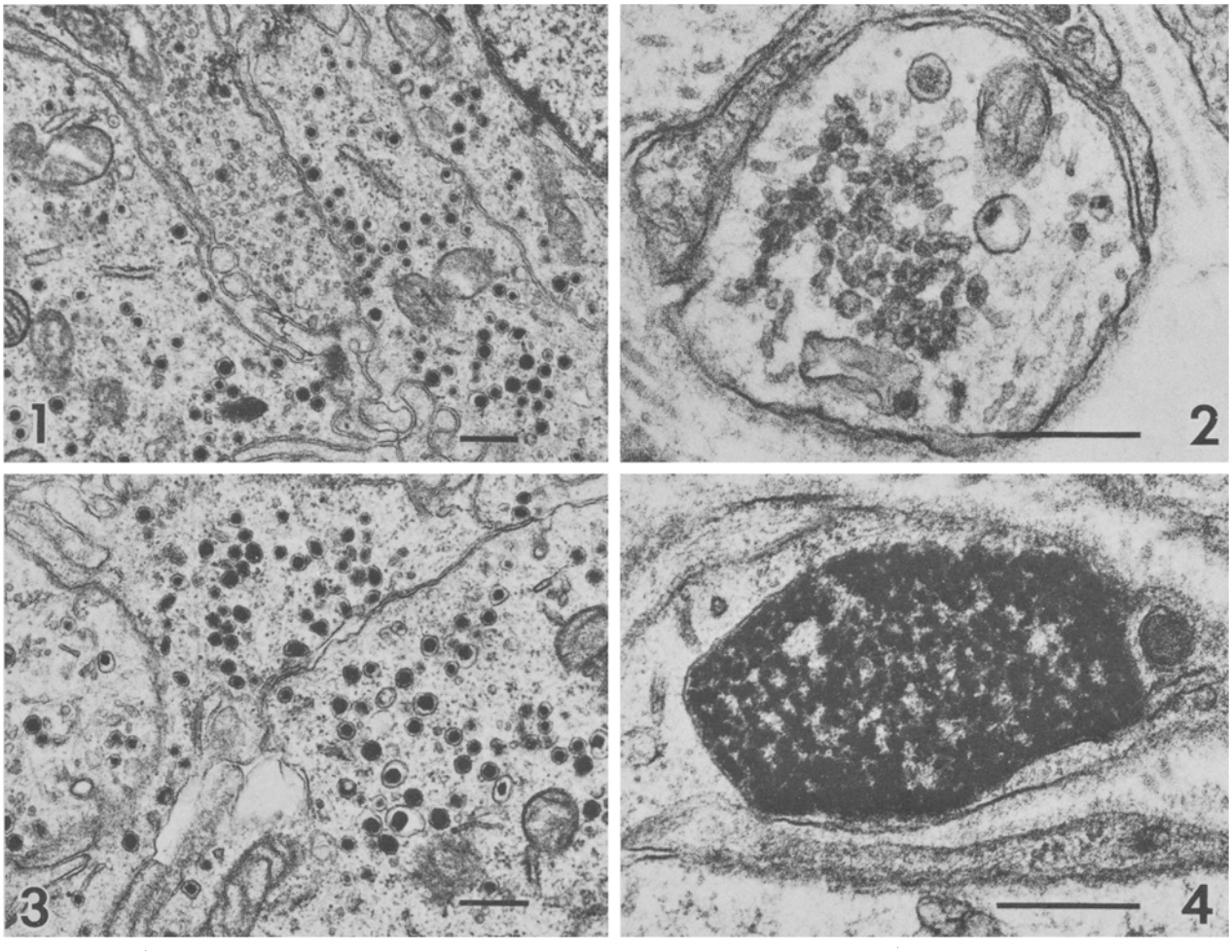

Fig. 1. Electron-dense cytoplasmic vesicles of normal carotid body chief cell. Fig. 2. Perivascular adrenergic nerve from normal carotid body. Fig. 3. Electron-dense vesicles from carotid body chief cell of animal receiving 6-OHDA. Fig. 4. Perivascular adrenergic nerve from carotid body of animal receiving 6-OHDA. Note degeneration. Bar represents 0.25 µm.

of 6-OHDA exhibit morphological signs of degeneration typical of 6-OHDA administration (figure 4). Alterations include an increased cytoplasmic density and clumping of synaptic vesicles. On the other hand, the carotid body chief cells from 6-OHDA-treated rats appear normal (figure 3). The size, distribution and density of the vesicle cores are similar to the control chief cells. In addition, no detectable decrease in formaldehyde-induced-fluorescence of the 6-OHDA-treated chief cells is observed.

These results suggest that the rat carotid body chief cells are relatively resistant to 6-OHDA treatment at levels high enough to cause degeneration of perivascular adrenergic terminals. Chief cells of the rat carotid body, although similar in many aspects to SIF cells, may be more selective in their uptake and concentration of 6-OHDA. The apparent discrepancy (no decrease in catecholamine fluorescence after 6-OHDA) between these results and those of Hess[12] may be attributable to the fact that his animals were examined shortly after 6-OHDA treatment while in this study the carotid body was examined either 2 or 6 days following the last injection. In this regard, the turnover of biogenic amines in the chief cells may be fast enough to recover from 6-OHDA pretreatment. Indeed Grönblad and Korkala[14] have demonstrated that the catecholamines of the carotid body are depleted relatively quickly after α-methyl-para-tyrosine treatment, suggesting that the catecholamines of the carotid body exhibit a rapid turnover compared to similarly treated SIF cells. Alternatively, the sustentacular cells which envelope the chief cells may provide an effective barrier against the uptake and concentration of 6-OHDA.

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