TISSUE-SPECIFIC INCREASE IN NORADRENALINE TURNOVER INDUCED BY BRAIN IL-1 AND A ROLE OF CORTICOTROPIN RELEASING HORMONE IN RATS

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Interleukin (IL)-1 and IL-6 were originally identified in peripheral cells. However, they are also known to be synthesized in the brain, both in neurons and glial cells, suggesting a significant role of brain IL-1 and IL-6 under certain pathophysiological conditions. To examine the effects of brain cytokines on the sympathetic nervous system, noradrenaline (NA) turnover in peripheral organs (spleen, lung, diaphragm, pancreas, heart, liver, kidney, and interscapular brown adipose tissue) was assessed after intracerebroventricular administration of human recombinant IL-1β and IL-6 to rats. The results were compared with those of peripheral administration of IL-1β or IL-6. An intraperitoneal injection of IL-1 accelerated NA turnover in the spleen, lung, and diaphragm without appreciable effects in other organs examined. When IL-1 was injected intracerebroventricularly at much lower doses, a dose-dependent increase in NA turnover was observed in the spleen, lung, diaphragm, and pancreas. IL-6 did not affect NA turnover in any organ examined, even when it was given at much higher doses. In contrast to tissue NA turnover, the plasma corticosterone level was increased after the administration of IL-6 as well IL-1, regardless of the site of administration. Intracerebroventricular injection of CRH showed a dose-response increase in NA turnover, specifically in the spleen, lung, and diaphragm as when IL-1 was injected. These results suggest that brain IL-1, but not IL-6, increases sympathetic nerve activity in some specific organs via CRH, whereas both cytokines are effective for adrenocortical activation.