

Abstract

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Human adrenal glands secrete vitamin C in response to adrenocorticotrophic hormone.

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BACKGROUND: When vitamin C intake is from foods, fasting plasma concentrations do not exceed 80 micromol/L. We postulated that such tight control permits a paracrine function of vitamin C.

OBJECTIVE: The purpose of this study was to determine whether paracrine secretion of vitamin C from the adrenal glands occurs.

DESIGN: During diagnostic evaluation of 26 patients with hyperaldosteronism, we administered adrenocorticotrophic hormone intravenously and measured vitamin C and cortisol in adrenal and peripheral veins.

RESULTS: Adrenal vein vitamin C concentrations increased in all cases and reached a peak of 176 +/- 71 micromol/L at 1-4 min, whereas the corresponding peripheral vein vitamin C concentrations were 35 +/- 15 micromol/L ($P < 0.0001$). Mean adrenal vein vitamin C increased from 39 +/- 15 micromol/L at 0 min, rose to 162 +/- 101 micromol/L at 2 min, and returned to 55 +/- 16 micromol/L at 15 min. Adrenal vein vitamin C release preceded the release of adrenal vein cortisol, which increased from 1923 +/- 2806 nmol/L at 0 min to 27 191 +/- 16 161 nmol/L at 15 min ($P < 0.0001$). Peripheral plasma cortisol increased from 250 +/- 119 nmol/L at 0 min to 506 +/- 189 nmol/L at 15 min ($P < 0.0001$).

CONCLUSIONS: Adrenocorticotrophic hormone stimulation increases adrenal vein but not peripheral vein vitamin C concentrations. **These data are the first in humans showing that hormone-regulated vitamin secretion occurs and that adrenal vitamin C paracrine secretion is part of the stress response.** Tight control of peripheral vitamin C concentration is permissive of higher local concentrations that may have paracrine functions.

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