THE JOURNAL OF
CLINICAL ENDOCRINOLOGY
& METABOLISM

The Journal of Clinical Endocrinology & Metabolism, doi:10.1210/jc.82.12.4015
The Journal of Clinical Endocrinology & Metabolism Vol. 82, No. 12 4015-4019

Original Studies

Seasonal Variation in Glucocorticoid Activity in Healthy Men[1]

Brian R. Walker[2], Ruth Best, Joseph P. Noon, Graham C. M. Watt and David J. Webb

University of Edinburgh, Department of Medicine, Western General Hospital (B.R.W., R.B., J.P.N., D.J.W.), Edinburgh EH4 2XU; and University of Glasgow, Department of General Practice, Woodside Health Centre (G.C.M.W.), Glasgow G20 7LR, Scotland, United Kingdom

Address all correspondence and requests for reprints to: Brian R. Walker, British Heart Foundation Senior Research Fellow, University of Edinburgh, Department of Medicine, Western General Hospital, Edinburgh EH4 2XU, Scotland, United Kingdom. E-mail: B.Walker@ed.ac.uk.

Many endocrine systems are subject to seasonal variation. However, studies of the hypothalamic-pituitary-adrenal axis in man have been limited to patients with psychiatric illness with conflicting results. We studied 105 healthy men, age 24–33 yr, during a 15-month period that included two winters. We measured cortisol and its metabolites by gas chromatography/mass spectrometry in plasma and urine and the intensity of dermal blanching after overnight topical application of beclomethasone dipropionate.

There were no differences between subjects studied during the two winter periods, but marked differences between subjects studied in winter and summer. In winter, 0900-h plasma cortisol concentrations were higher (73 ± 10 ng/mL, n = 41 *vs*. 35 ± 4, n = 25 in summer; $P < 0.01$), total cortisol metabolite excretion was lower (678 ± 67 μg/mmol creatinine *vs*. 900 ± 98; $P < 0.05$), the ratio of metabolites of cortisol to those of cortisone was higher (3.0 ± 0.2 *vs*. 2.1 ± 0.1; $P < 0.01$), and dermal glucocorticoid sensitivity was higher (7.2 ± 0.4 arbitrary units *vs*. 5.6 ± 0.5; $P < 0.02$). Although blood pressure and fasting insulin/glucose relationships were not measurably different between seasons, these correlated with dermal vasoconstriction and cortisol metabolite excretion rate.

We conclude that plasma cortisol and tissue sensitivity to glucocorticoids are higher in winter, but cortisol production rate is reduced. This could be explained by a reduction in cortisol clearance rate: urinary free cortisol/cortisone ratios were not different but A-ring-reduced metabolites of cortisol were higher in winter, suggesting that conversion of cortisone to cortisol by hepatic 11ß-hydroxysteroid dehydrogenase 1 is enhanced. It is an intriguing possibility that increased glucocorticoid activity contributes to the increased prevalence of disease during the winter.

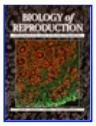
This article has been cited by other articles:

Journal of Endocrinology HOME

D. R Lemos, J. L Downs, M. N Raitiere, and H. F Urbanski
Photoperiodic modulation of adrenal gland function in the rhesus macaque: effect on 24-h plasma cortisol and dehydroepiandrosterone sulfate rhythms and adrenal gland gene expression
J. Endocrinol., May 1, 2009; 201(2): 275 - 285.
[Abstract] [Full Text] [PDF]

Endocrinology HOME

L. M. Pyter, J. D. Adelson, and R. J. Nelson
Short Days Increase Hypothalamic-Pituitary-Adrenal Axis Responsiveness
Endocrinology, July 1, 2007; 148(7): 3402 - 3409.
[Abstract] [Full Text] [PDF]



BIOLOGY of REPRODUCTION HOME

K. M. Breen and F. J. Karsch
Does Season Alter Responsiveness of the Reproductive Neuroendocrine Axis to the Suppressive Actions of Cortisol in Ovariectomized Ewes?
Biol Reprod, January 1, 2006; 74(1): 41 - 45.
[Abstract] [Full Text] [PDF]

American Journal of EPIDEMIOLOGY HOME

C.-L. Tseng, M. Brimacombe, M. Xie, M. Rajan, H. Wang, J. Kolassa, S. Crystal, T.-C. Chen, L. Pogach, and M. Safford
Seasonal Patterns in Monthly Hemoglobin A1c Values
Am. J. Epidemiol., March 15, 2005; 161(6): 565 - 574.
[Abstract] [Full Text] [PDF]

THE JOURNAL OF CLINICAL ENDOCRINOLOGY & METABOLISM HOME

L. M. L. van Winsen, D. F. R. Muris, C. H. Polman, C. D. Dijkstra, T. K. van den Berg, and B. M. J. Uitdehaag
Sensitivity to Glucocorticoids Is Decreased in Relapsing Remitting Multiple Sclerosis
J. Clin. Endocrinol. Metab., February 1, 2005; 90(2): 734 - 740.
[Abstract] [Full Text] [PDF]

Diabetes Care HOME

M. Sohmiya, I. Kanazawa, and Y. Kato
Seasonal Changes in Body Composition and Blood HbA1c Levels Without Weight Change in Male Patients With Type 2 Diabetes Treated With Insulin
Diabetes Care, May 1, 2004; 27(5): 1238 - 1239.
[Full Text] [PDF]

ARCHIVES OF GENERAL PSYCHIATRY HOME

K. Pajer, W. Gardner, R. T. Rubin, J. Perel, and S. Neal
Decreased Cortisol Levels in Adolescent Girls With Conduct Disorder
Arch Gen Psychiatry, March 1, 2001; 58(3): 297 - 302.
[Abstract] [Full Text] [PDF]

THE JOURNAL OF CLINICAL ENDOCRINOLOGY & METABOLISM HOME

S. D. Hearing, M. Norman, C. Smyth, C. Foy, and C. M. Dayan
Wide Variation in Lymphocyte Steroid Sensitivity Among Healthy Human Volunteers
J. Clin. Endocrinol. Metab., November 1, 1999; 84(11): 4149 - 4154.
[Abstract] [Full Text]
