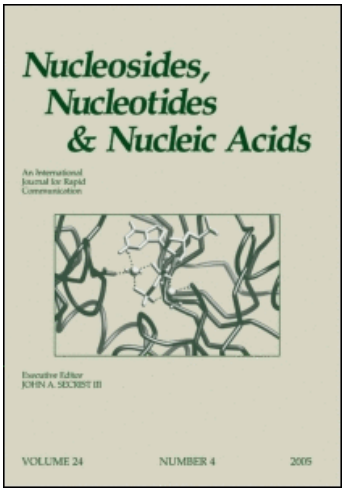


**Nucleosides, Nucleotides and Nucleic Acids**
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713597286

# The Pathophysiology of Hyperuricemia in Essential Hypertension: A Pilot Study

Juan G. Puig[a]; Rosa J. Torres[a]; Luis M. Ruilope[b]; C. Campo[b]; Cristina Grande[a]; Teresa Sancho[a]; José I. Bernardino[a]
[a] Division of Internal Medicine, Hospital "La Paz", Madrid, Spain [b] Hypertension Unit, Hospital "12 de Octubre", Madrid, Spain

Online publication date: 27 October 2004

**To cite this Article** Puig, Juan G. , Torres, Rosa J. , Ruilope, Luis M. , Campo, C. , Grande, Cristina , Sancho, Teresa and Bernardino, José I.(2004) 'The Pathophysiology of Hyperuricemia in Essential Hypertension: A Pilot Study', Nucleosides, Nucleotides and Nucleic Acids, 23: 8, 1197 — 1199
**To link to this Article: DOI:** 10.1081/NCN-200027466
**URL:** http://dx.doi.org/10.1081/NCN-200027466

NUCLEOSIDES, NUCLEOTIDES & NUCLEIC ACIDS
Vol. 23, Nos. 8 & 9, pp. 1197–1199, 2004

# The Pathophysiology of Hyperuricemia in Essential Hypertension: A Pilot Study

**Juan G. Puig,[1,*] Rosa J. Torres,[1] Luis M. Ruilope,[2] C. Campo,[2] Cristina Grande,[1] Teresa Sancho,[1] and José I. Bernardino[1]**

[1]Division of Internal Medicine, Hospital ''La Paz,'' Madrid, Spain
[2]Hypertension Unit, Hospital ''12 de Octubre,'' Madrid, Spain



## ABSTRACT

We have examined whether hyperuricemia in essential hypertension may be related to an increased insulin secretion thereby enhancing the tubular reabsorption of sodium and thus uric acid. Insulin hypersecretion, as elicited by the oral glucose tolerance test (OGTT), increased a mean of 5-fold in 12 essential hypertensive patients. Urinary uric acid to creatinine ratio significantly diminished by a mean of 62% after the OGTT. Simultaneously, urinary sodium to creatinine ratio decreased by a mean of 54%. These results suggest that insulin may mediate uric acid underexcretion due to its tubular sodium retaining effect in essential hypertensive patients.

*Key Words:* Metabolic syndrome; Uric acid; Insulin.

## INTRODUCTION

Hyperuricemia is a common condition in patients with essential hypertension. In fact, the incidence of gout has been shown to be 3-fold higher in hypertensive patients

*Correspondence: Juan G. Puig, Division of Internal Medicine and Clinical Biochemistry, Hospital ''La Paz,'' Madrid, Spain.



DOI: 10.1081/NCN-200027466
1525-7770 (Print); 1532-2335 (Online)

compared with normotensive subjects.[1] In most patients hyperuricemia has been related to a diminished urinary uric acid excretion rate.[2] It has been proposed that in hypertensive patients urinary uric acid underexcretion may be linked to an increased tubular reabsorption of sodium mediated by insulin.[3,4] In this pilot study we have examined whether insulin hypersecretion is accompanied by a decrease in urinary uric acid excretion rate.

## PATIENTS AND METHODS

Twelve Caucasian subjects with essential arterial hypertension (mean age, 52 years; range 40 to 65 years) and hyperuricemia ($\geq$7.0 mg/dL) were studied after informed written consent was obtained. An oral glucose tolerance test (OGTT, glucose 75 g) was performed in each patient. In addition, in 7 patients we examined for changes in urinary sodium excretion. Glucose, uric acid, creatinine and sodium were measured by standard methods. The serum insulin concentrations were measured by a radioimmunoassay (Pharmacia, Uppsala, Sweden). Impaired glucose tolerance was defined as a plasma glucose concentration of 140 to 199 mg/dL (7.8 to 11.0 mmol/L) two hours after the OGT in subjects whose plasma glucose concentration after an overnight fast was less than 140 mg/dL.[5] All data are presented as mean ± SD. Non-parametric statistical tests were used and P values less than 0.05 were considered statistically significant.



## RESULTS

Two patients showed baseline plasma glucose of 114 and 121 mg/dL and were diagnosed as having impaired fasting glucose ($\geq$110 and <126 mg/dL). One of these two patients showed glucose intolerance (141 mg/dL, 120 min after the OGTT). Another patient with baseline plasma glucose of 105 mg/dL had impaired glucose tolerance (176 mg/dL) following the OGTT. Nine patients showed normal OGT (baseline < 110 mg/dL and 120 min < 140 mg/dL). Mean baseline plasma glucose was 97 ± 13 mg/dL and increased to 117 ± 31 mg/dL following the OGTT (difference, 20 mg/dL; 95%CI, 10 to 30 mg/dL). Simultaneously, baseline insulin was 16.6 ± 9.3 mcUI/mL and increased a mean of 5-fold to 82.5 ± 45.3 mcUI/mL. Mean serum urate following the OGT remained stable (8.1 mg/dL). Urinary uric acid to creatinine ratio significantly decreased from a mean baseline value of 0.47 ± 0.21 mg/mg to 0.29 ± 0.12 mg/mg (difference, 0.18 mg/mg; 95%CI, 0.15 to 0.21 mg/mg) after the OGTT. In 7 patients in whom urinary sodium to creatinine ratio was determined, sodium excretion was markedly reduced by the OGTT (from 1.23 ± 0.56 at baseline to 0.67 ± 0.27 mmol/mg creatinine; difference, 0.56 mmol/mg creatinine; 95%CI, 0.46 to 0.56 mmol/mg creatinine).

In conclusion; this pilot study shows that acute endogenous insulin secretion is accompanied by a reduction in uric acid excretion that may be mediated by the sodium-retaining effect of insulin.

## REFERENCES

1. Campion, E.W.; Glynn, R.J.; DeLabry, L.O. Asymptomatic hyperuricemia. Risks and consequences in the normative aging study. Am. J. Med. **1987**, *82*, 421–426.
2. Tykarski, A. Evaluation of renal handling of uric acid in essential hypertension: hyperuricemia related to decreased urate secretion. Nephron **1991**, *59*, 364–368.
3. Capussio, F.P.; Strazzullo, P.; Farinaro, E.; Trevisan, M. Uric acid metabolism and tubular sodium handling. Results from a population-based study. JAMA **1993**, *270*, 354–359.
4. Puig, J.G.; Ruilope, L.M. Uric acid as a cardiovascular risk factor in arterial hypertension. J. Hypertens. **1999**, *17*, 869–872.
5. Diabetes mellitus: report of a WHO study group. W.H.O. Tech. Rep. Ser. **1985**, *727*, 7–113.