

Correlation Among Serum Levels of Procollagen Type 1 Carboxy Terminal Propeptide and Type 1 Collagen Carboxy Terminal Telopeptide and Urinary Excretion of Growth Hormone and Pyridinoline in Normal Children

Hiroshi Bando, Takako Abe, Toshihiro Ohkura, Yasumi Shintani and Shiro Saito

First Department of Internal Medicine, School of Medicine, University of Tokushima, Tokushima, Japan

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Introduction

Growth Hormone (GH), insulin-like growth factor I (IGF-I), parathyroid hormone-related protein (PTHrP) (1) and pyridinoline are known to be involved in bone metabolism in children. Recently, procollagen type 1 carboxy terminal propeptide (PICP) and type 1 collagen carboxy terminal telopeptide (ICTP) have been recognized as the markers for bone formation and resorption. Therefore in this study, we investigated the correlation among these parameters in normal children, and investigated the physiological roles in bone metabolism.

Subjects and Methods

The subjects in this study were 50 normal children aged 3-15 years. Urine samples were collected in the early morning and used for measurements of GH, pyridinoline, PTHrP,

calcium, phosphate and creatinine. Serum levels of IGF-I, PICP and ICTP were also measured from samples obtained in the morning in 16 of these subjects. Assay kits were as follows: urinary GH, Picoia HGH plate, Sumitomo Pharmaceutical Co., Ltd, Japan; urinary pyridinoline, Metra Biosystems Inc., USA; urinary and serum PTHrP, Daiichi Radioisotope, Japan; PICP and ICTP, Chugai Pharmaceutical Co., Ltd., Japan.

Results and Discussion

Mean serum levels of these parameters were as follows; Pyridinoline 173 ± 74 nmol/mmol cr, GH 23 ± 15 pg/mg cr, PTHrP 3.0 ± 1.4 nmol/mg cr, IGF-I 244 ± 78 ng/mL, PICP 299 ± 60 ng/mL, ICTP 12.7 ± 4.1 ng/mL. Correlation among these parameters were investigated and their P values were as follows;

Significant positive correlations were observed between U-pyridinoline and U-PTHrP (Fig. 1-a), U-pyridinoline and serum IGF-I (Fig. 1-b), U-pyridinoline and ICTP (Fig. 1-c), and serum IGF-I and PICP (Fig. 1-d).

Correspondence: Dr. Hiroshi Bando, First Department of Internal Medicine, School of Medicine, University of Tokushima, 3-18-15, Kuramoto-cho, Tokushima-shi, Tokushima 770 Japan

	Pyr	GH	PTHrP	IGF-I	PICP	ICTP
Pyr	—	0.23	0.02	0.04	0.62	<0.01
GH	0.23	—	0.73	0.19	0.95	0.07
PTHrP	0.02	0.73	—	0.96	0.09	0.35
IGF-I	0.04	0.19	0.96	—	<0.01	<0.01
PICP	0.62	0.95	0.09	<0.01	—	0.09
ICTP	<0.01	0.07	0.35	<0.01	0.09	—

Furthermore, a positive correlative tendency was observed between GH and ICTP, between PTHrP and PICP, and between PICP and ICTP (P<0.10). However, urinary GH did not show

significant correlations, suggesting daily variable data in urinary GH excretion.

Our results seem to be compatible with previous reports, indicating PICP and IGF-I as useful markers for bone formation, and ICTP and urinary pyridinoline for bone resorption (2, 3). In our former study (4), age-related decline was found in urinary concentrations of PTHrP (P>0.01), but not in those of GH, calcium or phosphate. These results suggest an elevated bone turnover rate in younger chil-

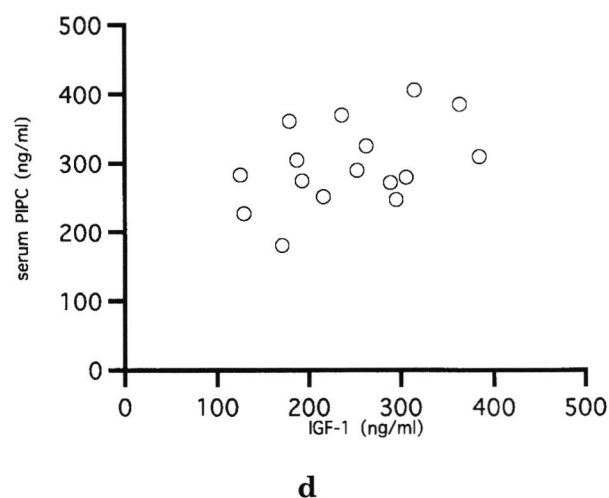
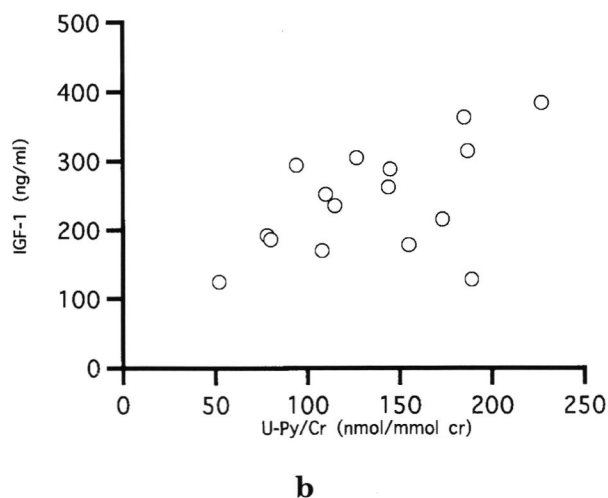
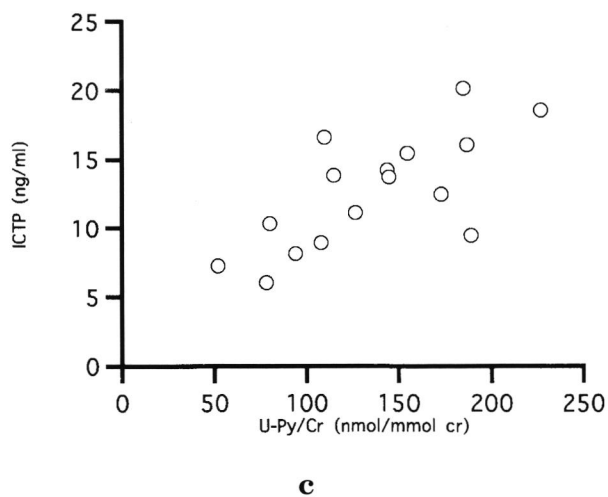
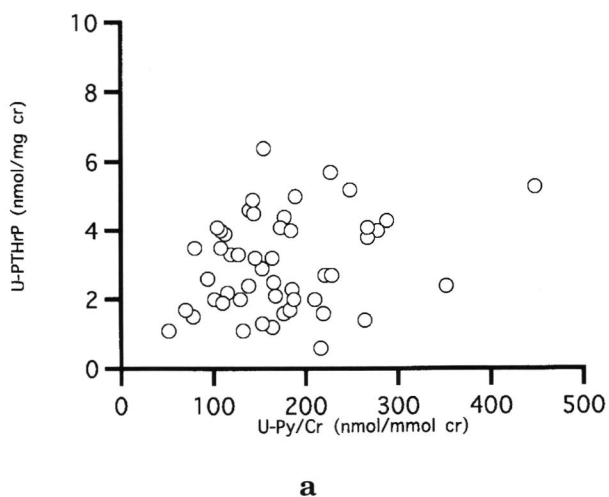


Fig. 1 Correlation among urinary excretion of pyridinoline and PTHrP, and serum concentrations of IGF-I, PICP and ICTP.

PICP, ICTP and GH

dren. In this study, moderate age-related decline was observed in U-pyridinoline, PICP and ICTP. Further investigation would be necessary for making these parameters useful markers in reflecting bone formation and resorption in normal and diseased states in children.

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