

II . Cadmium induced renal effects

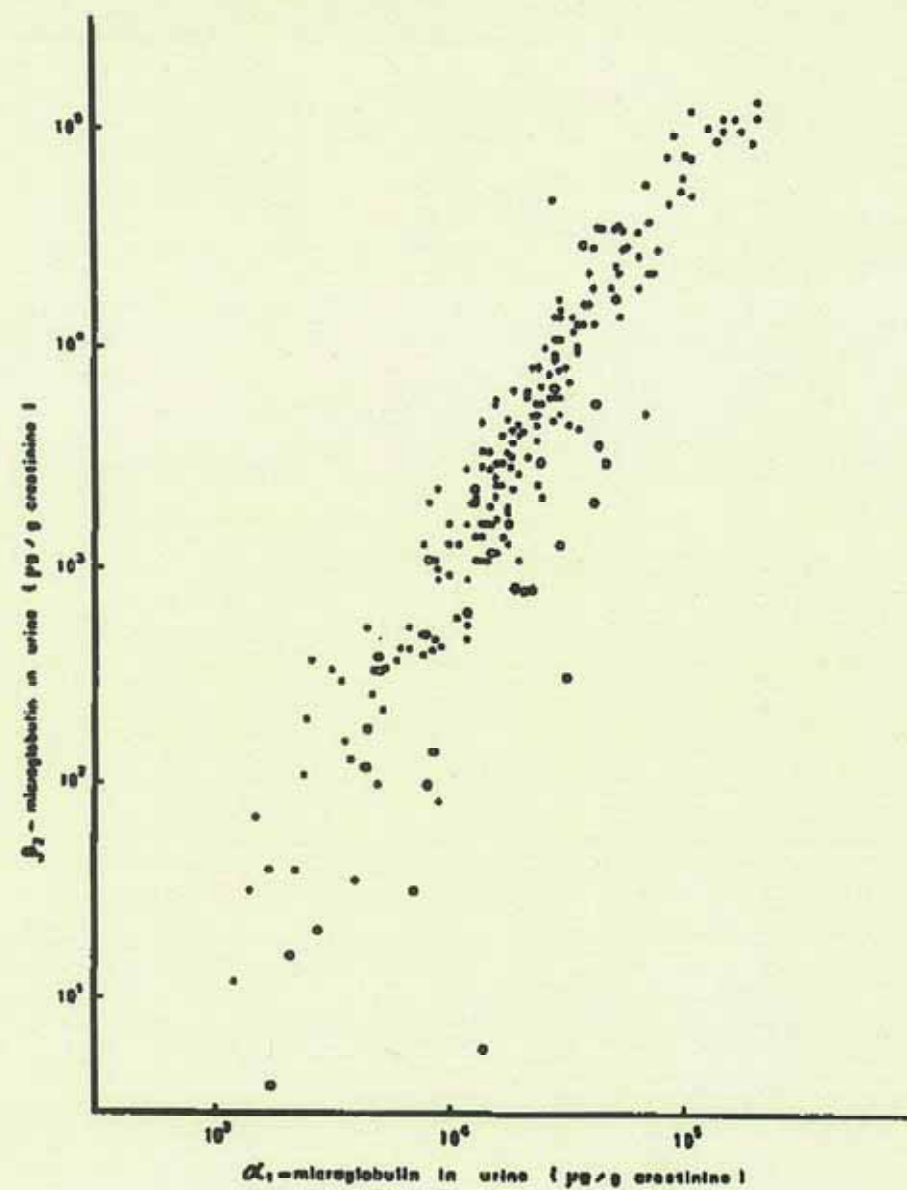


Fig. 5. Relationship between α_1 -m and β_2 -m concentrations of urine from the Cd-polluted subjects. $\bullet$ urine pH > 5.8; $\circ$, urine pH < 5.6.

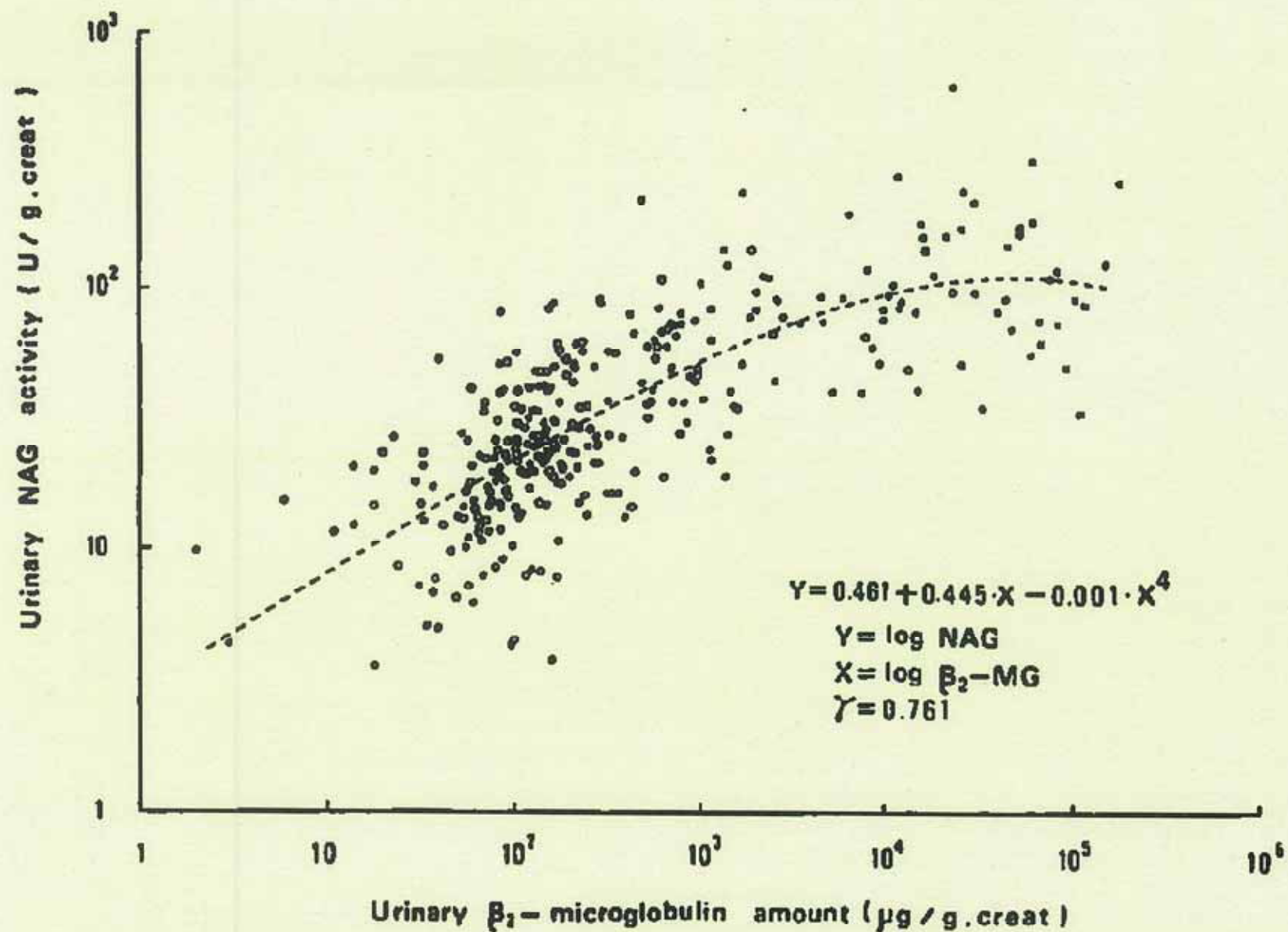


Fig 1. Relationship between urinary β_2 -microglobulin concentrations and NAG activities among people from an area free of cadmium (○), inhabitants of a cadmium-polluted area (●) and itai-itai disease patients and suspected patients (x).

**5-year follow-up study
of Cd-exposed subjects**

Table 1. —Sex and Age Distribution of Subjects Examined

Age* (Yr)	Men	Women	Total
50-59	8	19	27
60-69	19	15	34
70-79	5	5	10
80-	0	3	3
Total	32	42	74

***Age in 1981.**

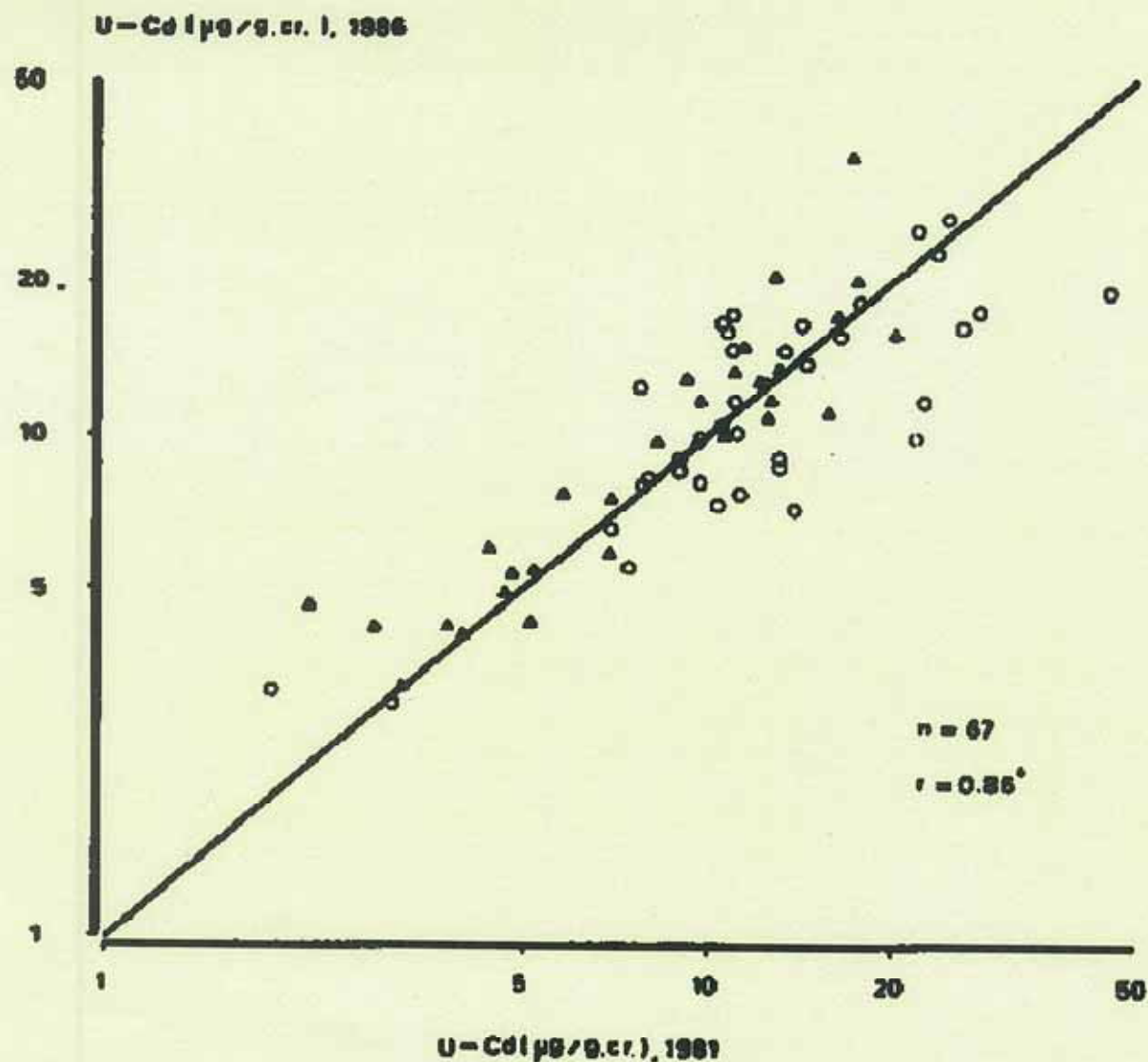


Fig. 5. Urinary excretion of cadmium ($\mu\text{g/g creatinine}$) in 74 cadmium-exposed inhabitants examined in 1981 and 1986; Δ = males, $\circ$ = females. The r denotes the correlation coefficient. *Significant r value at $p < .001$.

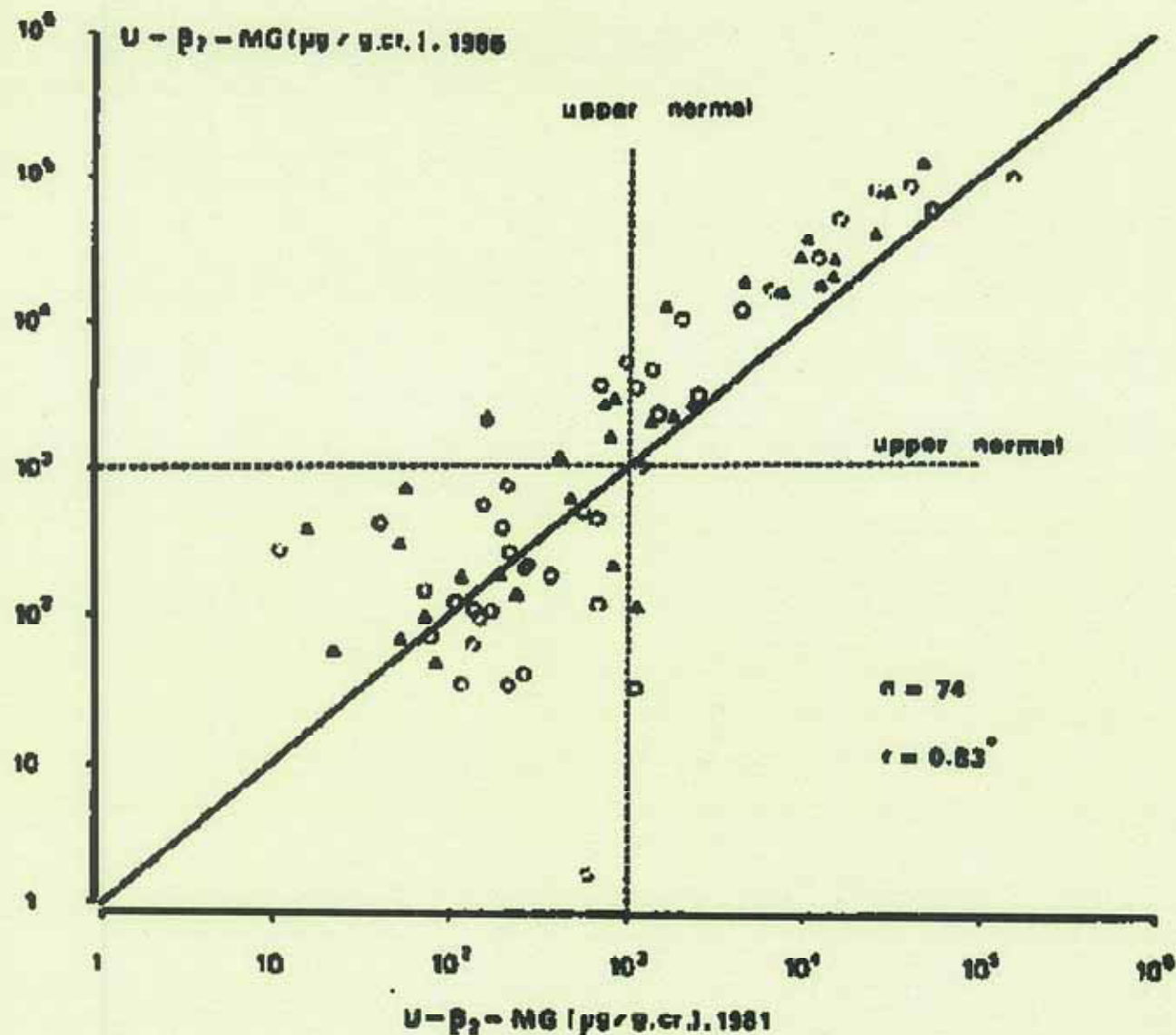


Fig. 1. Urinary excretion of β_2 -microglobulin (β_2 -MG) ($\mu g/g$ creatinine) in 74 cadmium-exposed inhabitants examined in 1981 and 1986; Δ = males, $\circ$ = females. The r denotes the correlation coefficient. *Significant r value at $p < .001$.

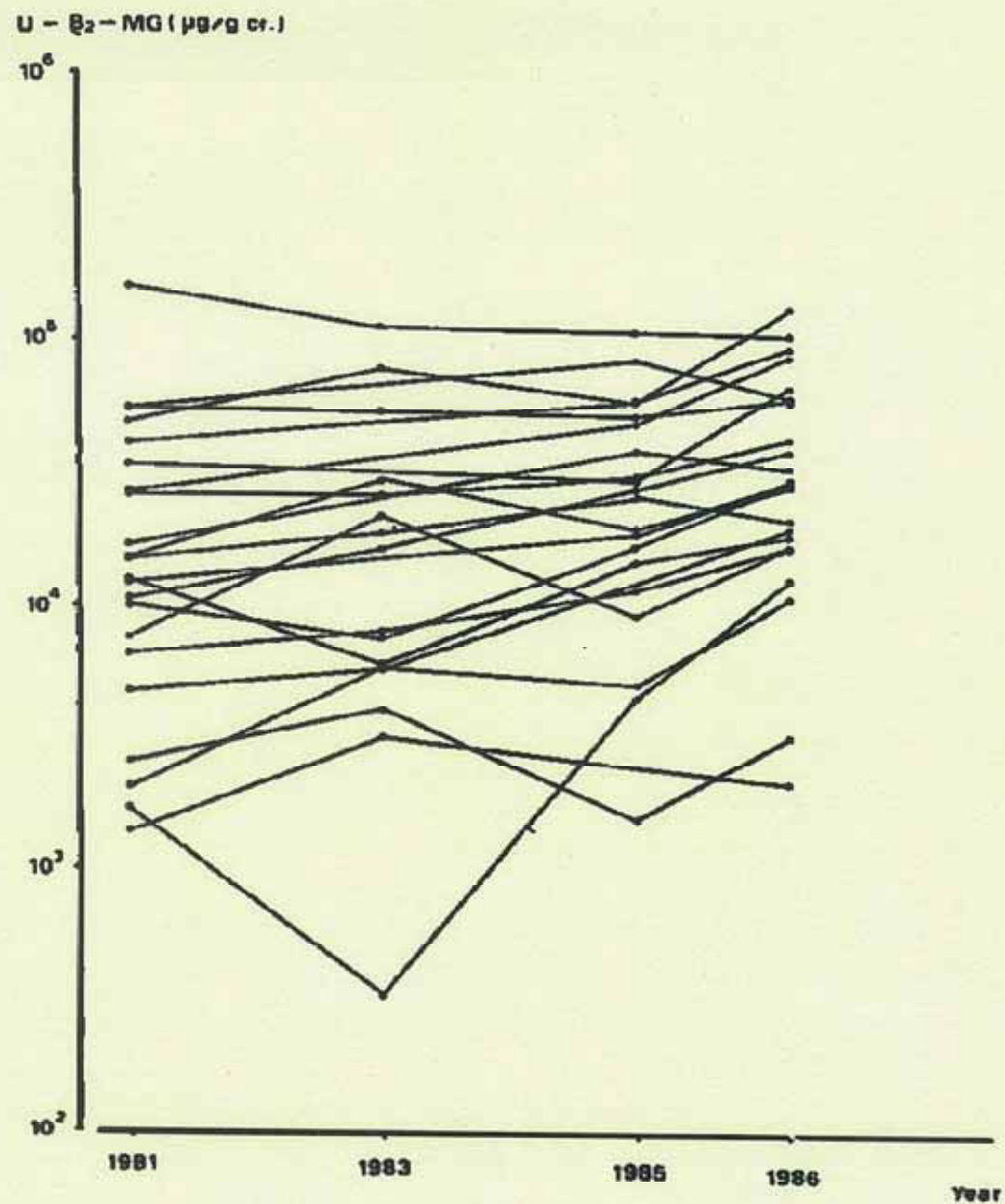


Fig. 2. Urinary excretion of β_2 -microglobulin (β_2 -MG) ($\mu\text{g/g creatinine}$) in 22 cadmium-exposed inhabitants examined between 1981 and 1986.

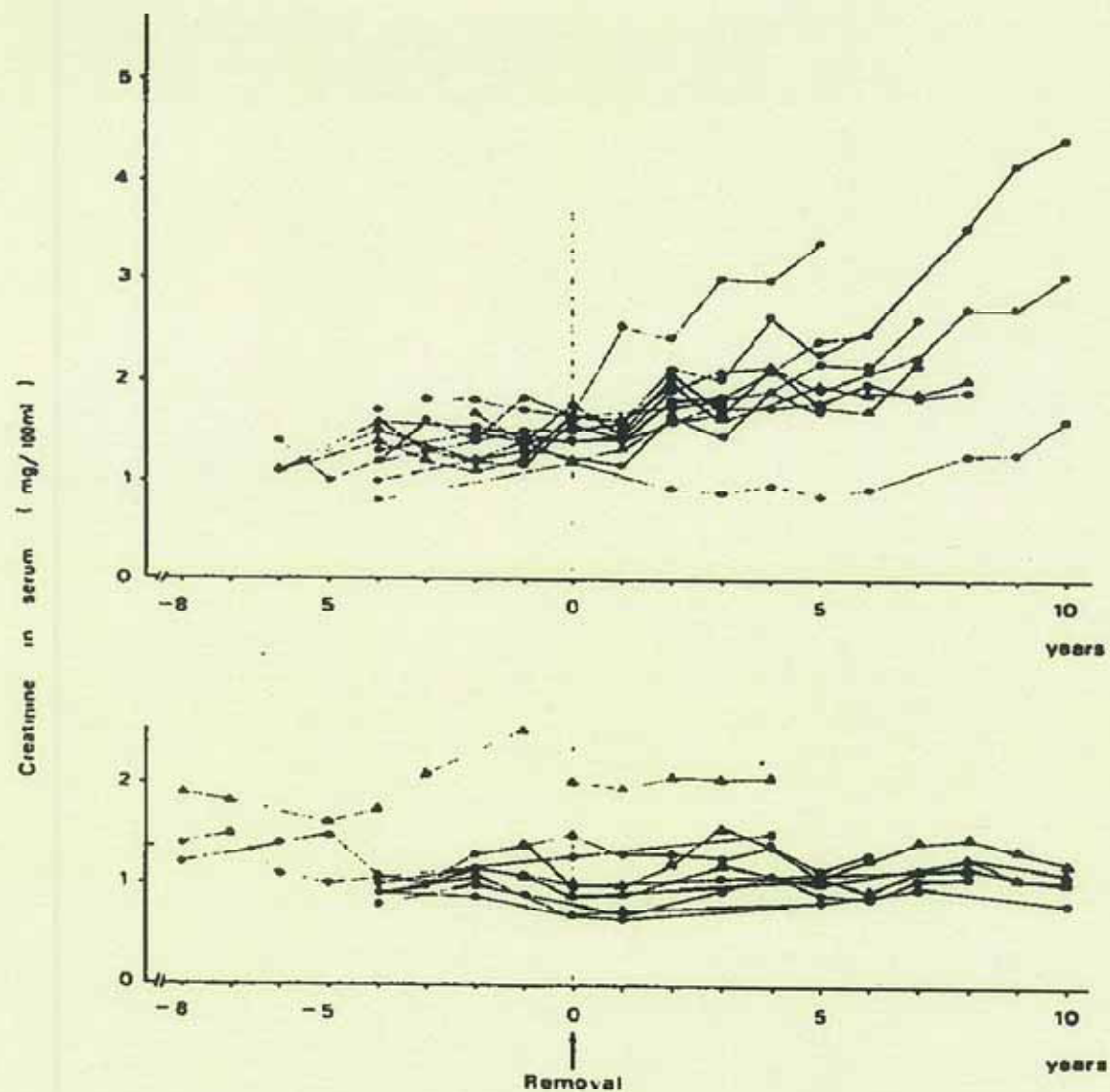


Fig. 1. Annual changes of serum creatinine levels before and after cessation of cadmium exposure. The *top* figure includes all subjects whose serum creatinine levels at their most recent examination were increased by $> 20\%$ above baseline values. The *bottom* figure includes subjects whose levels increased $< 20\%$ above baseline levels (Δ — Δ = males, $\bullet$ — $\bullet$ = females).

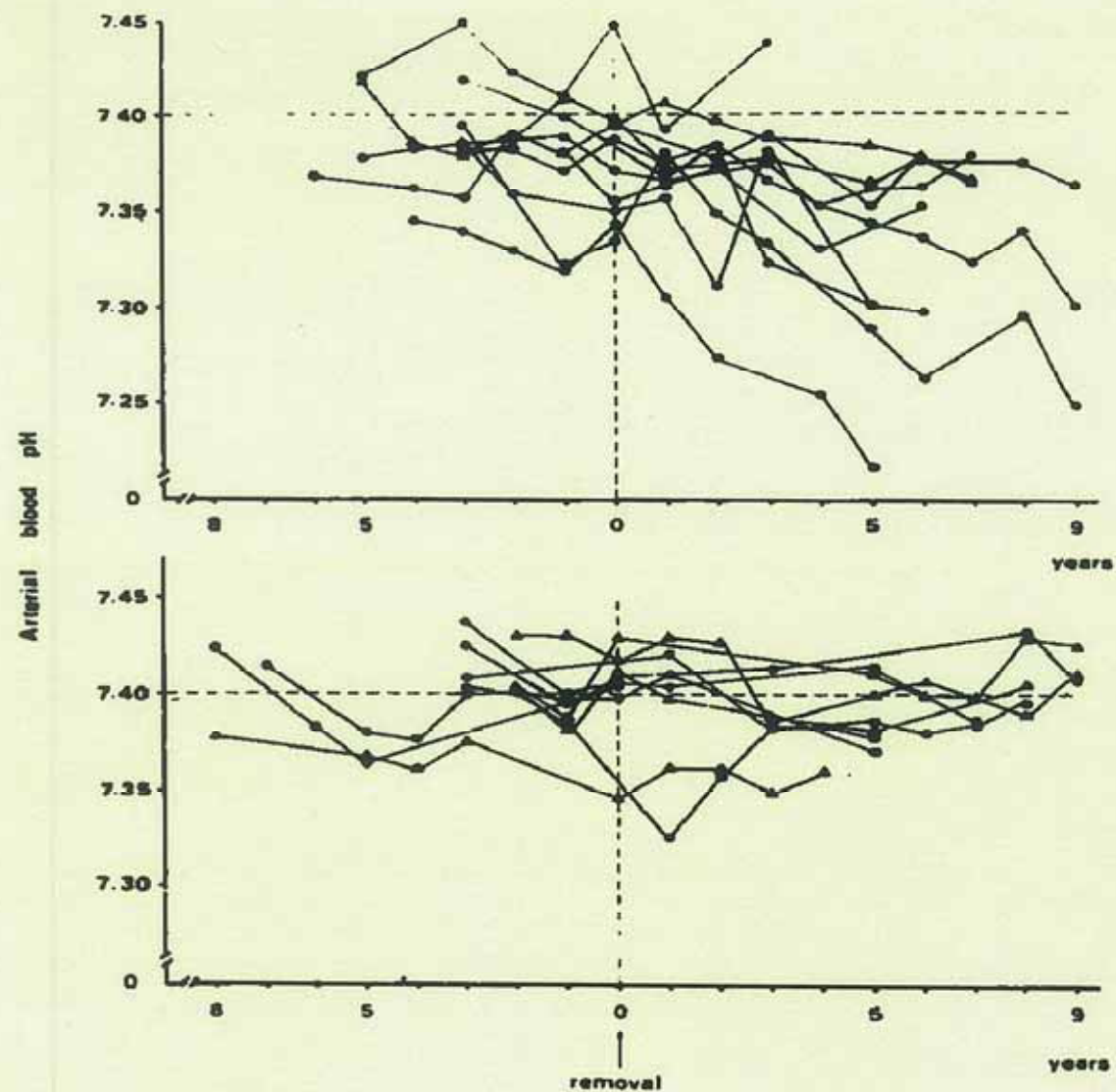


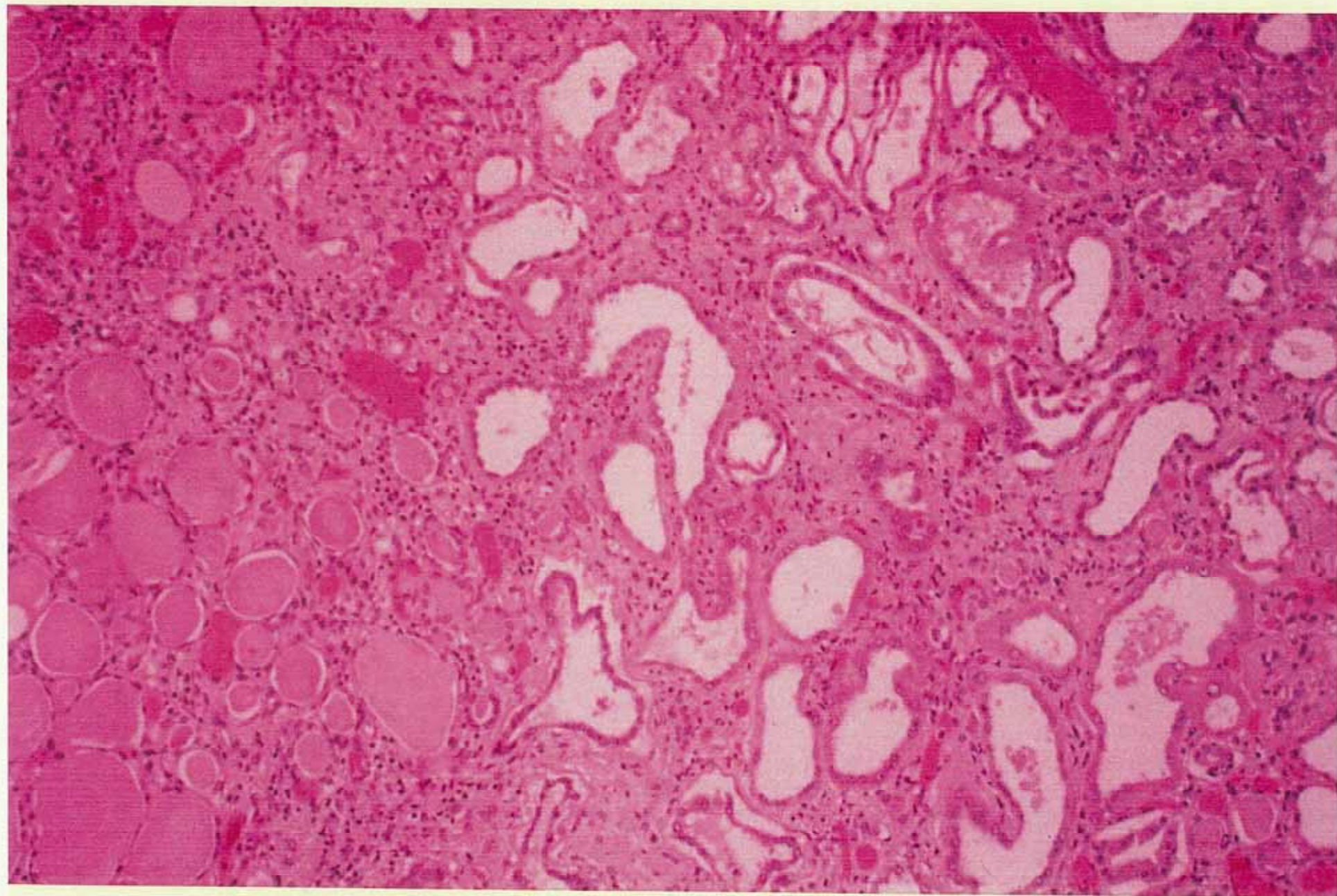
Fig. 2. Annual changes of arterial blood pH values before and after cessation of cadmium exposure. The *top* figure includes all subjects whose serum creatinine levels at their most recent examination were increased by > 20% above baseline values. The *bottom* figure includes subjects whose levels increased < 20% above baseline levels (Δ — Δ = males, $\bullet$ — $\bullet$ = females).

Table 4.—Biological Parameters of the Case Showing Renal Failure

Date of examination	1998
Sex	Female
Age(y)	80
Serum creatinine (mg/dl)	4.38
Blood urea nitrogen (mg/dl)	44.8
Red blood cell ($\times 10^4/\text{mm}^3$)	191
Hemoglobin (g/dl)	6.4
Hematocrit (%)	20
Urinalysis	
Glucose (mg/g cr)*	9016
Protein (mg/g cr)	1934
β_2 -microglobulin ($\mu\text{g/g cr}$)	137892
Retinol binding protein (mg/g cr)	167.9
Lysozyme (mg/g cr)	475.7
Cadmium ($\mu\text{g/g cr}$)	7.9
Creatinine clearance (ml/min)	10.9
Tubular reabsorptive phosphorus (%)	29.9

*g creatinine





**18-year follow-up study
of Cd-exposed subjects**

研究目的

カドミウム(Cd)汚染土壤の改善がなされて18年が経過した石川県梯川流域の1汚染地区住民で、その経過を観察し得た25名の尿中指標の推移を明らかにし、腎機能の可逆性について検討する。

また、Cd非汚染地域住民についても、尿中 β_2 -microglobulin(β_2 -MG)の推移を検討する。

研究方法

対象1:

石川県梯川流域Cd汚染地住民:

最も汚染の強かった1地区住民のうち、
1981年時点50才以上で、その年の健康調査を
受診し、その後1986, 91, 99年の検診にも参加
した25名(男11名、1999年の平均年齢75.7才;
女14名、72.6才)

対象2:

Cd非汚染地域住民:

1986年と2000年に尿検査を実施した
16名

(男7名、2000年の平均年齢80.7才;
女9名、79.0才)

方法:

各年度、早朝尿を採取し、尿中の糖、アミノ窒素、 β_2 -MG、Cdを測定した。

但し、尿中Cdについては1981年に2名分が尿量不足のため未測定であったので、その他の年度も23名について解析した。

**Fig. 1 Change of Urinary Findings
between 1981 and 1999**

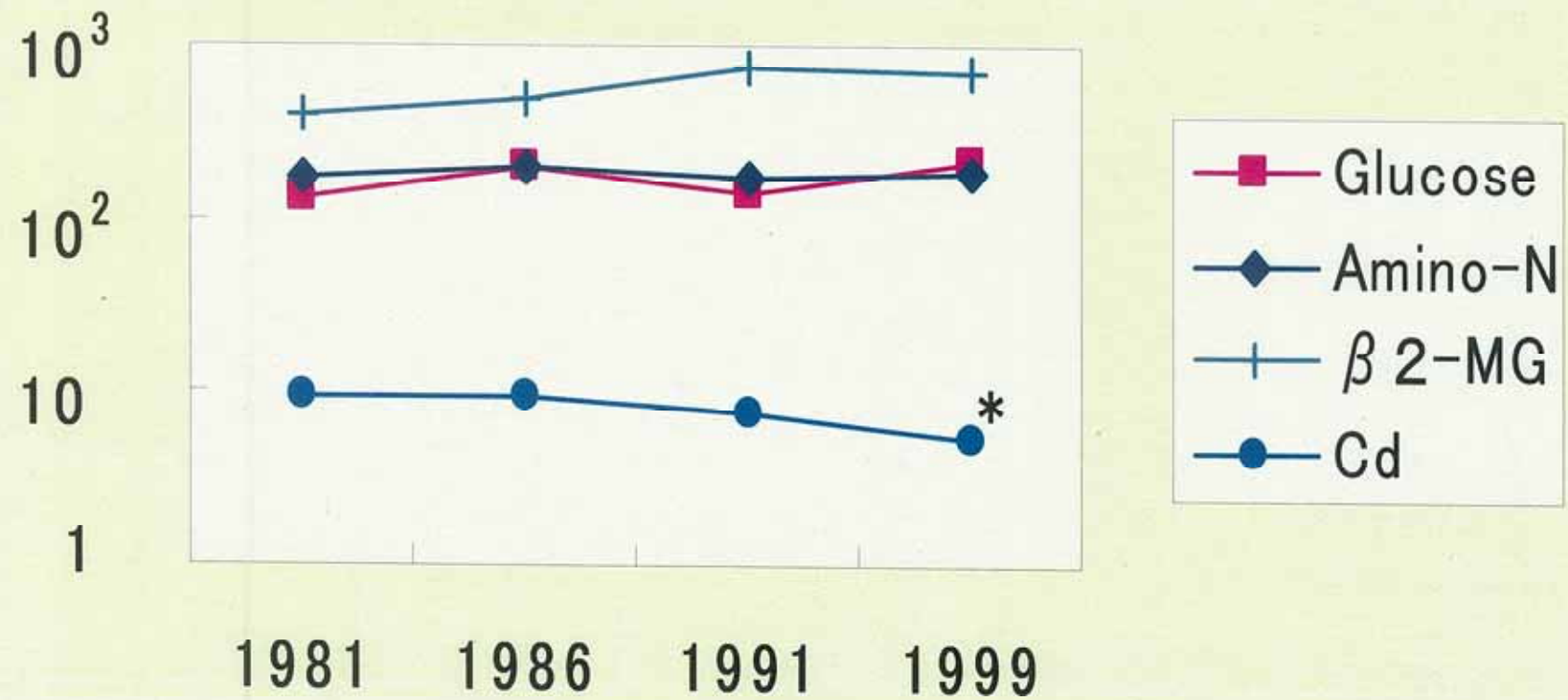


Fig. 2 Relationship between Urinary Glucose in 1981 and 1999

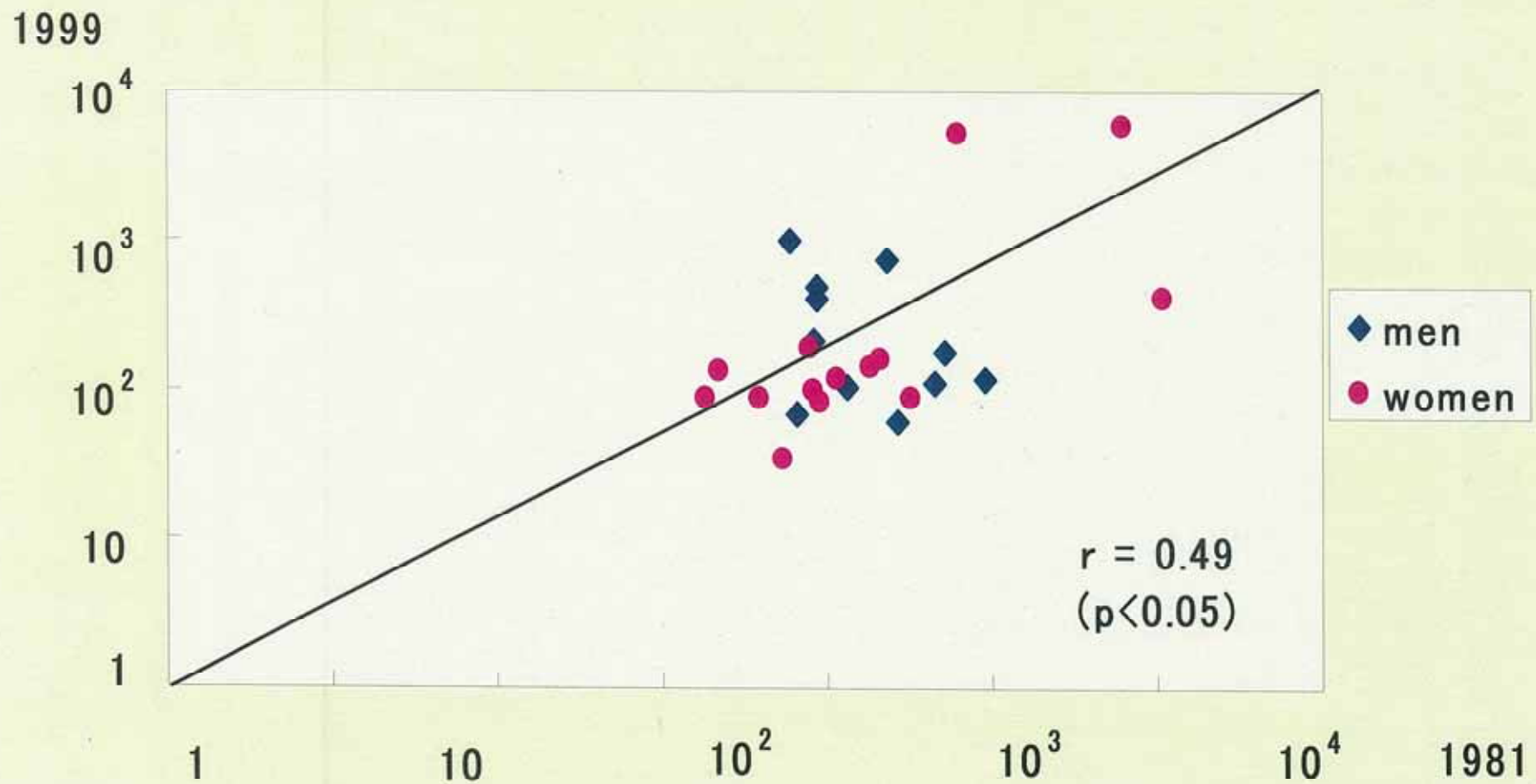


Fig. 3 Relationship between Urinary Amino-N in 1981 and 1999

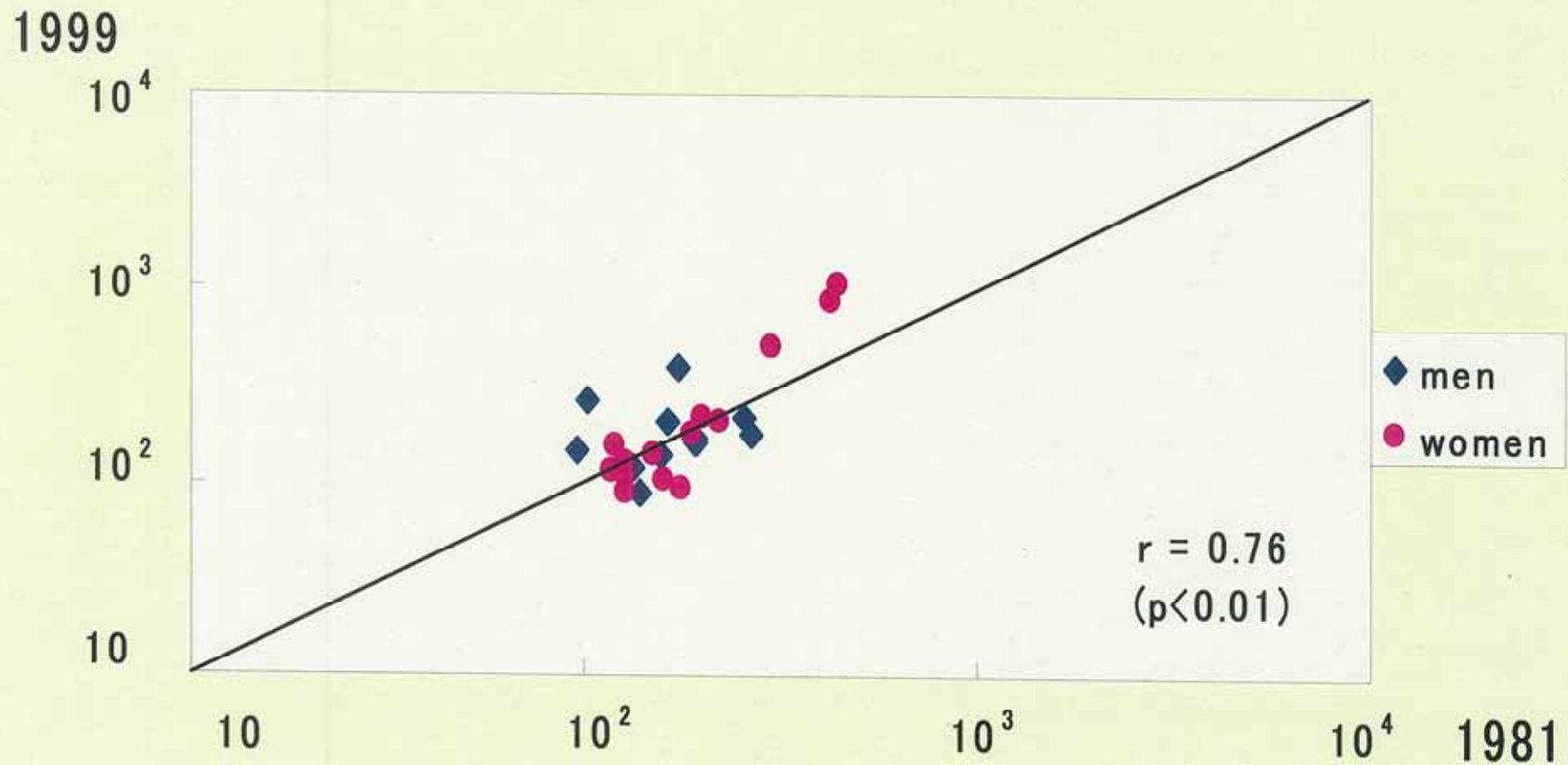


Fig. 4 Relationship between Urinary β_2 -MG in 1981 and 1999

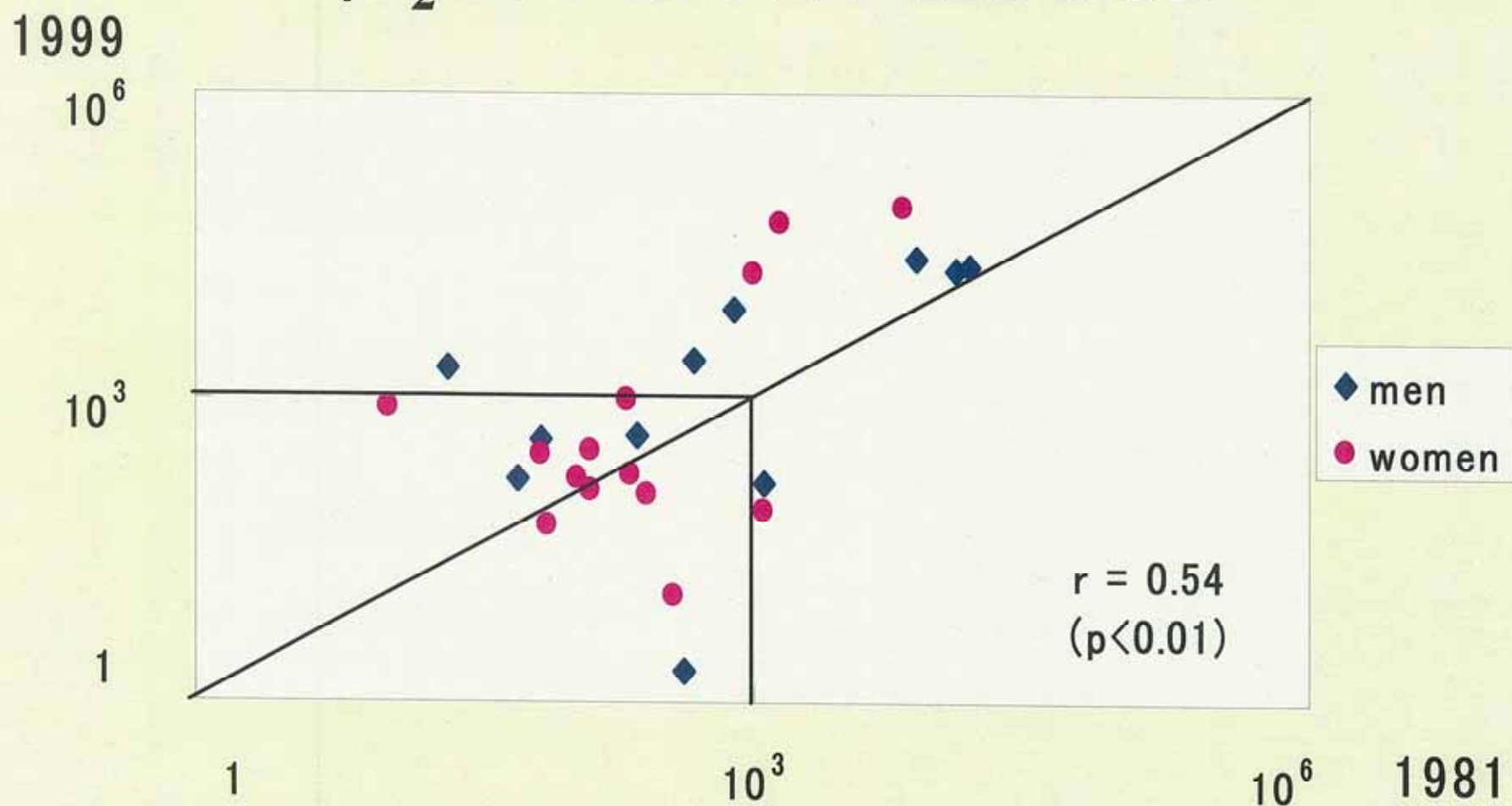
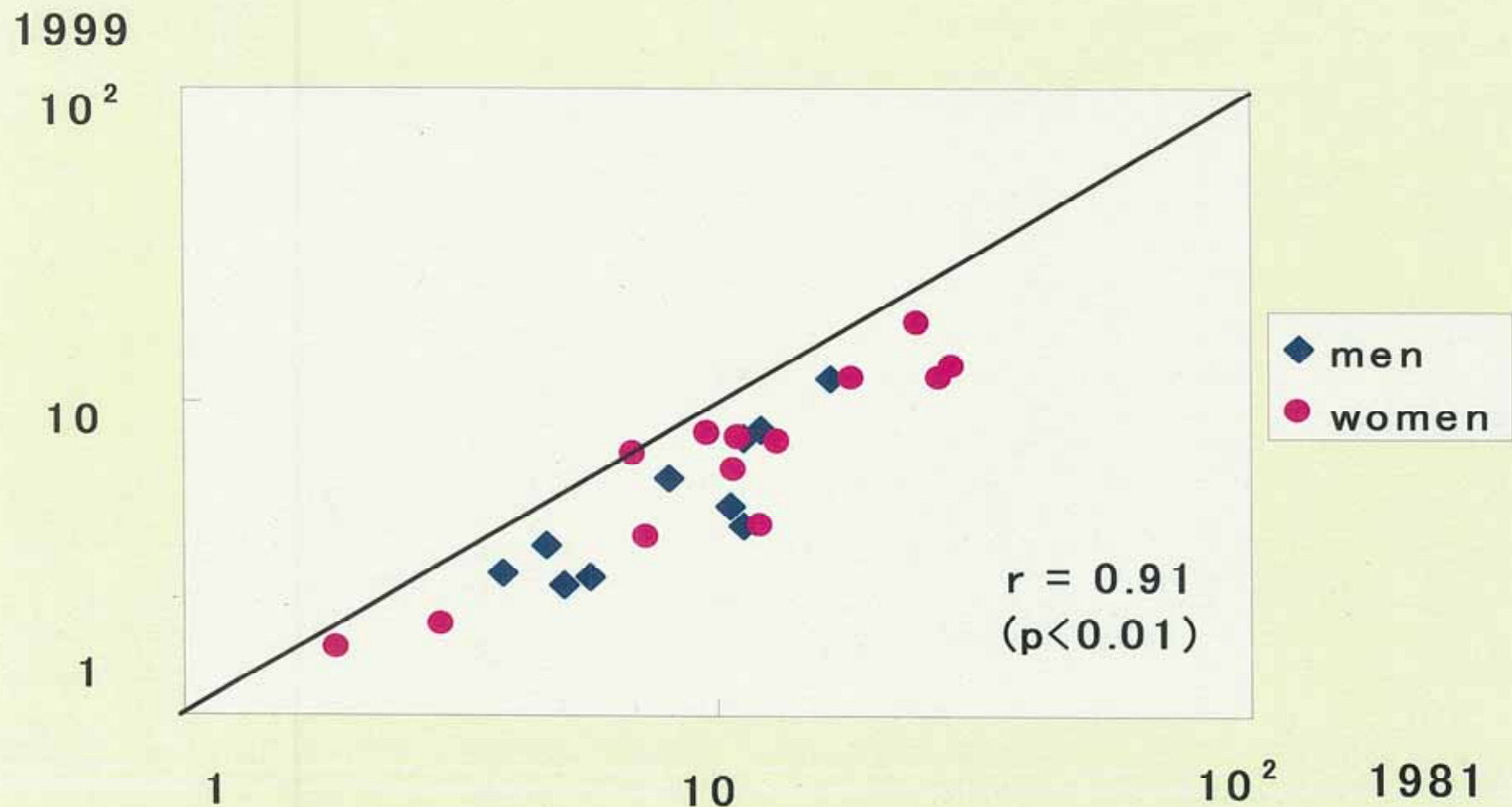


Fig. 5 Relationship between Urinary Cadmium in 1981 and 1999



**14-year follow-up study
of non-exposed subjects**

Fig.6 Urinary β_2 -MG in Cd-nonexposed Subjects in 1986 and 2000

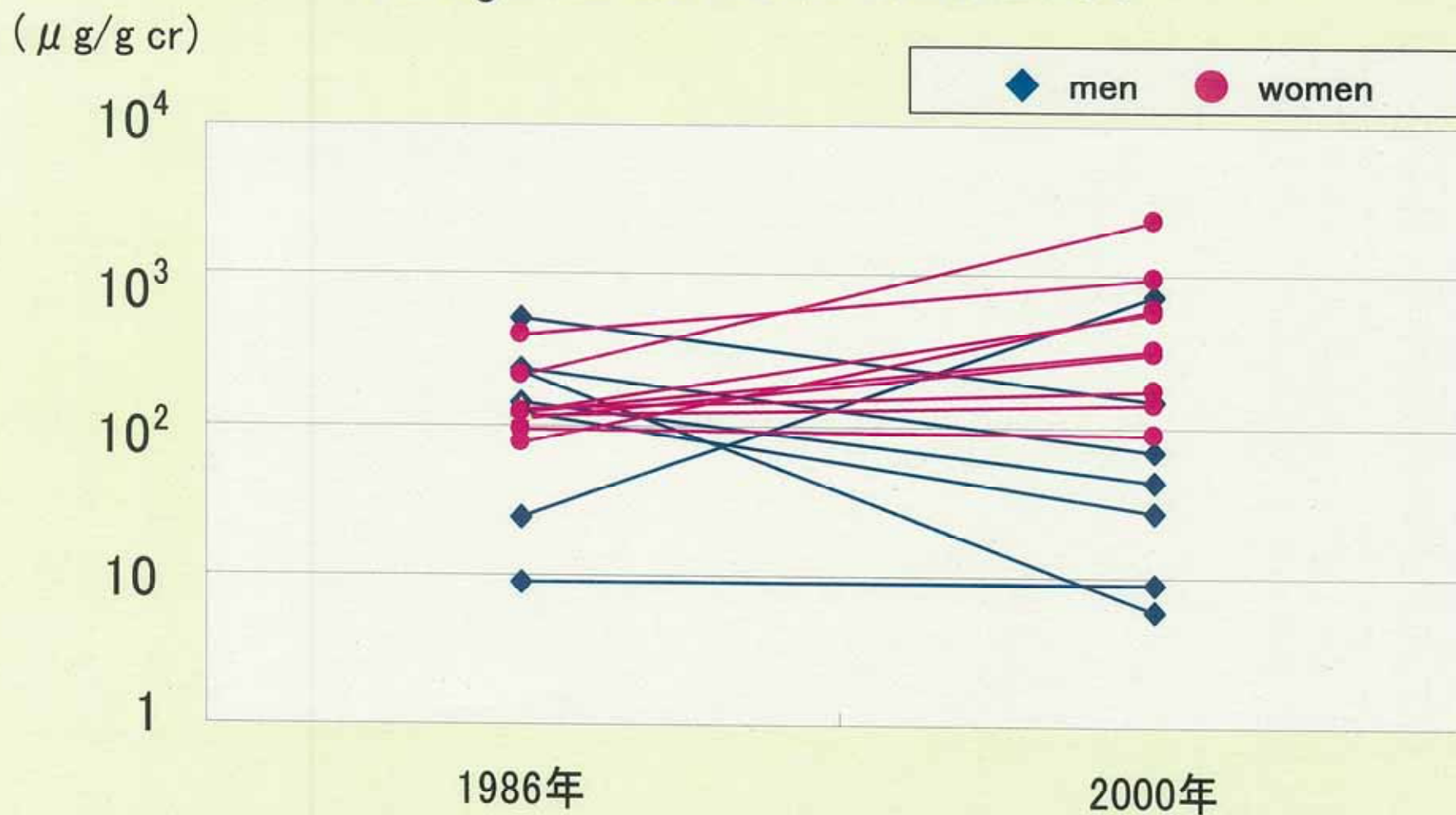


Fig. 7 Urinary Cadmium in Cd-nonexposed Subjects in 1986 and 2000

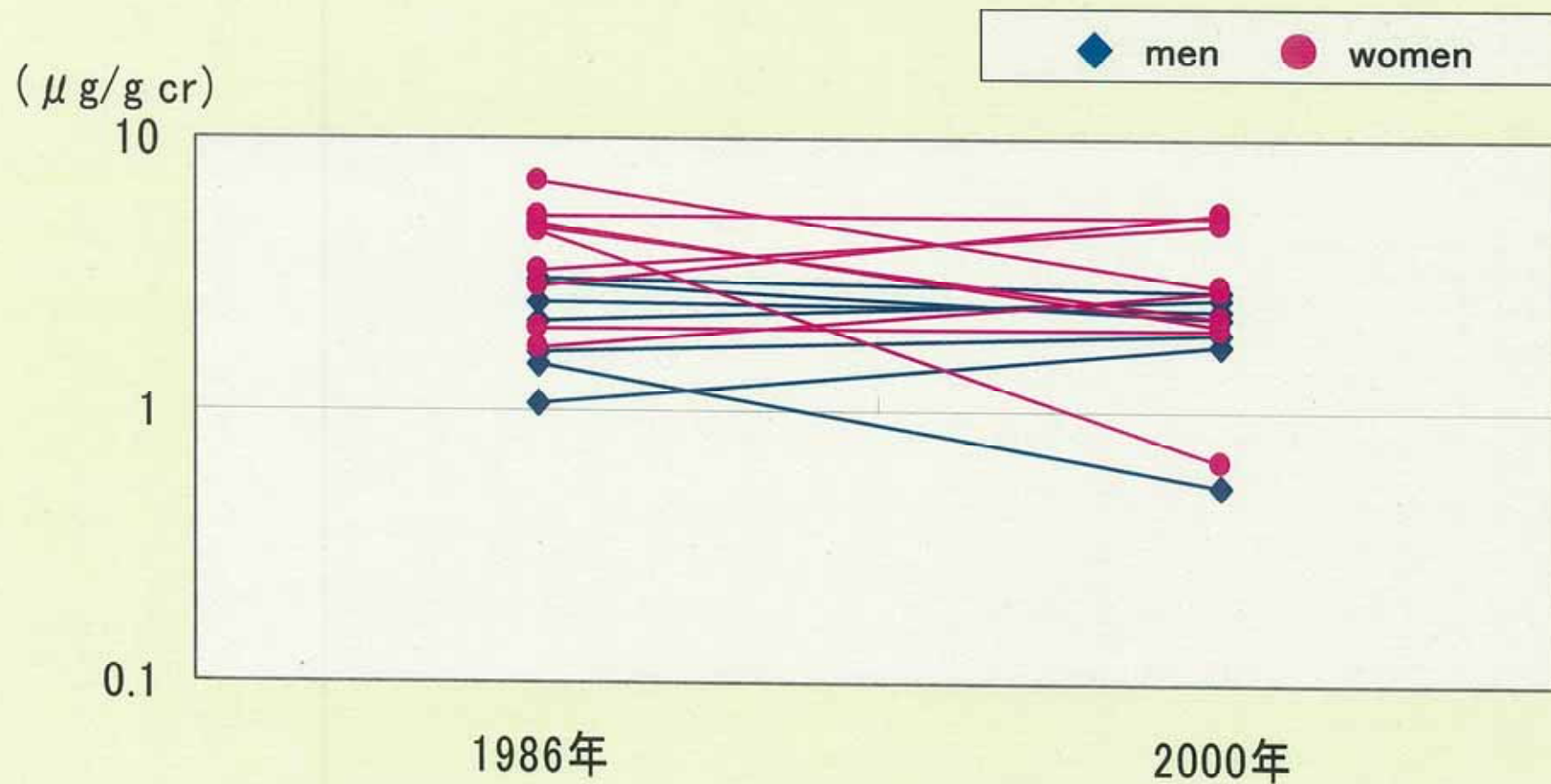


Fig. 8 Relationship between Urinary β_2 -MG in 1986 and Cd in 1986

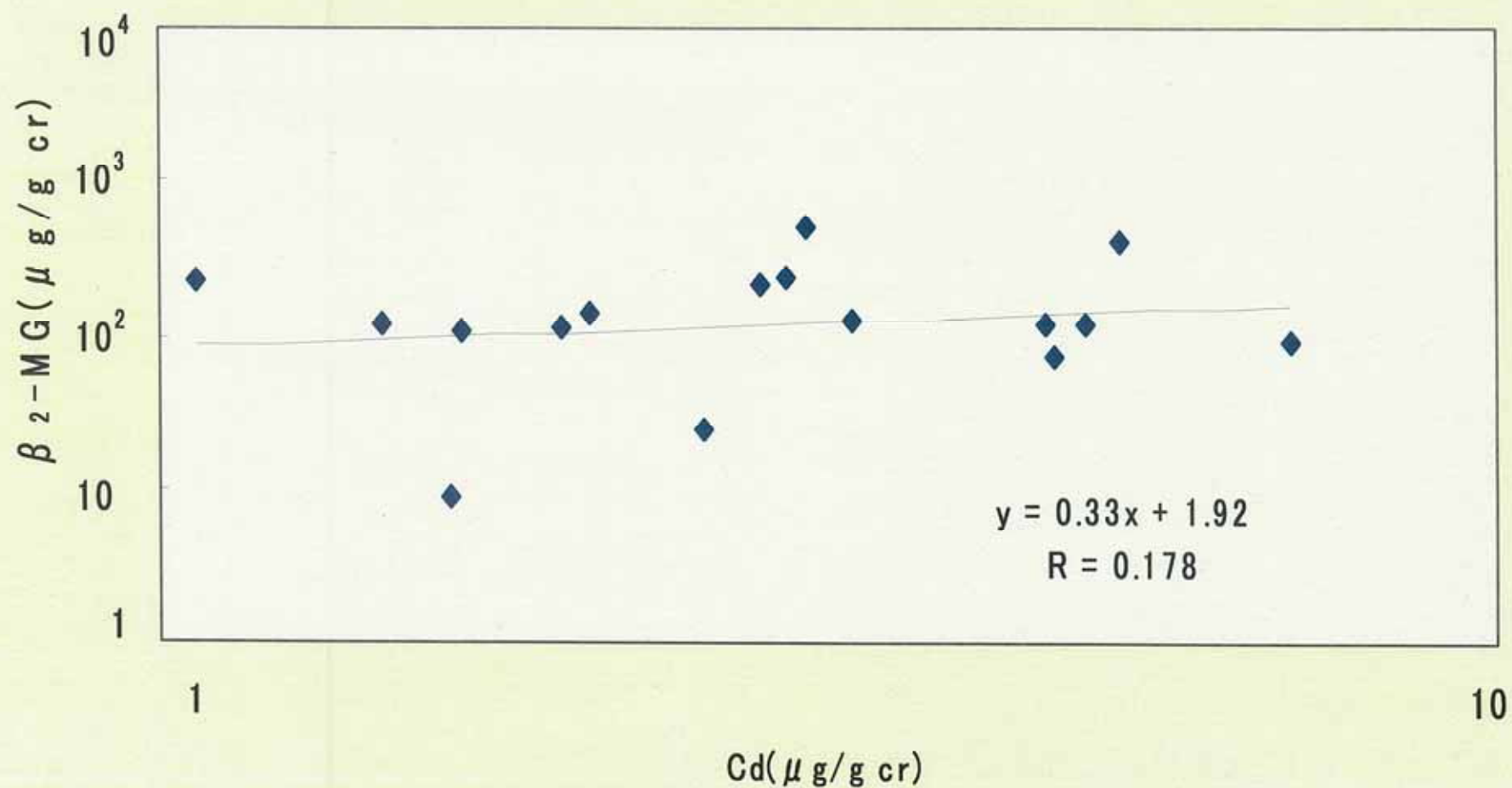


Fig. 9 Relationship between Urinary β_2 -MG in 2000 and Cd in 1986

