Effects of maternal serum folate levels, cigarette smoking and alcohol use during pregnancy on infant size at ten months of age and growth after birth

Fumihiro Sata,[1,2] Kana Suzuki,[1] Michiko Toh,[1] Noriaki Washino,[1] Kanae Konishi,[1] Shigeyuki Matsuzawa,[1] Ayako Kanazawa,[1] Susumu Ban,[1] Eiji Yoshioka,[1] Yasuaki Saijo,[1,3] Toshiaki Endo,[4] Kazuo Sengoku,[3] Hisanori Minakami[1] and Reiko Kishi[1]

[1]Hokkaido University Graduate School of Medicine, [2]National Institute of Public Health, [3]Asahikawa Medical College, [4]Sapporo Medical University

Objectives

- Epidemiological studies have shown that low concentrations of **maternal dietary and circulating folate**, **cigarette smoking** or **alcohol use** during pregnancy are associated with **adverse pregnancy outcomes**.
- We reported that **low levels of maternal serum folate, cigarette smoking** and **alcohol use** during pregnancy reduced infant **birth weight, length, head and chest circumference** in the 19th international conference of environmental epidemiology (Sata et al. Epidemiology 2007;18(5):S56-7).
- The aim of this study is to elucidate how **maternal serum folate levels, cigarette smoking** and **alcohol use** during pregnancy affect **infant size at ten months** of age and **growth after birth**.

Materials and methods

- We performed a **prospective birth cohort study** in the Hokkaido prefecture, Japan, during the years 2003-2006.
- We conducted the **self-administered questionnaire survey** to **1,043 women**
  - **before 13 weeks' gestational age**.
  - **at fourth month** and **at one year after birth**.
- Their **serum folate levels** were measured **at 12 weeks' gestational age**.
- Their infants took **health examination at ten months** of age.
- We conducted **multiple regression analyses** to estimate effects of maternal serum folate levels, cigarette smoking and alcohol use during pregnancy on infant weight and height (length) at birth and at ten months of age, and gains in weight and height after birth, respectively.

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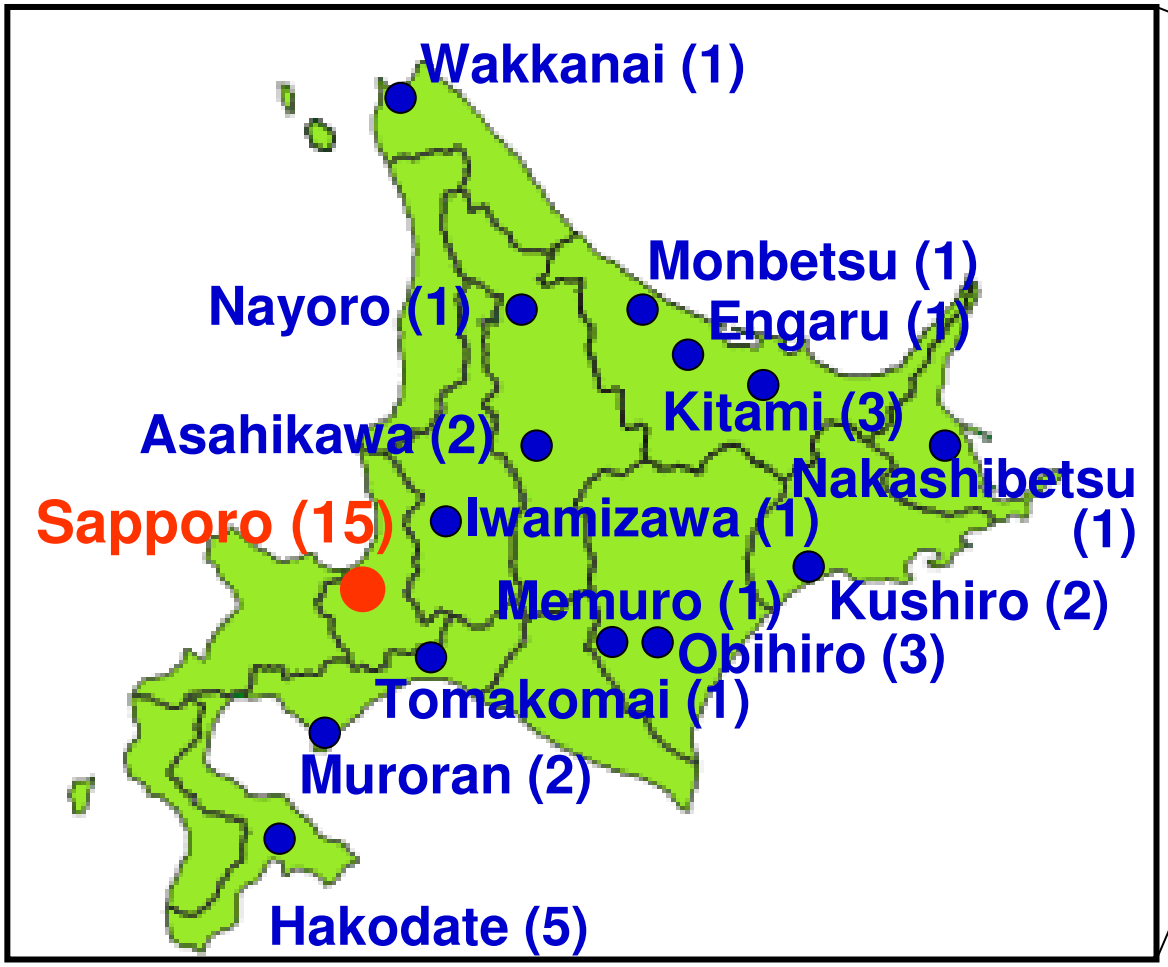

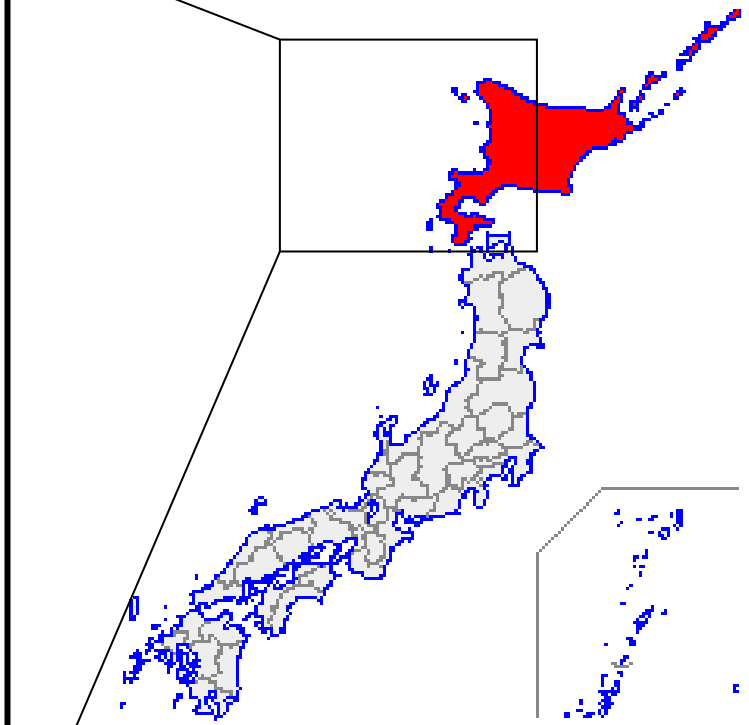

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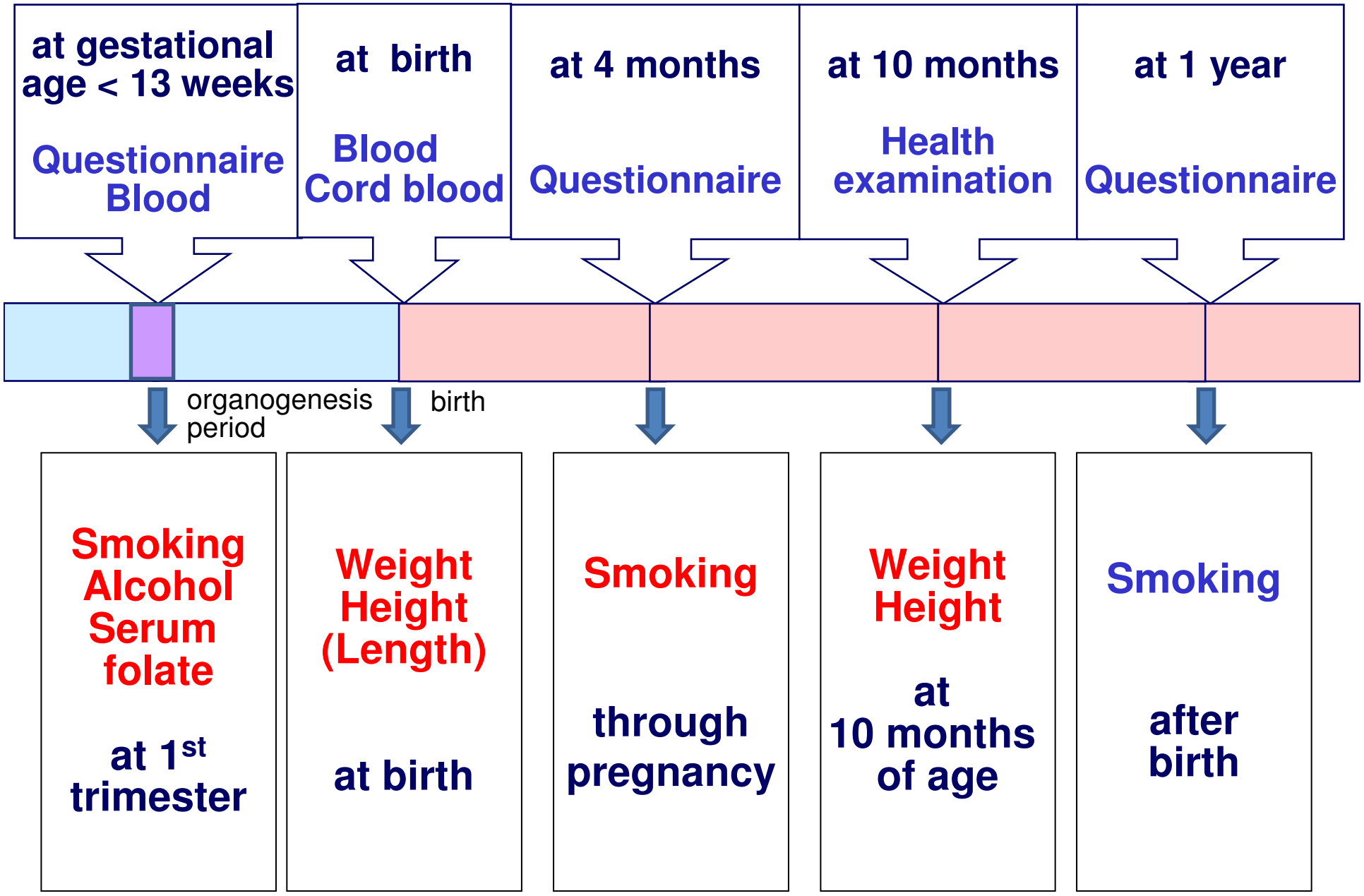


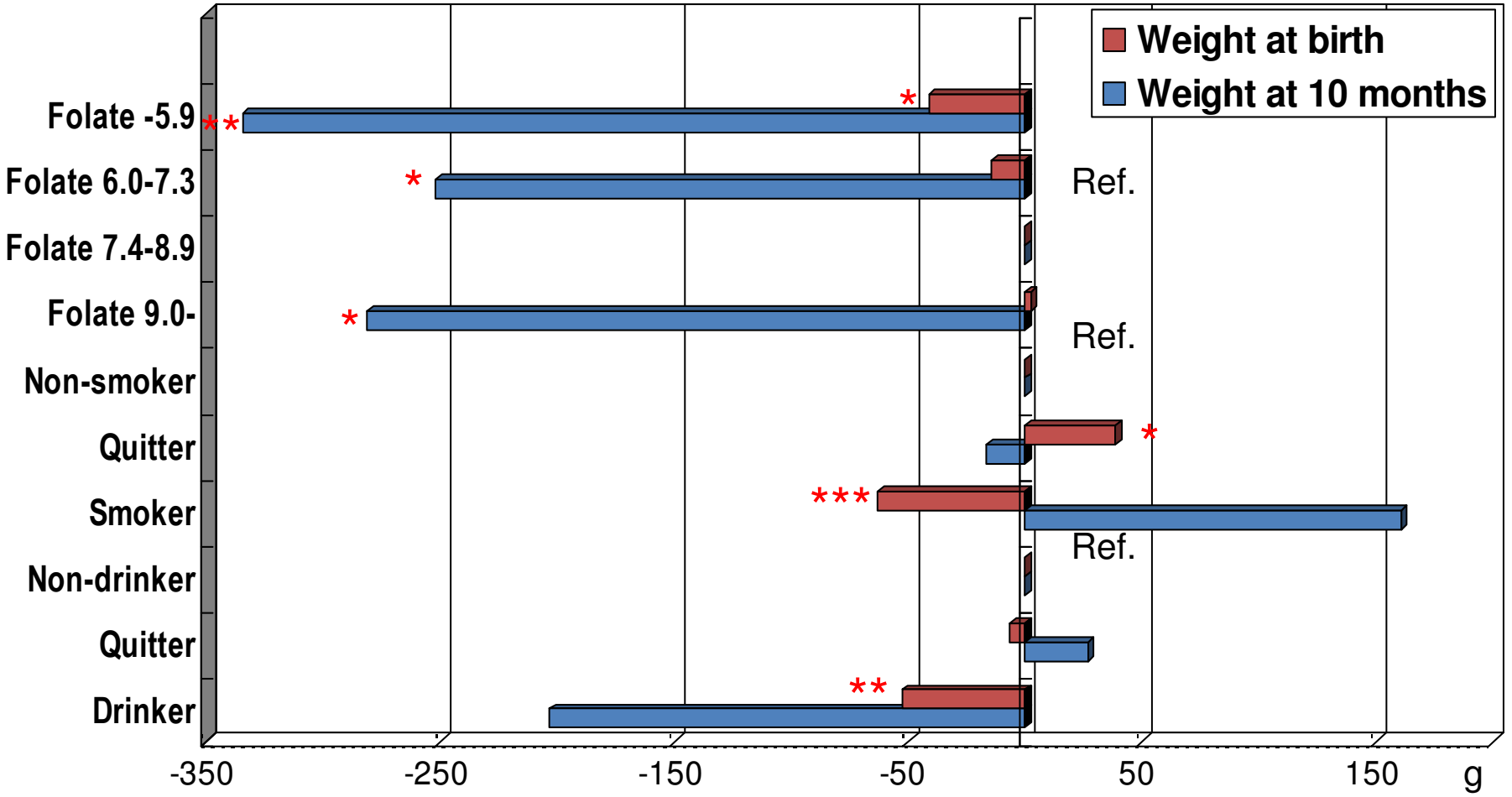
Characteristics of the study population -1-

Characteristics	mean (SD)	Categories	Number (%)
Maternal age (years)	30.7 (4.3)		
Body mass index (BMI) (kg/m^2)	21.1 (3.2)		
Parity		0	509 (49.2)
		≥1	526 (50.8)
Serum folate level (ng/ml) at 1st trimester	7.8 (3.9)	≤5.9	233 (25.3)
		6.0-7.3	235 (25.5)
		7.4-8.9	227 (24.6)
		≥9.0	227 (24.6)
Maternal cigarette smoking during pregnancy		Never	778 (74.3)
		Quitter	149 (14.9)
		Continuous	113 (10.9)
Maternal alcohol use at 1st trimester		Never	410 (39.5)
		Quitter	507 (48.8)
		Continuous	121 (11.7)

Characteristics of the study population -2-

Characteristics	mean (SD)	Categories	Number (%)
Weight at birth (g)	3,063 (372)	< 2,500	56 (5.4)
		≥ 2,500	987 (94.6)
Weight at 10 months of age (g)	8,909 (957)		
Weight gain rate (g/month)	585 (88)		
Height (Length) at birth (cm)	48.9 (1.9)		
Height at 10 months of age (cm)	71.7 (2.4)		
Height gain rate (cm/month)	2.3 (0.2)		
Gestational age (week)	39.2 (1.3)	< 37	52 (5.5)
		≥ 37	895 (94.5)
Infant sex		Male	530 (51.4)
		Female	502 (48.6)

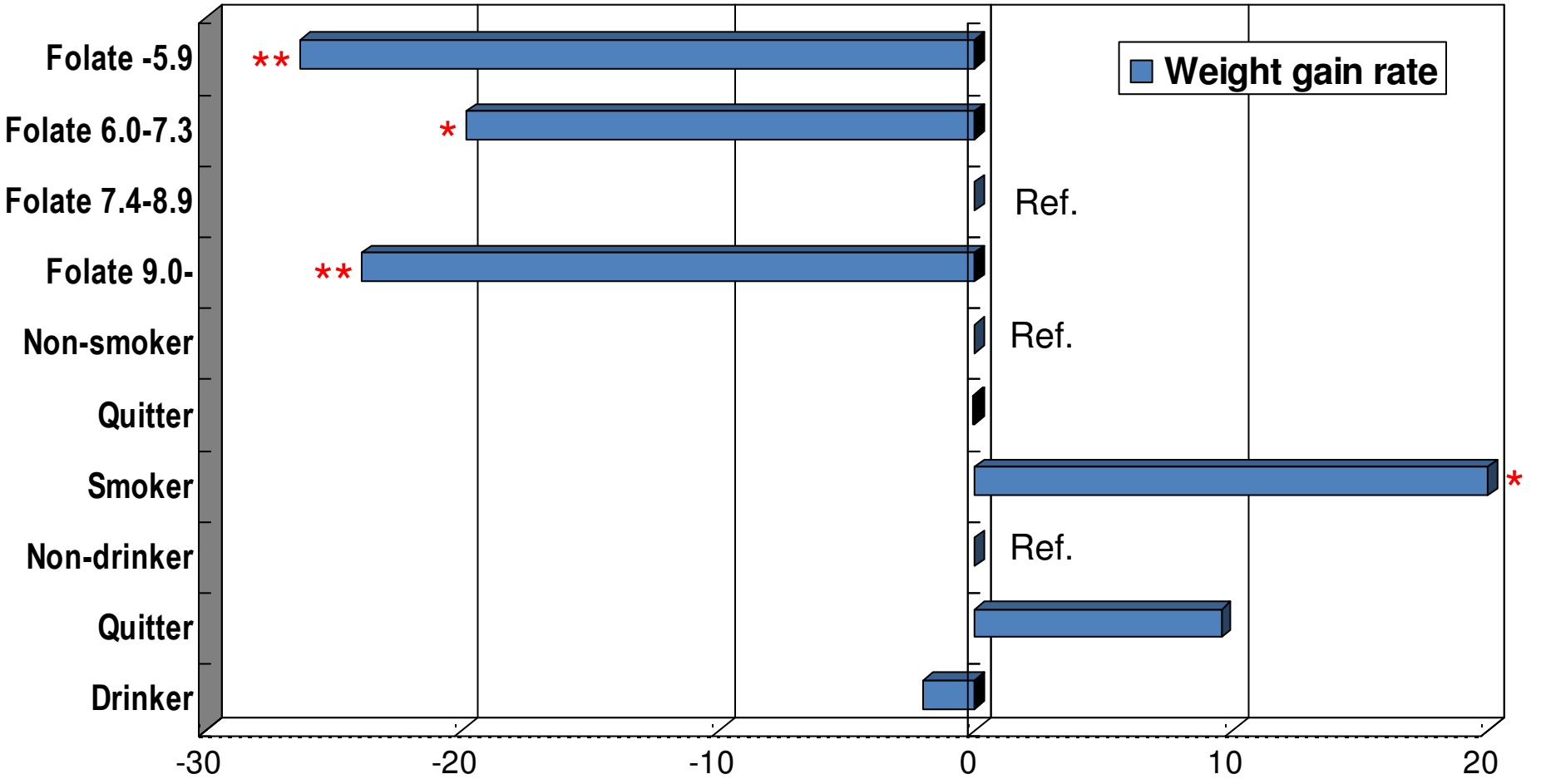
Weight at birth and at 10 months of age in relation to maternal serum folate levels and alcohol use at 1st trimester, and cigarette smoking during pregnancy†



*p<0.05, **p<0.01, ***p<0.001

†multiple regression analyses adjusted to maternal age at birth, gestational age, parity, infant sex and maternal BMI before pregnancy

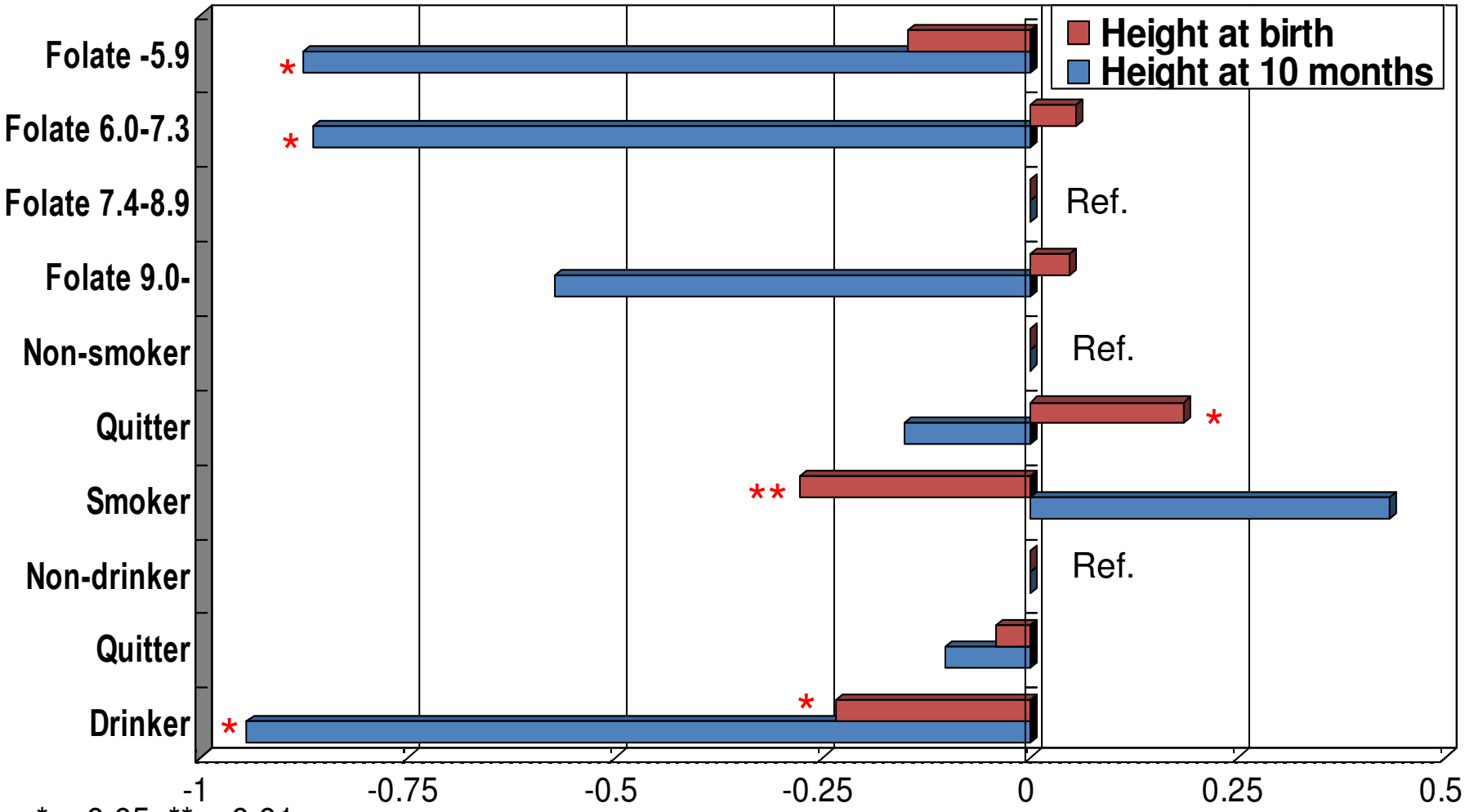
Weight gain rate in relation to maternal serum folate levels and alcohol use at 1st trimester, and cigarette smoking during pregnancy†



*p<0.05, **p<0.01

†multiple regression analyses adjusted to maternal age at birth, gestational age, parity, infant sex and maternal BMI before pregnancy

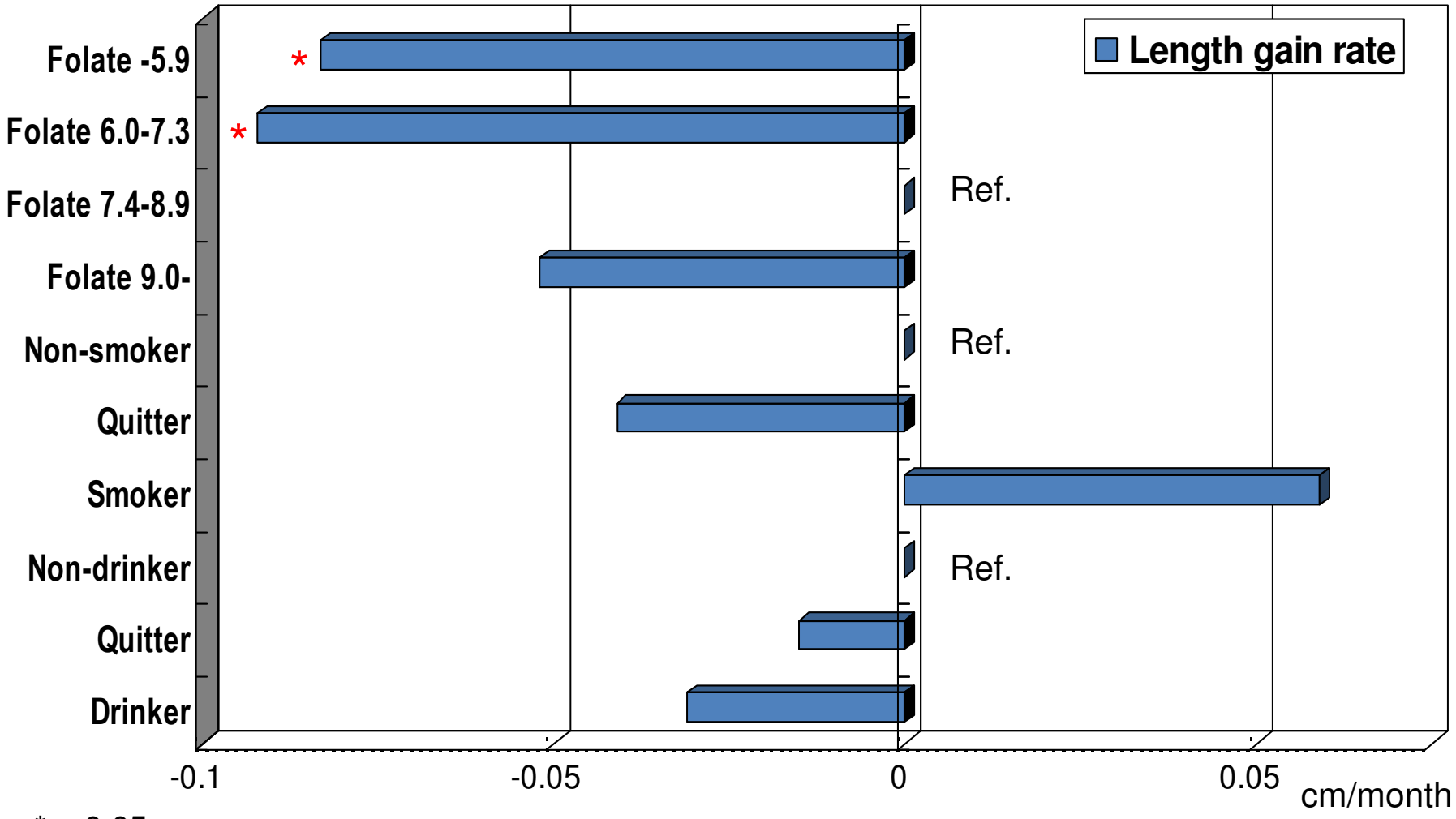
Height at birth and at 10 months of age in relation to maternal serum folate levels and alcohol use at 1st trimester, and cigarette smoking during pregnancy†



*p<0.05, **p<0.01

†multiple regression analyses adjusted to maternal age at birth, gestational age, parity, infant sex and maternal BMI before pregnancy

Height gain rate in relation to maternal serum folate levels and alcohol use at 1st trimester, and cigarette smoking during pregnancy†



*p<0.05

†multiple regression analyses adjusted to maternal age at birth, gestational age, parity, infant sex and maternal BMI before pregnancy

Summary of the results

- We found that the **lowest folate level** (less than 6.0 ng/ml) **at 1st trimester** was associated with mean reductions in **birth weight** (P=0.01) and **weight at ten months** of age (P=0.003) compared to the middle-high folate level (7.4-8.9ng/ml).
- We also found that the **middle-high folate level** at 1st trimester increased mean **weight and height at ten months** of age, **gains in weight and height after birth** compared to lower two folate groups.
- On the other hand, we found that **maternal smoking** during pregnancy **reduced mean birth weight** (P<0.001) and **increased mean gain in weight after birth** (P=0.03), whereas **maternal alcohol use** at 1st trimester **reduced mean birth weight** (P=0.004) , **birth length** (P=0.02) and **height at ten months** of age (P=0.02).

Conclusions

- Our findings suggested that maternal **middle-high serum folate level** (7.4-8.9ng/ml) **at 1st trimester** might be in **better condition** for fetal and infant growth.
- **Maternal smoking** during pregnancy might cause **low birth weight, high weight gain after birth** and probably subsequent infant **obesity**.

Collaborations

- Department of Obstetrics and Gynecology, Hokkaido University Graduate School of Medicine

  Hisanori Minakami

  Noriaki Sakuragi

- Department of Obstetrics and Gynecology, Sapporo Medical University School of Medicine

  Toshiaki Endo

- Department of Obstetrics and Gynecology, Asahikawa Medical College

  Kazuo Sengoku