

**Historical and
geographic aspects of
perfluorooctanoate and
perfluorooctane sulfonate
in human serum in Japan**

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Introduction

Perfluorooctanoate (PFOA)

some reports

Human exposure to PFOA had reached a steady-state in the 1990s

but

Human exposure levels of PFOA in residents in Northern Japan have still continued to increase from 90s to the millennium

Perfluorooctanesulfonate (PFOS)

To investigate
a long-term time trend
of exposure levels

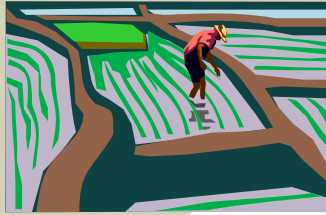
PFOS and PFOA concentrations
in human serum samples

historically samples in Kyoto
and samples at various locations
throughout Japan



Perfluorooctanoate (PFOA)

Materials and Methods



Akita

Miyagi



Fukui

Gifu



Yamaguchi

Kyoto



Hyogo



Kochi



Okinawa



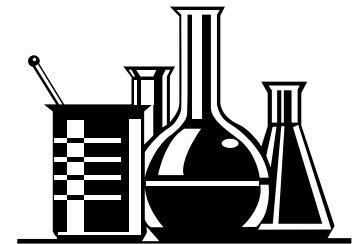
**Sampling
regions
in our**

SAMPLE BANK

Methods

The extraction process by Hansen et al. (2001)

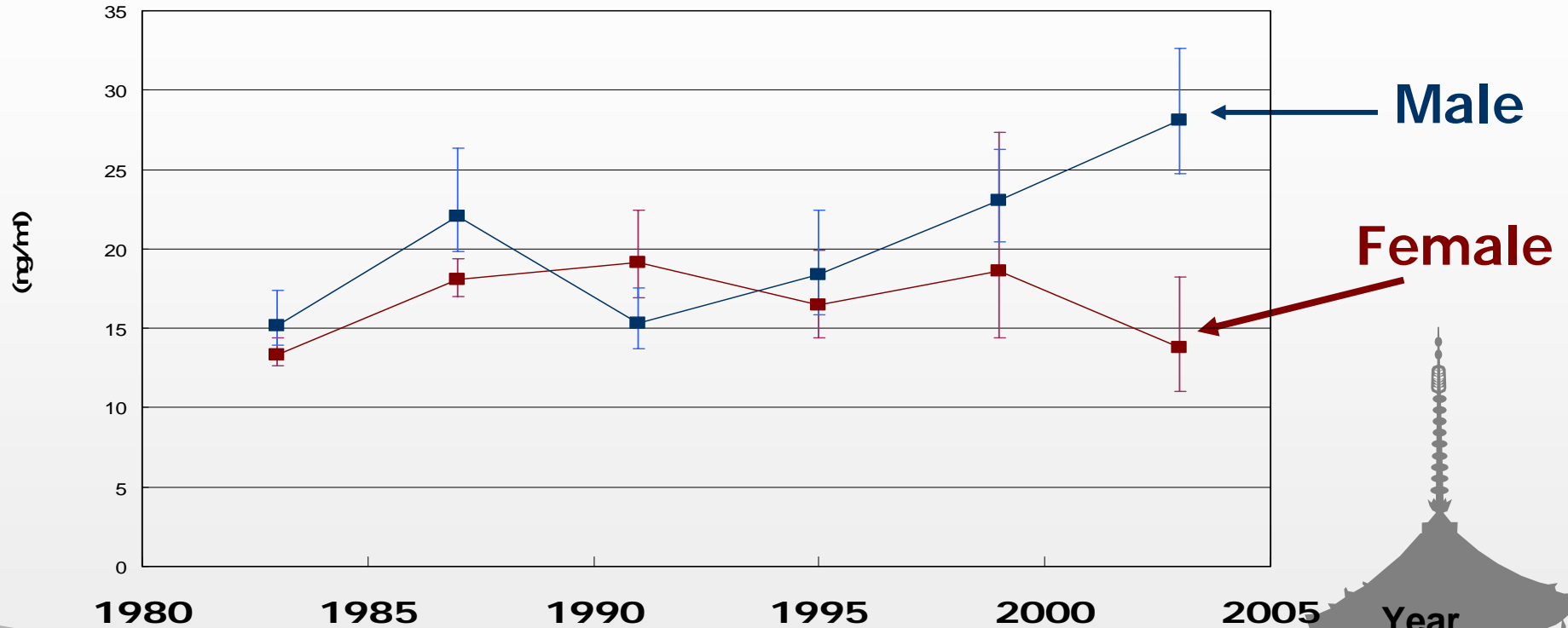
**Analyzed by
liquid chromatography-
mass spectrometry (LC/MS)**



The lowest limits of quantification (LOQ) ($\mu\text{g/L}$) were 0.1 for both analytes in the serum samples.

Results

PFOS during 1983-2003 in residents in Kyoto



1980 1985 1990 1995 2000 2005 Year

37.3_±8.6 37.1_±8.8 40.5_±11.1 38.5_±9.6 40.6_±11.2 40.9_±11.9 Age (M)

36.8_±10.2 33.3_±10.0 34.8_±13.6 37.5_±10.5 38.2_±12.7 37.6_±11.3 Age (F)

A AC A A BC BC HSD (M)

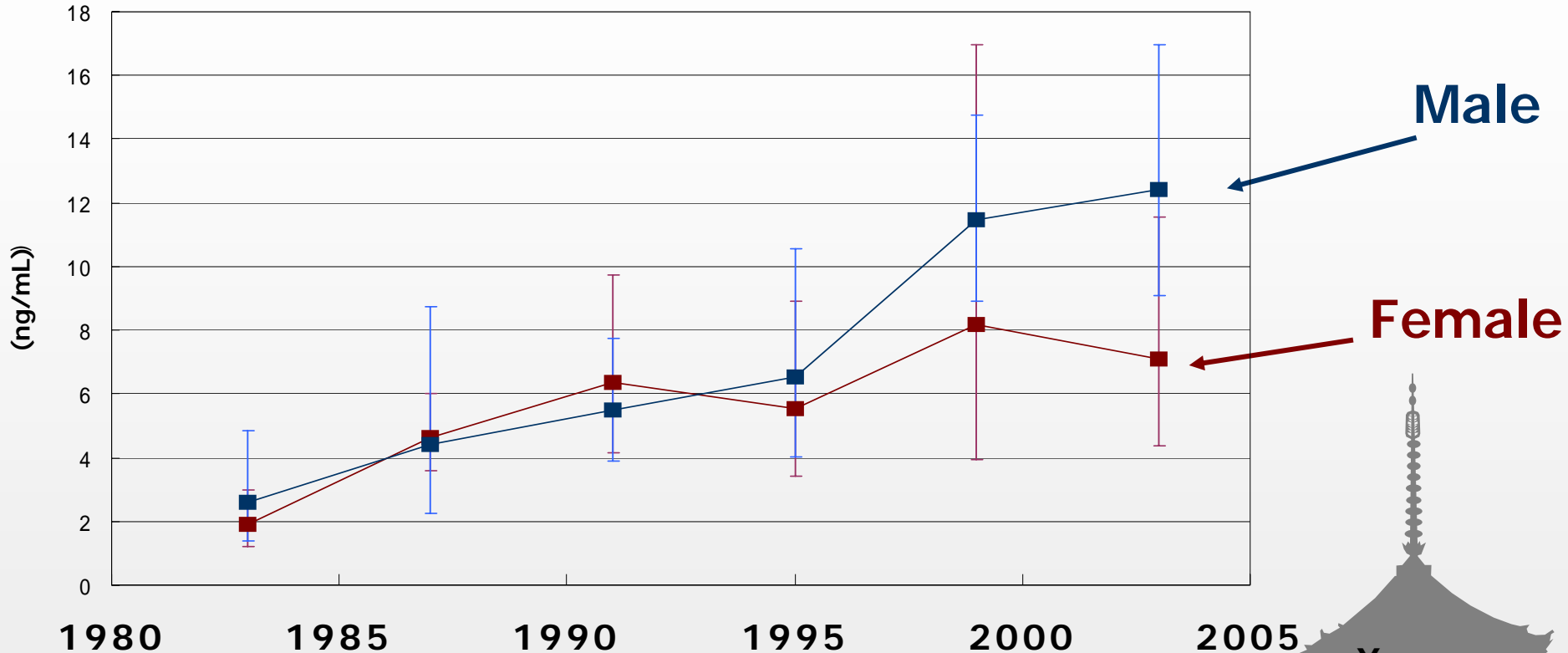
A AC BC AC AC AC HSD (F)

10 samples per each time point per each sex

P<0.05

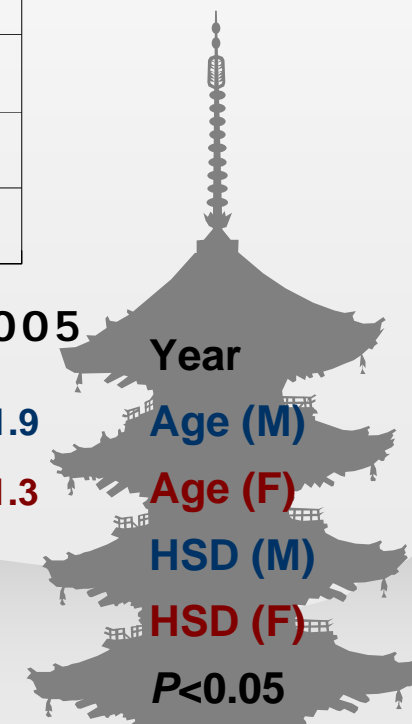
Results

PFOA during 1983-2003 in residents in Kyoto



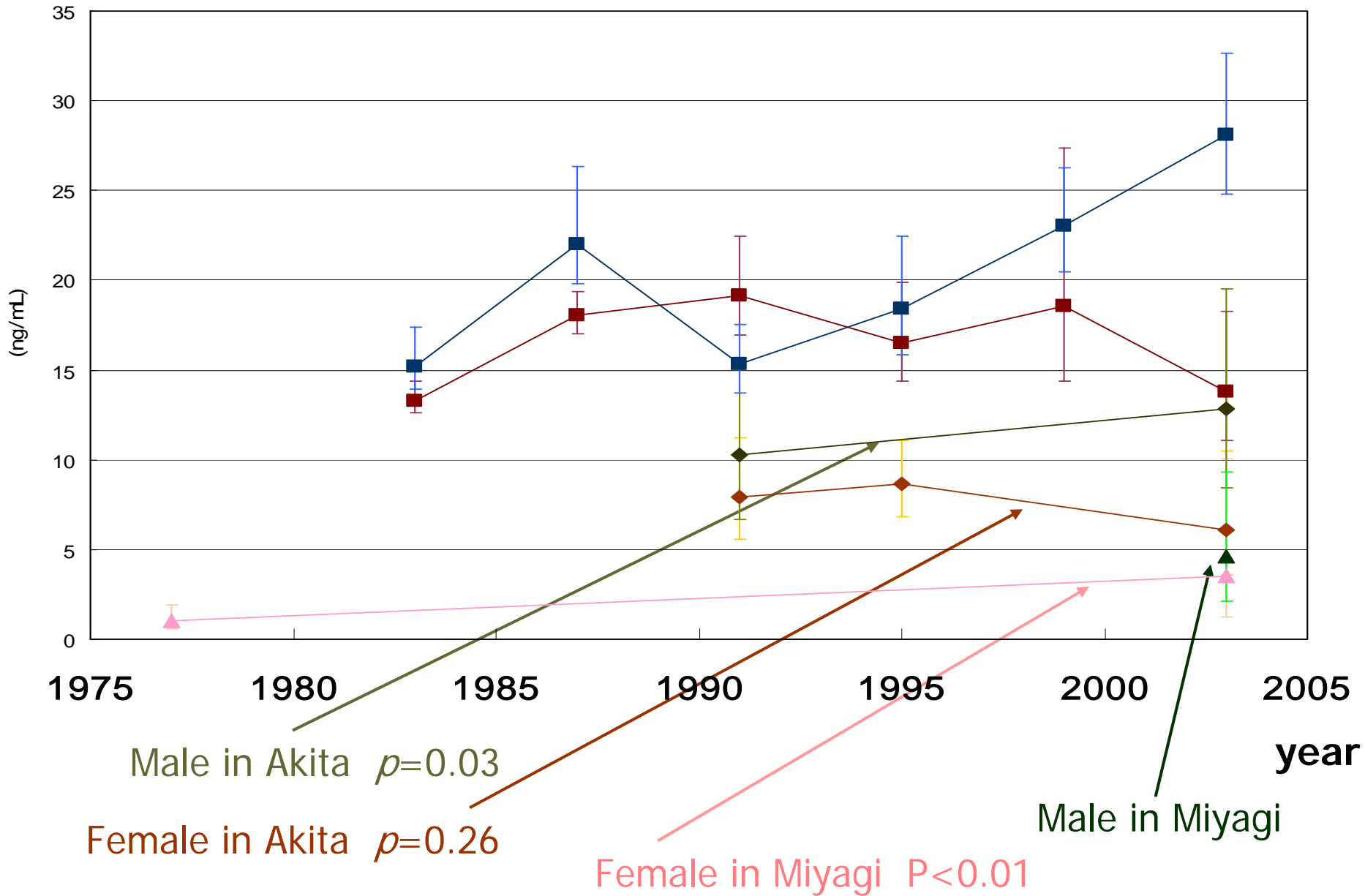
37.3 _± 8.6	37.1 _± 8.8	40.5 _± 11.1	38.5 _± 9.6	40.6 _± 11.2	40.9 _± 11.9
36.8 _± 10.2	33.3 _± 10.0	34.8 _± 13.6	37.5 _± 10.5	38.2 _± 12.7	37.6 _± 11.3
A	AB	B	B	C	C
A	B	BD	BD	CD	CD

10 samples per each time point per each sex

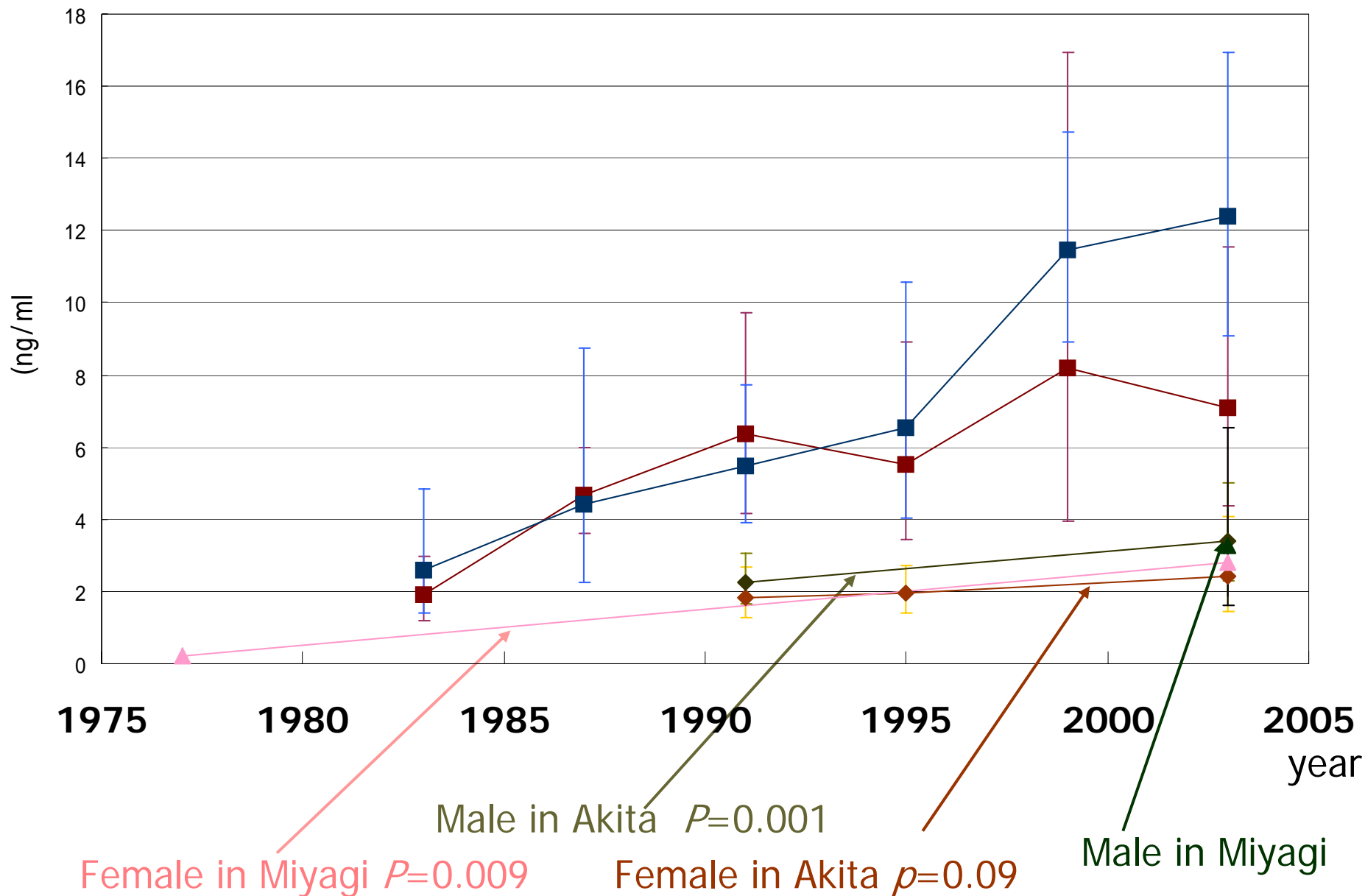


Year
Age (M)
Age (F)
HSD (M)
HSD (F)
P<0.05

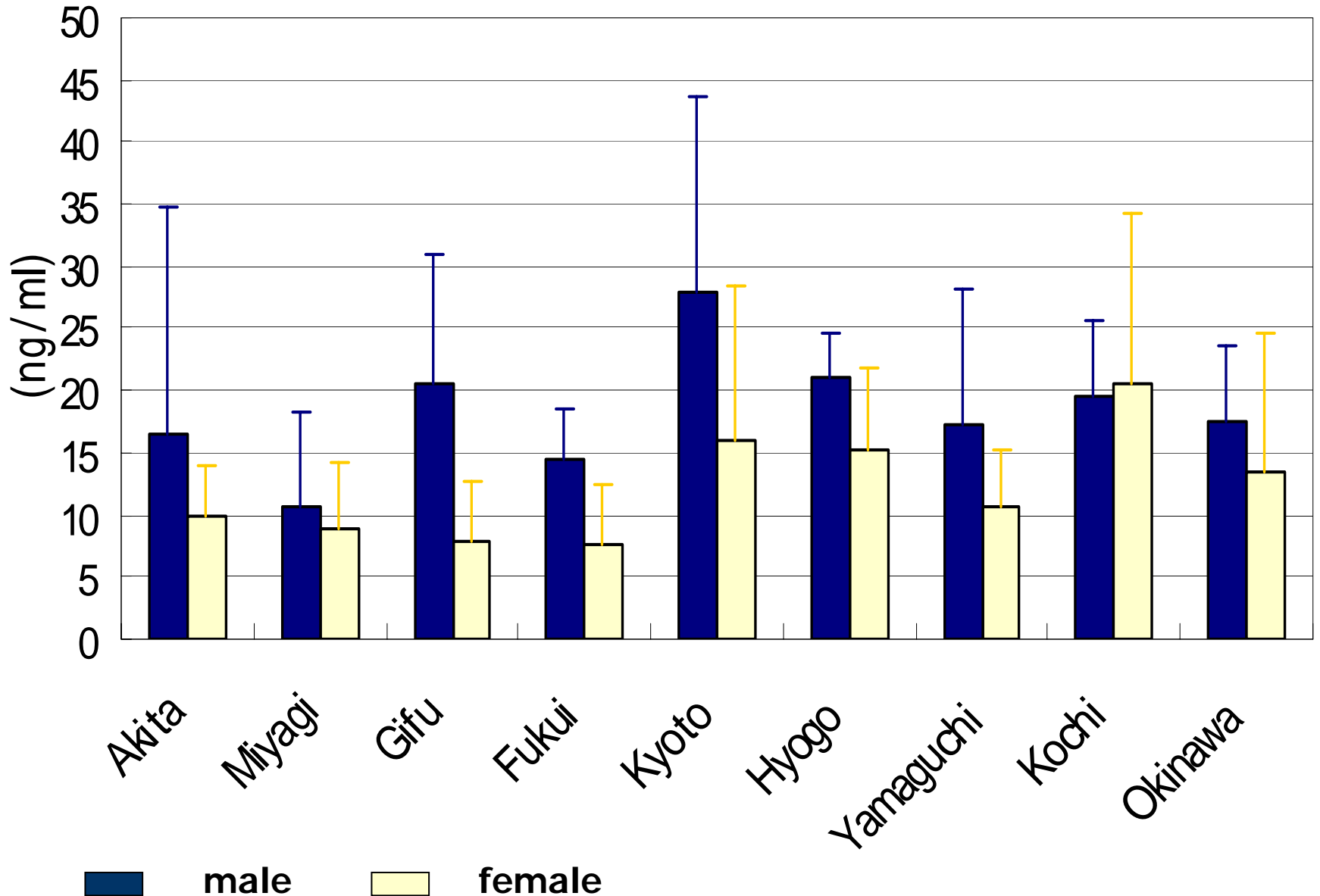
PFOS in Kyoto and in northern area in Japan



PFOA in Kyoto and in northern area in Japan

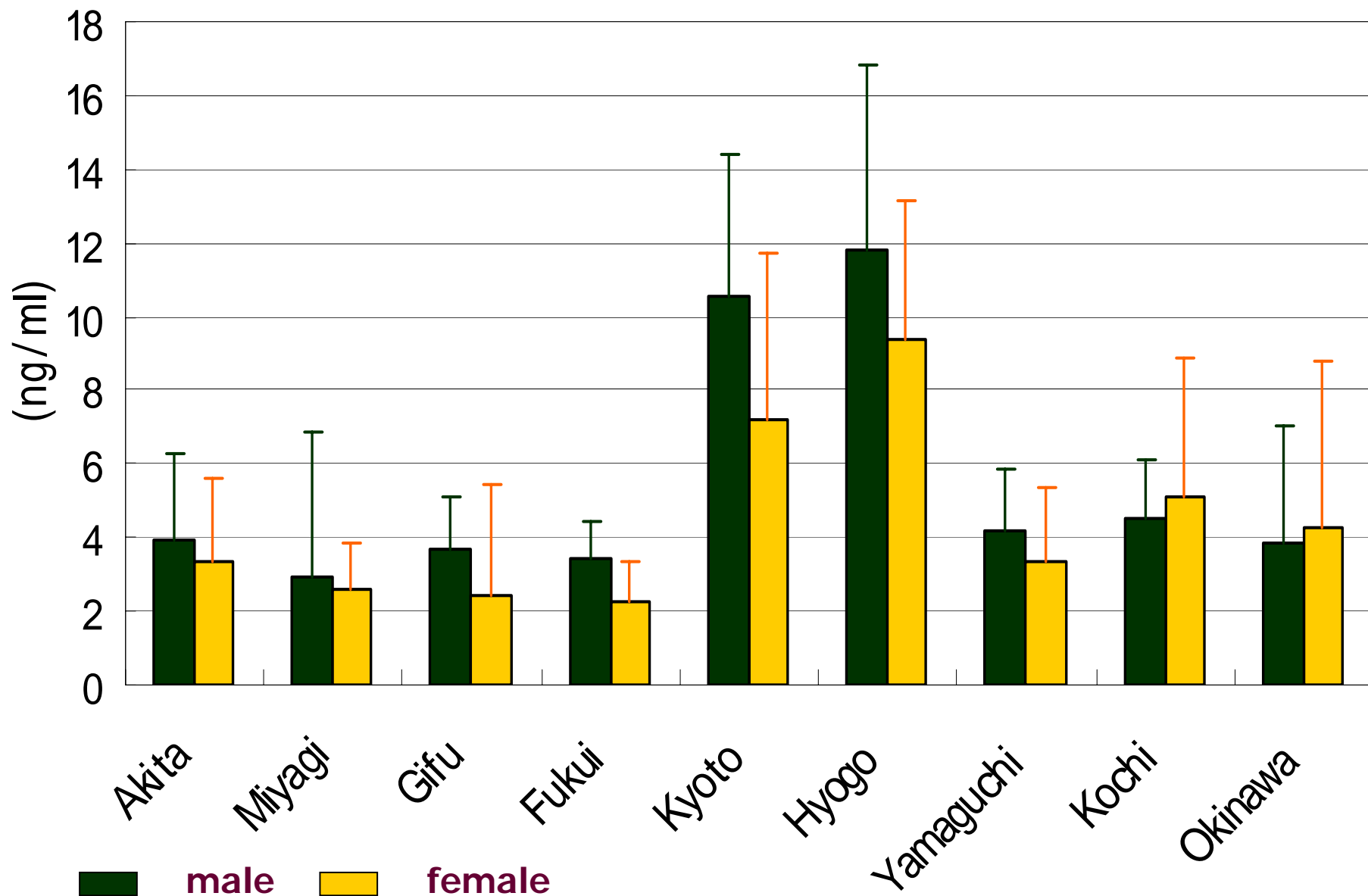


PFOS in 2003 in JAPAN



ANOVA $P < 0.001$

PFOA in 2003 in JAPAN



ANOVA $P < 0.001$

Discussion

Exposure to PFOA was increasing steadily in Kyoto, as well as rural areas in Japan, in sharp contrast to the survey conducted in the U.S.A.

High concentrations of PFOA in the Kinki district (Kyoto and Hyogo) suggests potential sources of contaminations as indicated by heavy contamination of drinking water and air-borne dust (Saito et al. 2004).

References:

- Hansen et al. (2001) Environ Sci Technol 35,766-70
- Harada et al. (2004) J Occup Health 46,141-147
- Olsen et al. (2005) Environ Health Perspect 113,539-45
- Saito et al. (2004) J Occup Health 46,49-59