Why do women eliminate PFOS faster than men?

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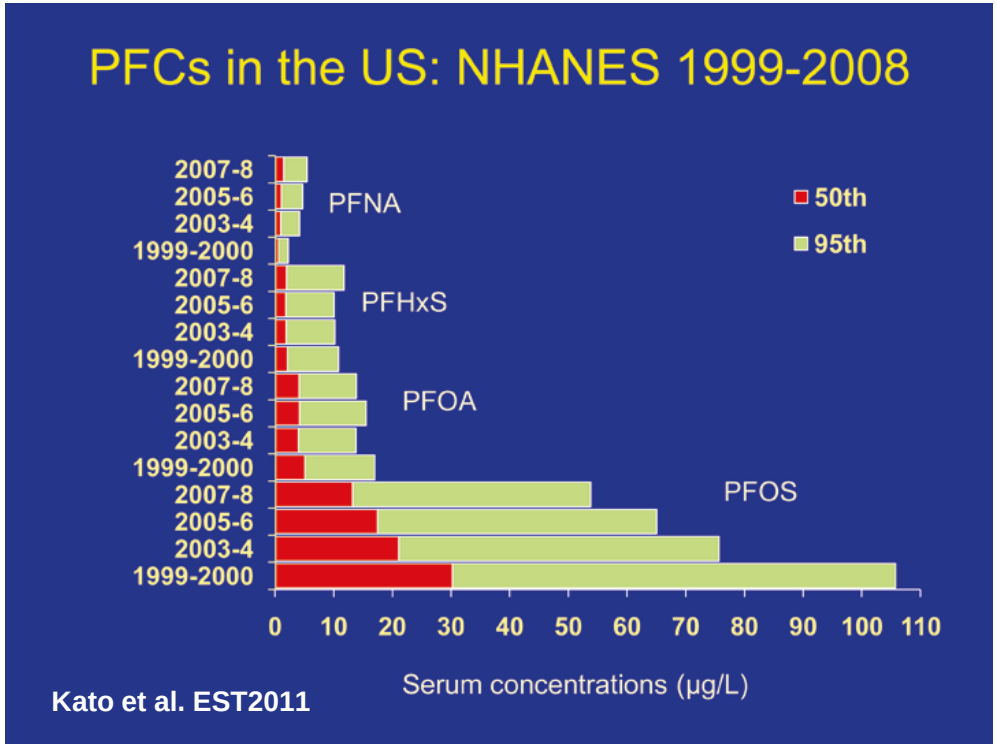
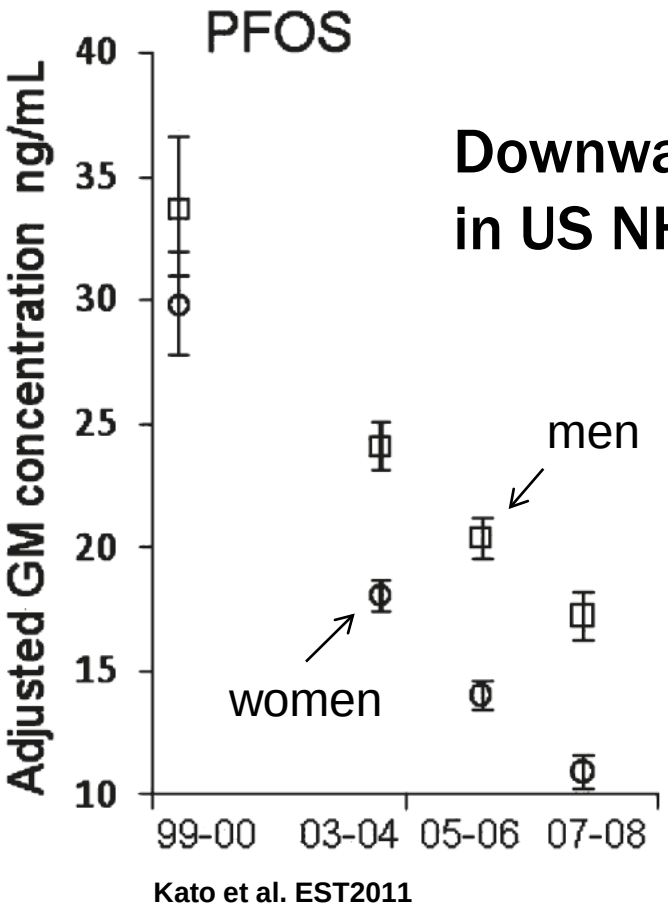
PFOS (Perfluorooctane sulfonate)

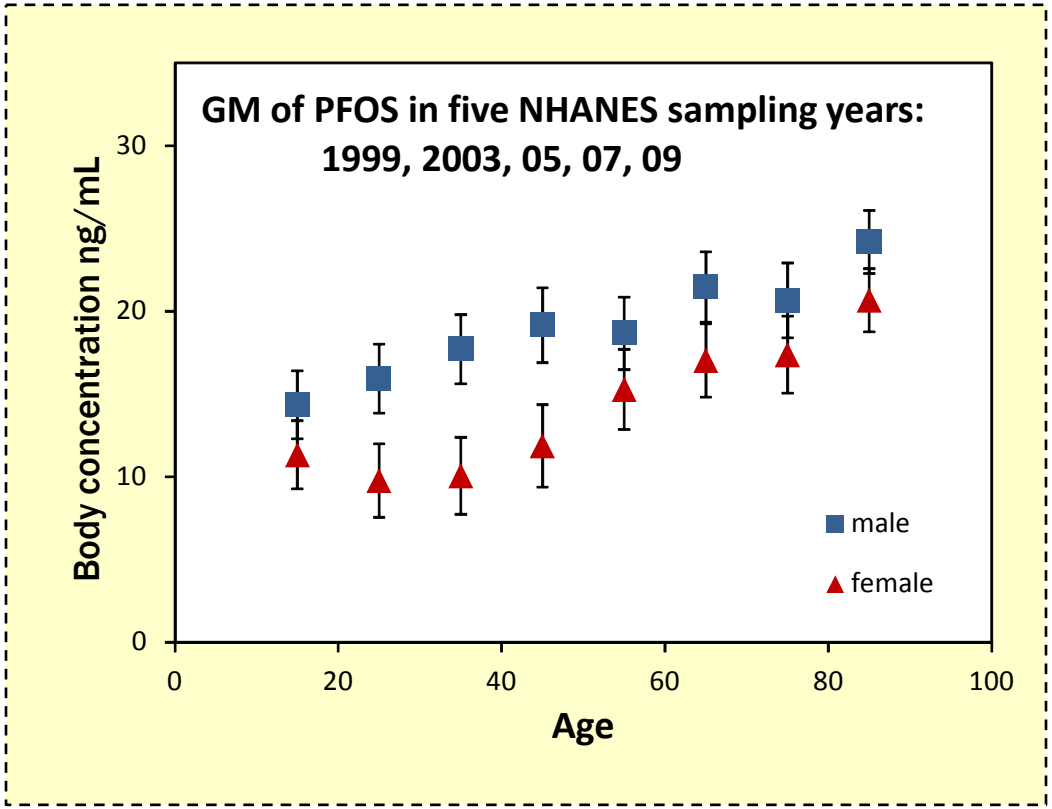
- Most abundant PFASs detected in human
- Listed under POPs in the Stockholm Convention



Downward trend after 2000 in US NHANES



Kato et al. EST2011



Hypothesis

1. Elimination rate constant (k_e) of PFOS in men is slower than in women.

2. If menstruation is the cause of the discrepancy, the intrinsic k_e of PFOS in men is equal to women.

Tool:

The "Ritter" Population-pharmacokinetic model

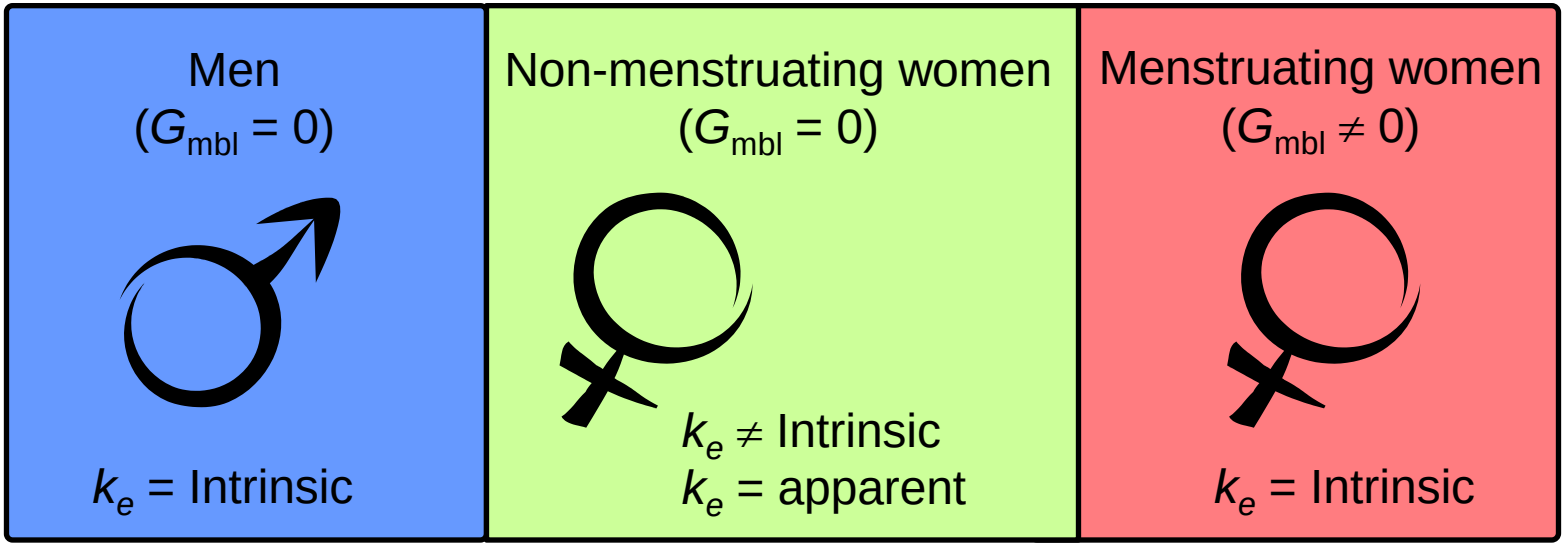
To derive k_e:

- Men
- Non-menstruating women
- Menstruating women

Ritter et al. EHP2011

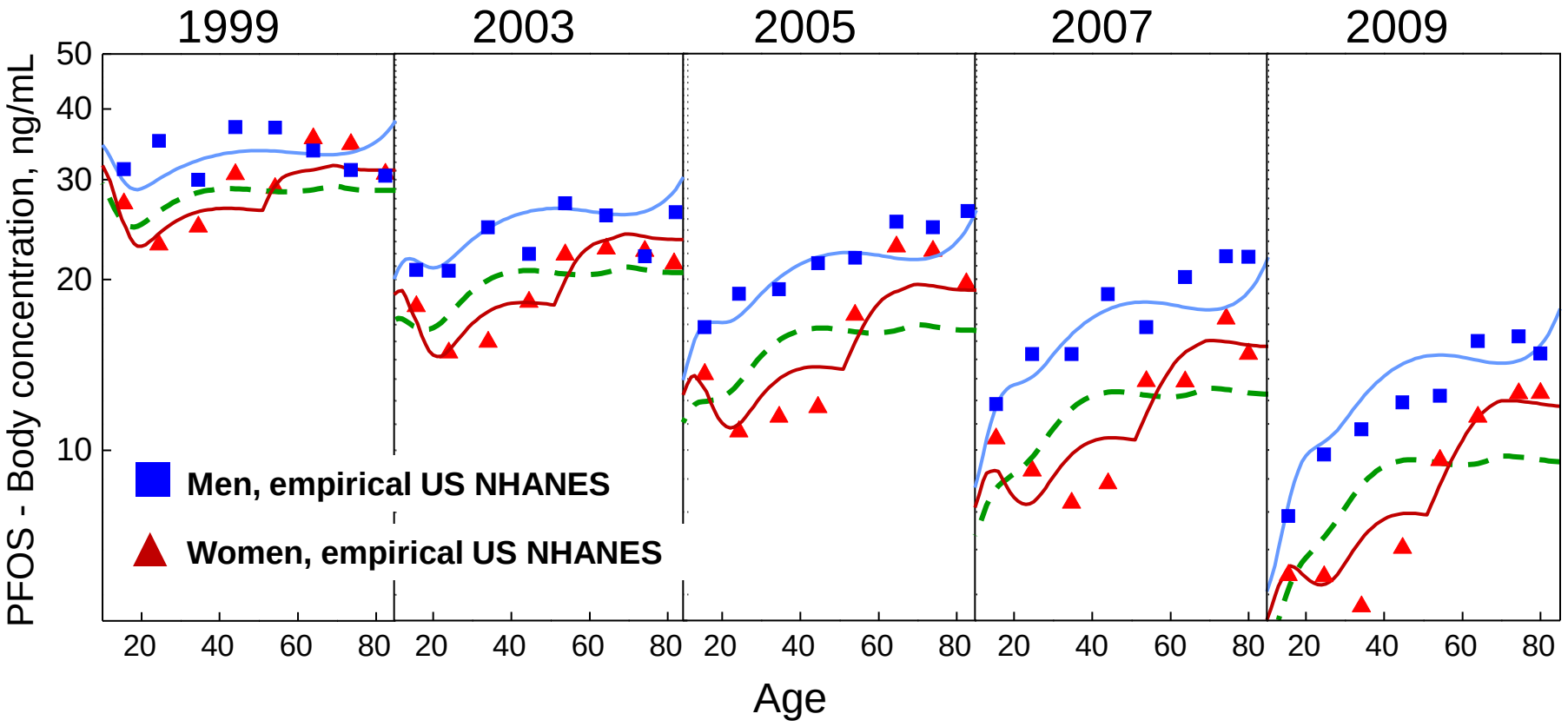
Elimination rate constant (k_e)

- Chemical, population specific
- Corrected for many controlling factors:
  - age, body weight, ongoing exposure, and physiology (e.g. Women – menstruation, $G_{\underline{\mathbf{m}}\text{enstrual }\underline{\mathbf{b}}\text{lood }\underline{\mathbf{l}}\text{oss}}$)



Results

Stockholms universitet



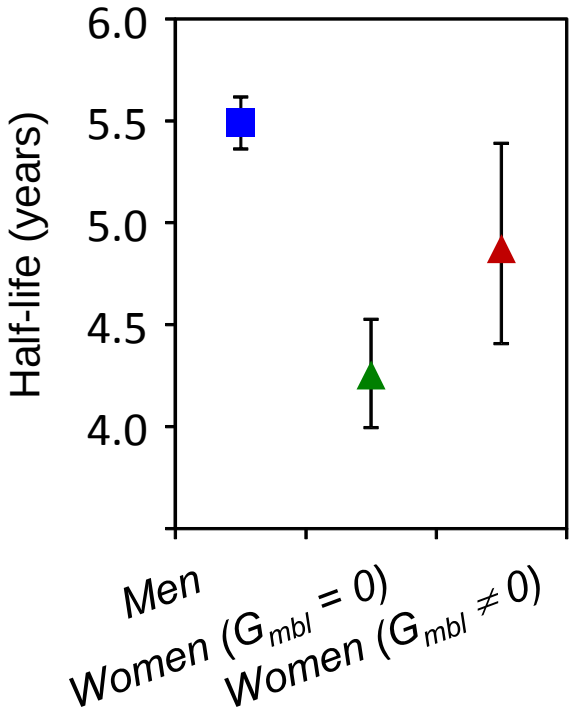
Men, modeled – HL 5.5 years (intrinsic)

Women (*non-menstruating*), modeled – HL 4.3 years (apparent)

Women (*menstruating*), modeled – HL 4.9 years (intrinsic)

Summary

- Elimination HL of PFOS in women is shorter than in men by 25%
- Menstruation only accounts for 12% of the 25% difference.
- The differences between men and women may due to:
  - Sex-specific elimination route (hormonal regulated)
  - Model uncertainty (intake, parity, breast-feeding etc.)



INFLAME ER2

Publications:

Wong, F.; Cousins, I. T.; MacLeod, M. Enhanced elimination of perfluorooctane sulfonate by menstruating women: evidence in biomonitoring data. Environ. Health Perspect. *In prep.*

Wong, F.; Cousins, I. T.; MacLeod, M. 2013. Bounding the uncertainties of intrinsic human elimination half-lives and intake of polybrominated diphenyl ethers in the North American population. *Environ. Intern*. 59, 168-174.

Thuy (A-Team) – Ritter PK model (PBDE)

Chiral BFRs in the indoor/outdoor environment and humans