

MEEExD Lab

(**M**ultiple **E**nvironmental **E**xposure and **D**isease **L**ab)

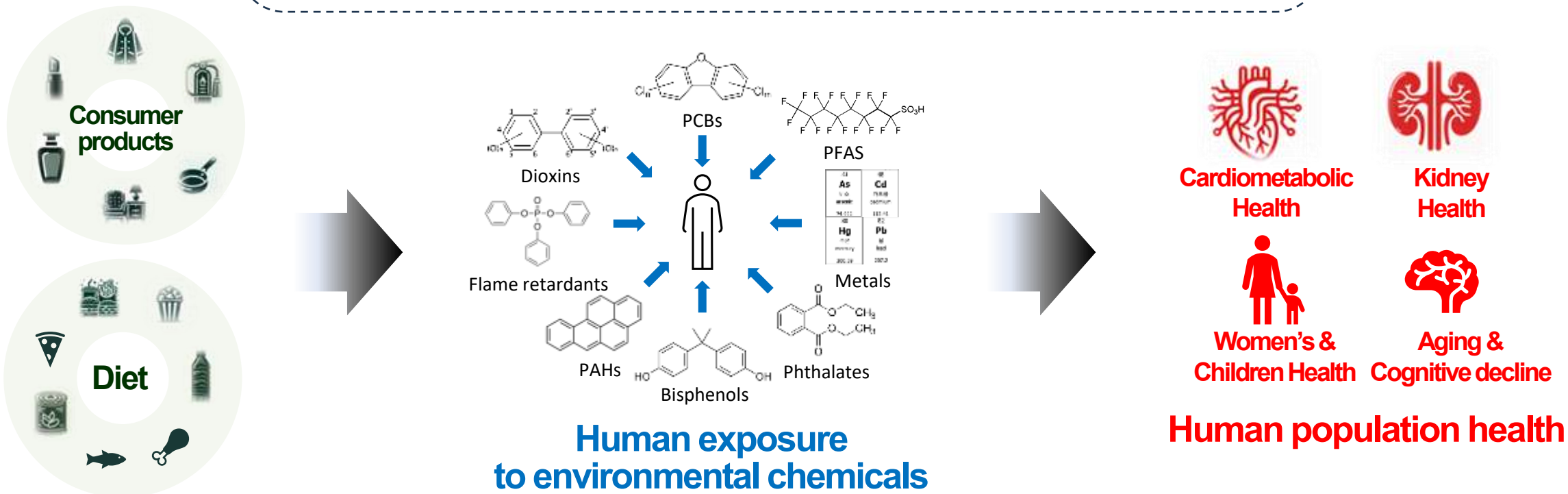
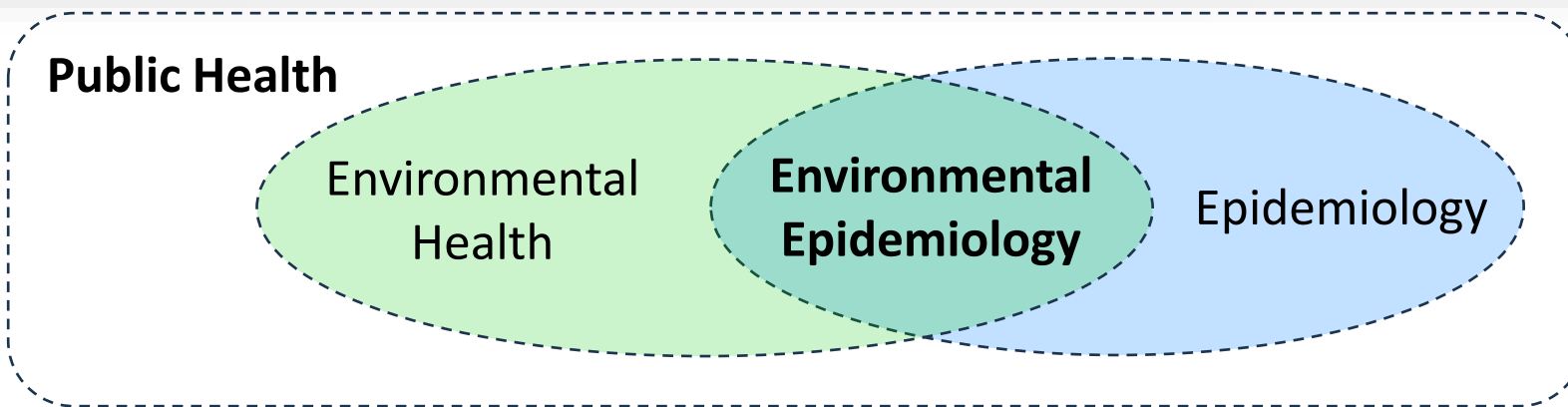
Habyeong Kang, PhD, MPH

Assistant Professor

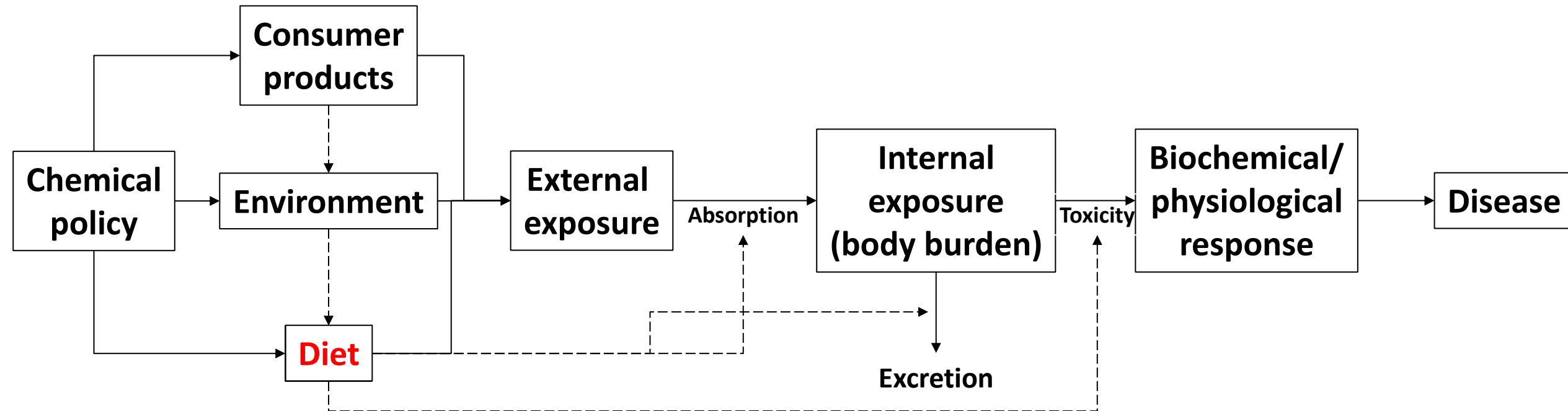
Department of Preventive Medicine

Hanyang University College of Medicine

Research Area



MEExD Lab Research Program



“Based on Human Observational Data Analysis”

Why [Chemical Exposure] X [Diet] ?

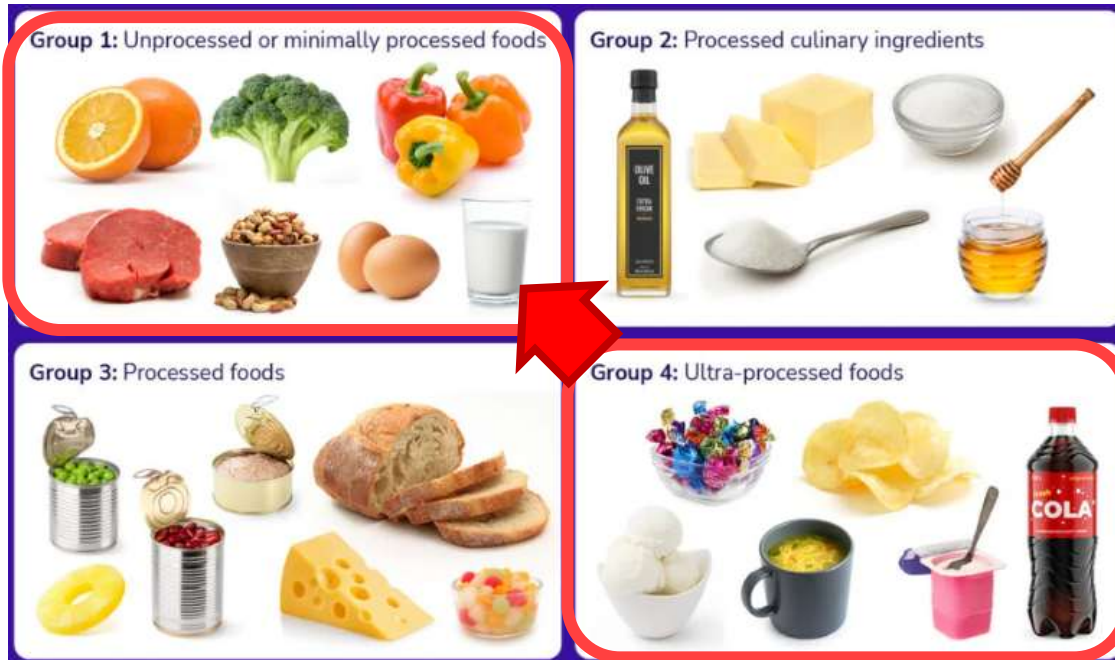
- 1) Analogy between nutrient consumption and chemical exposure
 - Nutrients are “chemicals”
 - Exposure assessment (nutrient consumption assessment)
 - Measurement of biomarkers
 - Dose-response relationships
- 2) Diet is one of the most important sources of chemical exposure
- 3) Nutritional factors can attenuate chemical toxicokinetics
 - Absorption, metabolism, distribution, and excretion
- 4) Nutritional factors can attenuate chemical toxicity

1) Analogy between Diet/Nutrients & Chemicals

- Estimation of **food substitution** effects on health benefits

(Lancet Planetary Health 2023; 7: e219–32)

Food substitution



Food processing and cancer risk in Europe: results from the prospective EPIC cohort study

Nathalie Kliemann, Fernanda Rauber, Renata Bertazzi Levy, Vivian Viallon, Eszter P Vamos, Reynalda Cordova, Heinz Freisling, Corinne Casagrande, Genevieve Nicolas, Dagfinn Aune, Konstantinos K Tsilidis, Alicia Heath, Matthias B Schulze, Franziska Jannasch, Bernard Srour, Rudolf Kaaks, Miguel Rodriguez-Barranco, Giovanna Tagliabue, Antonio Agudo, Salvatore Panico, Eva Ardanaz, María-Dolores Chirlaque, Paolo Vineis, Rosario Tumino, Aurora Perez-Cornago, Julie Louise Munk Andersen, Anne Tjønneland, Guri Skeie, Elisabete Weiderpass, Carlos Augusto Monteiro, Marc J Gunter, Christopher Millett, Inge Huybrechts

10% substitution

All cancer risk: 2% (1-3%) ↓

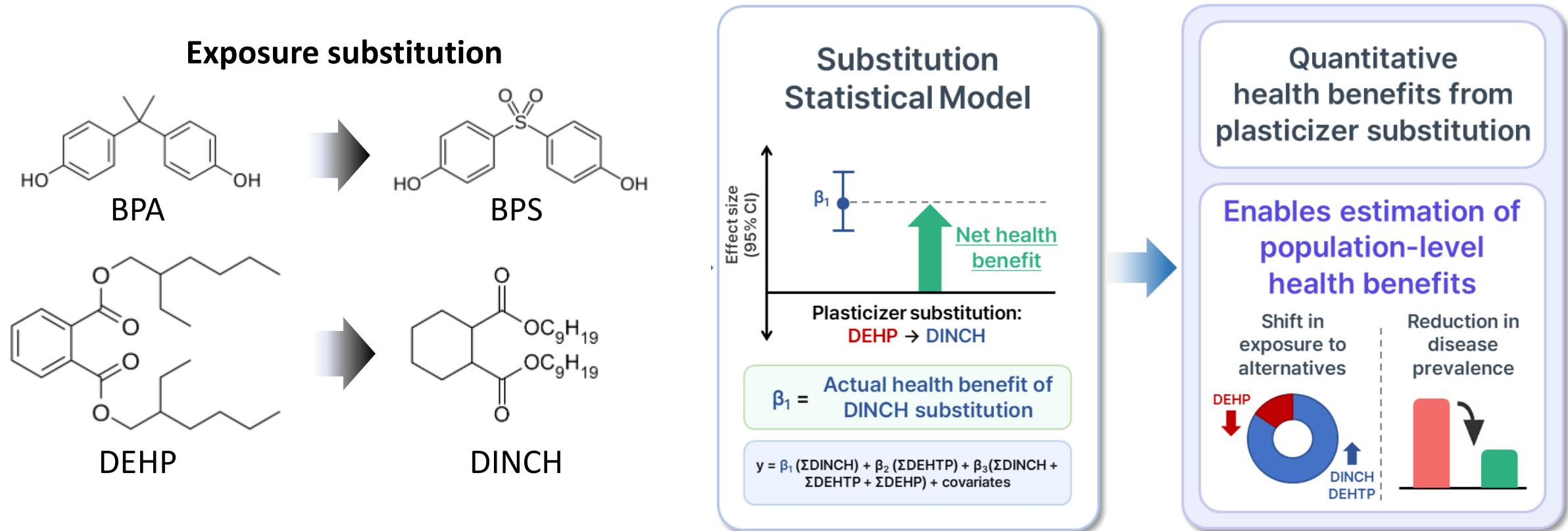
Head and neck cancer risk: 24% (19-28%) ↓

Colon cancer risk: 7% (2-11%) ↓

[Food substitution model] $y = \beta_1 \text{Group1} + \beta_2 \text{Group2} + \beta_3 \text{Group3} + \beta_4 (\text{Group1} + \text{Group2} + \text{Group3} + \text{Group1})$

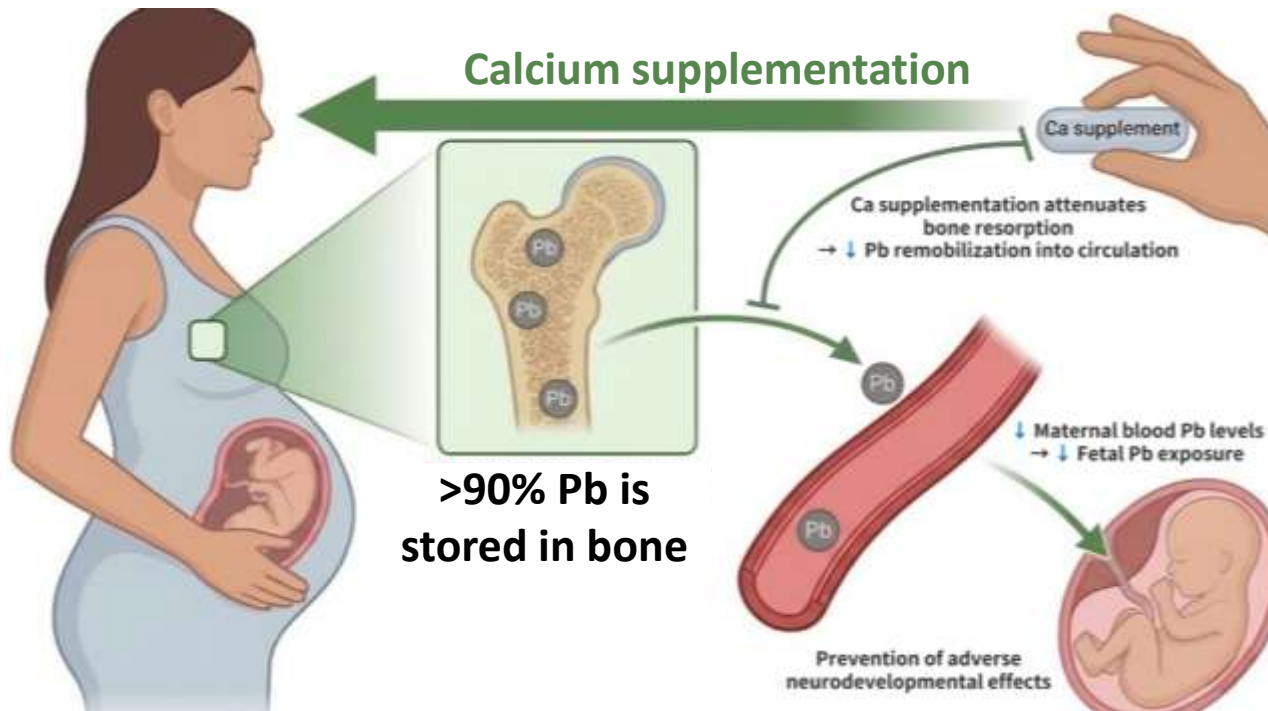
1) Analogy between Diet/Nutrients & Chemicals

- Estimation of **chemical substitution** effects on health benefits



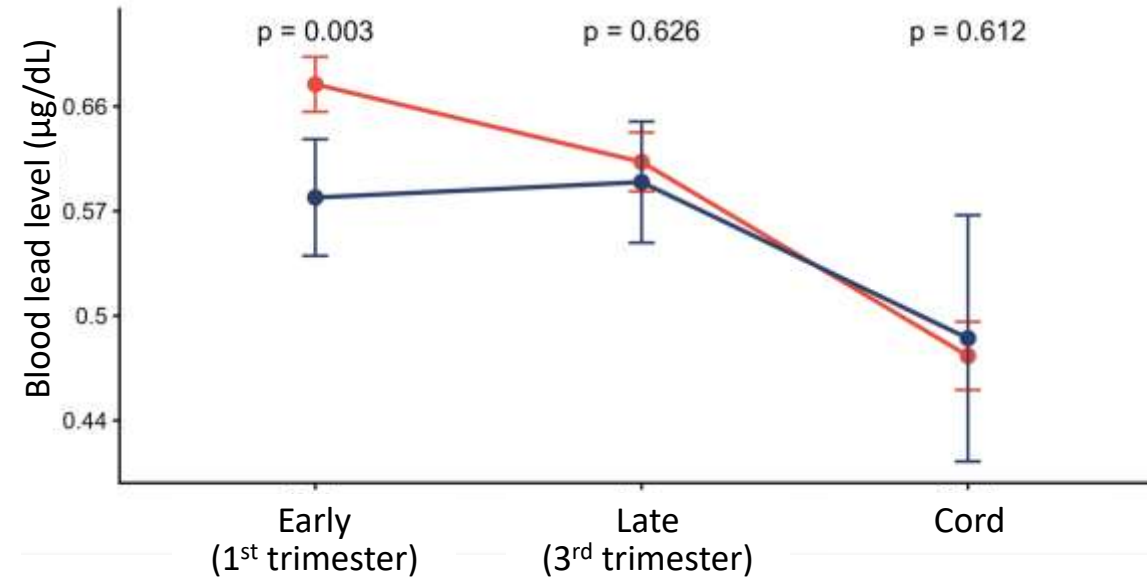
(Yeonju Kim et al., in preparation)

3) Nutrients attenuate chemical toxicokinetics



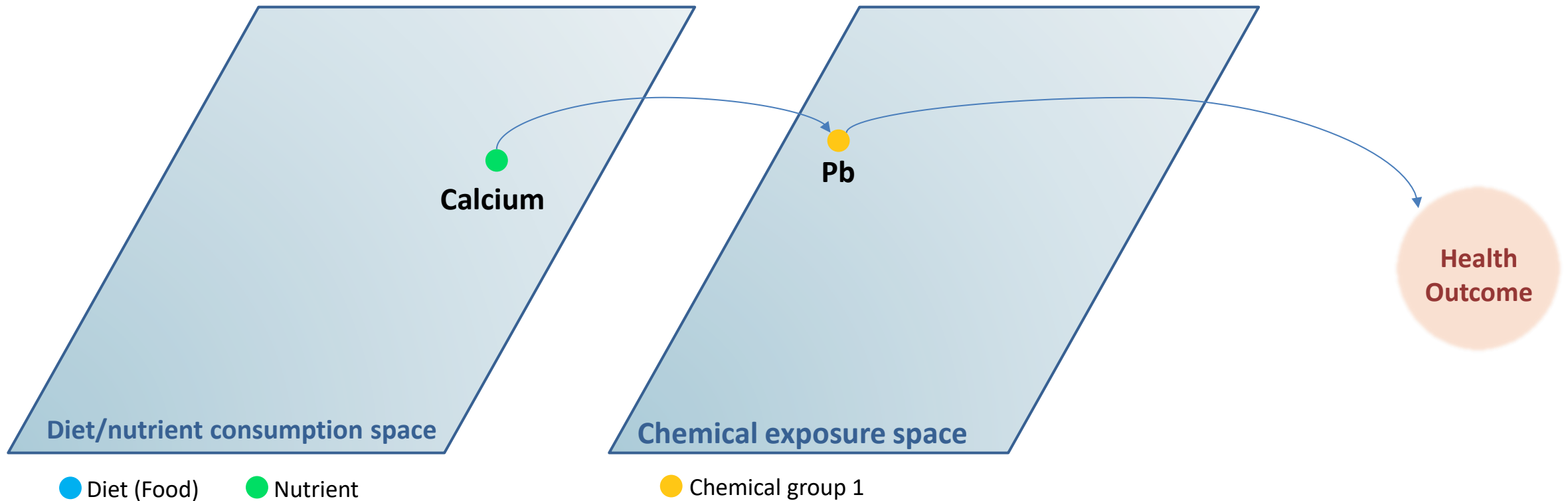
Korean nationwide pregnant women cohort (Ko-CHENS)

- No calcium supplementation at early pregnancy (n = 704)
- Regular calcium supplementation at early pregnancy (n = 176)



(Hyunkyung Kim et al., unpublished data)

Diet/nutrient – chemical exposure spaces & health outcome relationship

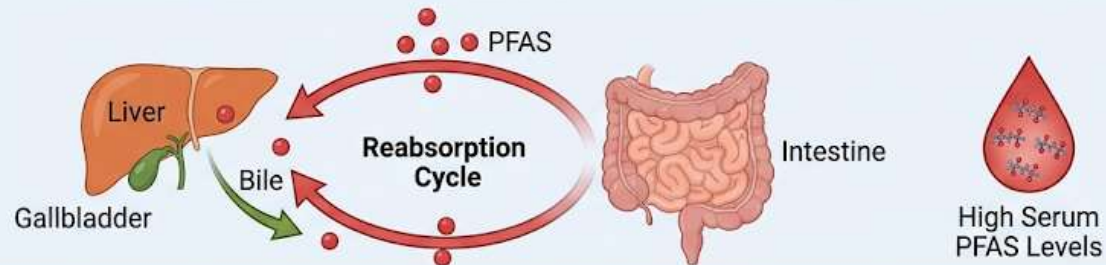


3) Nutrients attenuate chemical toxicokinetics

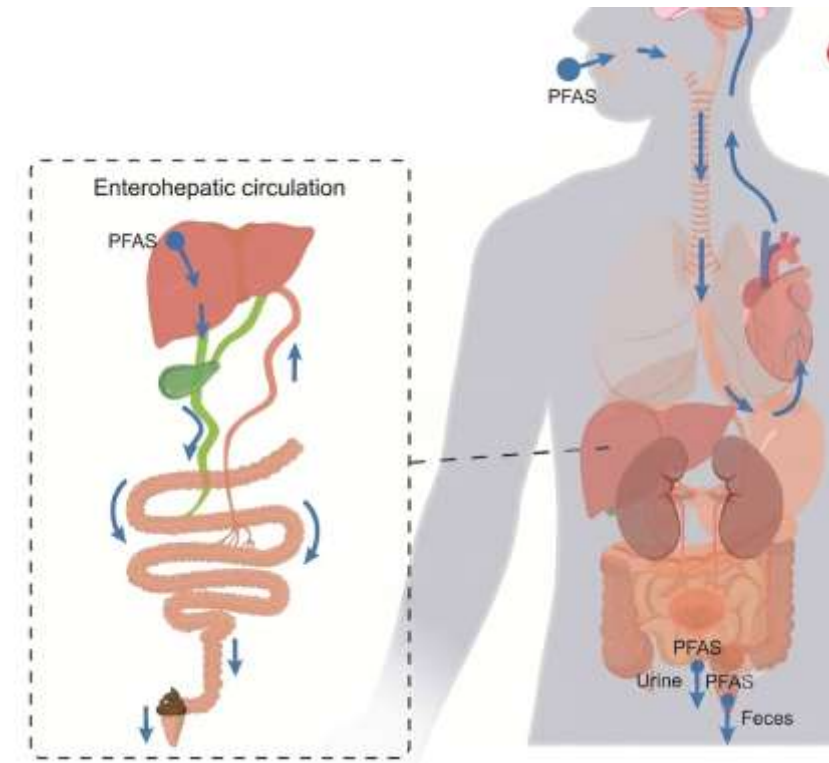
- Hypothesis: Dietary fiber can reduce PFAS body burden

Research Plan: Enhancing PFAS Elimination through Dietary Fiber Intervention

Current Challenge:
PFAS Persistence &
Enterohepatic
Circulation



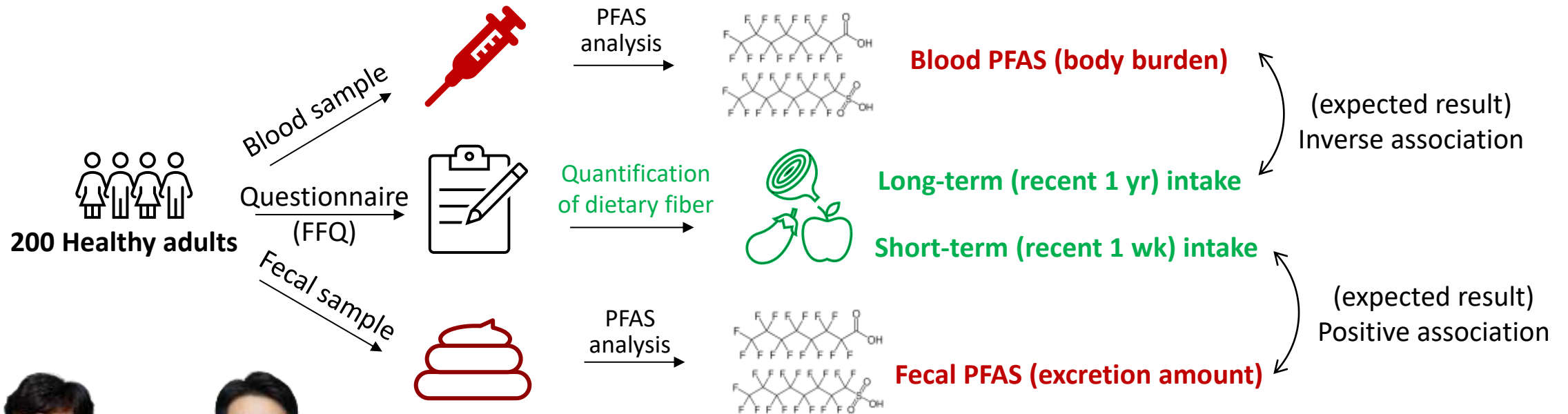
Proposed Strategy: Dietary Fiber Intervention



**Enterohepatic Circulation &
Fecal Excretion of PFAS**

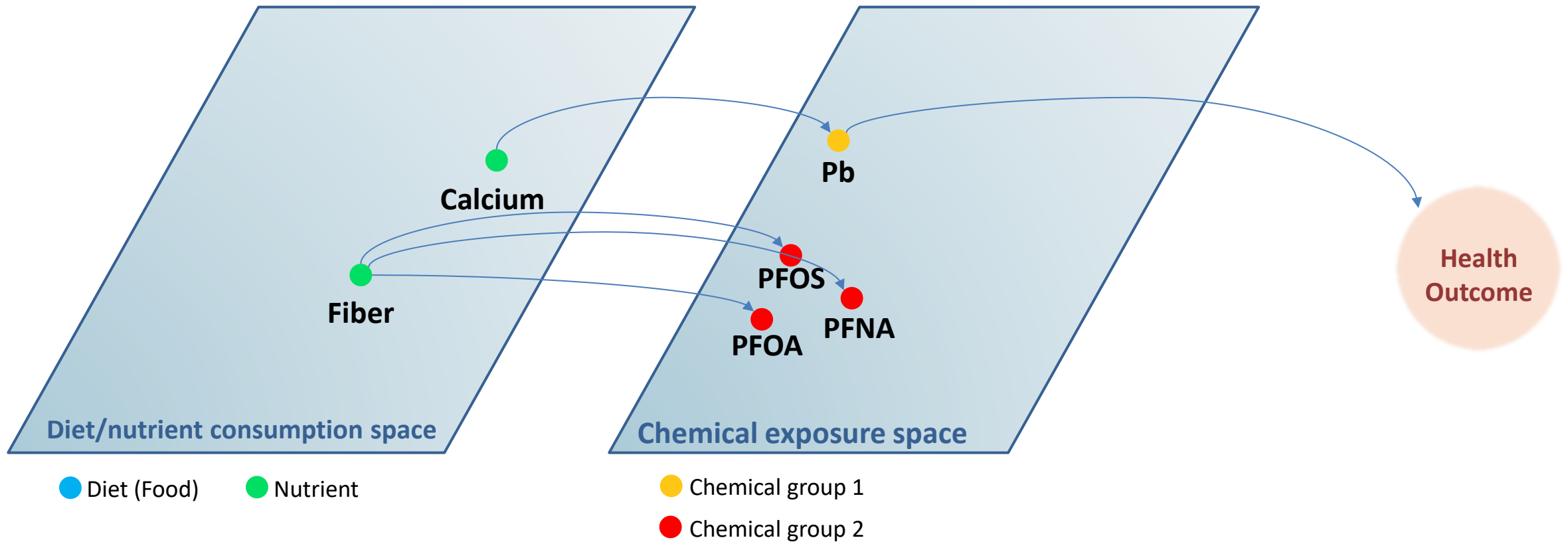
3) Nutrients attenuate chemical toxicokinetics

- Hypothesis: Dietary fiber can reduce PFAS body burden



Prof. Hyo-Bang Moon Prof. Sangwon Lee

Diet/nutrient – chemical exposure spaces & health outcome relationship



4) Nutrients attenuate chemical toxicity

[U.S. NHANES III – mortality linkage data]

Serum antioxidant status

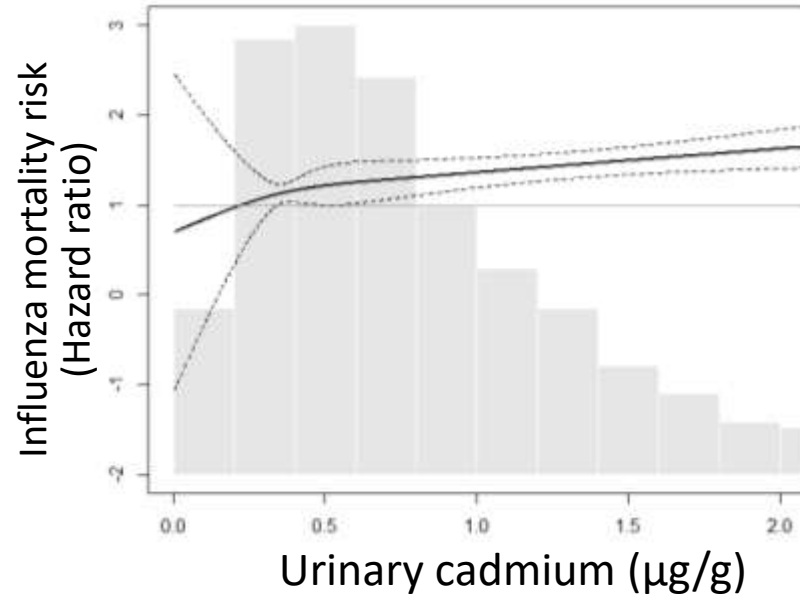
(Kang et al. 2022)
(-)

Influenza mortality

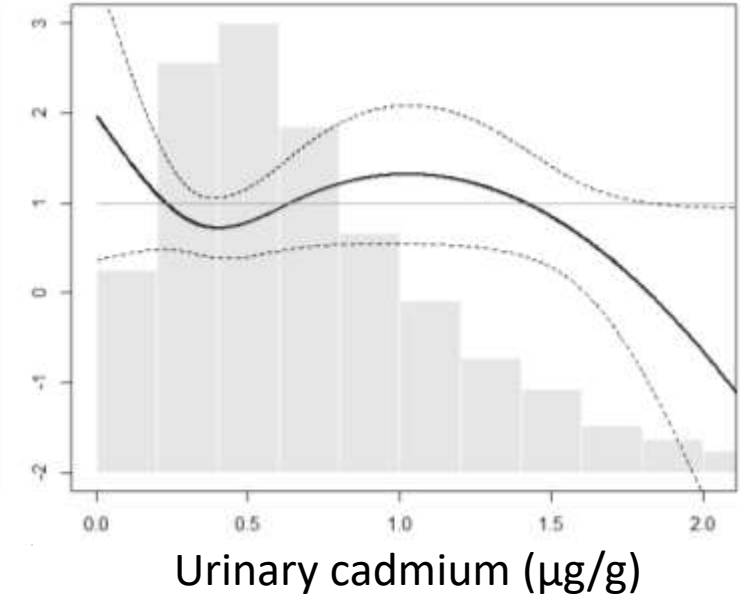
Urinary cadmium level

(Park et al. 2020)
(+)

A. Low antioxidant status
(n=3,453)

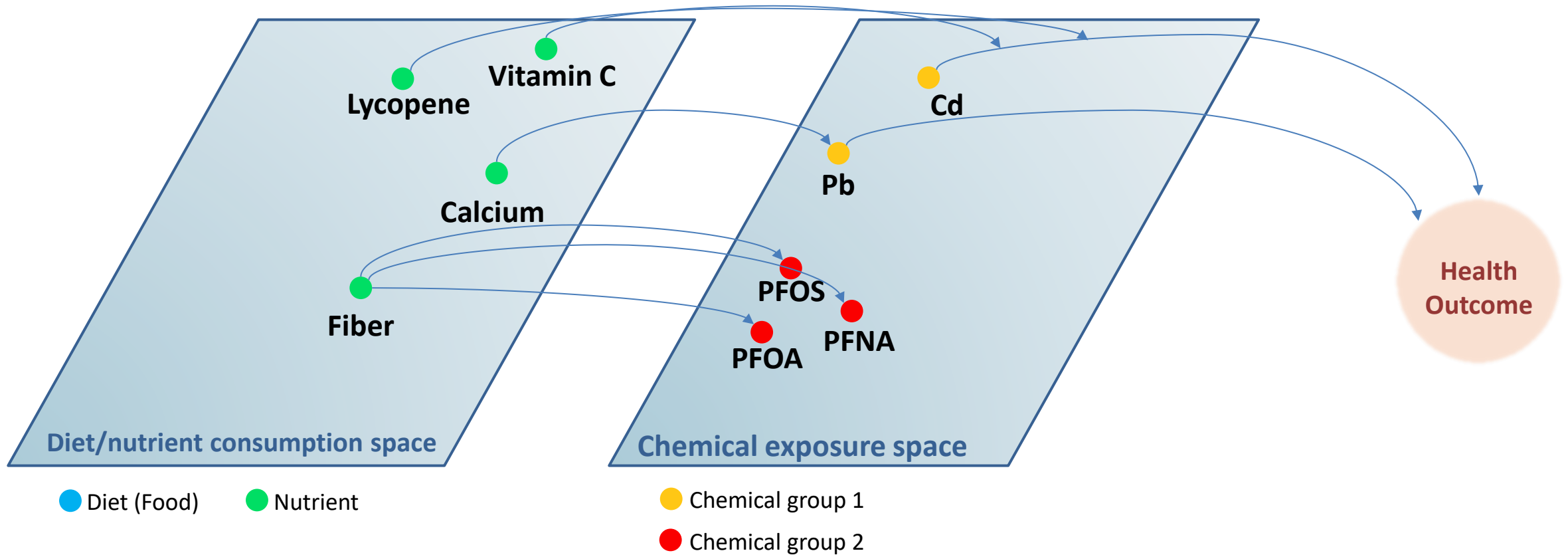


B. High antioxidant status
(n=3,453)

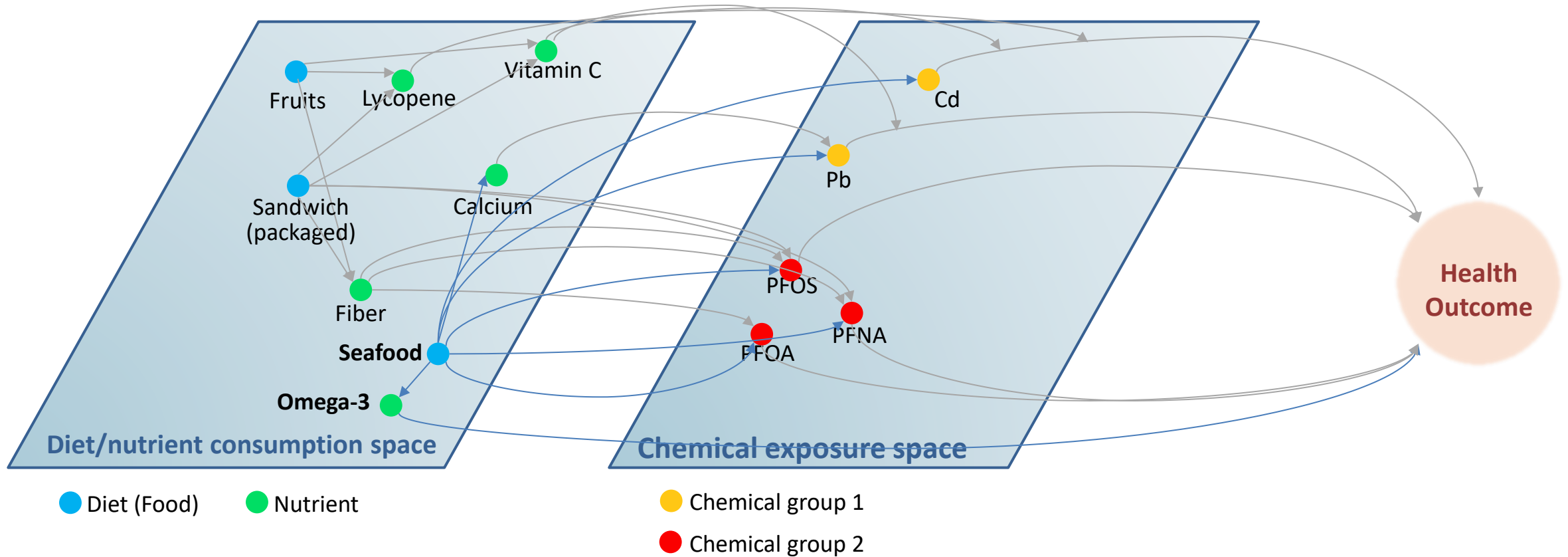


(Habyeong Kang et al., unpublished data)

Diet/nutrient – chemical exposure spaces & health outcome relationship



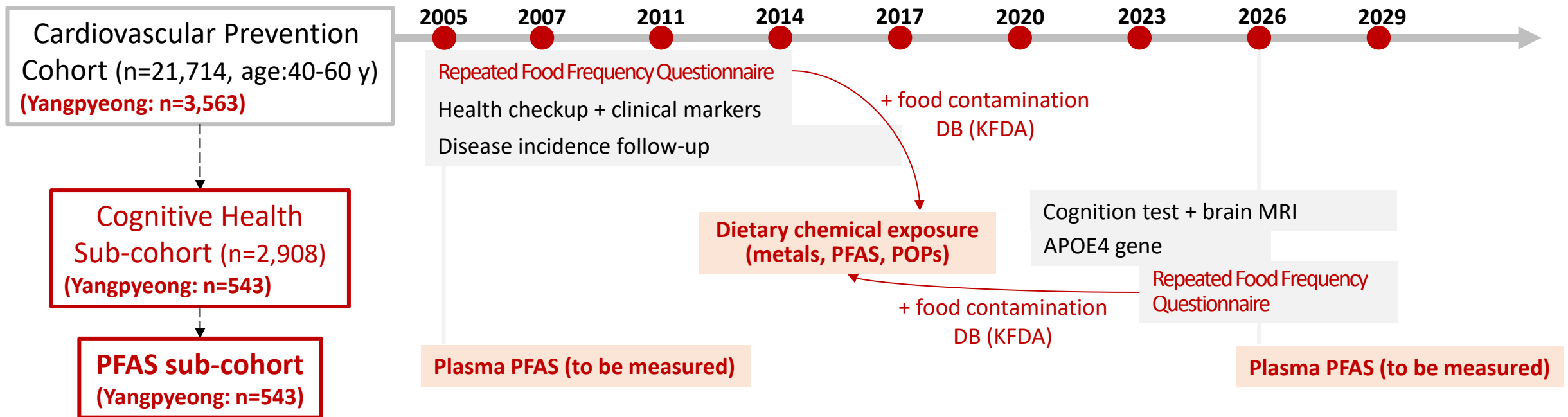
Diet/nutrient – chemical exposure spaces & health outcome relationship



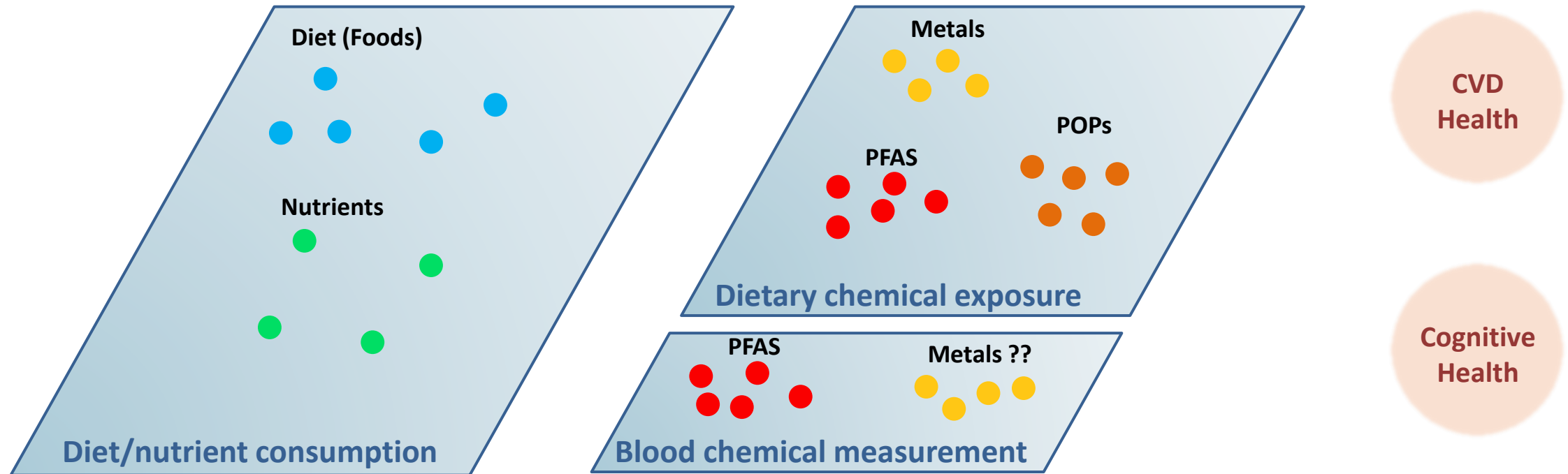
Prospective Cohort for Diet/Nutrient–Chemical Interaction Study



Prof. Mi Kyung Kim



Prospective Cohort for Diet/Nutrient–Chemical Interaction Study



Methods in Nutritional epidemiology

- Residual model
- Substitution model
- DWAS



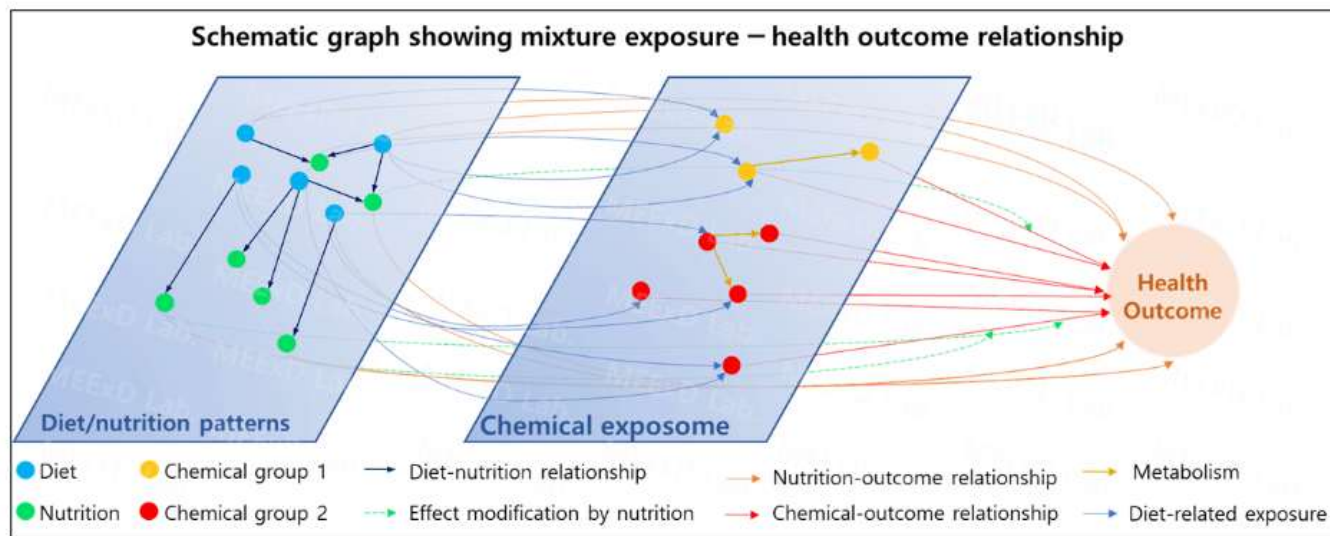
Methods in Environmental epidemiology

- Mixture approach (BKMR, QGcomp, ...)
- EWAS

+ AI?

MEExD (Multiple Environmental Exposure and Disease) Lab

Pronounced "**mixed**," my group conducts epidemiological research on the associations between **multiple** environmental exposures and diseases. We focus on **mixture** exposure, covering a range of environmental contaminants and other factors, such as nutrition and lifestyle. We integrate **multidisciplinary** knowledge and approaches to explore the complex relationships between environmental exposures and health outcomes.



(sites.google.com/view/meexd)



Lab webpage
(sites.google.com/view/meexd)



YouTube Channel
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