

子どもの環境保健に関する
これまでのわが国の取り組み
Measures for Children's Environmental
Health Issues in Japan

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Background of activities of children's Health

小児の環境保健活動に関する経緯

- **Declaration of the Environment Leaders of the Eight on Children's Environmental Health in 1997 (Miami)**
G8環境大臣会合における先進8カ国による環境保健に関する宣言(マイアミ宣言,1997)
 - *Need for risk assessment taking children's characteristic
小児の特性を考慮に入れたリスク評価の必要性
 - *Requirement of effort to reduce environmental risks to children (exposure to lead, passive smoking, intake of endocrine disruptors, etc.)
鉛暴露、受動喫煙、内分泌かく乱物質等による環境リスク削減の必要性



Background of activities of children's Health(2)

小児の環境保健活動に関する経緯(続き)

- 2002～: **Projects for the Children's Environmental Health in NIES and Cooperation Research Laboratories**
国立環境研究所と協力研究機関による調査研究
- 2003～: **International Symposium for Children's Environmental Health**
小児等の環境保健に関する国際シンポジウム
- 2006: **Ad Hoc Committee on the Children's Environmental Health (MOE)**
小児の環境保健に関する懇談会(報告書)(環境省)
- 2007: **Strategy of environmental founding a state of the 21st century** 21世紀環境立国戦略
- 2007.10: **Committee on the Epidemiological Study for Children's Environmental Health** 小児環境保健疫学調査に関する検討会

Why We Focus to the Children's Environmental Health -Factors of Children's Vulnerability – 小児の脆弱性に関する要因(環境省,2006)

(1) Characteristics of Exposure 曝露に関する特性

①Exposure to Breast Milk and Foods
母乳摂取及び食物からの曝露

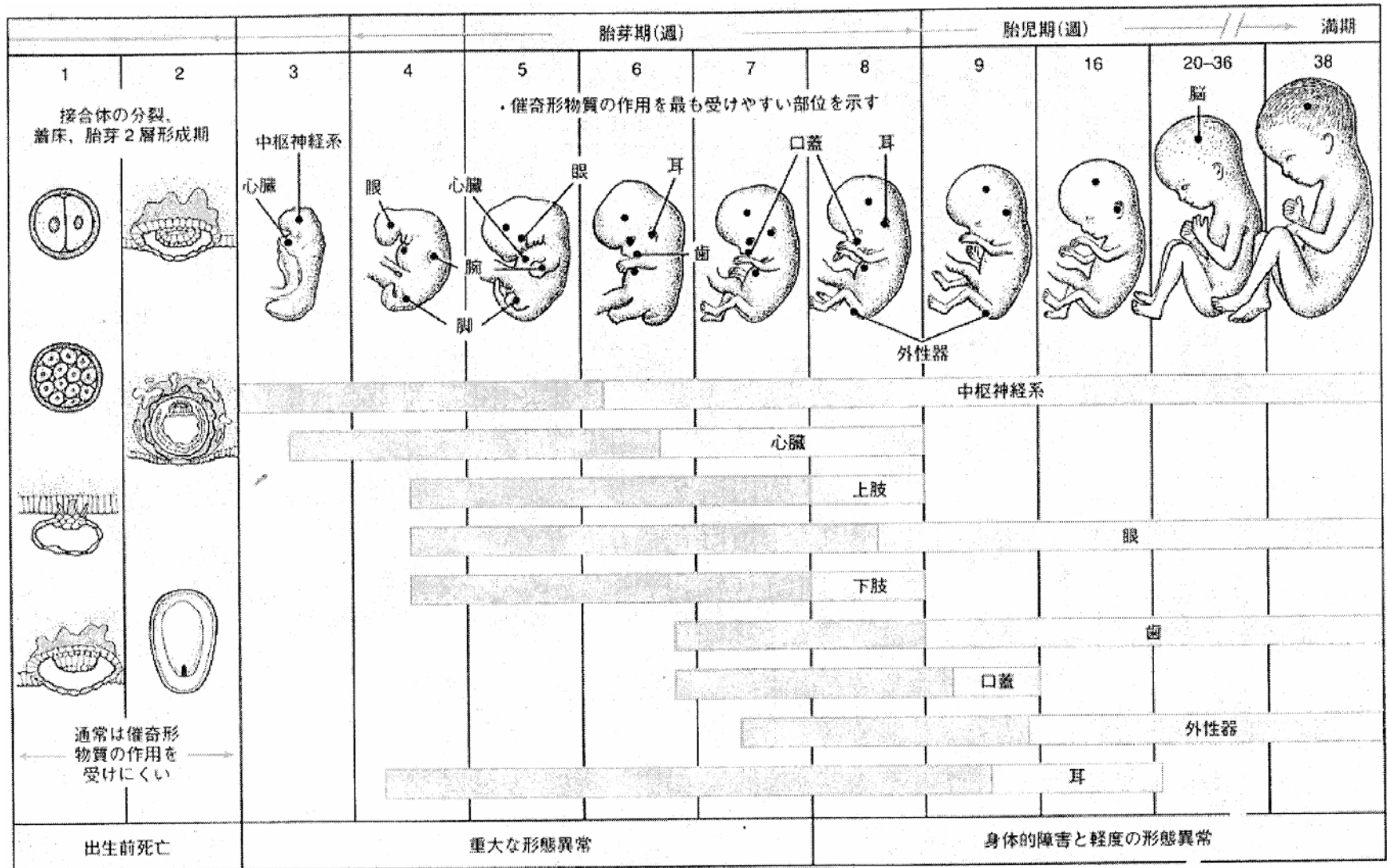
②Children's Environment and Behavior activities
小児の環境と行動特性

③Body Burden of Chemicals per Body Weight
体重あたりの化学物質負荷量

(2) Characteristics of Bio kinetics of Chemicals 化学物質の体内動態の特性

①Absorption, 吸収, ②Distribution, metabolism
分布・代謝, ③Renal Function 腎機能





胎児の発達 (Nelson Textbook of pediatrics 17th edition)

Fetal Development (Nelson Textbook of pediatrics 17th edition)

fetal 期 0 1 2 3 4 5 6 7 8 9 10... (歳)

Development



Central nervous system

Respiratory system

Skin

Internal kinetics

高

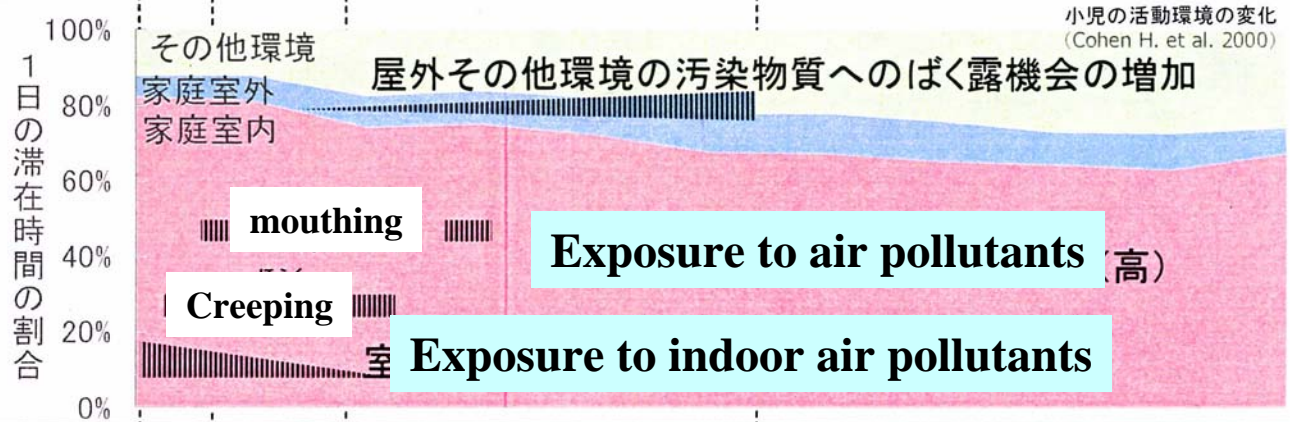
Absorption through intestinal

低
低

Activity of metabolic Enzyme

排泄機能

Environment and behavior

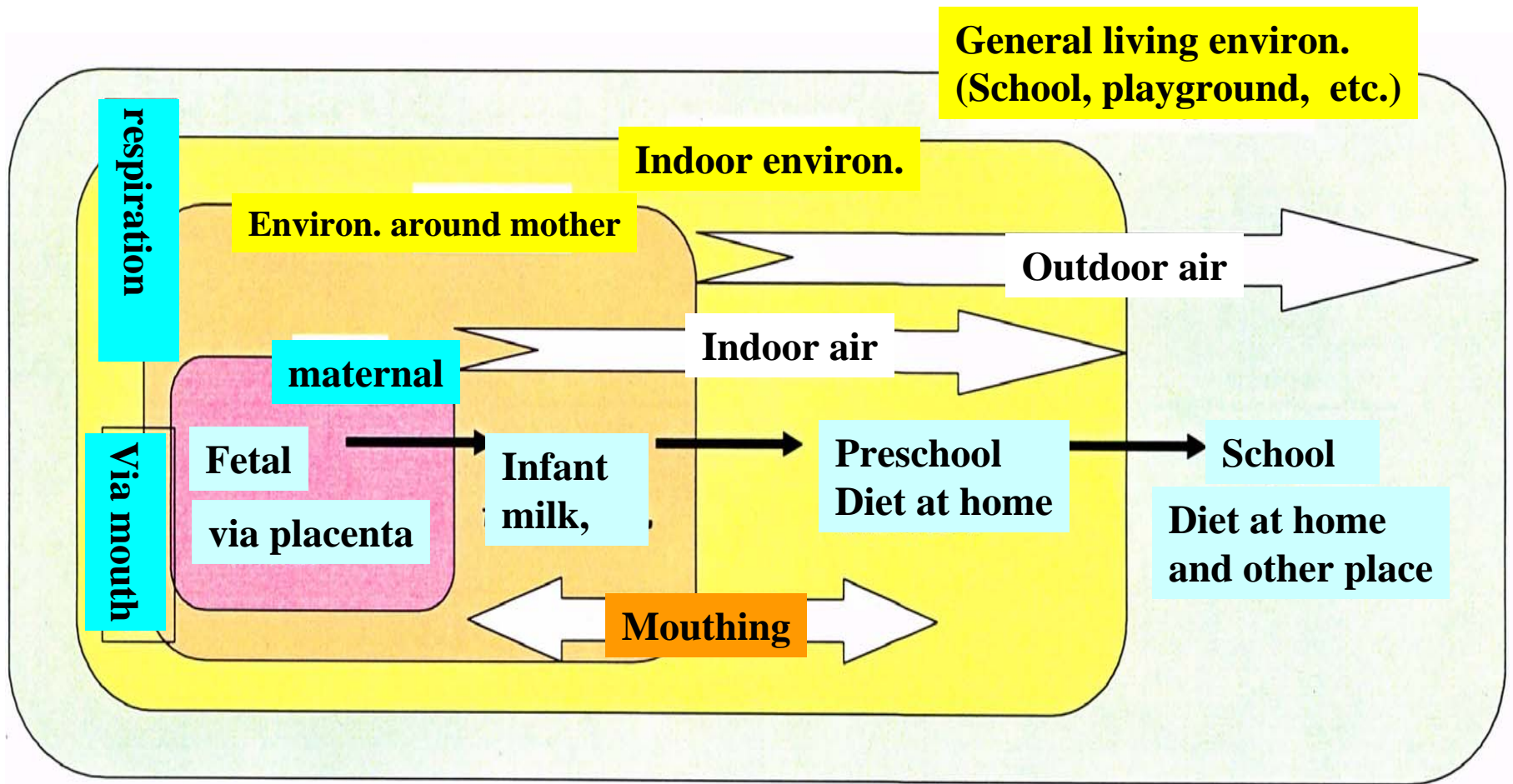


小児の発達・成長に応じた生活環境・行動の変化1 (環境省, 2006)

Children's Environment and Behavior in Developing Stages



Kyoto University

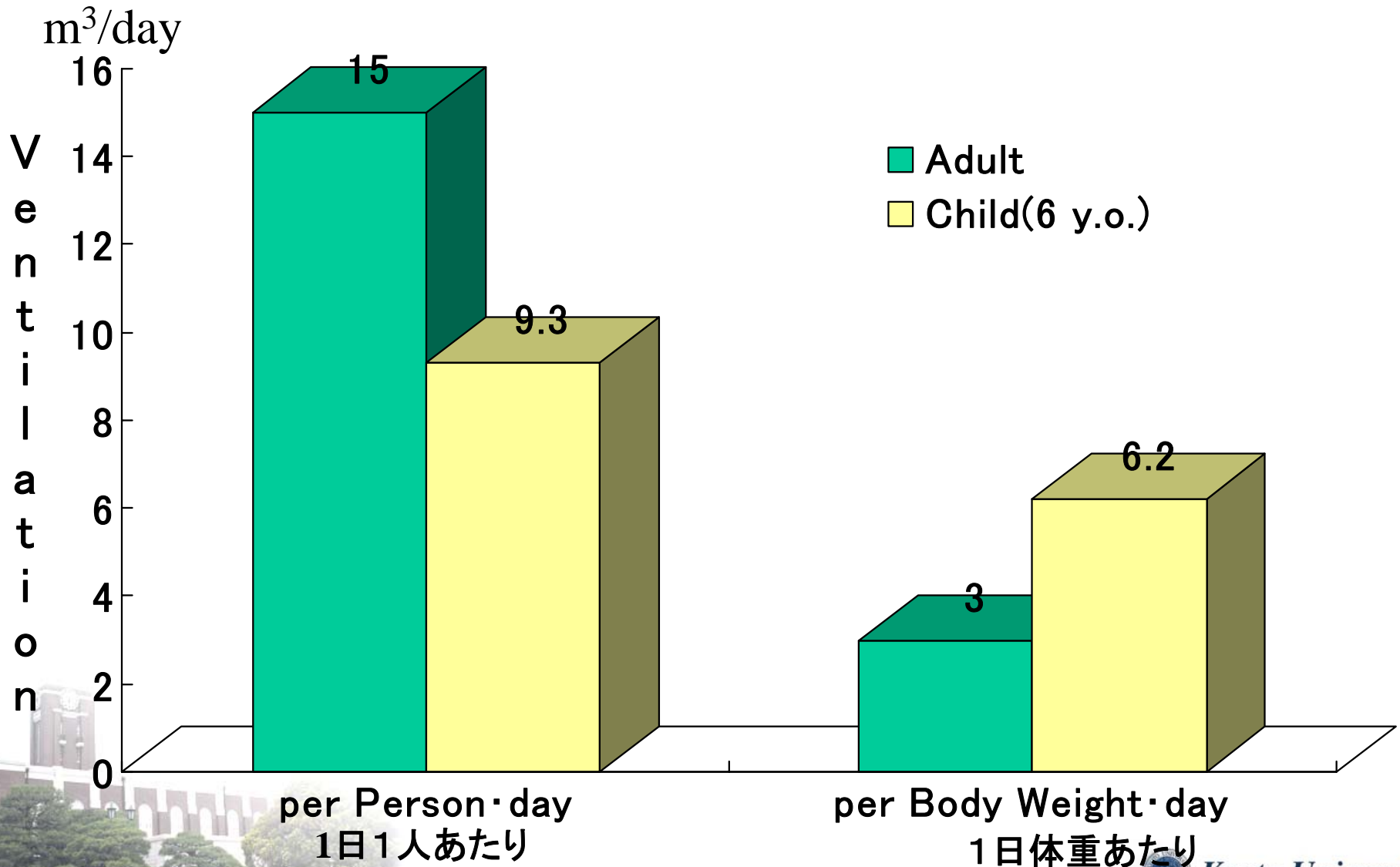


小児の発達・成長に応じた生活環境・行動の変化2 (環境省, 2006)

Children's Environment and Behavior in Developing Stages(2)

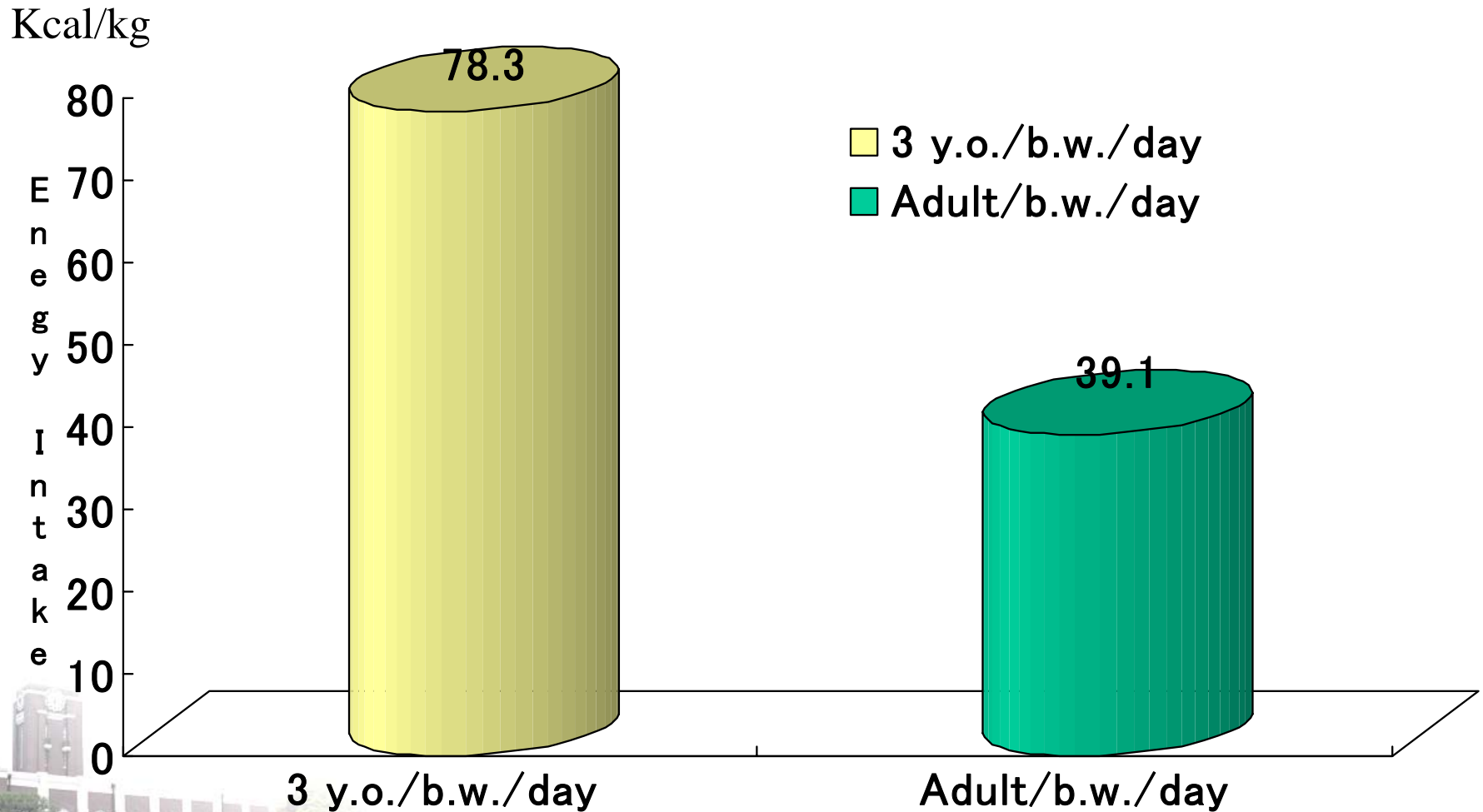
Air Inhaled per Day by Adults and Children

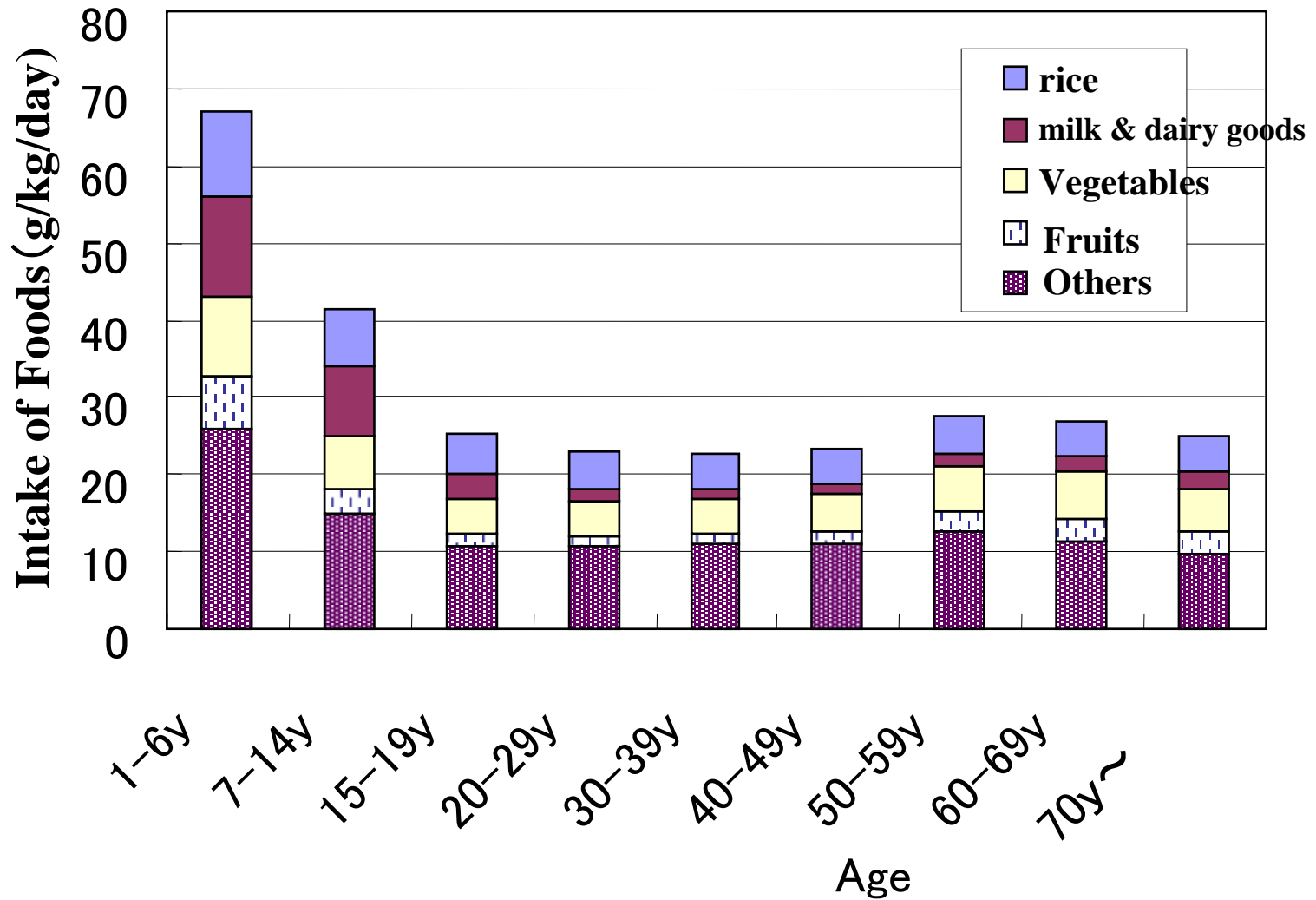
一日の空気吸入量の比較



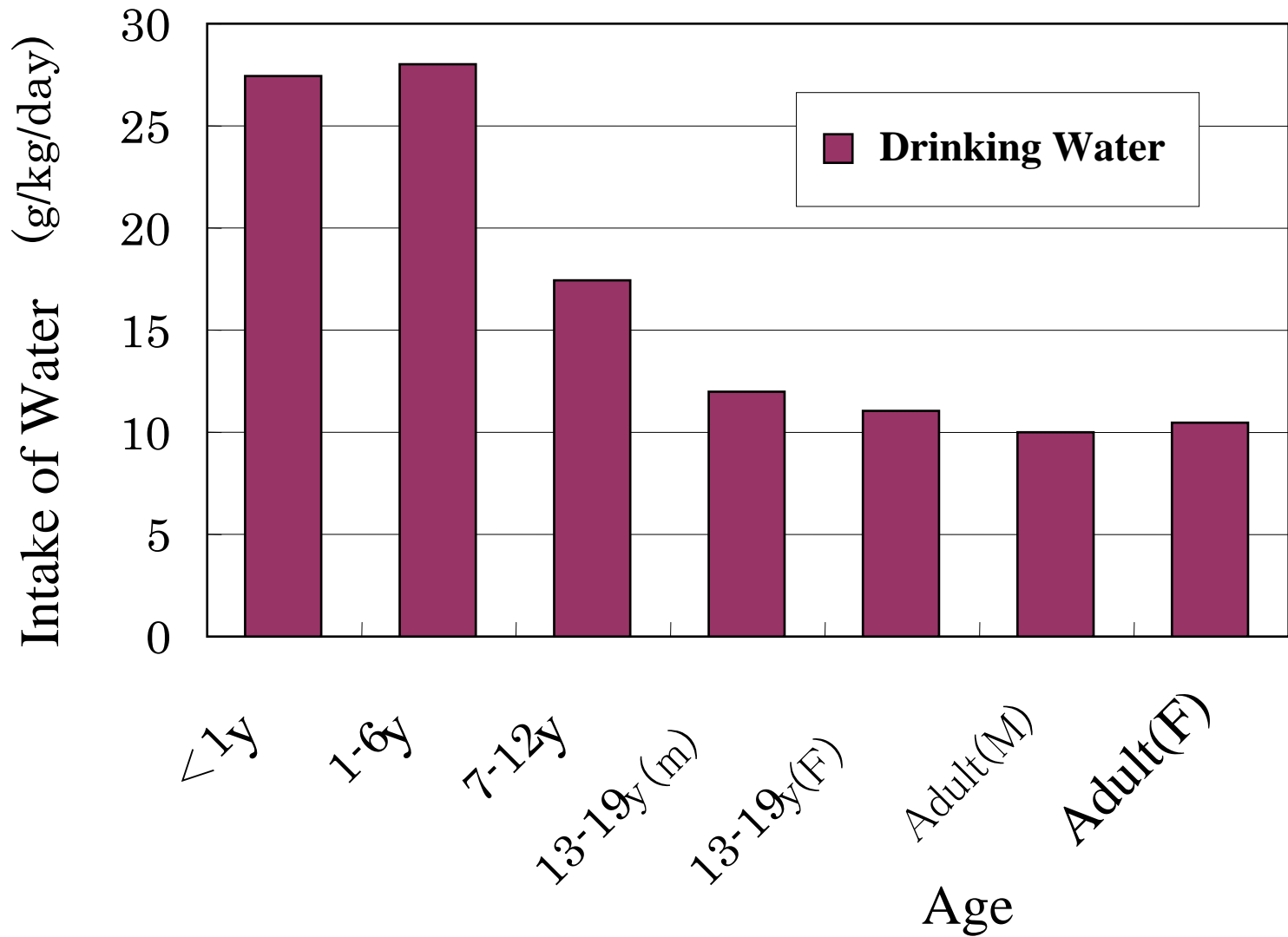
Energy Intake per Body Weight by Three Year-old and Adults

3歳児と成人の体重当たり摂取エネルギーの比較





Intake of Foods per Day by Age (by Food Categories)
 (平成14年国民栄養の現状より)
 (JME, 2006)



Intake of Drinking Water by Age and B.W.

(Laura M.P. et al.1992 [ILSI Press ,1992]) (JME, 2006)



Projects for the Children's Environmental Health in NIES and Cooperation research laboratories

国立環境研究所と協力研究機関における取り組み

- **Collecting data to estimate their exposure to environmental pollutants taking their specific characteristics and behaviors into account**
子供の特性や行動を考慮した環境曝露評価を可能とするデータの収集
- **Data Collection** データ収集項目
 - **Activities** 行動 (Umezawa A., Tamura Y., Matsuzaki K.: NIES)
 - **Dietary Intake** 食物摂取量 (Sato Y., Hirose S.: Yokohama City Univ.
Uchiyama I., Matsui Y.: Kyoto Univ.)
 - **Soil Ingestion** 土壌摂取量 (Yoshinaga J.: Univ. Tokyo)
 - **Ventilation** 呼吸量 (Kawahara J.: NIES, Tanaka C.: Obirin Univ.
Tanaka S.: NIHN)
 - **Exposure to Hazardous Chemicals** 有害化学物質への曝露形態
(Uchiyama I., Matsui Y.: Kyoto Univ.)



Studies on Dietary intake for Japanese Children by Foods Categories

子どもの食物摂取量について

- **Subjects: 126 preschool children (0-5 yrs-old)**
0~5歳児 計126名
- **Area: Metropolitan area 首都圏**
- **Sampling period: 2 days in March, 2004**
平成16年3月 2日間
- **Data collection: Food diary 食事内容の記録(自記式)による**
 - Food menu 献立
 - Quantity of food/beverages and consumed
調理した量、摂取量(目分量)
 - Food items used for meal
18食品群のうち、使用した食品群を選択し、回答

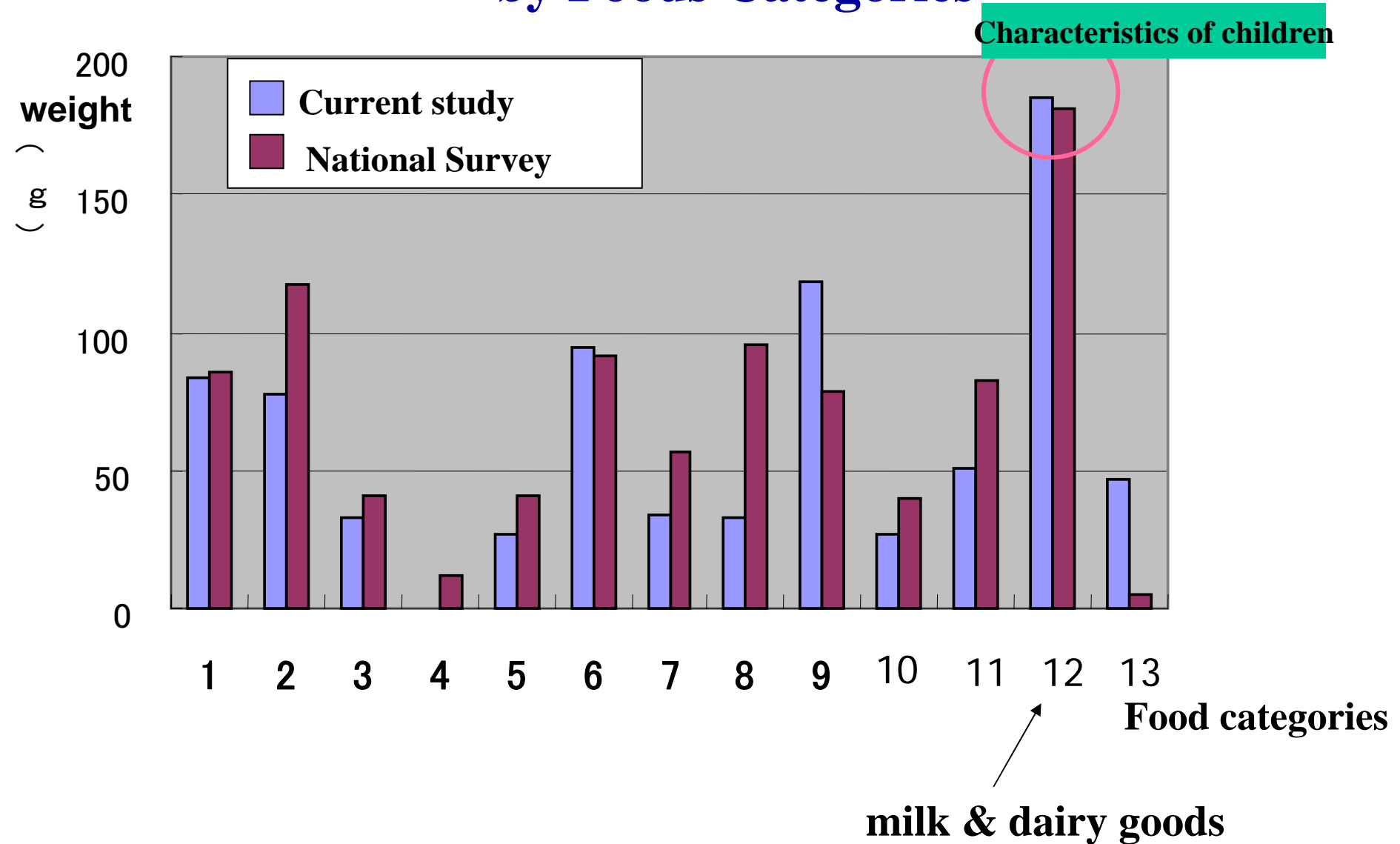


13 Food Categories

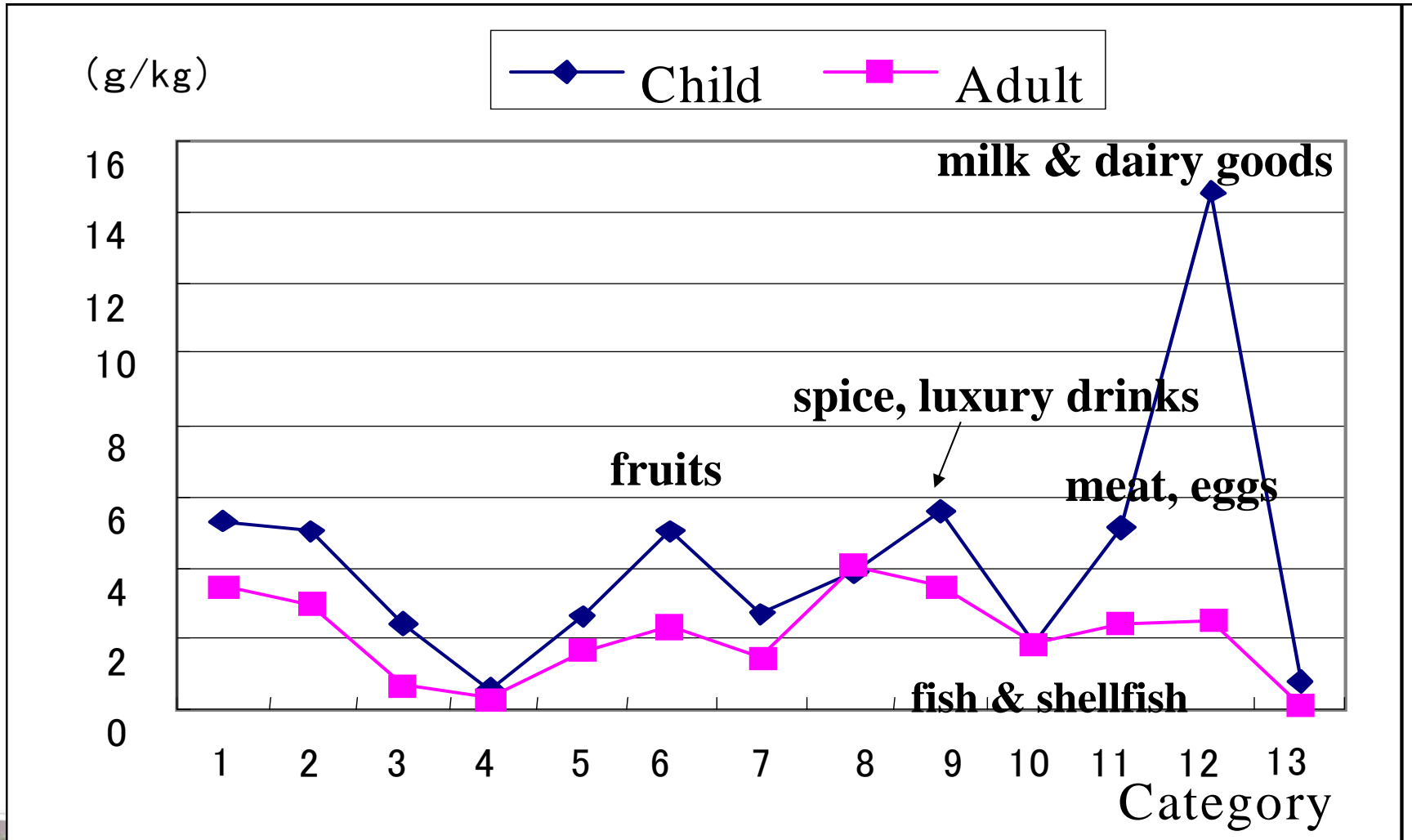
- 1 : rice & rice products**
- 2 : other grain, potato, etc**
- 3 : sugar, confectionary**
- 4 : oil**
- 5 : beans & beans products**
- 6 : fruits**
- 7 : green vegetables**
- 8 : other vegetables, mushroom, seaweed**
- 9 : spice, luxury drinks**
- 10 : fish & shellfish**
- 11 : meat, eggs**
- 12 : milk & dairy goods**
- 13 : other meals**



Dietary intake for Japanese Children by Foods Categories



The Amount of Daily Intake per Body Weight of Each Food Categories (Uchiyama, Sato 2001)



Studies on Ventilation Rate of Japanese Preschool Children

小児の肺換気量研究への取り組み

- **Objective: Providing data to estimate children's respiratory exposure to pollutants according to physical activities level**

日常における活動強度と活動環境を考慮に入れた子供の肺換気量データを収集する

- **Data collection**

- **Ventilation rate (daily activities) 肺換気量 (日常生活)**

- **Short term: rest, sedentary, low moderate and heavy activities 休息, 安静, 低, 中, 強 強度の活動時の換気量**

- **Long term: daily total inhalation volume**

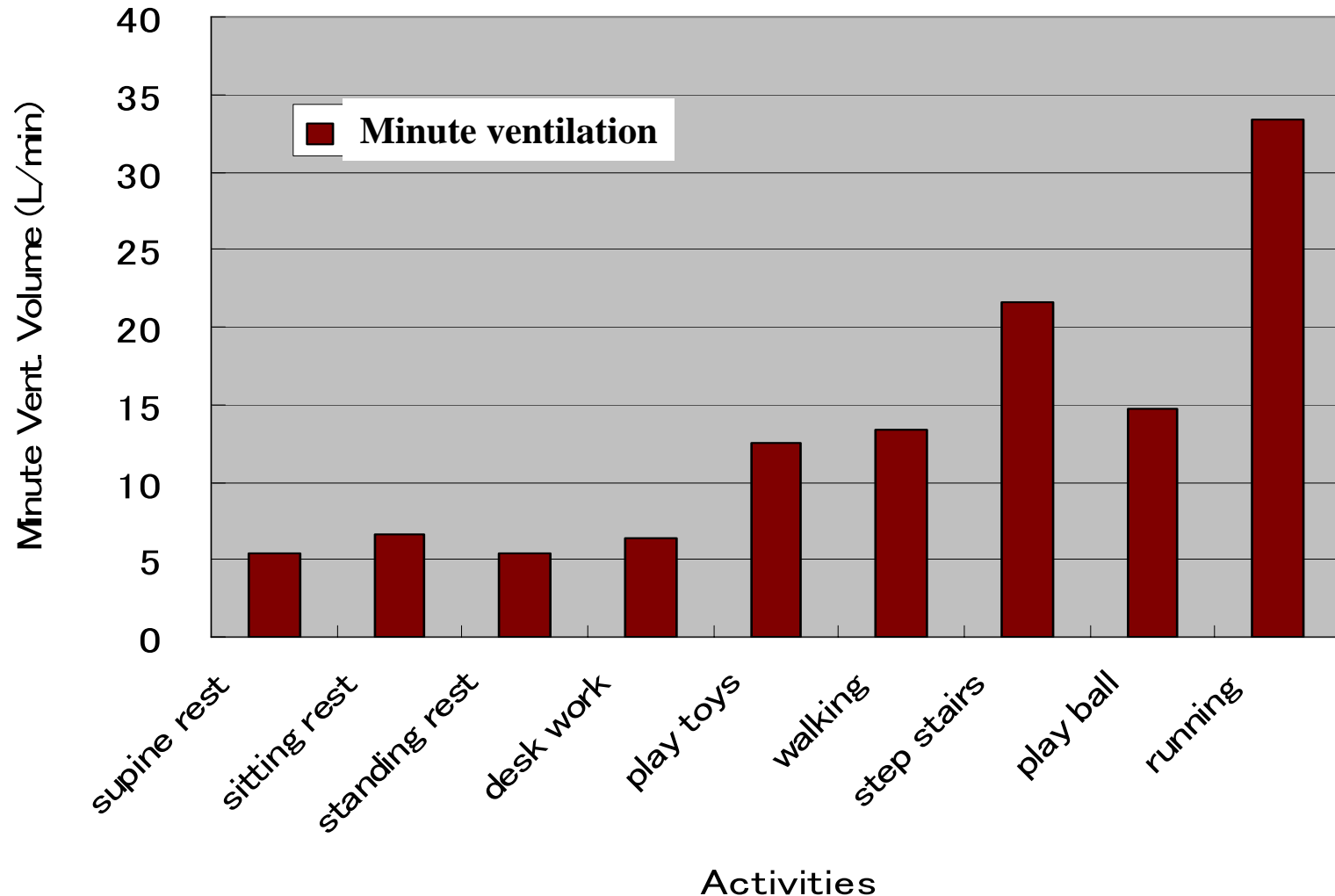
- **一日のトータル換気量**

- **Ventilation rate due to environment 環境に応じた換気率**



Minute Ventilation Volume by Each Activity Level

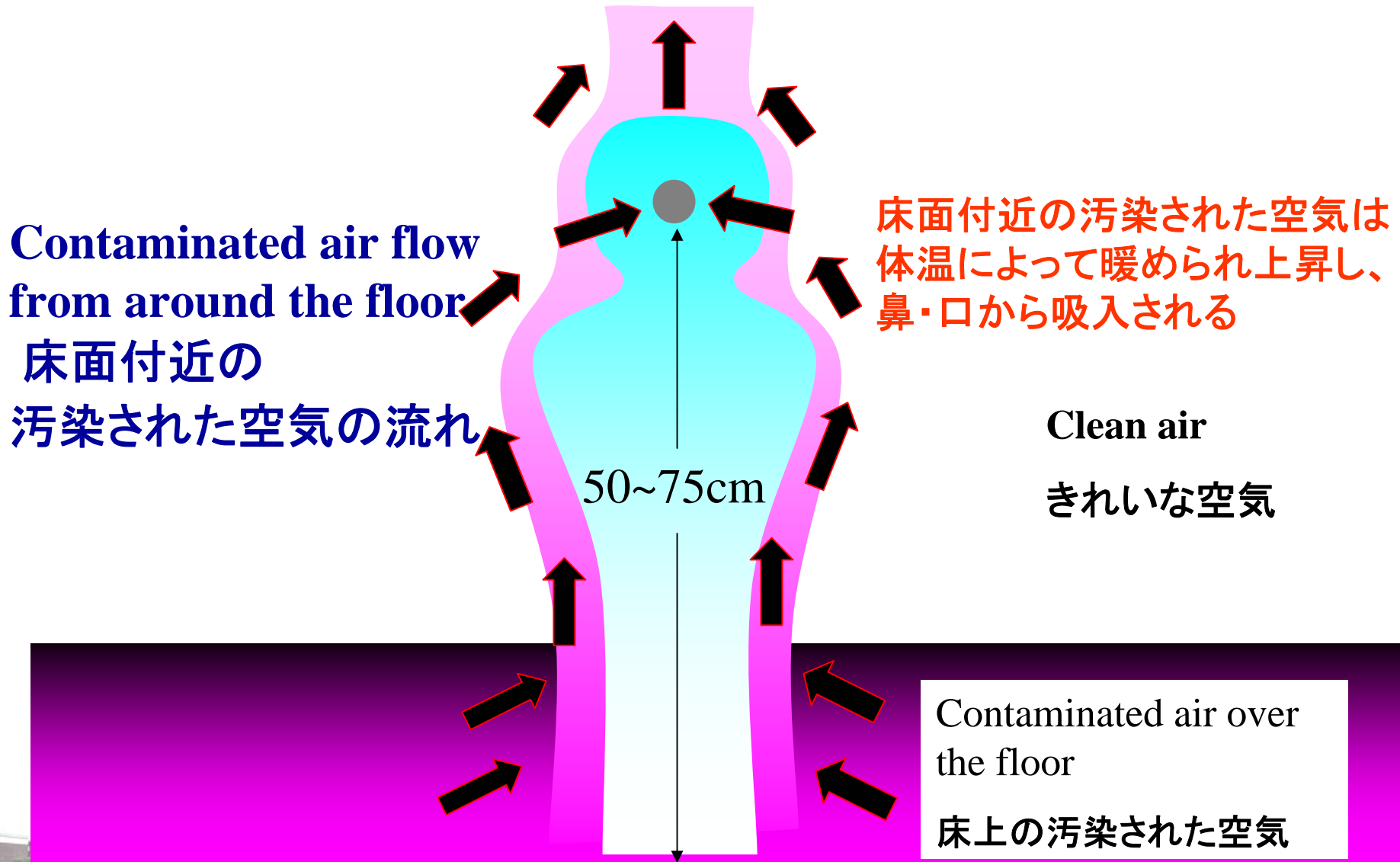
幼児の活動時の肺換気量 (6~7y-o, N=4)



(Kawahara, J. Tanaka C, and Tanaka S) (河原純子、田中千晶、田中茂穂)



Children and Pollutants



Current measures and issues on the children's environmental health in Japan

小児保健のわが国の施策と課題 (MOE,2006)

- **Chemical risk management considered to children's environmental health**

小児の環境保健に配慮した化学物質のリスク管理の現状

- ① **Caution to pregnant woman concerning feeding of seafood and mercury (MLHW)** 妊婦への魚介類の摂食と水銀に関する注意事項
- ② **Indoor air quality guideline (chlorpyrifos) are considered to vulnerability of children (MLHW)**
クロルピリホスの室内濃度指針値を小児の感受性を考慮(厚生労働省)
- ③ **Investigation and reduction concerning content of lead of metallic accessories(MLHW)** 金属製アクセサリーの含有鉛に関する対策
- ④ **Children's soil injection was considered to the soil quality standard of dioxins (MOE)**ダイオキシンの土壌環境基準に小児の土壌摂食量を考慮(環境省)



Representative Projects on Children's Environmental Health in MOE

- **Epidemiological study on adverse effects on human health of localized air pollution**
 - **Schoolchildren's prospective cohort study-**
- **Research on effects on human health caused by low dose exposure to methyl mercury**
- **Research on the human biomonitoring (part of the environmental investigation on the status of pollution by chemical substances)**
(Research for analysing POPs and heavy metals in maternal and umbilical cord blood)



Future measures and the direction of research promotion (MOE,2006)

- (1) The need to extract problems from the viewpoint of protecting children's health**
- (2) Approach for the establishment of research infrastructure**
 - (a) Substantiation of research funds and the introduction of competitive funds,**
 - (b) Formation of the group of research sites,**
 - (c) Collection of scientific findings and the grasping of international research trends,**
 - (d) Human resource development**



Future measures and the direction of research promotion (Cont'd)

(3) Promotion of priority research projects

- (a) **Reliable data collection for the exposure assessment of children to hazardous chemicals**
- (b) **Development of health effect evaluation methods on environmental chemicals with focus on the hypersensitivity of children,**
- (c) **Promotion of epidemiological studies on the relevance between the environment and children's health,**
- (d) **Development of biomarkers for exposure assessment and health risk assessment and promotion of the establish of a sample banking system,**
- (e) **Research on how medical and welfare services should be provided in relation to children's environmental health**



Future measures and the direction of research promotion (Cont'd)

- (4) Promotion of environmental risk assessment for hazardous chemicals, etc. with focus on exposure modes and vulnerability of children**
- (5) Promotion of risk communication**
- (6) Promotion of cooperation among ministries and international cooperation**



Cohort Study	Size	Outcome
The Norwegian Mother and Child Cohort Study 1999-2007 (Norway)	100,000 mothers, 75,000 fathers, 100,000 children	.milestones, birth defects, • infections, growth/obesity, • neurodevelopment, asthma/allergies, other
The National Children's Study 2008-2013 (U.S.A.)	100,000	asthma, birth defects, • development and behavior • growth, fertility and pregnancy
The Faroese Birth cohort (Children's Health and the Environment in the Faroes - Cohort 1) 1986-1987 (Denmark)	1,022	Growth disturbance (WISC-R, CVLT, Bender-Gestalt Test, BNT)
Tohoku Study of Child Development 2001-2003 (Japan)	1,300	neurodevelopment, (NBAS, KSPD, BSID, FTII, K-ABC)
Hokkaido Cohort 2002-2005 (Japan)	20,000 (512)	allergy, birth defects, • development and behavior disturbance, other