

제6회 국민건강지식센터 포럼

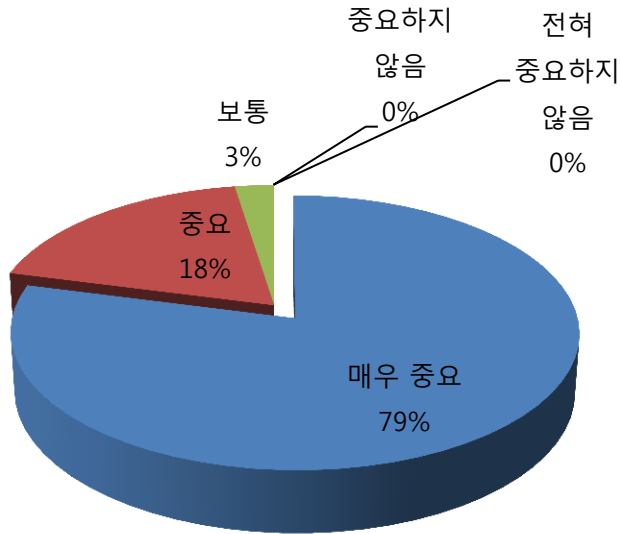
환경오염과 국민건강

-대기오염, 환경호르몬-

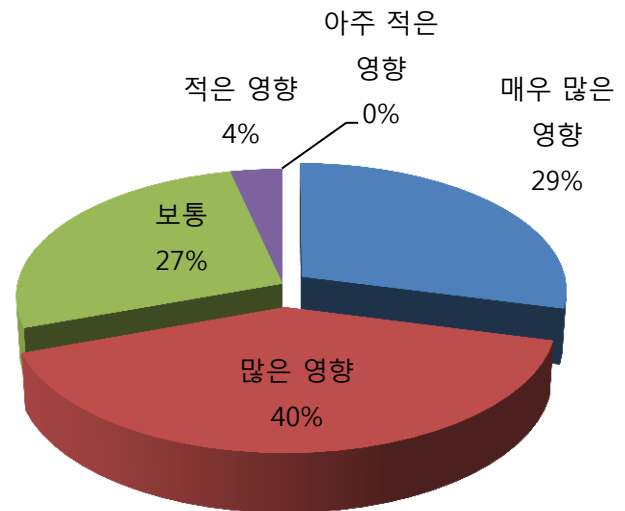
서울의대
홍윤철

환경의 건강에 대한 영향

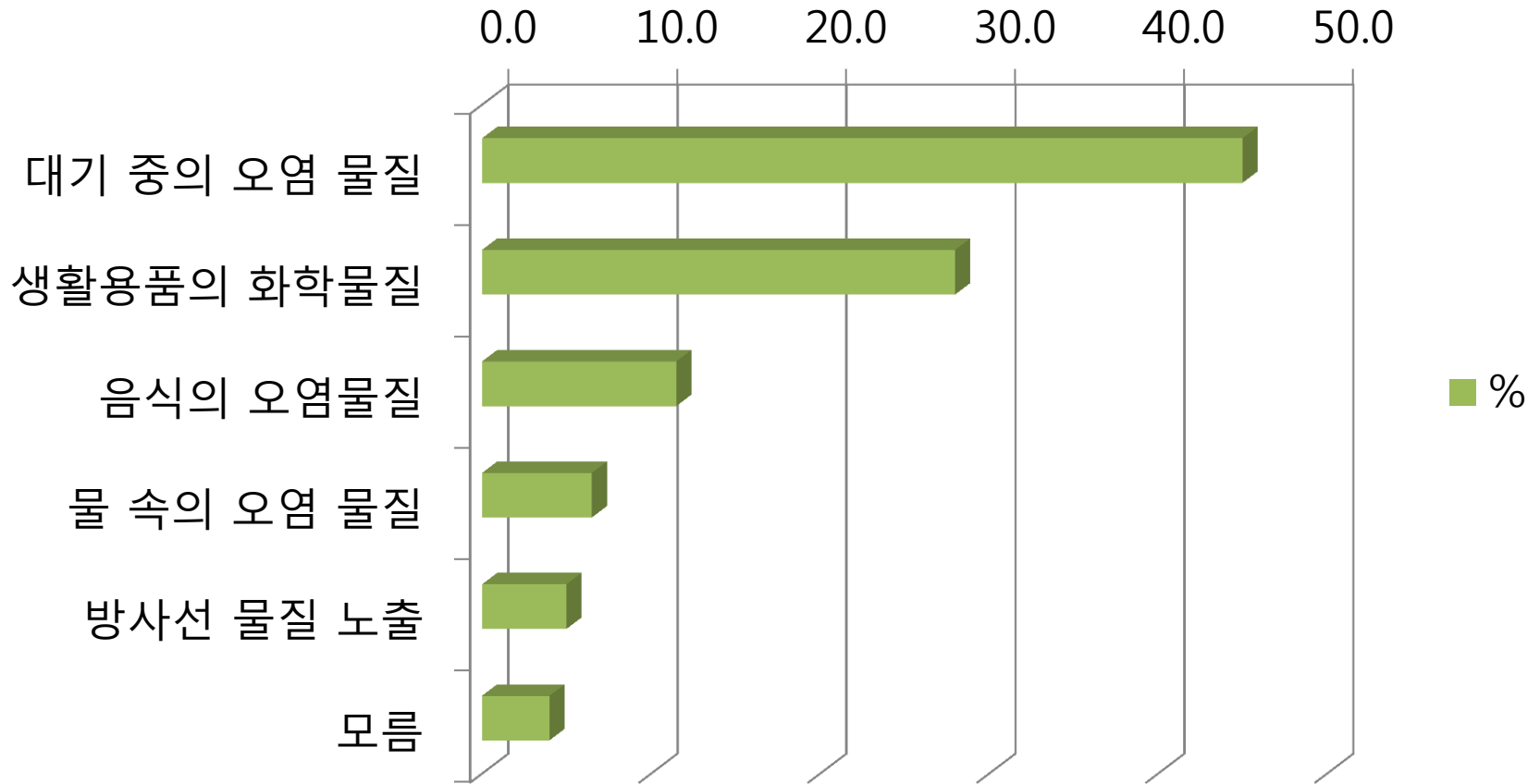
건강에 있어 환경이 얼마나 중요한가?



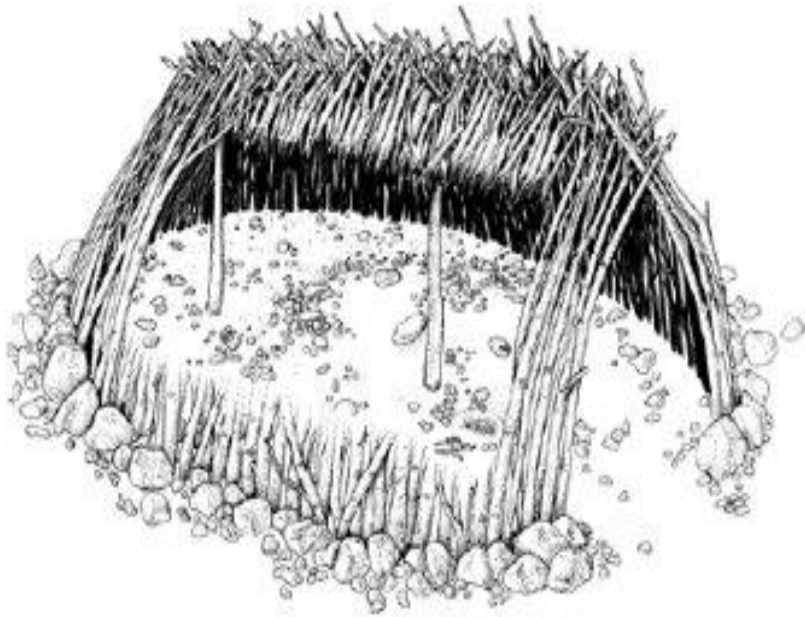
환경오염이 본인의 건강에 얼마나 영향을 주는가?



환경성질환의 가장 큰 원인?

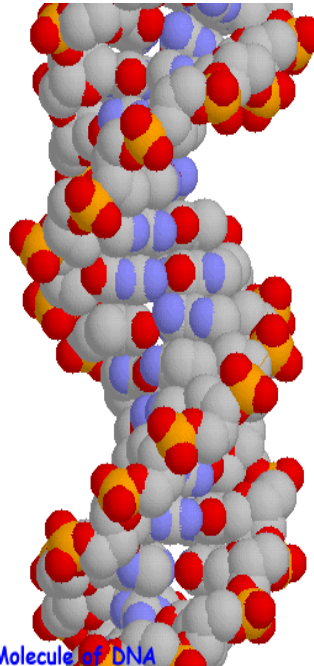
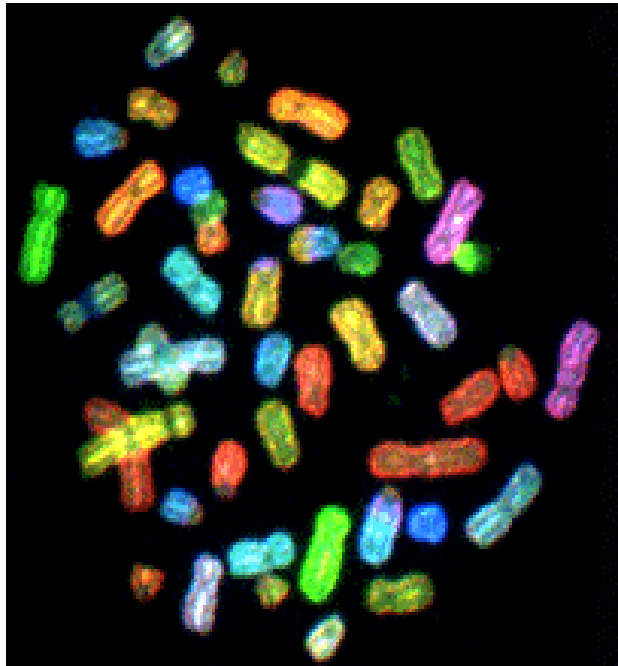


수렵채집시대



Shelter at Terra Amata (~400K years old)

염색체와 유전자



Molecule of DNA

©Rothamsted Experimental station, 1997, 1998

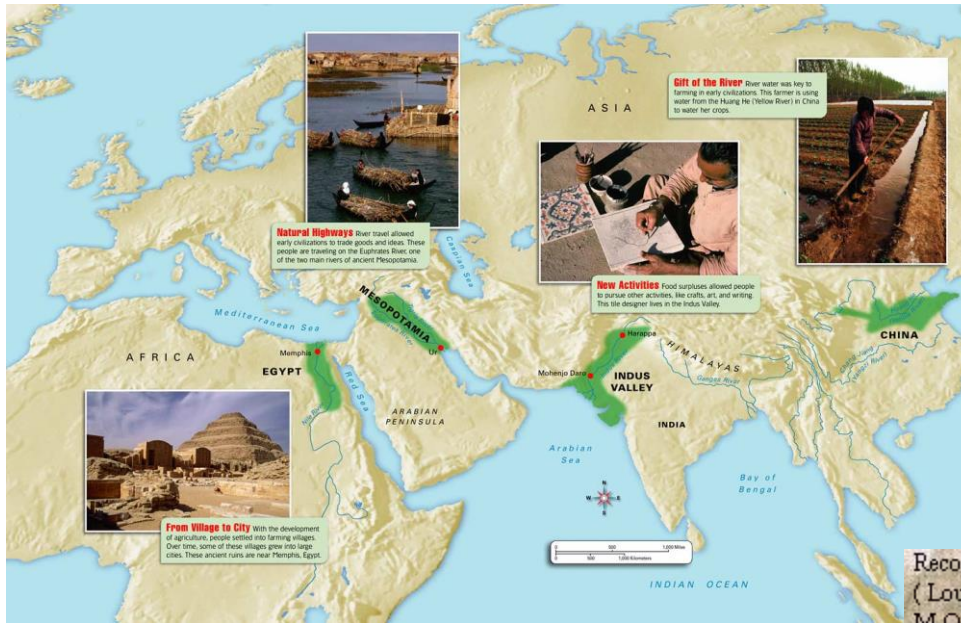
Sequence from chromosome 7

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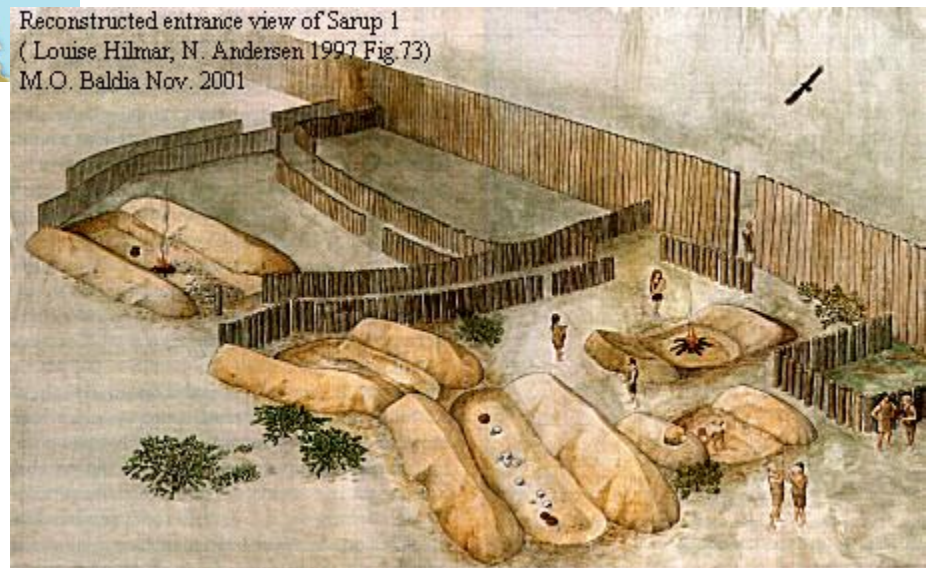
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Three SNPs are present

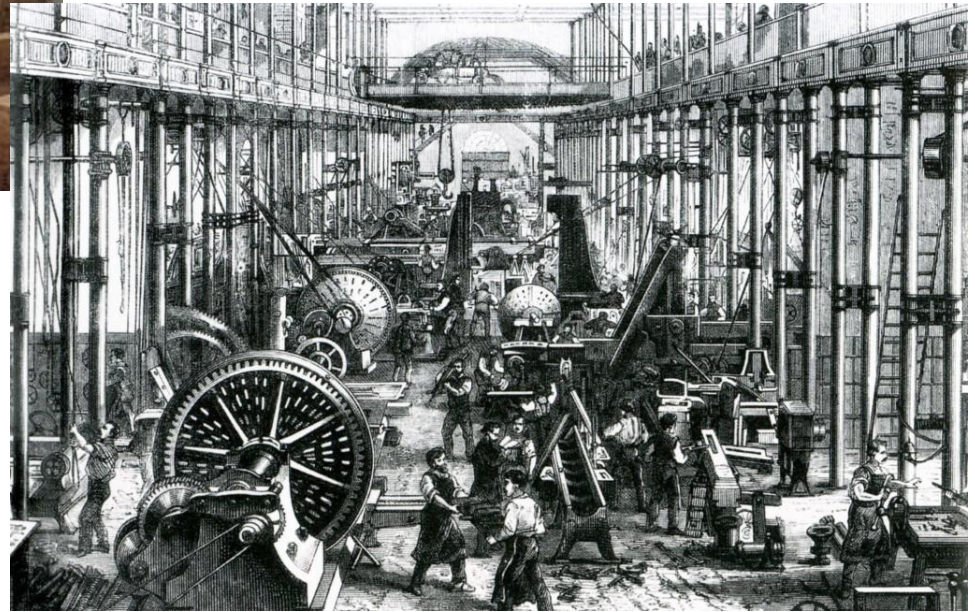
Civilizations and New Pathogens



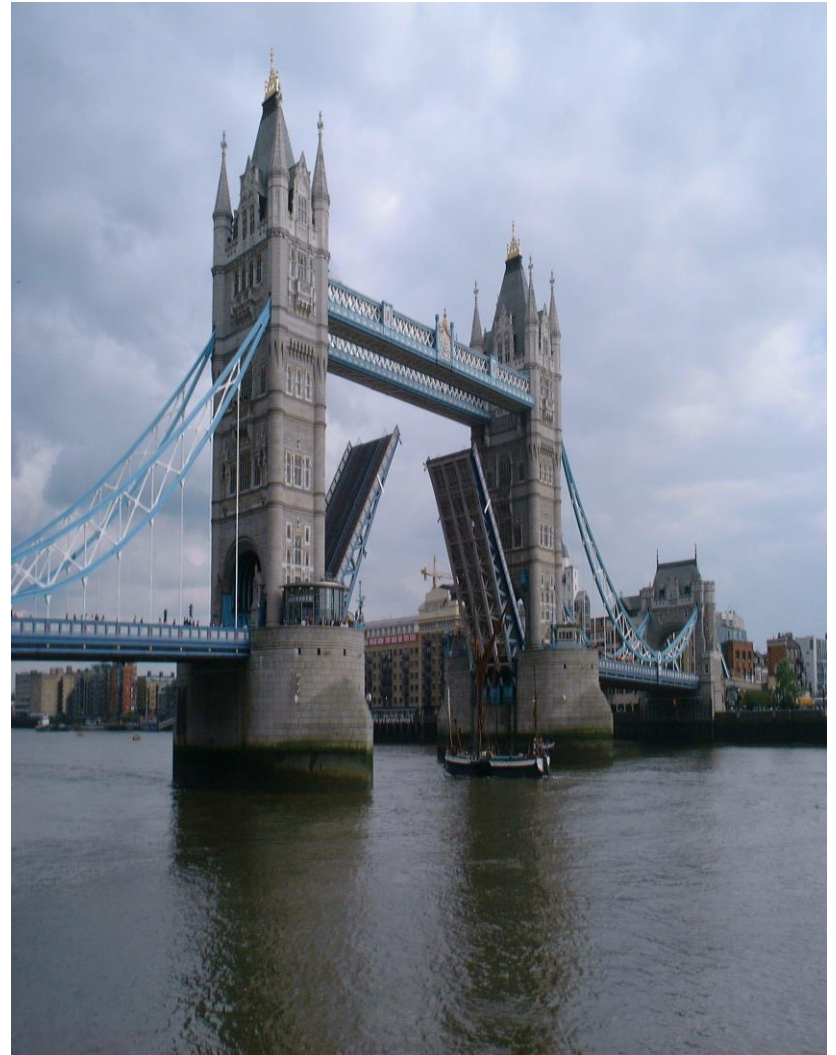
Reconstructed entrance view of Sarup 1
(Louise Hilmar, N. Andersen 1997 Fig. 73)
M.O. Baldia Nov. 2001



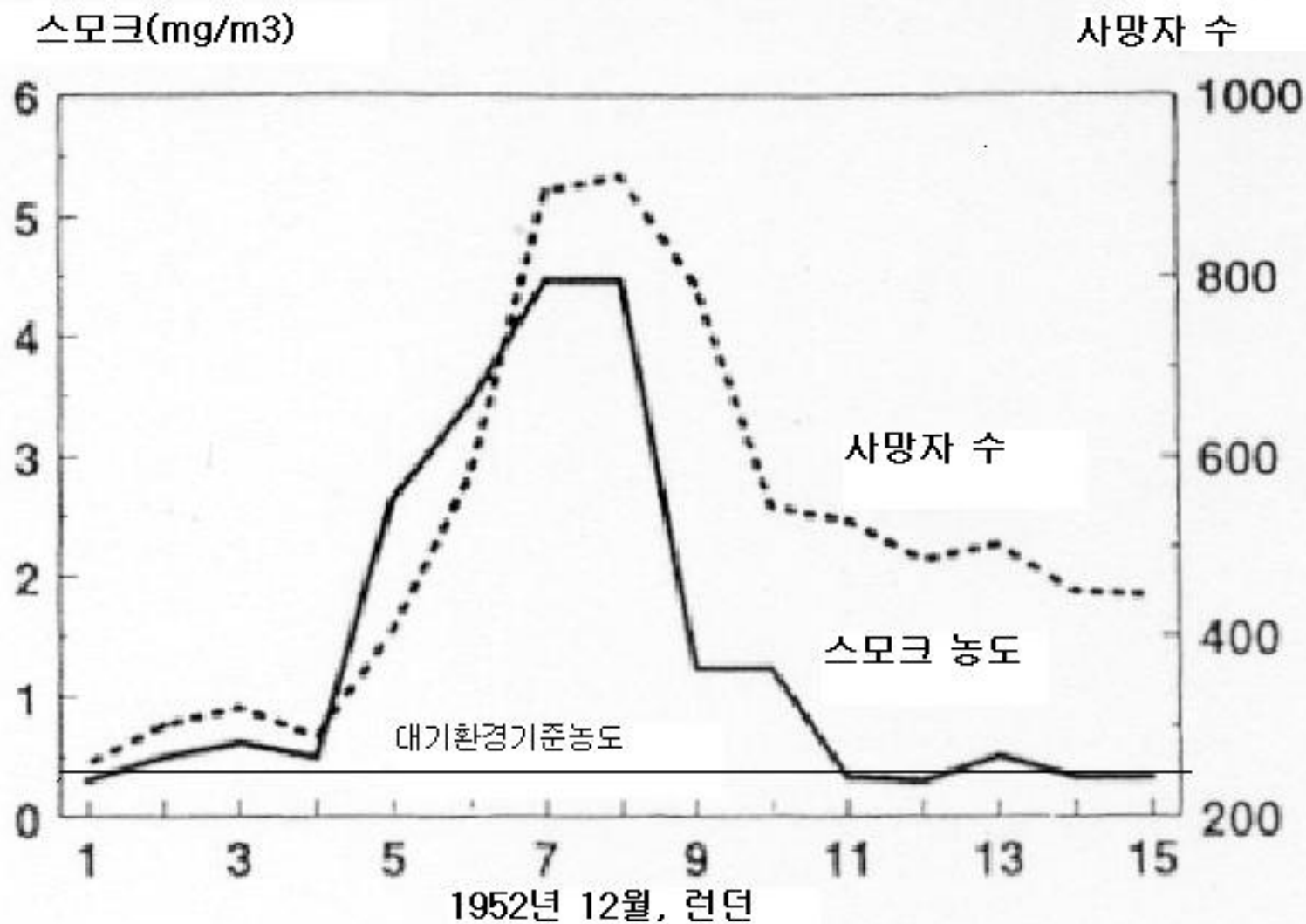
산업혁명



London Past and Present



런던스모그, 1952년



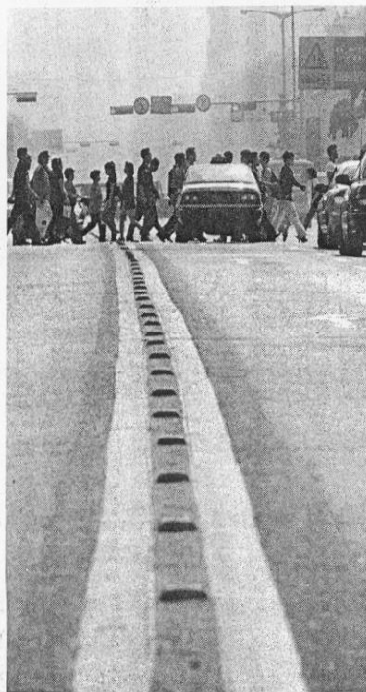
'오존 주의보' 다음날 사망자 7% 늘어나

차량배기가스가 주범... 폐손상

호흡기 질환은 2배까지 늘어

趙秀憲교수팀 6년간 「서울시 사망통계」조사

이제부터 오존 주의보가 발령되면 서울 시민들의 건강이 위협받을 수 있다. 오존 주의보 발령일 다음날 사망자가 7% 증가하고, 호흡기 질환 환자는 2배 가까이 늘어났다는 연구 결과가 나왔다. 서울대학교 의과대학 환경보건연구소의 오존 연구팀이 1992년부터 1997년까지 서울시에 거주하는 10만 명 이상의 주민을 대상으로 실시한 연구 결과다. 오존 주의보 발령일 다음날 사망자가 7% 증가하고, 호흡기 질환 환자는 2배 가까이 늘어났다는 연구 결과가 나왔다. 서울대학교 의과대학 환경보건연구소의 오존 연구팀이 1992년부터 1997년까지 서울시에 거주하는 10만 명 이상의 주민을 대상으로 실시한 연구 결과다.

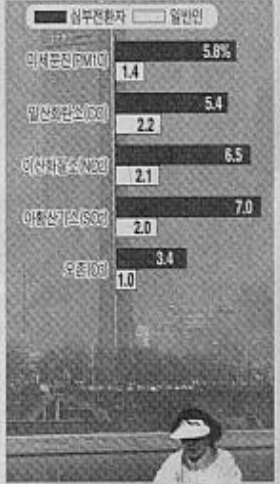


◇이제부터 오존 주의보 발령일 다음날 사망자가 7% 증가하고, 호흡기 질환 환자는 2배 가까이 늘어났다는 연구 결과가 나왔다. <서울대학교 환경보건연구소 제공>

서울 경기 오전

오존 주의보 발령... 동피막과 함께 헬기... 오존 주의보 발령일 다음날 사망자가 7% 증가하고, 호흡기 질환 환자는 2배 가까이 늘어났다는 연구 결과가 나왔다. 서울대학교 의과대학 환경보건연구소의 오존 연구팀이 1992년부터 1997년까지 서울시에 거주하는 10만 명 이상의 주민을 대상으로 실시한 연구 결과다.

대기오염 악화에 따른 사망률 증가 추이



(자료: 국제학술지 의학(Epidemiology))

대기오염 극심한 날 심장병 환자 '치명타'

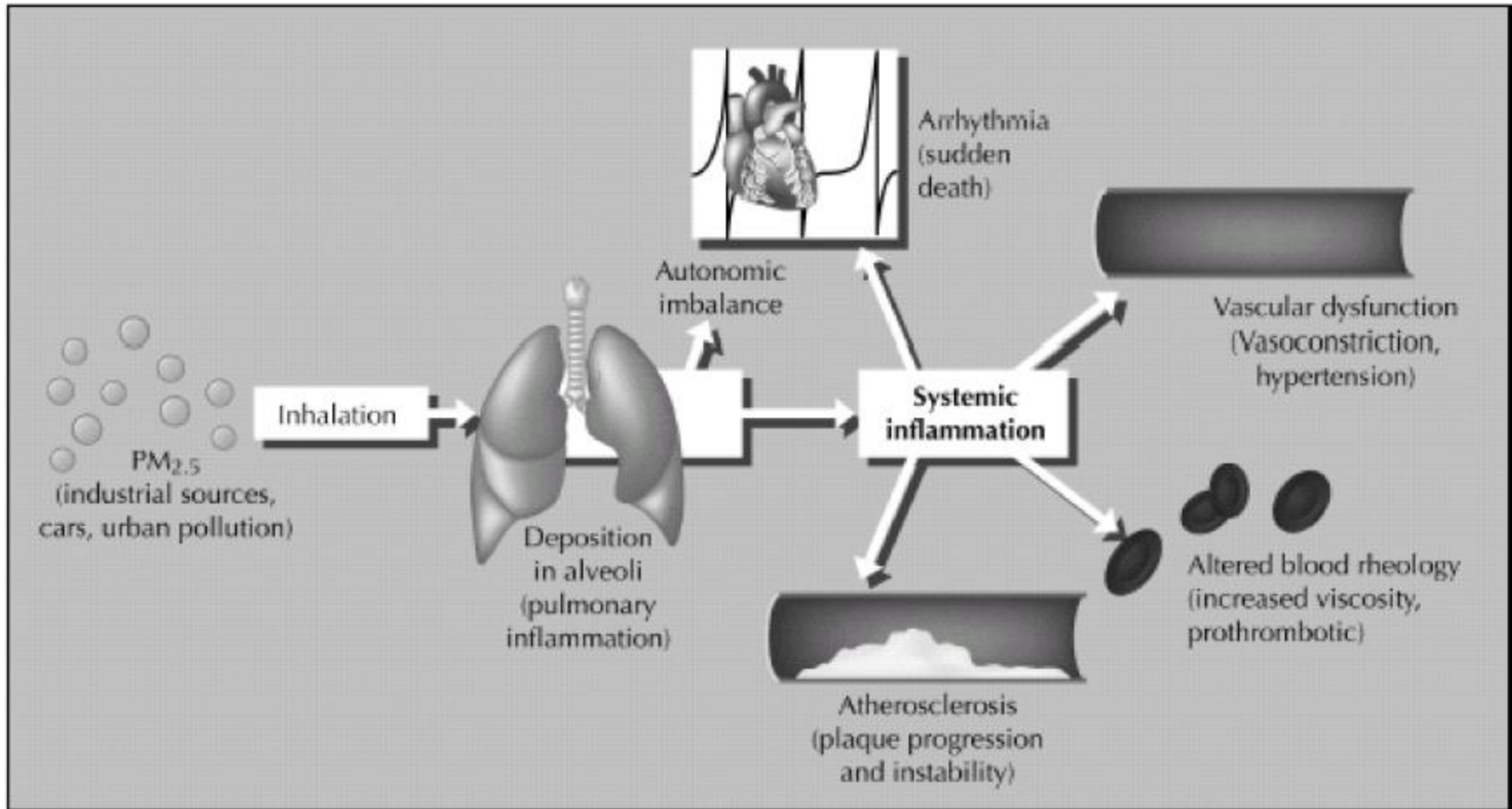
사망증가율 일반인보다 '최대 4배'

단국대·서울대의대 조사
서울 '위험한 날'
1년중 3개월

심장병 환자들은 대기오염이 심한 날을 특히 조심해야 한다. 대기오염이 밀한 날에 비해 대기오염이 심한 날 사망증가율이 일반인들에 비해 최대 4배 이상 높아지기 때문이다. 이 같은 사실은 단국대의대(권호장 교수)와 서울대의대(조수현 교수) 예방의학과 공동연구팀의 조사 결과 밝혀졌다. 연구팀은 94~96년 사이 심장박동 기능이 떨어진 심부전(心不全) 증세로 치료를 받은 적이 있는 서울 지역 거주 환자 1136명 중 96년 이전에 사망한(교통사고 제외) 1807명을 대상으로 그들의 사망날짜와 그날 미세먼지·아황산가스·오존 등의 대기오염 지표와의 관계를 일반인들의 그것과 비교해 조사했다. 일반인들의 경우 서울시의 사망통계(교통사고 제외)를 이용했다. 그 결과, 대기오염이 악화되면 심장병 환자들의 사망증가율이 같은

'카롤린스카' 연구소도 참여했다. 이번 연구는 1년 중 대기오염이 가장 심했던 날을 100점으로 봤을 때, 그 값이 25점 수준인 날(대기오염이 밀한 날)과 75점 수준인 날(대기오염이 심한 날)에 심장병 환자와 일반인들의 사망률 차이를 분석했다. 대기중 미세먼지(PM10·10마이크론 이하 크기의 분진) 오염이 심해지면 일반인의 사망률은 1.4% 증가하는 반면, 심장병 환자의 사망률은 4.1배인 5.8% 증가한 것으로 조사됐다. 또 ▲아황산가스의 증가는 3.5배 ▲오존은 3.4배 ▲이산화질소는 3.1배 ▲일산화탄소는 2.5배씩 각각 심장병 환자의 사망증가율을 높이는 것으로 분석했다. (그래픽협조) 때문에 심장병 환자들은 1년 중 75점 이상 수준으로 대기오염이 악화된 3개월 동안에는 특히 조심해야 한다. 권호장 교수는 "우리가 들이마시는 공기에는 여러 오염물질들이 섞여 있기 때문에 실제로 인체에 미치는 영향은 이보다 훨씬 클 것"이라고 말했다. /全善中 의학전문기자 doctor@chosun.com

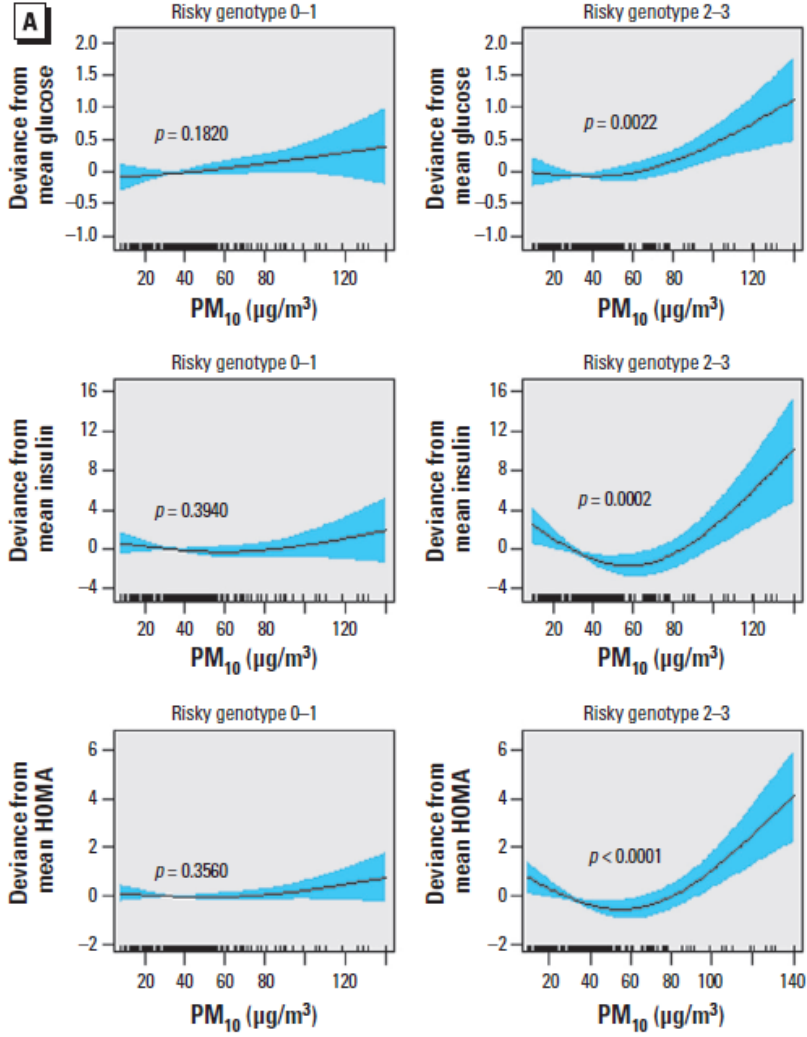
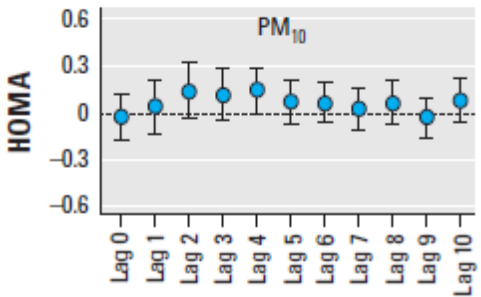
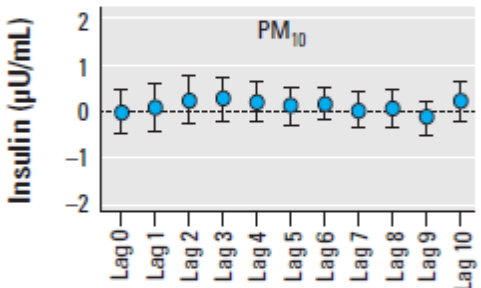
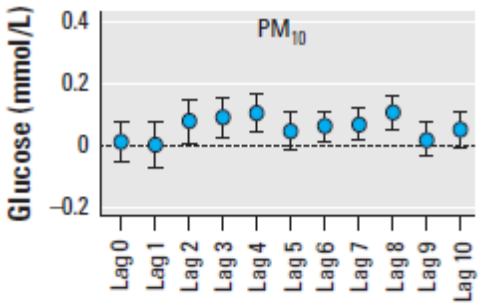
주식투자 4억



GSTM1, GSTT1, and GSTP1 Polymorphisms and Associations between Air Pollutants and Markers of Insulin Resistance in Elderly Koreans

Jin Hee Kim¹ and Yun-Chul Hong^{1,2}

¹Institute of Environmental Medicine, Seoul National University Medical Research Center, Seoul, Republic of Korea; ²Department of Preventive Medicine, Seoul National University College of Medicine, Seoul, Republic of Korea



Air Pollution and Symptoms of Depression in Elderly Adults

Youn-Hee Lim,^{1,2} Ho Kim,¹ Jin Hee Kim,³ Sanghyuk Bae,⁴ Hye Yin Park,⁵ and Yun-Chul Hong^{3,6}

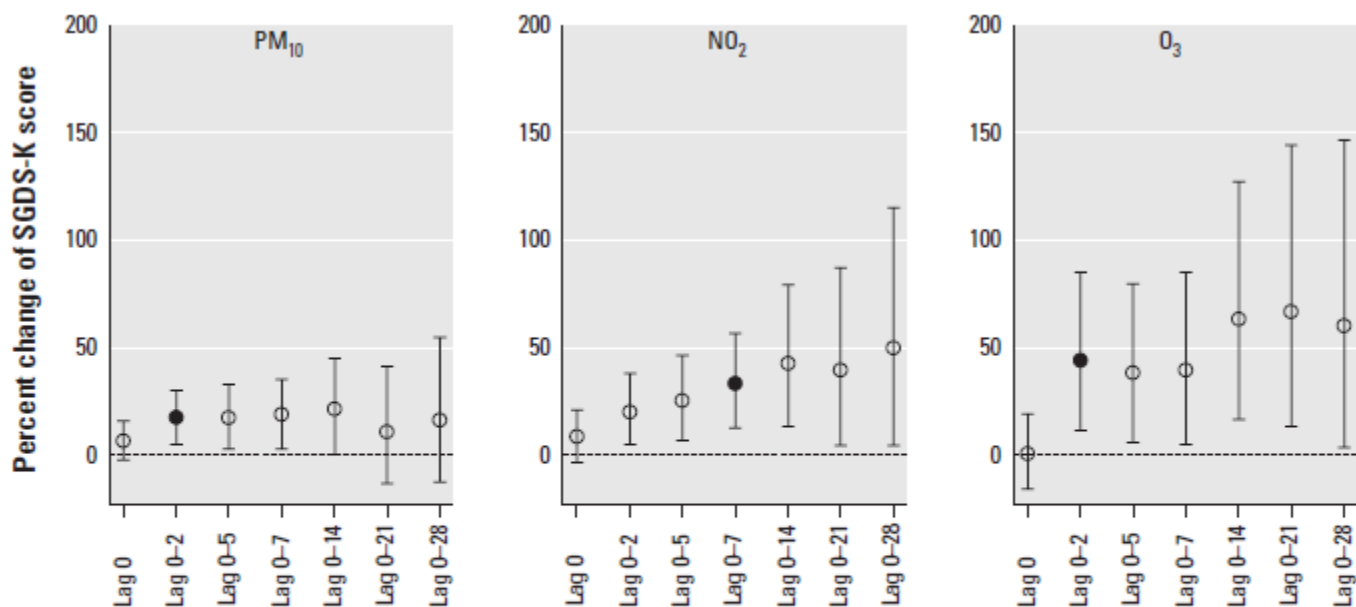
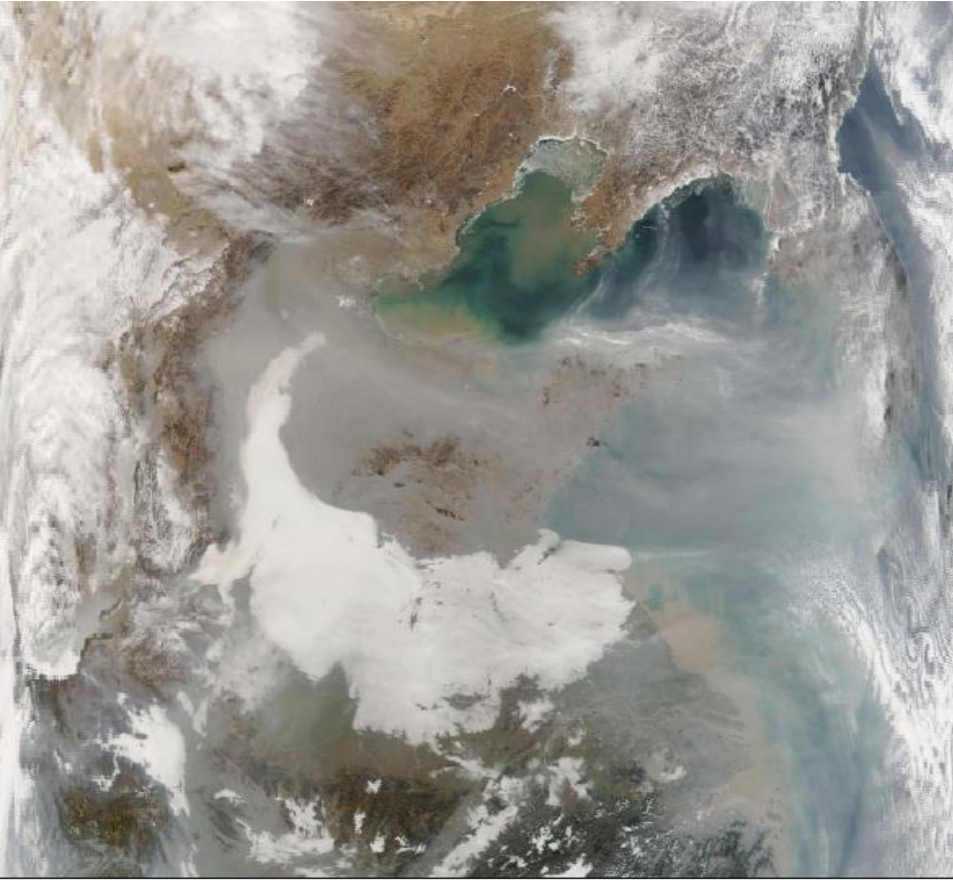
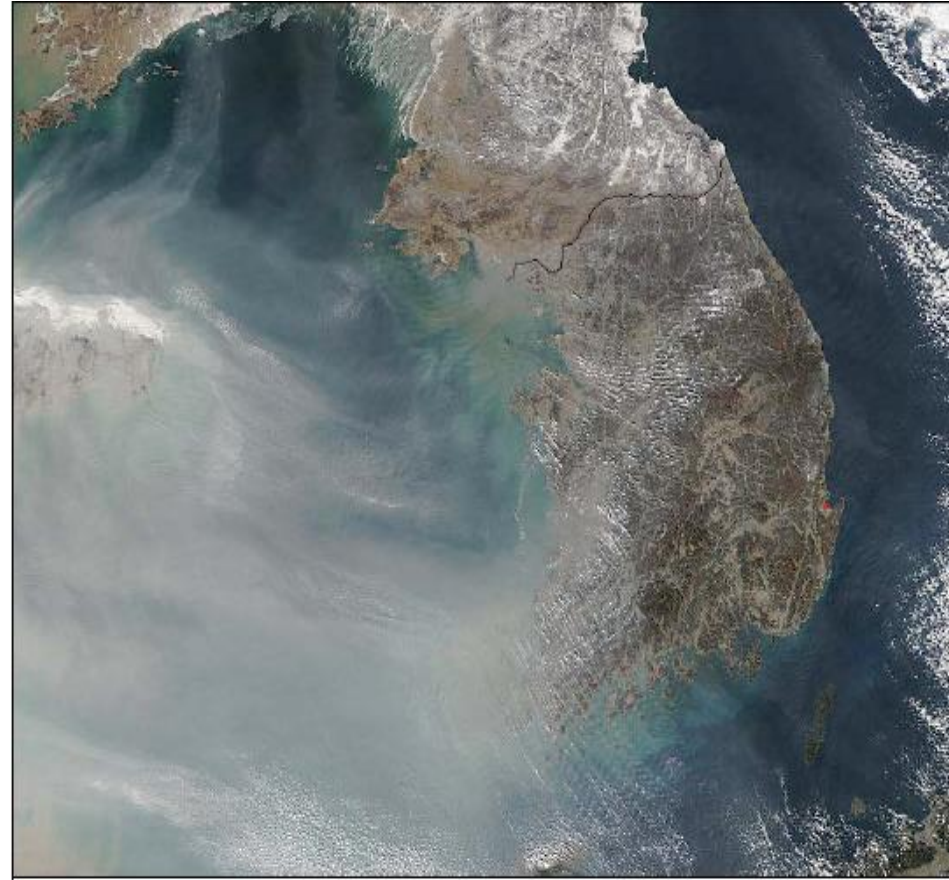


Figure 1. Percent change in SGDS-K scores per interquartile range (IQR) of air pollutants by increasing lag day. Solid circles indicate the best-selected lag days based on minimal Akaike Information Criterion. IQRs for PM₁₀, NO₂, and O₃ were 24 $\mu\text{g}/\text{m}^3$, 15 ppb, and 37 ppb, respectively. The model for each lag structure included the following variables: age, sex, number of years of school, BMI, alcohol consumption, regular exercise, creatinine-adjusted urine cotinine level, SBP, triglyceride, daily mean temperature, follow-up time, and day of the week.

Air pollution in East Asia

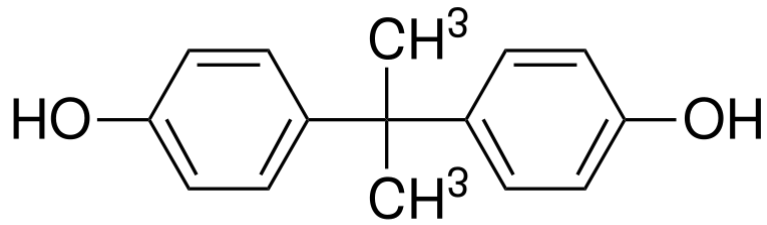


This **January 27, 2006**, MODIS/Terra Real-Time image shows the effects of prevailing west winds during the winter. Smog is being pushed by the winds across the eastern coastal plains of China, and over the Yellow Sea to the Korea Peninsula and Japan. Note the ground fog below the haze in the southern portion of the coastal plains. Fog forms when warm moist air flows over colder air near the ground. The fog, and the associated humidity, tend to concentrate air pollution near the ground.



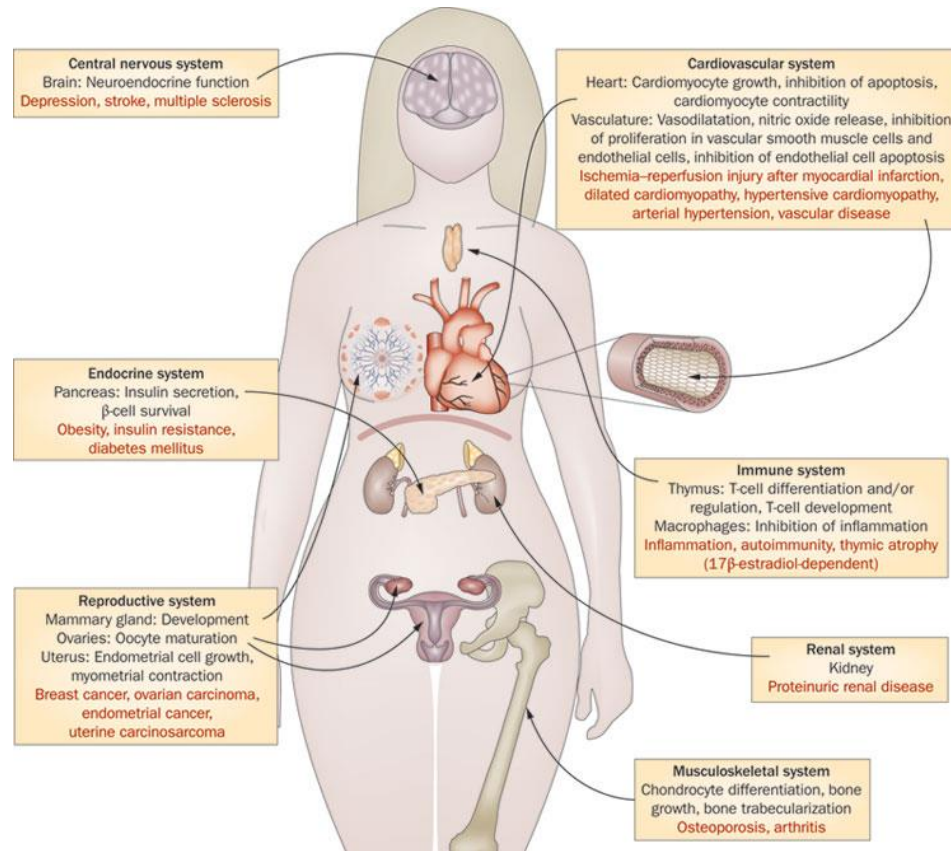
Taken the same day as the previous image, this **January 27, 2006**, MODIS/Aqua image of the Korean Peninsula shows the dramatic influence that Chinese air pollution has on its neighbors to the east. The Japanese island of Kyushu can just be seen in the bottom right corner of the image, just across the Korean Strait from the South Korean city of Busan. China's Shandong Peninsula, which is covered with thick smog, is just above center on the left edge of the image.

Bisphenol A



OTHER

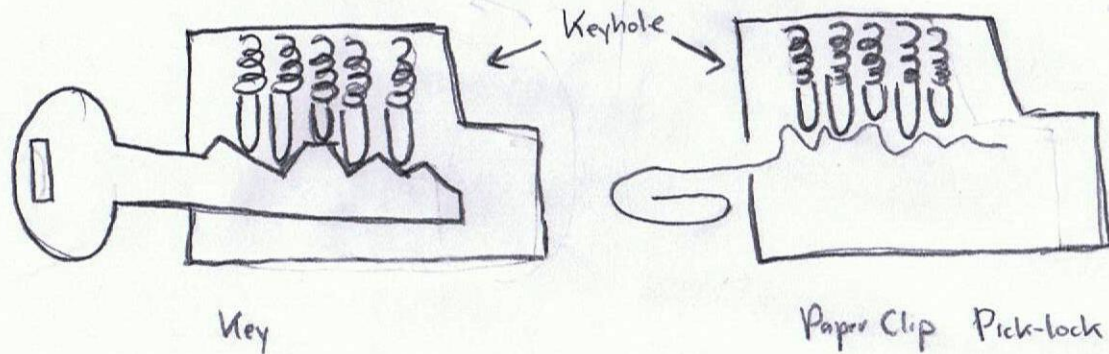
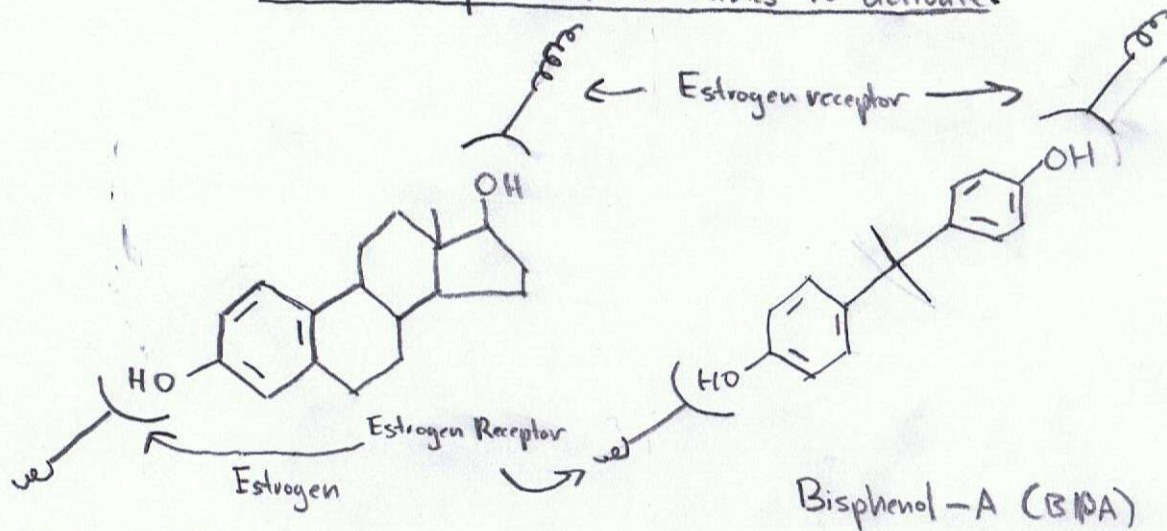
Figure 3 Involvement of G-protein-coupled estrogen receptor (GPER) action in regulation of physiological responses and disease



Prossnitz, E. R. & Barton, M. (2011) The G-protein-coupled estrogen receptor GPER in health and disease *Nat. Rev. Endocrinol.* doi:10.1038/nrendo.2011.122

Estrogen Receptor = Keyhole Estrogen = Key

The same shape is all it takes to activate!



Note: Pictures are simplified

Associations of Bisphenol A Exposure With Heart Rate Variability and Blood Pressure

Sanghyuk Bae, Jin Hee Kim, Youn-Hee Lim, Hye Yin Park, Yun-Chul Hong

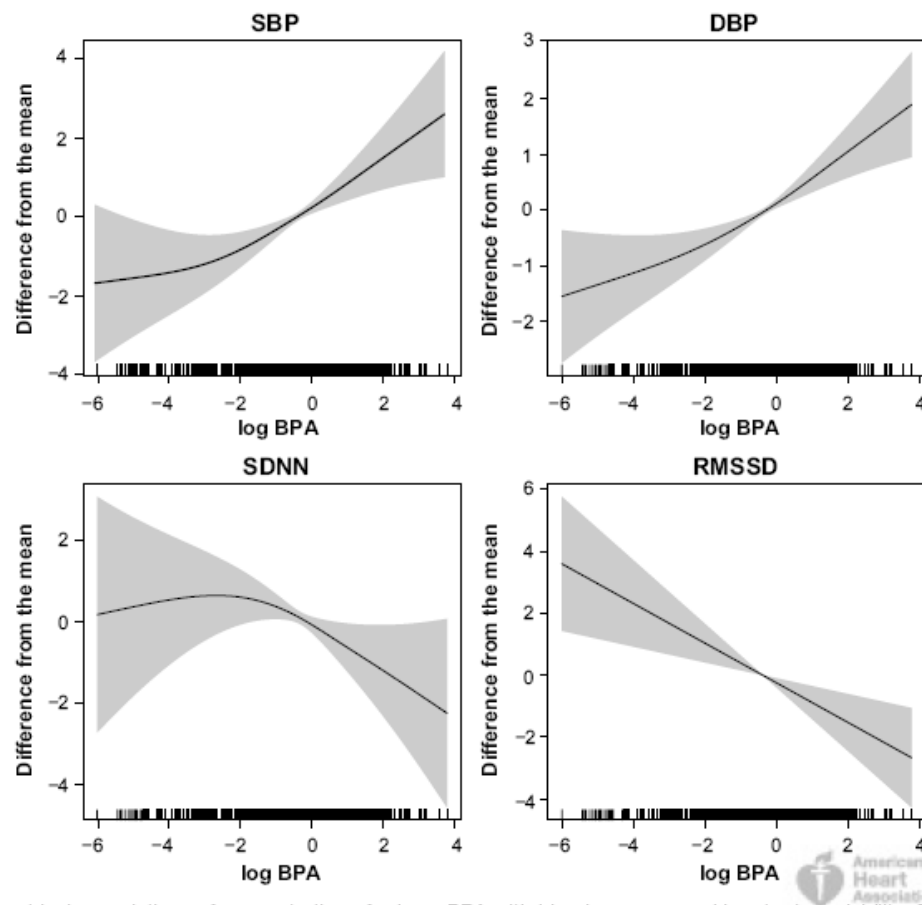
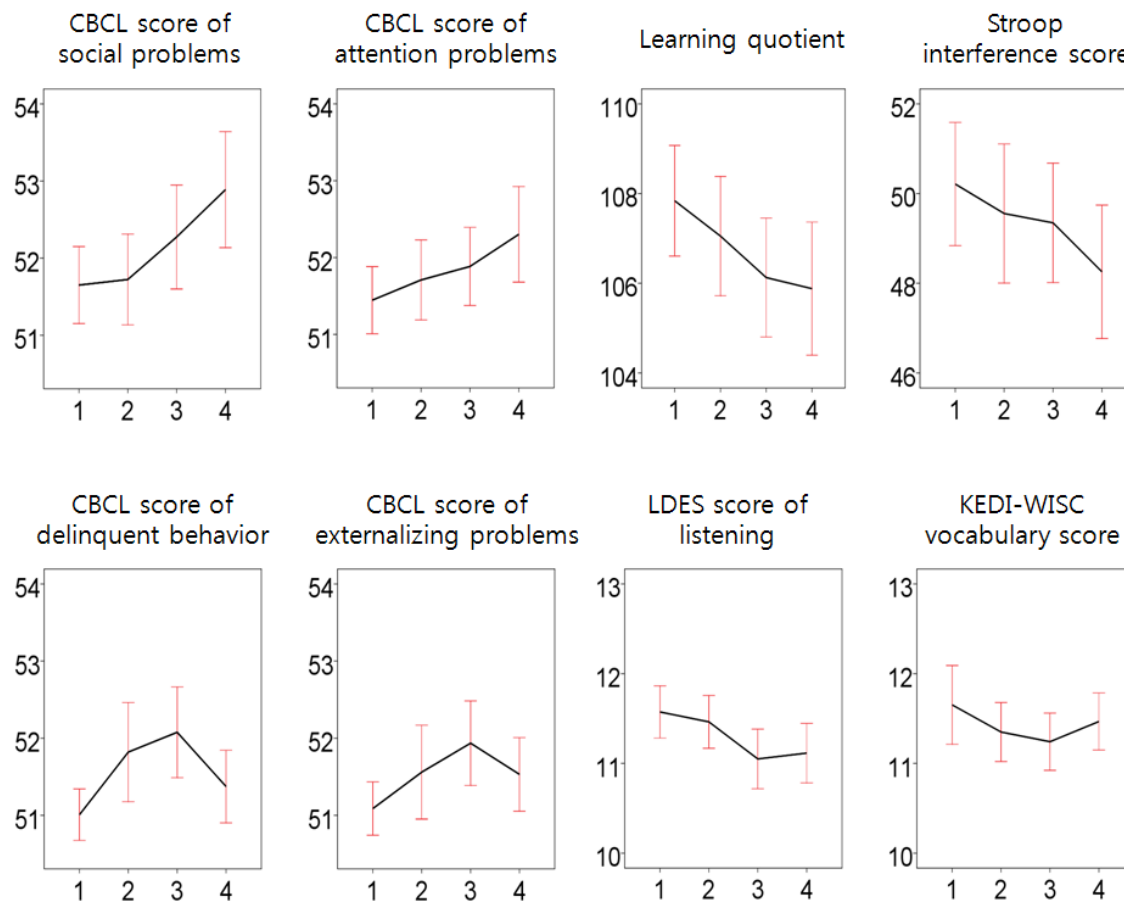


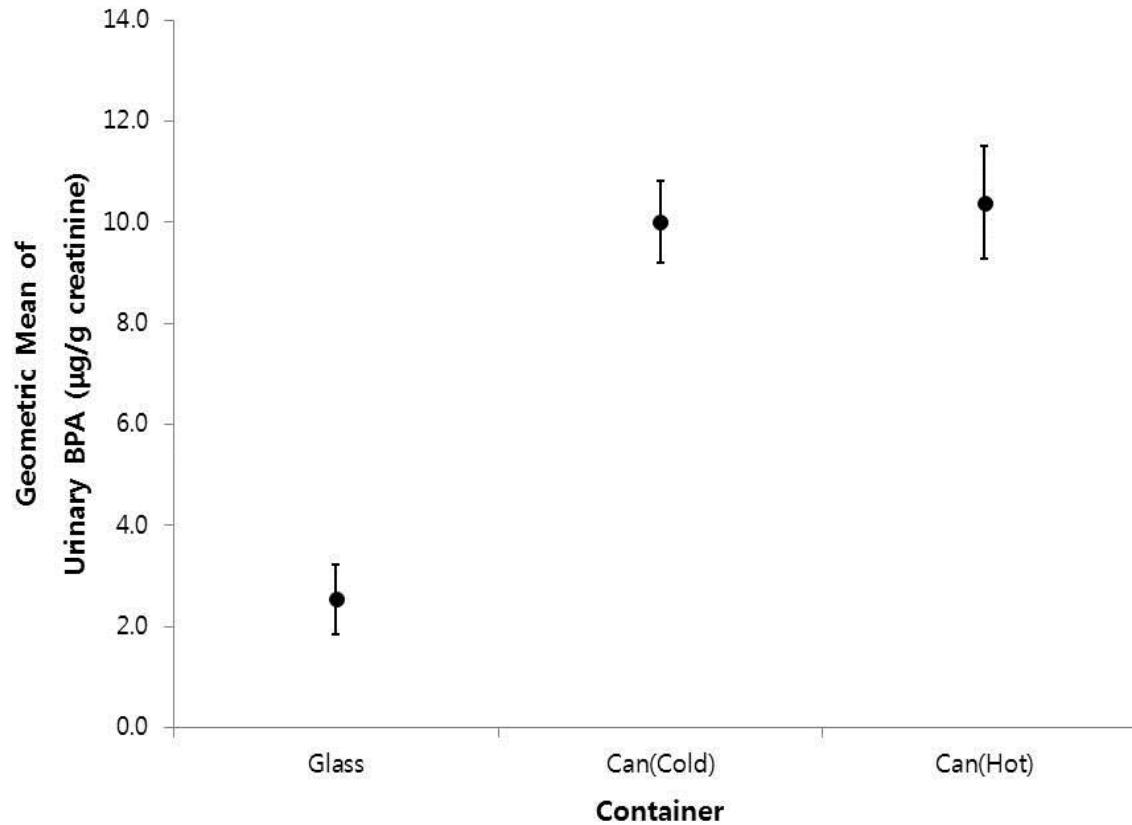
Figure. Nonparametrical associations of concentration of urinary BPA with blood pressure and heart rate variability. Data were adjusted for sex, age, date of examination, height, weight, mean fast blood glucose, smoking status, current consumption of alcohol, and previous history of hypertension. SBP indicates systolic blood pressure; DBP, diastolic blood pressure; SDNN, SD of normal-to-normal intervals; RMSSD, square root of the mean squared difference of successive normal-to-normal intervals.

Bisphenol A in relation to behavior and learning of school-age children

Soon-Beom Hong,^{1,*} Yun-Chul Hong,^{2,*} Jae-Won Kim,¹ Eun-Jin Park,³ Min-Sup Shin,¹ Boong-Nyun Kim,¹ Hee-Jeong Yoo,¹ In-Hee Cho,⁴ Soo-Young Bhang,⁵ and Soo-Churl Cho¹



Consumption of Canned Beverage and Increase of Bisphenol A Exposure: A Randomized Crossover Trial



Phthalate

- General chemical structure of phthalates.
R and R' = C_nH_{2n+1}; n = 4-15

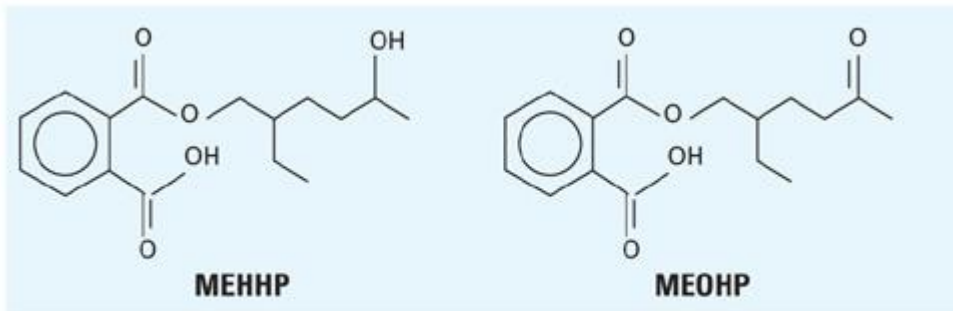
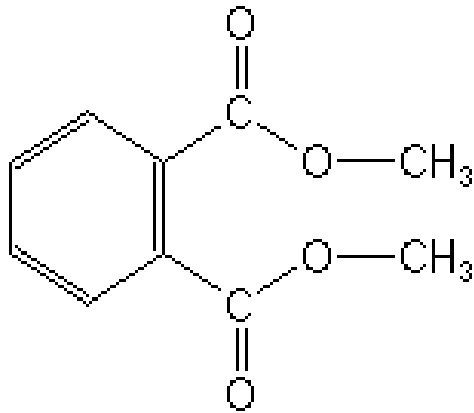


Figure 1. DEHP metabolites used as markers of human exposure to DEHP.





프탈레이트류란?

▪ 개 요

polyvinyl chloride(PVC) 등의 플라스틱에 유연성을 주기 위한 가소제임.

▪ 사용실태

- 1) 의료용구, 고무호스, 장난감, 건축자재, 자동차 내장재 등 플라스틱 제품
- 2) 화학제품, 화장품 용매(매니큐어, 향수, 헤어스프레이 등)
- 3) 잉크도료, 의류, 카펫트 등 생활용품

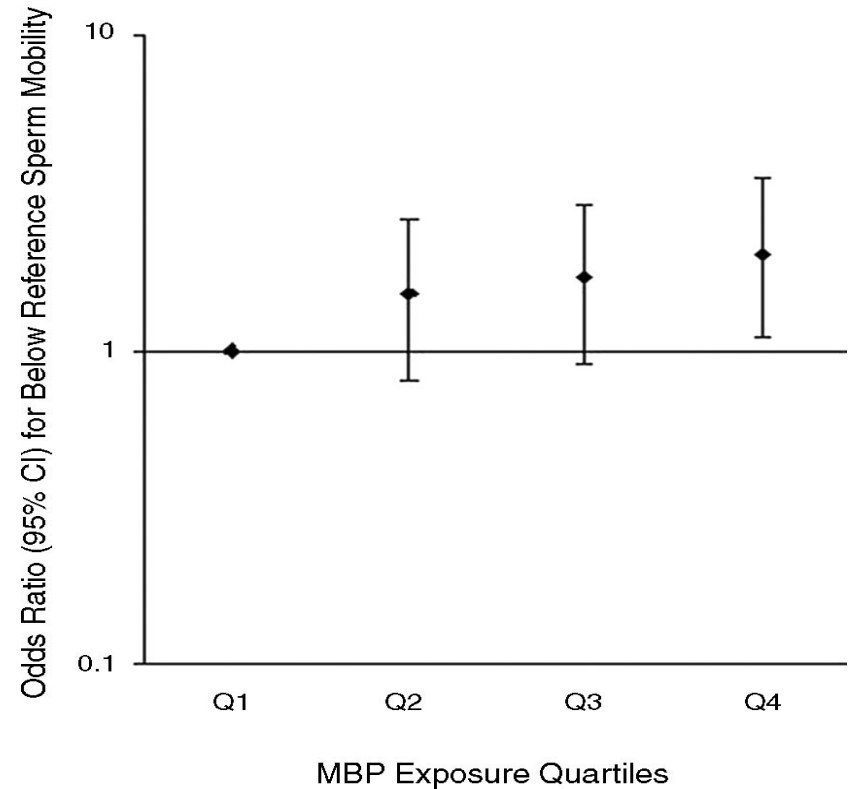
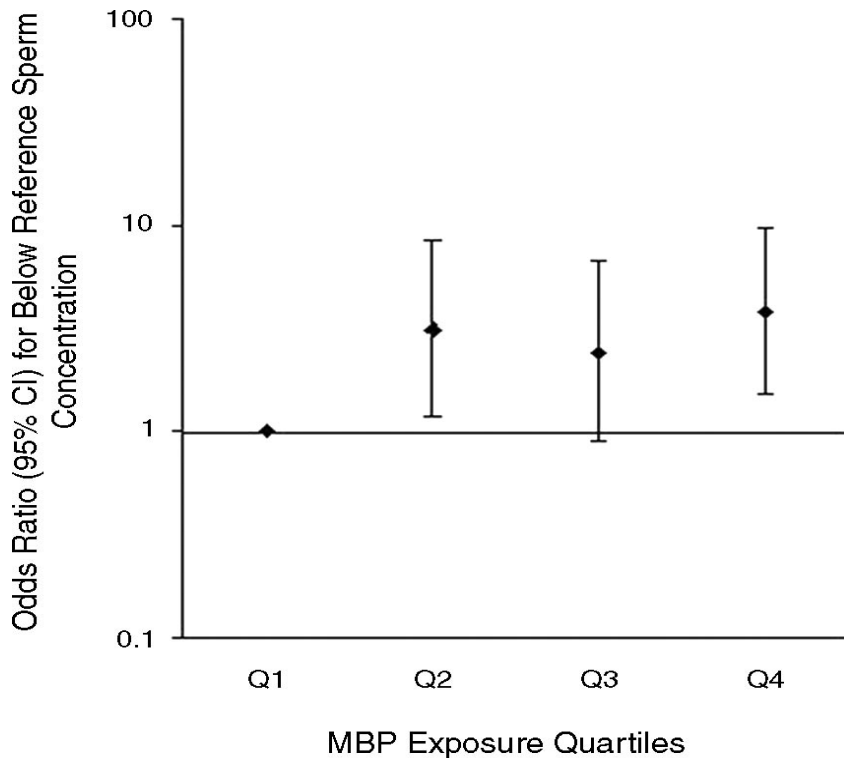
▪ 노출경로

- 1) 환경에 잔류하는 특성으로 지하수, 강과 음용수 등에서도 발견
- 2) 식품용 기구, 용기 및 포장재 사용으로 인한 섭취

▪ 인체영향

- 1) 동물이나 사람의 체내 유입시 호르몬 작용 방해하거나 혼란시키는 내분비계 장애물질
- 2) 각종 암이나 당뇨 등의 질병의 원인 또는 촉진물질이라는 연구가 진행 중

Altered Sperm Quality in Adult Males



(Duty et al. 2004, Hauser et al. 2008)

Decrease in Anogenital Distance Among Male Infants with Prenatal Phthalate Exposure

- Anogenital index decreased with increased phthalate exposure
- Correlated with
 - Penile volume
 - Cryptorchidism

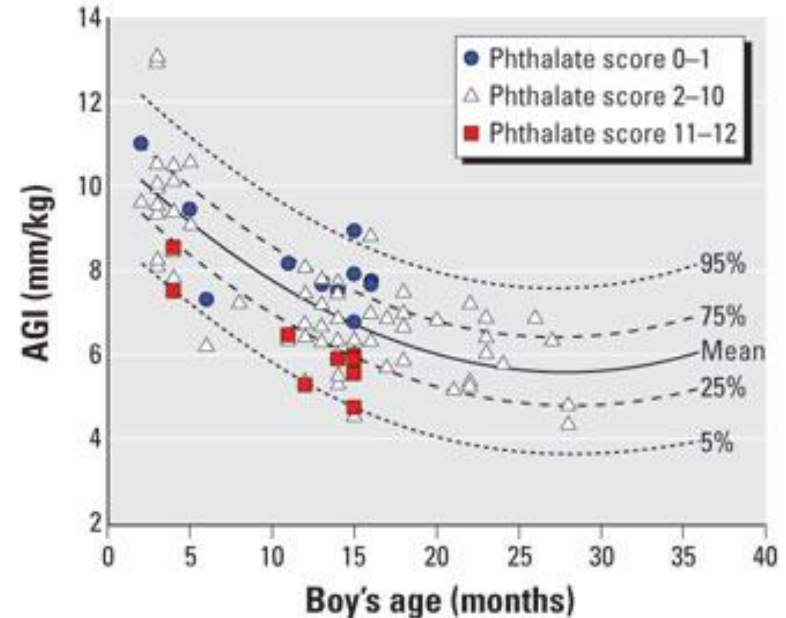


Figure 1. Mean AGI (mm/kg) in relation to boys' age at examination (months).

(Swan et al. Environ Health Perspect 2005;113:1056-61.)

Phthalates Exposure and Attention-Deficit/Hyperactivity Disorder in School-Age Children

Bung-Nyun Kim, Soo-Churl Cho, Yeni Kim, Min-Sup Shin, Hee-Jeong Yoo, Jae-Won Kim, Young Hee Yang, Hyo-Won Kim, Soo-Young Bhang, and Yun-Chul Hong

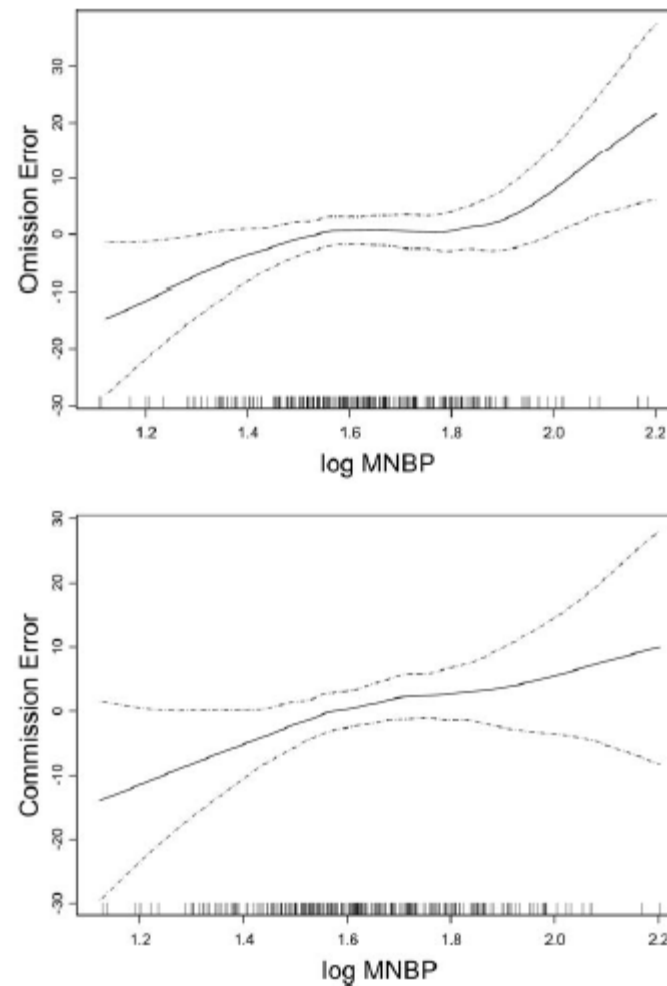


Figure 2. Distribution of the scores of omission and commission errors of ADHD Diagnostic System (ADS) according to log concentrations of urine DBP metabolite after adjustment of children's IQ, age, gender, and parental education level and SES. Omission Error, score of omission errors from ADS test; Commission Error, HA: score of omission errors from ADS test; MNBP, mono-n-butyl phthalate, metabolite of dibutyl phthalate; other abbreviations as in Figure 1.

Phthalate and IQ



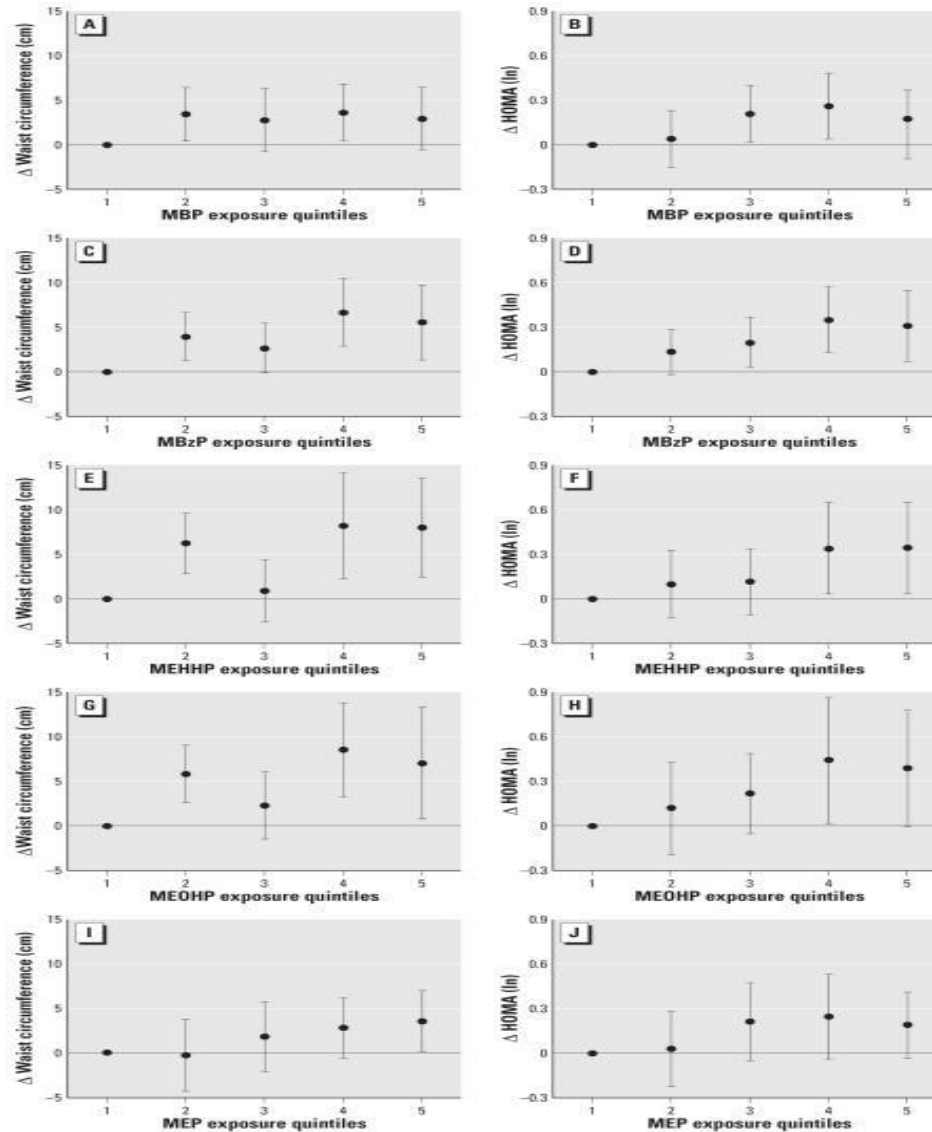
Table 4. Multiple regression analysis of the relationship of phthalates with IQ adjusted for influences of covariates

		β values(SE, 95% CI) for Log-biomarkers											
Model		FSIQ			VIQ			Vocabulary			Block		
		B(SE)	95%CI	<i>p</i>	B(SE)	95%CI	<i>p</i>	B(SE)	95%CI	<i>p</i>	B(SE)	95%CI	<i>p</i>
1	MEHHP	-2.0(0.8)	-3.5~-0.4	0.016	-0.8(0.3)	-1.4~-0.2	0.008	-0.8(0.2)	-1.2~-0.5	<0.001	-0.4(0.2)	-0.7~-0.1	0.048
	MEOHP	-2.2(0.7)	-3.6~-0.8	0.003	-0.8(0.3)	-1.3~-0.3	0.003	-0.7(0.2)	-1.1~-0.4	<0.001	-0.4(0.2)	-0.7~-0.1	0.019
	MEHHP + MEOHP	-2.3(0.8)	-3.8~-0.7	0.005	-0.9(0.3)	-1.5~-0.3	0.003	-0.9(0.2)	-1.2~-0.5	<0.001	-0.4(0.2)	-0.8~-0.1	0.023
	MBP	-0.6(0.8)	-2.2~1.0	0.440	-0.5(0.3)	-1.1~0.1	0.136	-0.6(0.2)	-0.9~-0.2	0.005	-0.1(0.2)	-0.5~0.3	0.625
2	MEHHP	-0.2(0.8)	-1.8~1.4	0.795	-0.3(0.3)	-0.9~0.2	0.283	-0.5(0.2)	-0.8~-0.2	0.01	0.1(0.2)	-0.3~0.4	0.748
	MEOHP	-0.5(0.8)	-2.0~1.2	0.552	-0.3(0.3)	-0.9~2.4	0.264	-0.4(0.2)	-0.8~-0.1	0.015	-0.1(0.2)	-0.4~0.3	0.799
	MEHHP + MEOHP	-0.4(0.8)	-2.0~1.2	0.629	-0.4(0.3)	-1.0~0.2	0.220	-0.5(0.2)	-0.9~-0.1	0.007	-0.1(0.2)	-0.4~0.4	0.997
	MBP	0.4(0.1)	-1.4~2.1	0.683	-0.1(0.3)	-0.8~0.6	0.769	-0.3(0.1)	-0.7~0.2	0.191	0.1(0.2)	-0.4~0.4	0.937

Abbreviations: FSIQ, full-scale IQ; VIQ, verbal IQ; MEHHP, mono-2-ethylhexyl phthalate; MEOHP, mono(2-ethyl-5-oxohexyl)phthalate; MBP, mono-n-butyl phthalate

Concentrations of Urinary Phthalate Metabolites Are Associated with Increased Waist Circumference and Insulin Resistance in Adult U.S. Males

Environ Health Perspect. 2007 June; 115(6): 876–882.



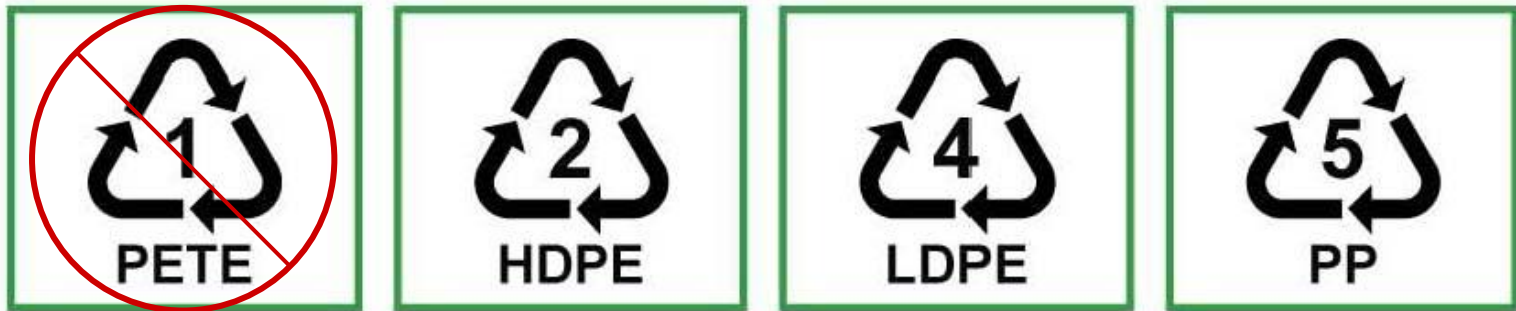
Phthalates in NICU



- Hauser et al, 2005 NICU Setting – found urinary levels of DEHP to be 50x higher in preterm neonates as compared to levels in children from NHANES
- FDA has released a statement saying that premature infants may be adversely affected by these chemicals

Check the symbol on the bottom of the plastic items before you buy

The safer plastic choices for toys and food and beverage containers:



Can contain phthalates

Plastics to avoid:

Polycarbonate



PVC or vinyl
Can contain phthalates

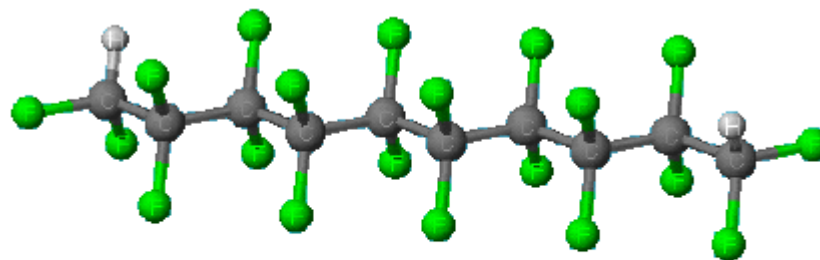
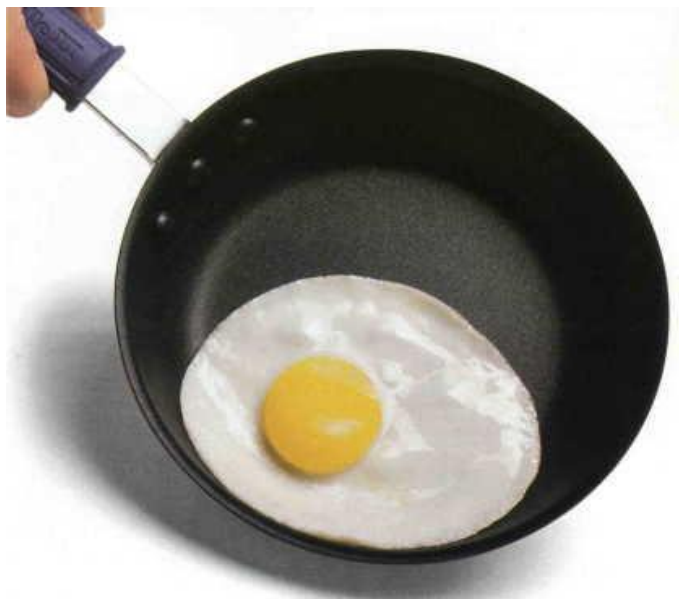


Polystyrene
Foam



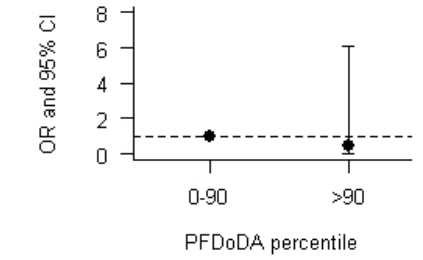
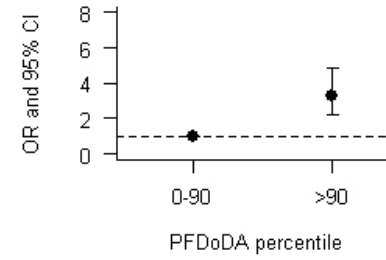
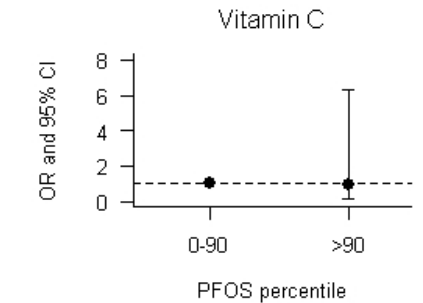
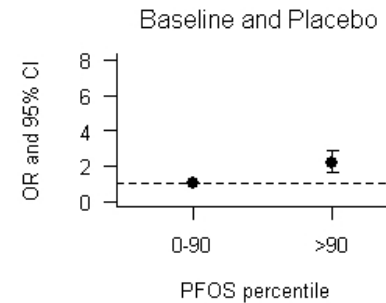
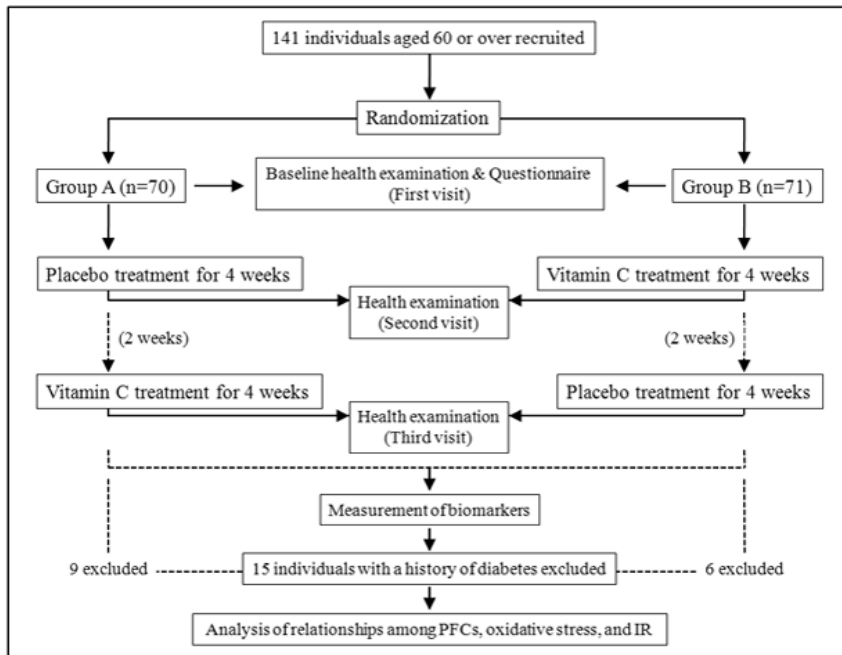
Can contain
Bisphenol A

Perfluorinated Compounds



Teflon, $-(CF_2CF_2)-$

Vitamin C Supplementation Protects Against the Adverse Effects of Perfluorinated Compounds on Insulin Resistance: A Randomized Cross-Over Trial



감사합니다.