

Cardiovascular Risk Factors in Elderly



질병관리본부 심혈관·희귀질환과
박현영

Women's Health & CVD

Today's Topic

- Menopause, HRT & CV Disease
- Metabolic Syndrome in Women: What's the Difference Between Men and Women
- Alterations of Lipid and Metabolic Profile After Menopause
- Unique Characteristics of Women's Coronary Artery Disease
- and, CVD risks in elderly women



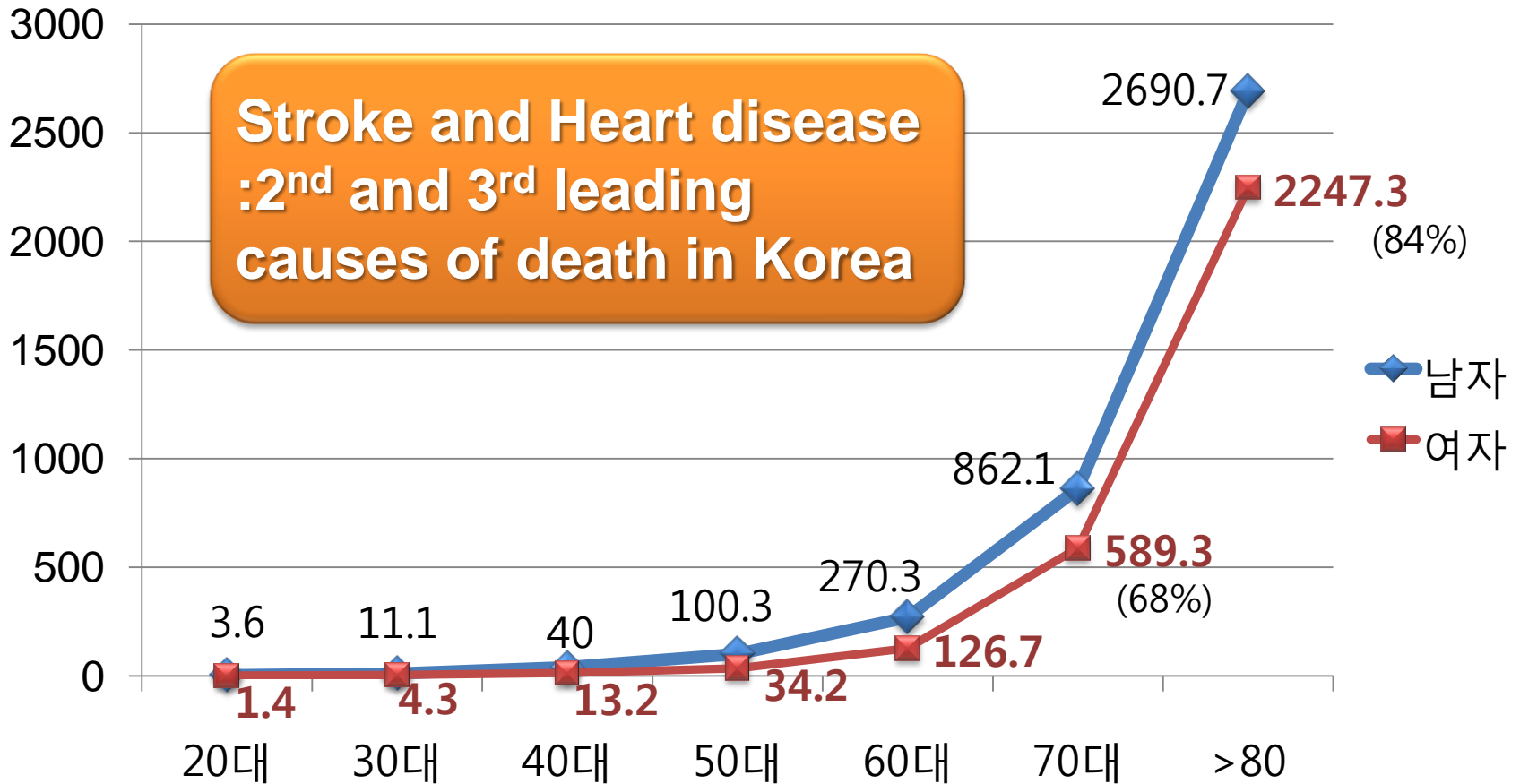
Cardiovascular diseases in Elderly Women

CVD mortality in Elderly Women

CVD Death* in Korea (2008)

인구10만 명당 사망자수

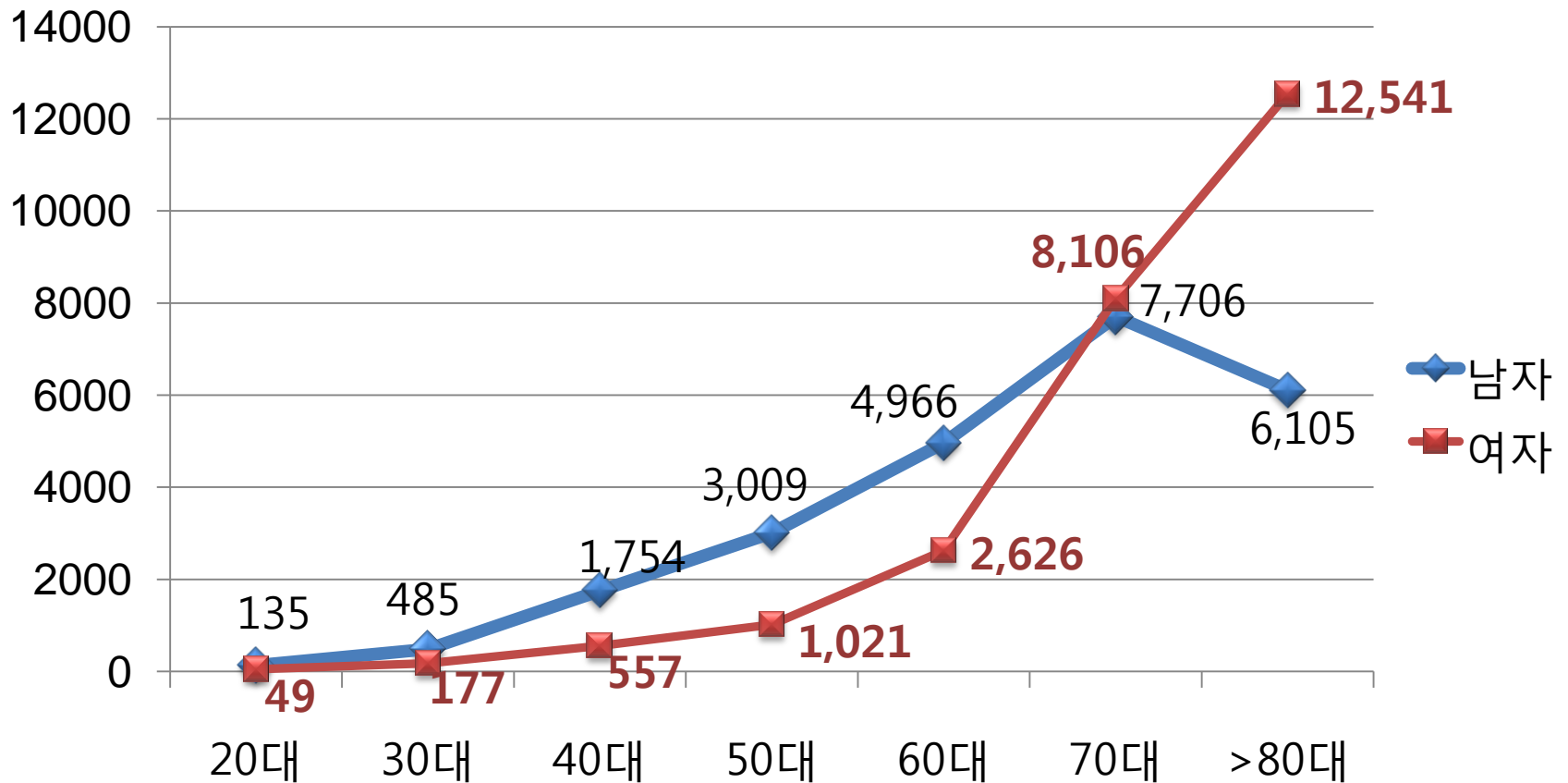
* 뇌혈관질환, 심혈관질환만 포함



통계청, 2008년 사망원인통계 결과

CVD Death in Korea (2008)

사망인구



통계청, 2008년 사망원인통계 결과

“Breast Cancer is the REAL issue!”

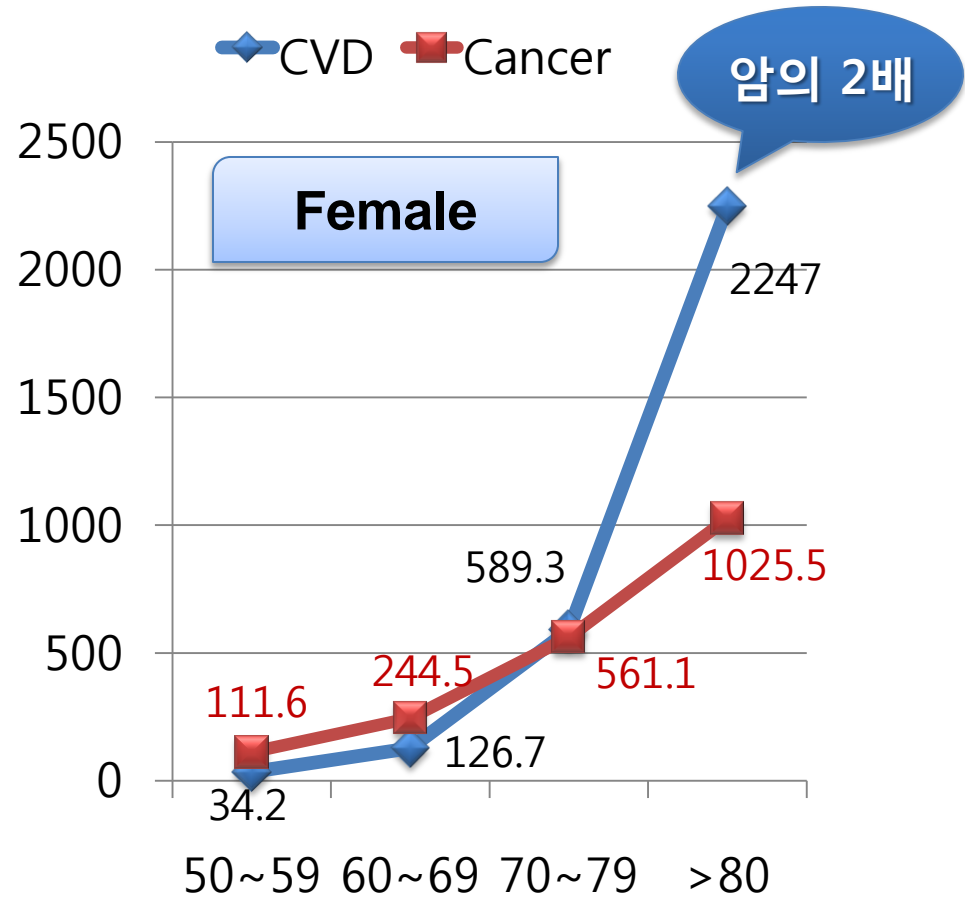
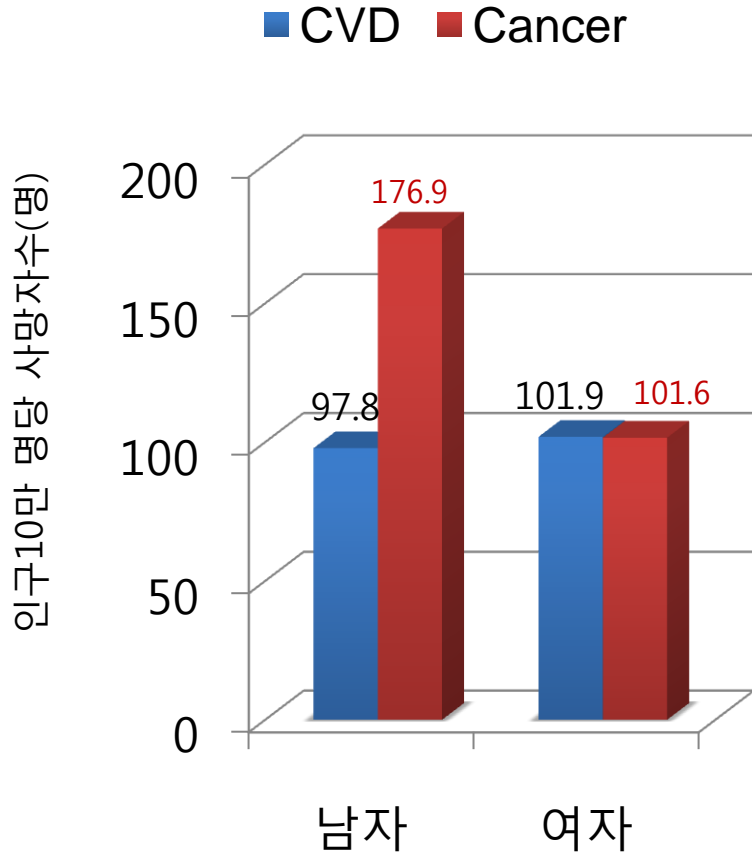
- Who cares about heart disease doc...I am more concerned about:

BREAST CANCER and lung cancer!”

- In a recent survey, **75%** of women identified cancer as their leading cause of death...

Ginger Hook, MSN, RN

CVD is the #1 Killer in Women



통계청, 2008년 사망원인통계 결과

Cardiovascular Risk Factors

CVD Risk Factors

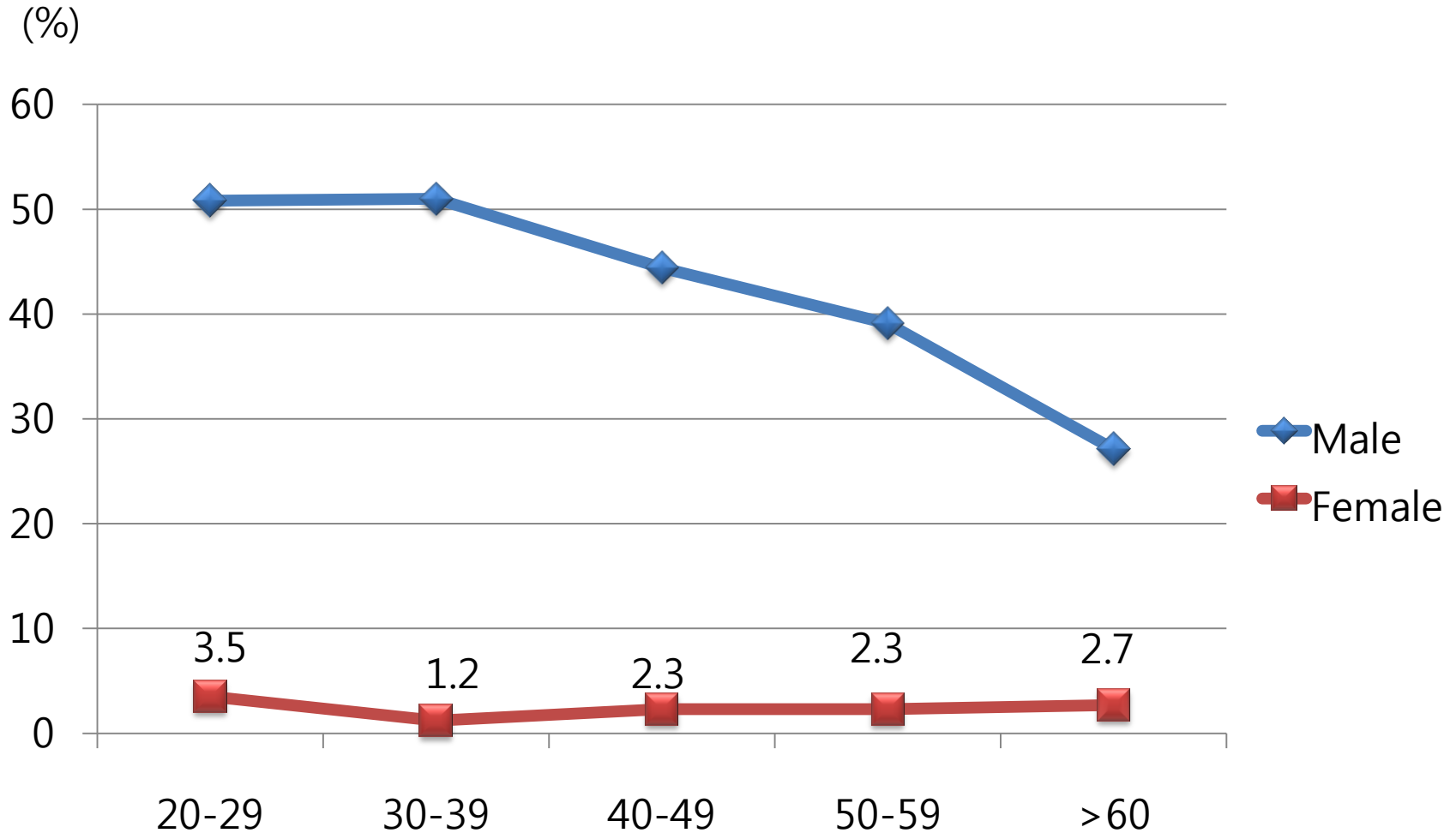
- **Hypertension***
- **Cigarette smoking**
- **Obesity*** (BMI ≥ 30 kg/m²)
- **Physical inactivity**
- **Dyslipidemia***
- **Diabetes mellitus***
- Microalbuminuria or estimated GFR <60 ml/min
- Age (older than 55 for men, 65 for women)
- Family history of premature CVD
(men under age 55 or women under age 65)

Cardiovascular risks in pre- & post menopausal women

	Premenopausal	Postmenopausal	p value ¹⁾
No. of subjects	1,624 (60.1)	1,072 (39.7)	
Age (y)	36.6 ± 8.1	62.6 ± 10.0	<0.001
BMI (kg/m²)	22.9 ± 3.3	24.4 ± 3.2	<0.001
SBP (mmHg)	72.0 ± 9.3	78.9 ± 10.4	<0.001
DBP (mm Hg)	108.4 ± 12.5	128.7 ± 19.8	<0.001
FPG(mg/dL)	89.1 ± 14.6	98.7 ± 24.5	<0.001
TC (mg/dL)	174.7 ± 31.3	199.5 ± 36.5	<0.001
TG (mg/dL)	97.7 ± 59.2	137.7 ± 93.5	<0.001
HDL-C (mg/dL)	48.2 ± 10.7	45.3 ± 10.8	<0.001
LDL-C (mg/dL)	107.2 ± 26.2	127.3 ± 32.5	<0.001

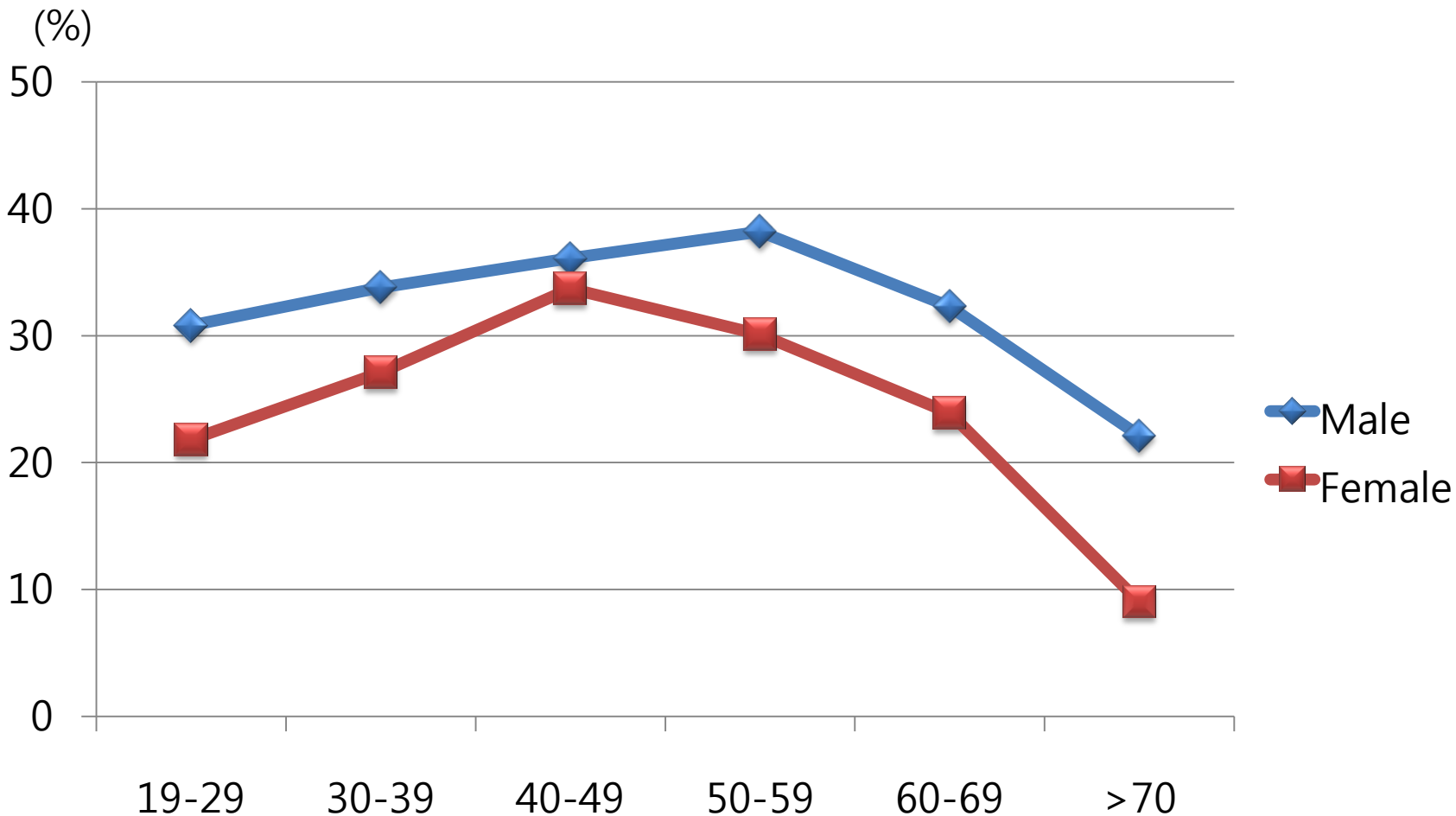
제3기 국민건강영양자료, unpublished data

Smoking



한국갤럽, 성인흡연율조사, 2006
국건영 3기 심층분석연구 보고자료

Physical Activities (중등도 활동이상)

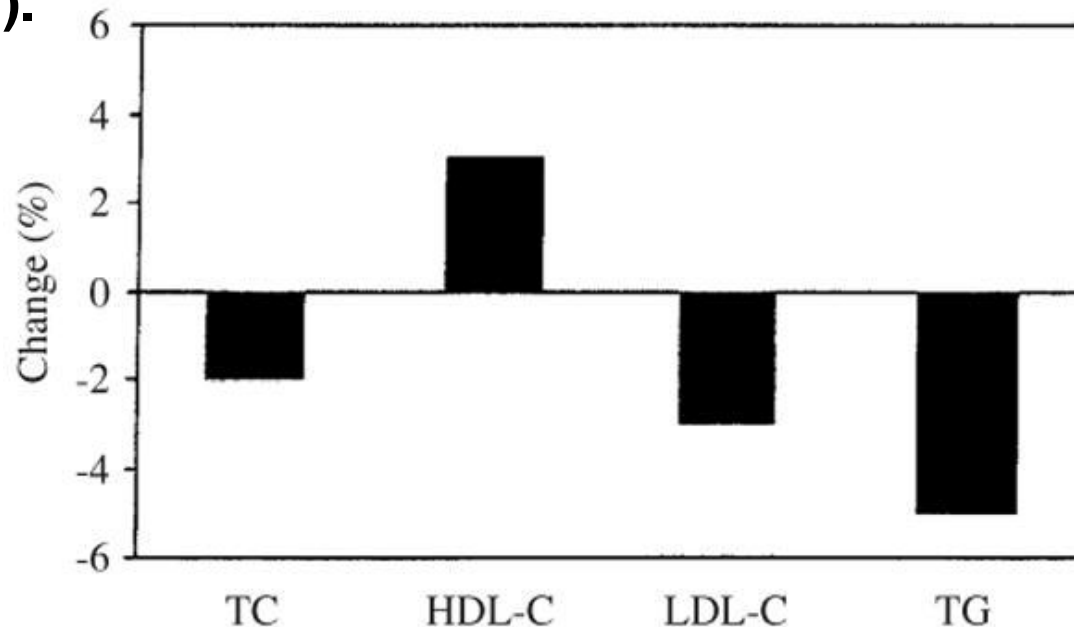


국민건강영양조사 3기 심층분석연구, 2007

Aerobic Exercise and Lipids and Lipoproteins in Women

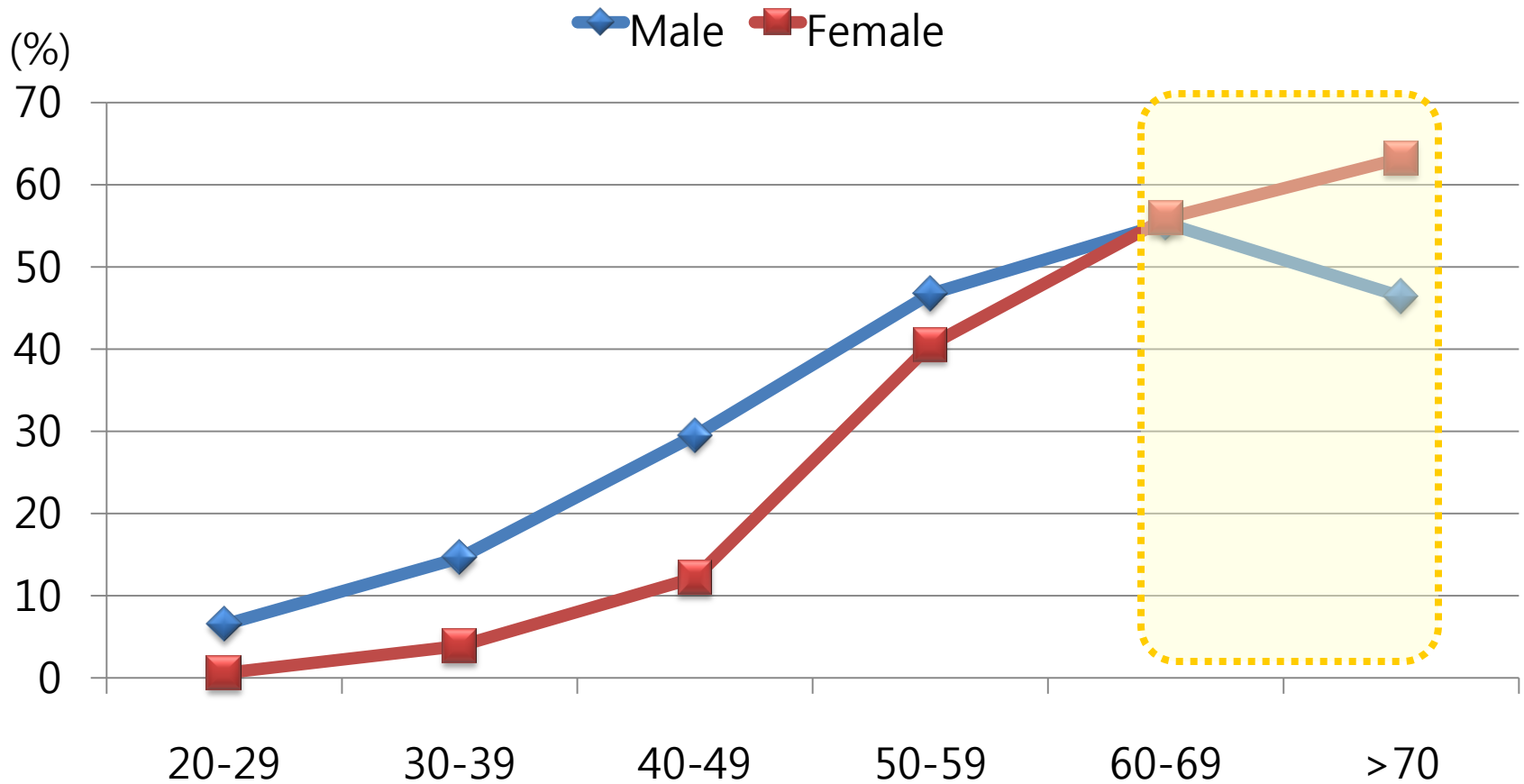
A Meta-Analysis of Randomized Controlled Trials

- 41 studies
- Relative changes (%) in lipids and lipoproteins (exercise minus control).



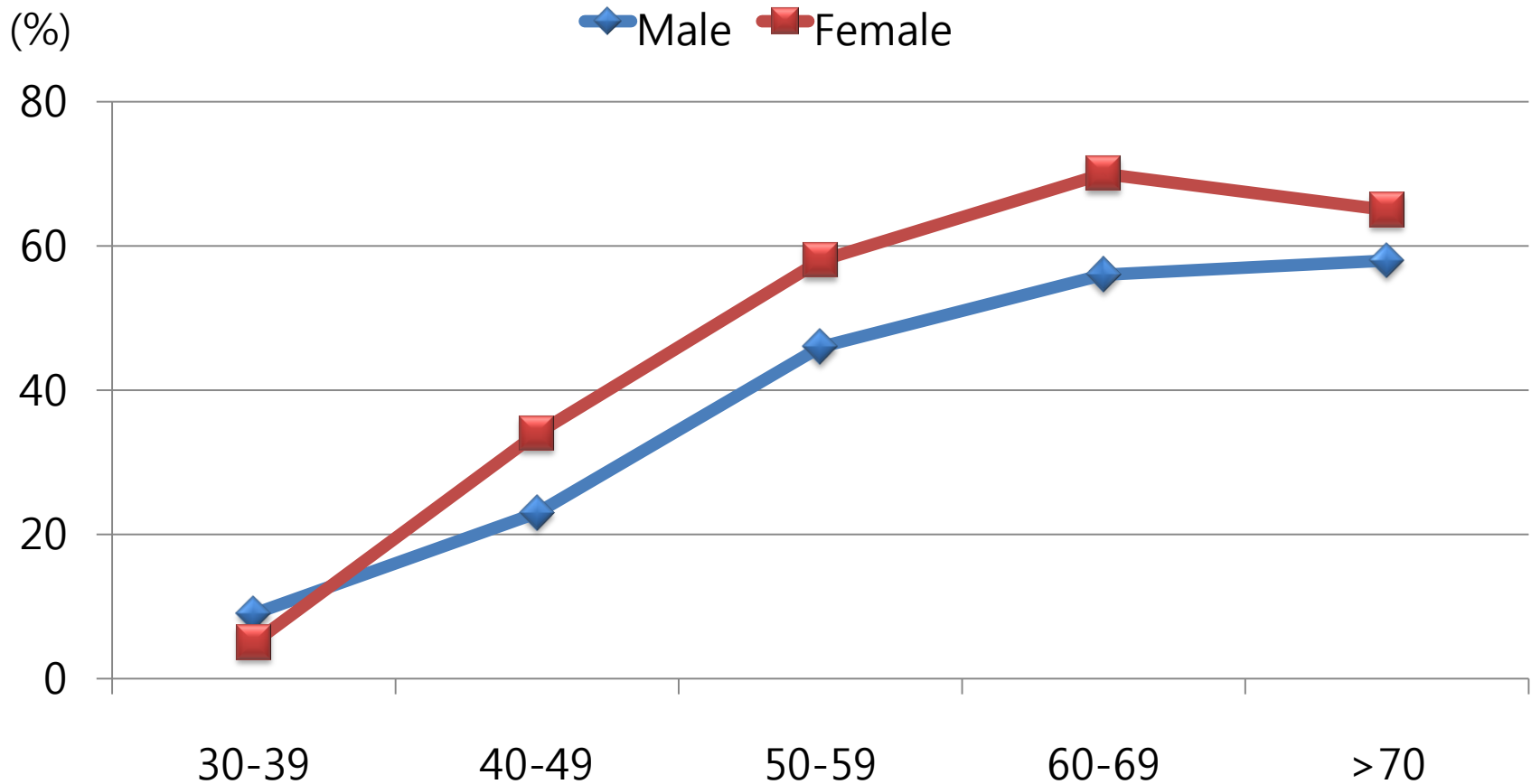
J Womens Health 2004;13(10): 1148

Hypertension: Prevalence



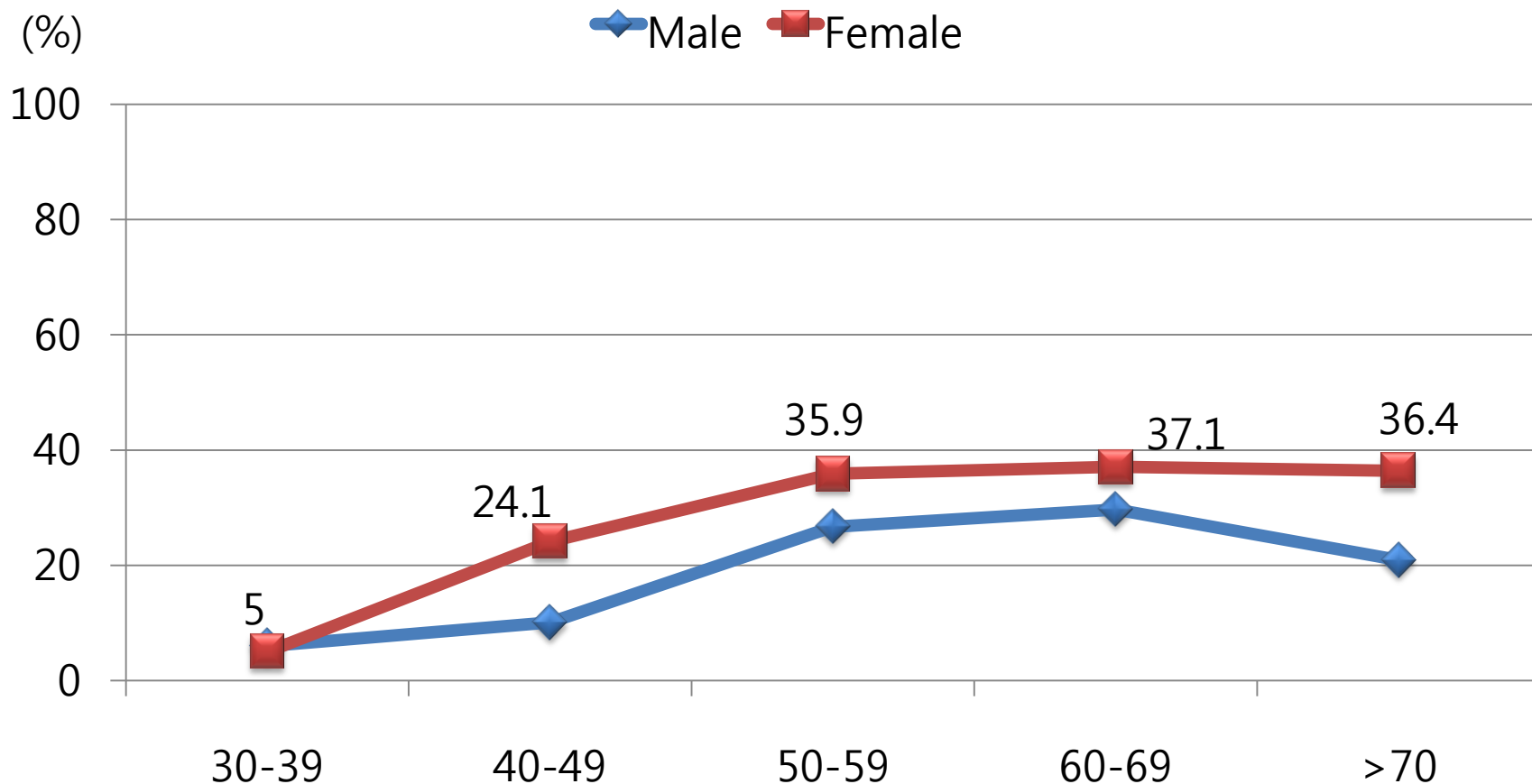
국건영 3기 심층분석연구 보고서, 2007

Hypertension: Treatment



국건영 3기 심층분석연구 보고서, 2007

Hypertension: Control Rate



국건영 3기 심층분석연구 보고서, 2007

Hypertension and Its Treatment in Postmenopausal Women

Baseline Data from the Women's Health Initiative

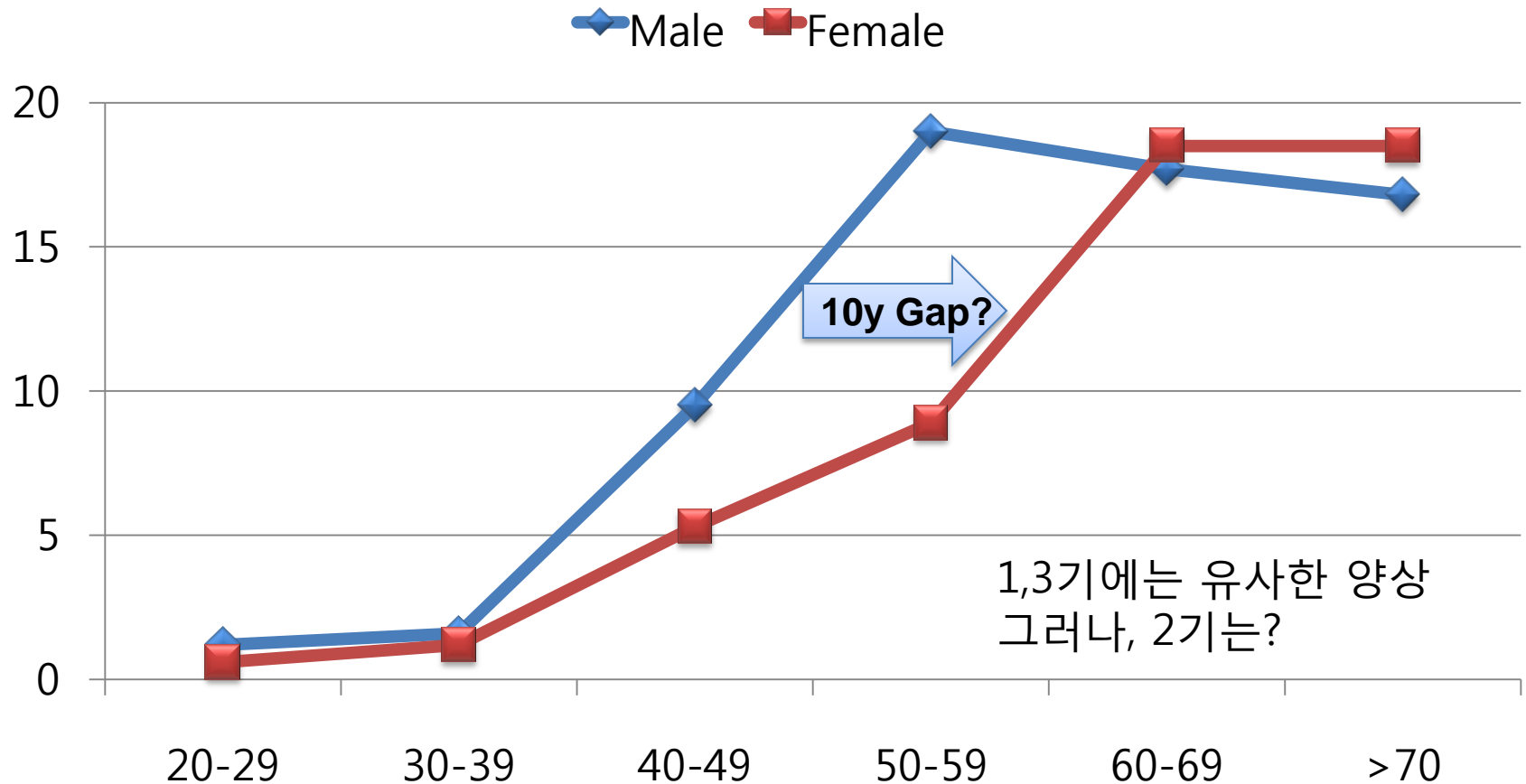
Sylvia Wassertheil-Smoller, Garnet Anderson, Bruce M. Psaty, Henry R. Black, JoAnn Manson, Nathan Wong, Jon Francis, Richard Grimm, Theodore Kotchen, Robert Langer, Norman Lasser

TABLE 2. Rates of Hypertension Prevalence, Treatment, and Control by Subgroups

	Group Total, n	% of Group Total Who Are Hypertensives	% of Prevalent Hypertensives Who Are Treated	% of Prevalent Hypertensives Who Are Controlled
Total	90 755	37.8	64.3	36.1
Demographic				
Age, y				
50–59	35 927	26.7	64.2	41.3
60–69	36 591	41.0	65.1	37.1
70–79	18 237	53.4	63.2	29.3

Hypertension. 2000;36:780-789

Diabetes: Prevalence



국건영 3기 심층분석연구 보고서, 2007

Korean Genome Epidemiology Study

- Age 40-69 years (40~49 y; ~50%)

Table 4. Incidence and multivariable-adjusted odds ratio (OR) and 95% confidence intervals (CIs) for predicting diabetes

Baseline	n	At 2nd follow-up survey						
		Events	Person-years	Incidence rate per 1,000 person-years	Age-adjusted OR (95% CI)		Multivariate-adjusted OR (95% CI)	
Men								
<75	363	17	1,395	12.18	1.00		1.00	
75-79	563	26	2,166	12.00	1.00 (0.53 - 1.86)		0.96 (0.50 - 1.84)	
80-84	730	54	2,807	19.24	1.66 (0.95 - 2.91)		1.59 (0.84 - 3.00)	
85-89	701	70	2,684	26.08	2.30 (1.33 - 3.97)**		2.12 (1.07 - 4.23)*	
90-94	400	47	1,540	30.51	2.74 (1.54 - 4.86)**		2.49 (1.13 - 5.50)*	
≥95	190	36	729	49.36	4.77 (2.60 - 8.76)**		4.15 (1.65 - 10.44)**	
Total	2,947	250	11,321	22.08				
Women								
<75	822	21	3,189	6.58	1.00		1.00	
75-79	644	31	2,494	12.43	1.83 (1.04 - 3.22)*		1.55 (0.87 - 2.79)	
80-84	621	46	2,399	19.17	2.79 (1.64 - 4.76)**		2.12 (1.19 - 3.78)*	
85-89	525	41	2,026	20.24	2.82 (1.62 - 4.89)**		1.90 (1.01 - 3.55)*	
90-94	343	30	1,327	22.61	3.18 (1.77 - 5.71)**		2.12 (1.07 - 4.19)*	
≥95	304	45	1,177	38.23	5.62 (3.22 - 9.80)**		2.87 (1.34 - 6.17)**	
Total	3,259	214	12,612	16.97				

P-values for multiple logistic regression analysis were adjusted for age, BMI, alcohol consumption and smoking status measured during follow-up.

*P < 0.05, **P < 0.01

Choi et al, Circ J 2010, In press

Korean Genome Epidemiology Study

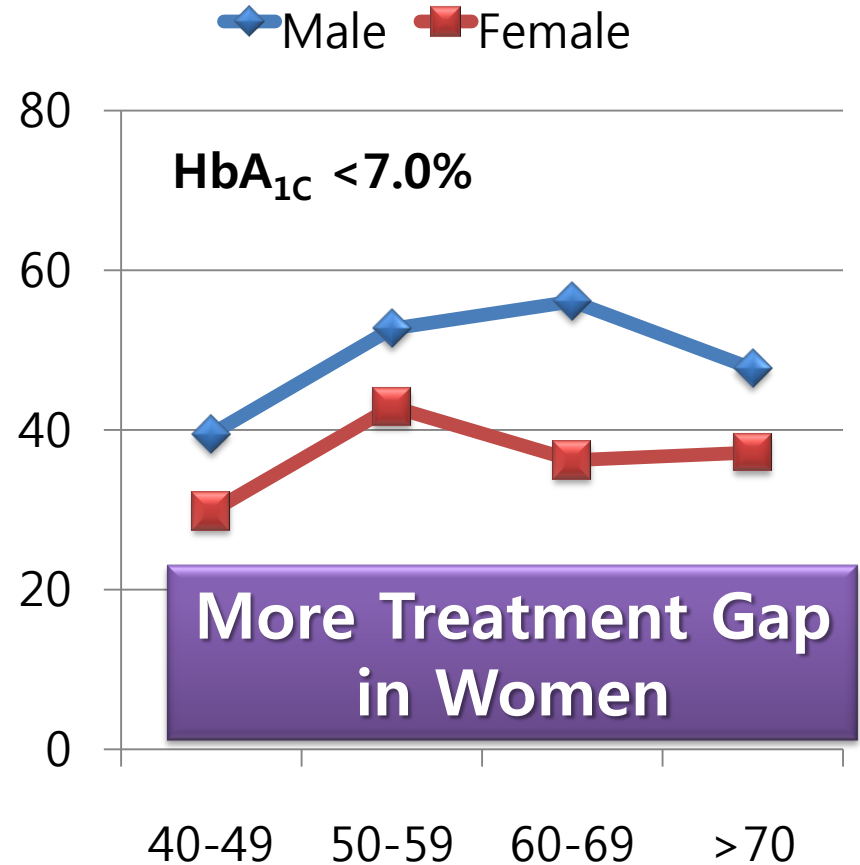
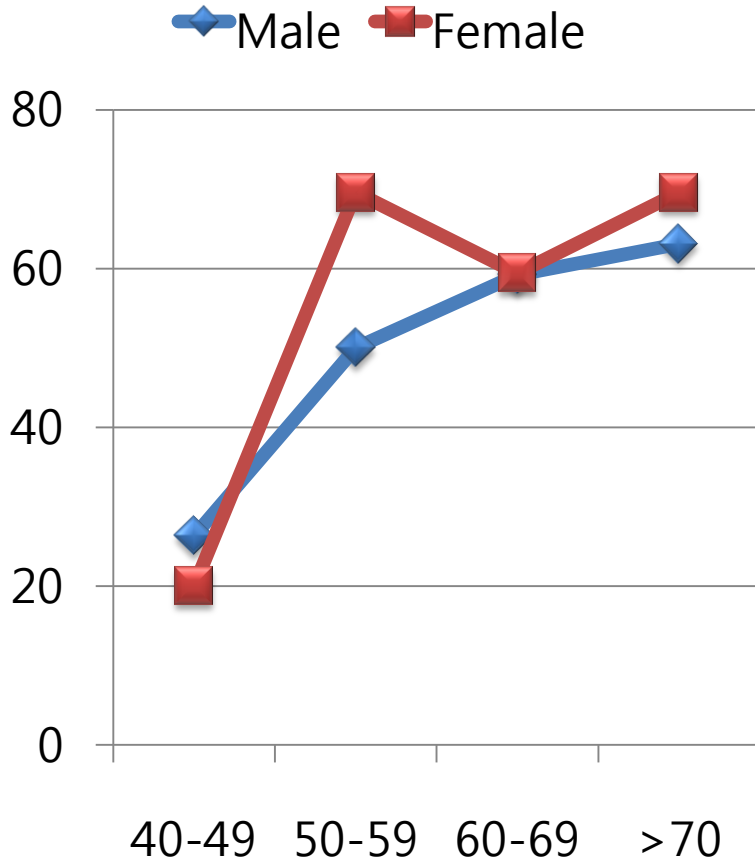
- Age 40-69 years (40~49 y; ~50%)

Table 5. Odds ratio (OR) and 95% confidence intervals (CI) of risk factors for development of diabetes in subjects with NGT and isolated IGT at in baseline examination

Variables	NGT → Diabetes			Isolated IGT → Diabetes		
	OR	(95% CI)	<i>P</i> -value	OR	(95% CI)	<i>P</i> -value
Age (years)	1.014	(0.993 - 1.034)	0.186	1.025	(1.008 - 1.042)	0.004
Sex						
Male	1			1		
Female	0.629	(0.441 - 0.898)	0.011	0.803	(0.599 - 1.077)	0.144
WC (cm)	1.040	(1.019 - 1.062)	<0.001	1.051	(1.032 - 1.069)	<0.001
BMI (kg/m ²)	1.122	(1.053 - 1.195)	<0.001	1.101	(1.045 - 1.160)	<0.001
SBP (mmHg)	1.008	(0.997 - 1.018)	0.158	1.009	(1.001 - 1.017)	0.034
DBP (mmHg)	1.007	(0.991 - 1.023)	0.381	1.019	(1.006 - 1.032)	0.004
TC (mg/dl)	1.002	(0.997 - 1.008)	0.358	1.003	(0.999 - 1.007)	0.175
HDL-C (mg/dl)	0.977	(0.958 - 0.996)	0.018	0.961	(0.945 - 0.977)	<0.001

Diabetes

Treatment & Control rate



국건영 3기 심층분석연구 보고서, 2007

The Impact of Diabetes Mellitus on Mortality From All Causes and Coronary Heart Disease in Women

20 Years of Follow-up

Frank B. Hu, MD; Meir J. Stampfer, MD; Caren G. Solomon, MD; Simin Liu, MD; Walter C. Willett, MD;
Frank E. Speizer, MD; David M. Nathan, MD; JoAnn E. Manson, MD

Arch Intern Med. 2001;161:1717

Table 2. Relative Risks of Death From All Causes, CHD, and All Cardiovascular Disease According to History of Diabetes and Prior CHD at Baseline in 1976: The Nurses' Health Study, 1976-1996*

Type of Death	No Diabetes and No CHD	Diabetes and No CHD	CHD and No Diabetes	Diabetes and CHD
Deaths from all causes				
No. of cases	7853	458	123	30
Person-years	2 300 753	31 641	7997	948
RR (95% CI)				
Age adjusted	1.0	3.39 (3.08-3.73)	3.00 (2.50-3.60)	6.84 (4.71-9.95)
Multivariate†	1.0	3.12 (2.83-3.44)	2.55 (2.12-3.07)	5.08 (3.47-7.43)
All cardiovascular deaths‡				
No. of cases	1582	216	75	19
RR (95% CI)				
Age adjusted	1.0	7.51 (6.50-8.67)	8.40 (6.63-10.6)	19.9 (12.5-31.8)
Multivariate	1.0	6.59 (5.69-7.63)	6.58 (5.19-8.36)	13.6 (8.45-21.8)
Fatal CHD				
No. of cases	1001	161	61	16
RR (95% CI)				
Age adjusted	1.0	8.70 (7.35-10.3)	10.6 (8.14-13.8)	25.8 (15.6-42.9)
Multivariate	1.0	7.48 (6.30-8.89)	8.15 (6.25-10.6)	17.6 (10.5-29.4)

The Independent Effect of Type 2 Diabetes Mellitus on Ischemic Heart Disease, Stroke, and Death

A Population-Based Study of 13 000 Men and Women With 20 Years of Follow-up

Thomas Almdal, DMSc; Henrik Scharling, MS; Jan Skov Jensen, DMSc; Henrik Vestergaard, DMSc

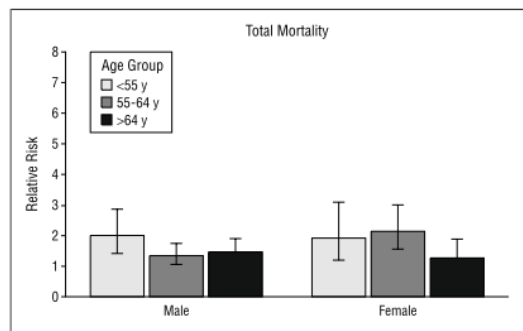


Figure 1. The adjusted relative total mortality (95% confidence level) in women and men with type 2 diabetes mellitus compared with healthy controls. The relative risk was adjusted for tobacco consumption, physical activity, alcohol consumption, body mass index, and triglyceride and total cholesterol levels.

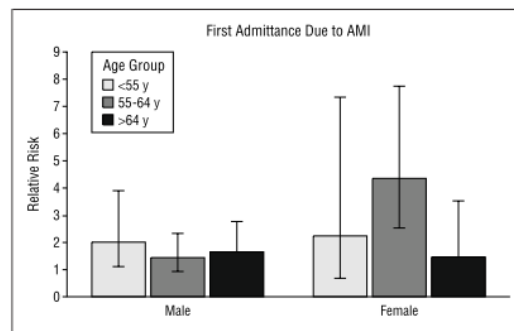


Figure 3. The adjusted relative risk (95% confidence level) of first admission for acute myocardial infarction (AMI) in women and men with type 2 diabetes mellitus compared with healthy controls. The relative risk was adjusted for tobacco consumption, physical activity alcohol consumption, body mass index, and triglyceride and total cholesterol levels.

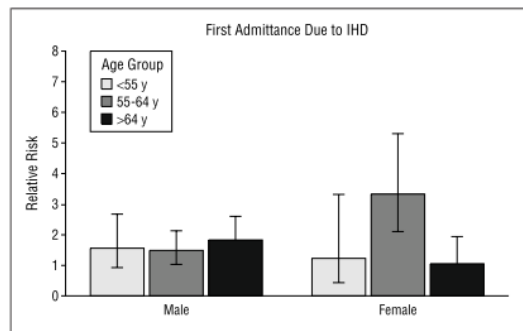


Figure 2. The adjusted relative risk (95% confidence level) of first admission for ischemic heart disease (IHD) in women and men with type 2 diabetes mellitus compared with healthy controls. The relative risk was adjusted for tobacco consumption, physical activity, alcohol consumption, body mass index, and triglyceride and total cholesterol levels.

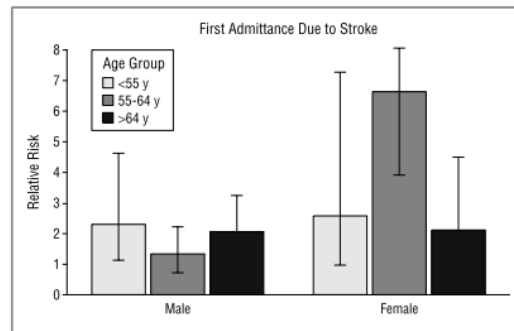
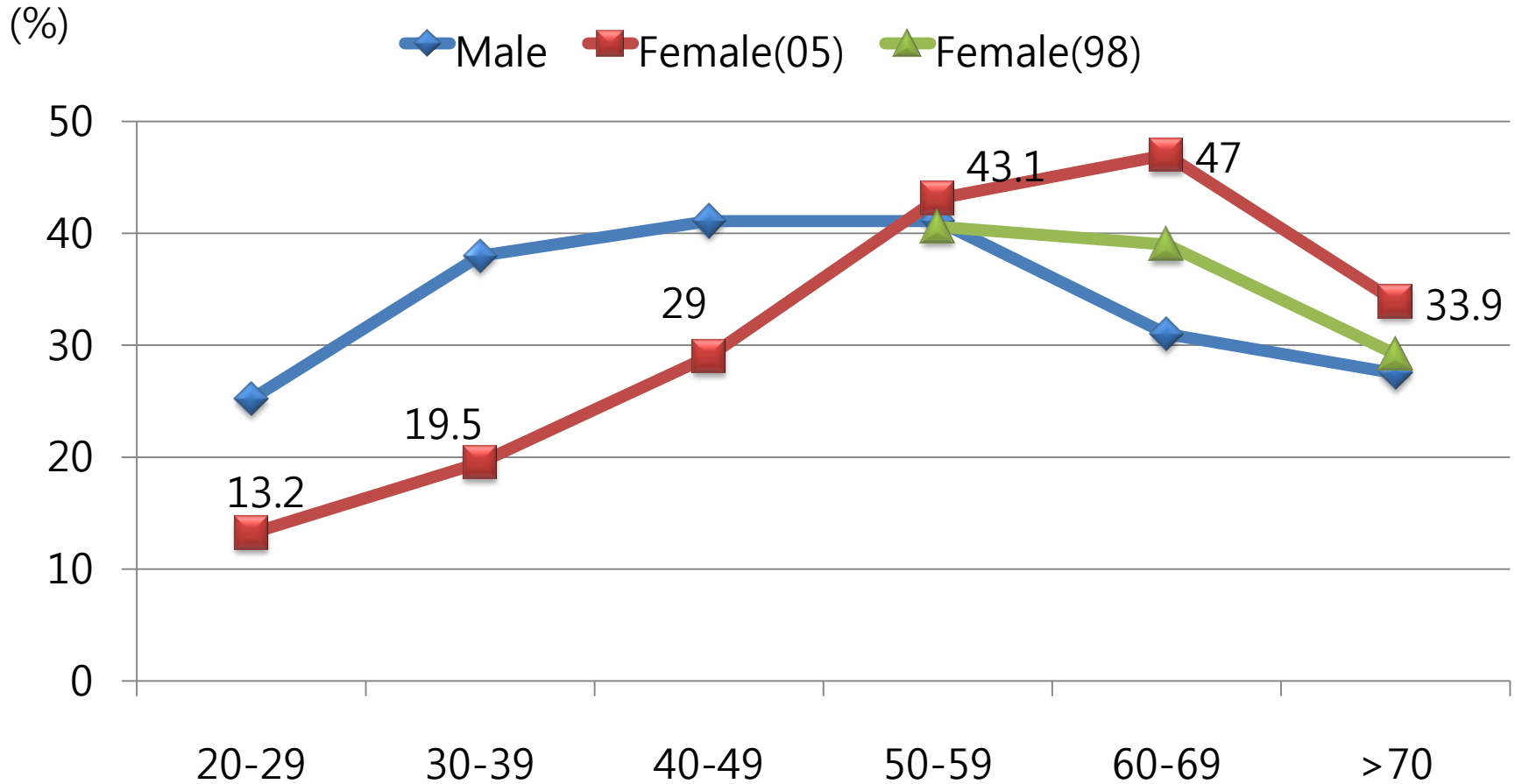


Figure 4. The adjusted relative risk (95% confidence interval) of first admission for stroke in women and men with type 2 diabetes mellitus compared with healthy controls. The relative risk was adjusted for tobacco consumption, physical activity alcohol consumption, body mass index, and triglyceride and total cholesterol levels.

Obesity: Prevalence

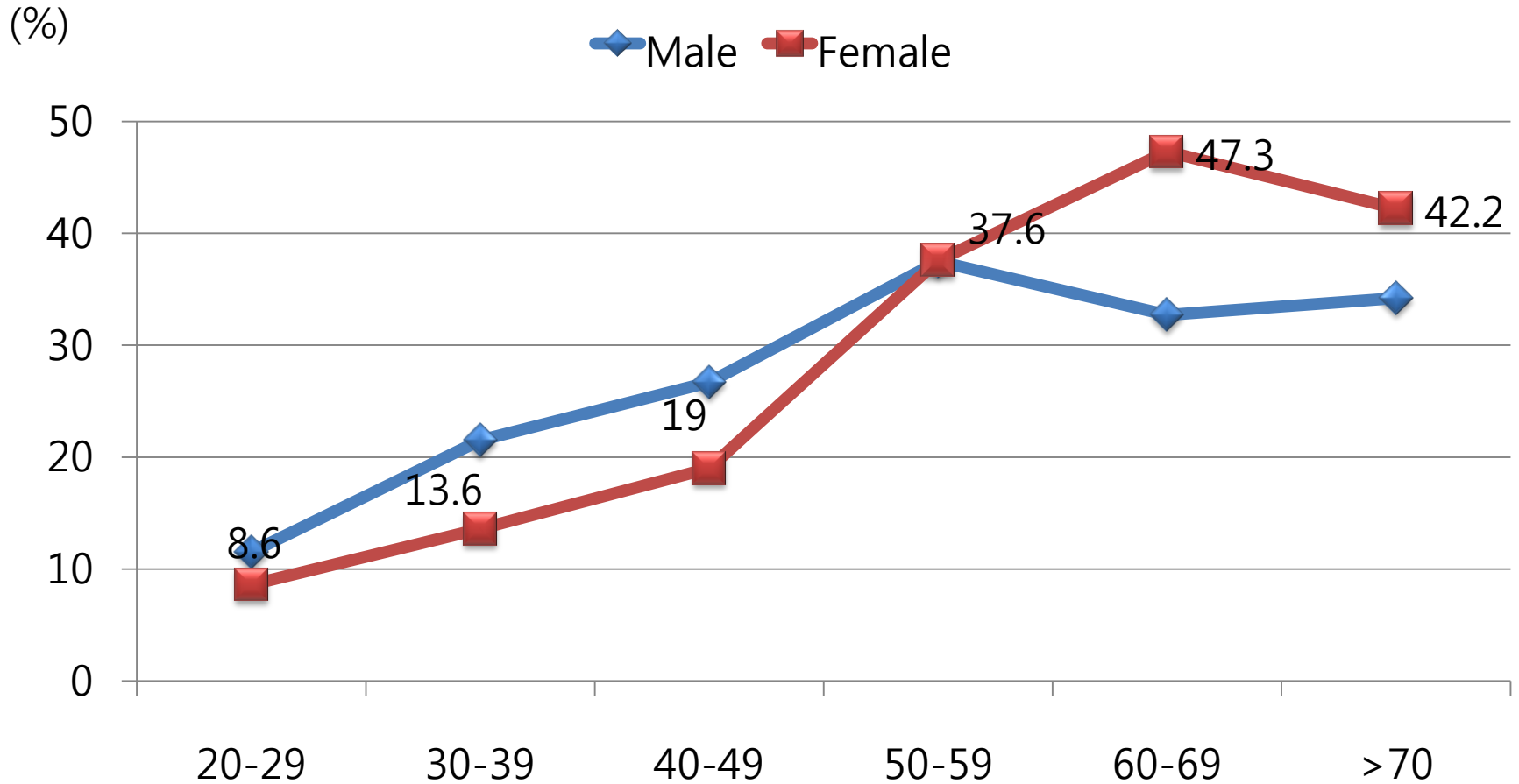
BMI > 25kg/m²



국건영 3기 심층분석연구 보고서, 2007

Obesity: Prevalence

WC (male >90cm, female >85cm)



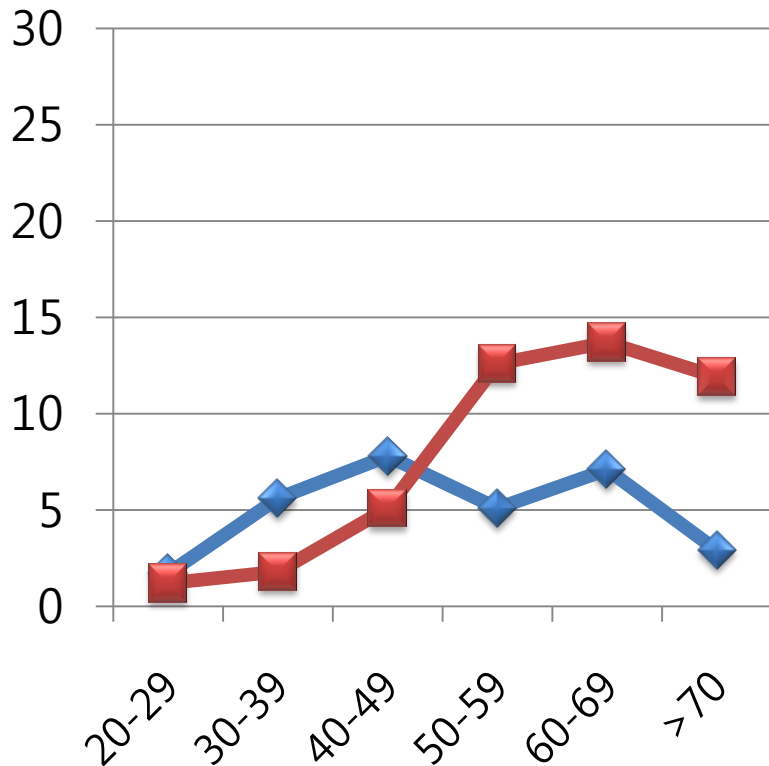
국건영 3기 심층분석연구 보고서, 2007

Dyslipidemia

Total cholesterol

(>240mg/dL)

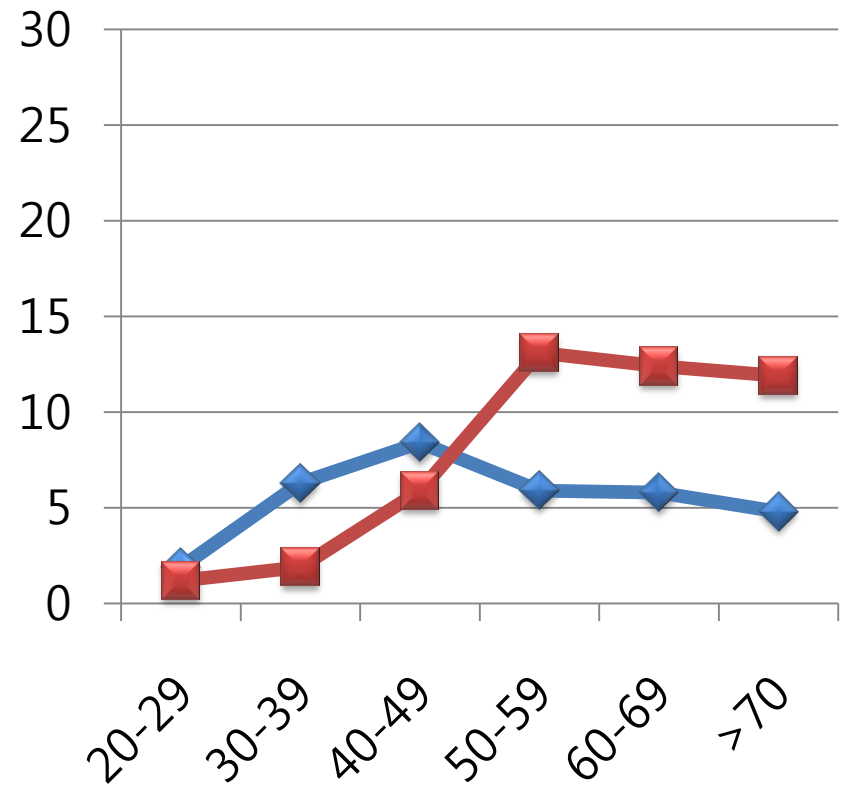
◆ Male ■ Female



LDL cholesterol

(>160mg/dL)

◆ Male ■ Female

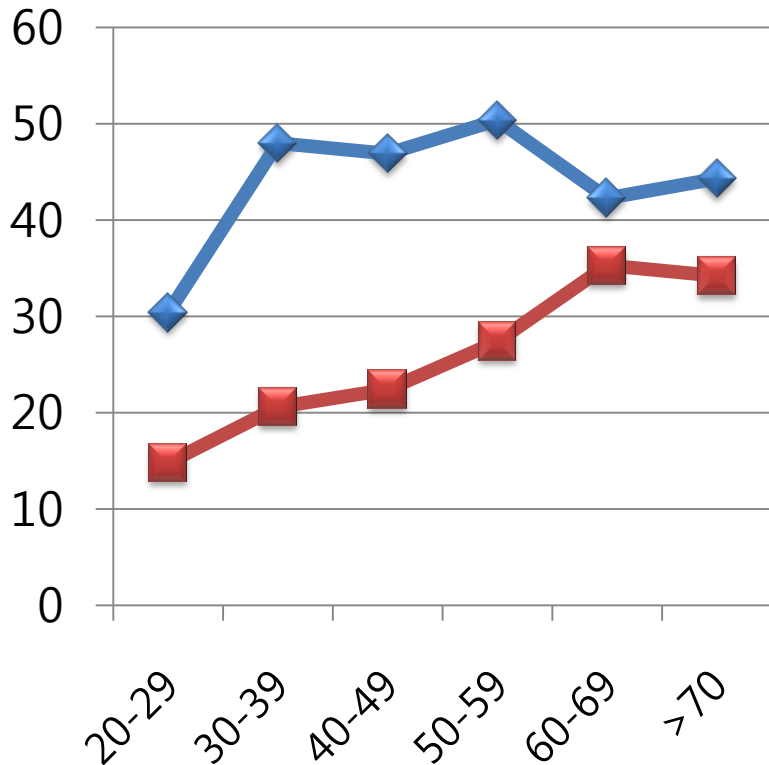


Dyslipidemia

HDL cholesterol

(<40mg/dL)

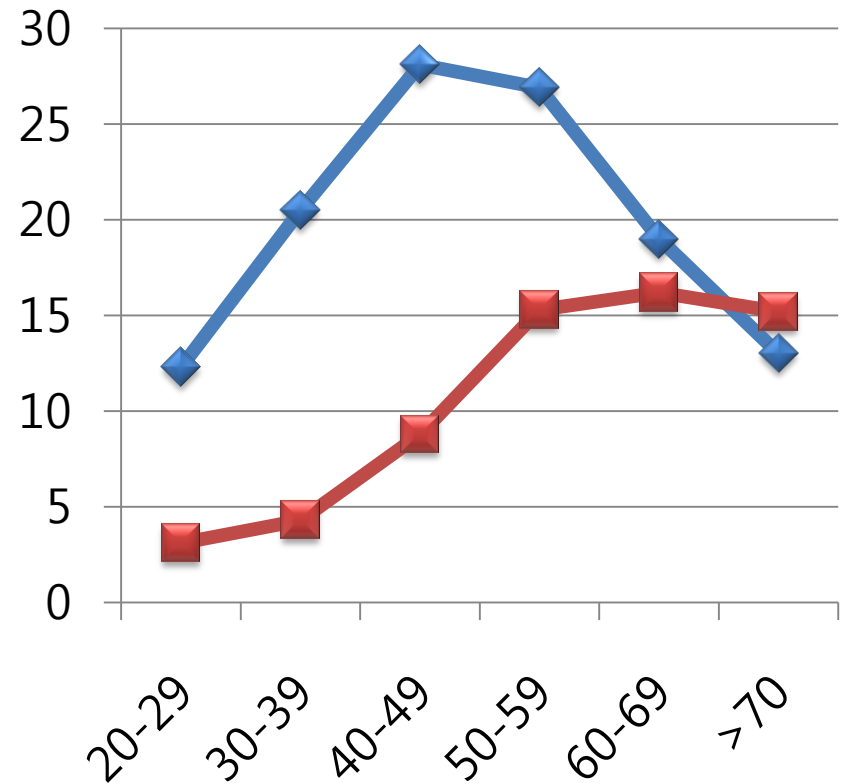
◆ Male ■ Female



TG

(>200mg/dL)

◆ Male ■ Female



The Prevalence, Awareness and Treatment of High Low-Density Lipoprotein Cholesterol in Korean Adults Without Coronary Heart Diseases

- The Third Korea National Health and Nutrition Examination Survey, 2005 -

Sun-Ja Choi, MPH, Sung-Hee Park, PhD, Kwang-Soo Lee, PhD and Hyun-Young Park, MD

Division of Cardiovascular and Rare Diseases, Center for Biomedical Science, National Institute of Health, Seoul, Korea

Table 4. Distribution of LDL-C for therapeutic lifestyle changes (TLC) and drug therapy in different risk categories by NCEP ATP III

Risk category	Total	TLC	Consider drug therapy
CHD risk equivalents (10 year risk >20%)	483 (9.8)	359 (74.3)	186 (38.5)
2+ risk factors (10 year risk ≤20%)	1,454 (29.5)	451 (31.0)	222 (15.3) (10 year risk 10-20%) 53 (3.6) (10 year risk <10%)
0-1 risk factor	2,997 (60.7)	174 (5.8)	30 (1.0)
Total	4,934	984 (19.9)	491 (10.0)

Values are n (%). NCEP ATP III: National Cholesterol Education Program Adult Treatment Panel III, LDL-C: low-density lipoprotein cholesterol, CHD: coronary heart disease

Korean Circ J. In press

Table 5. Distribution of awareness of this diagnosis, and treatment by TLC or drug therapy with high LDL-C in Korean adults

Variables	Total	TLC			Drug therapy		
		High LDL-C*	Awareness*†	Treatment*‡	Very high LDL-C§	Awareness§†	Treatment§‡
Total	4,934	984 (19.9)	78 (7.9)	21 (2.1)	491 (10.0)	41 (8.4)	11 (2.2)
Age (years)							
20-29	632	23 (3.6)	0 (0.0)	0 (0.0)	1 (0.2)	0 (0.0)	0 (0.0)
30-39	1,165	82 (7.0)	3 (3.7)	0 (0.0)	22 (1.9)	1 (4.5)	0 (0.0)
40-49	1,244	198 (15.9)	16 (8.1)	1 (0.5)	105 (8.4)	6 (5.7)	1 (1.0)
50-59	814	249 (30.6)	21 (8.4)	4 (1.6)	124 (15.2)	12 (9.7)	3 (2.4)
60-69	712	272 (38.2)	31 (11.4)	14 (5.1)	139 (19.5)	17 (12.2)	5 (3.6)
70-79	367	160 (43.6)	7 (4.4)	2 (1.3)	100 (27.2)	5 (5.0)	2 (2.0)
Sex							
Male	2,048	490 (23.9)	36 (7.3)	6 (1.2)	288 (14.1)	21 (7.3)	4 (1.4)
Female	2,886	494 (17.1)	42 (8.5)	15 (3.0)	203 (7.0)	20 (9.9)	7 (3.4)
ATP III risk category							
CHD risk equivalent (10 year risk >20%)	483	359 (74.3)	27 (7.5)	12 (3.3)	186 (38.5)	14 (7.5)	5 (2.7)
2+ risk factors (10 year risk ≤20%)	1,454	451 (31.0)	42 (9.3)	9 (2.0)	275 (18.9)	26 (9.5)	6 (2.2)
0-1 risk factors	2,997	174 (5.8)	9 (5.2)	0 (0.0)	30 (1.0)	1 (3.3)	0 (0.0)

Values are n (%). High LDL-C was defined patients for initiate therapeutic lifestyle change by NCEP ATP III. Very high LDL-C was defined as patients indicated for drug therapy by NCEP ATP III. *Distribution of high LDL-C among the total subjects, †Awareness: self-report of any prior diagnosis of dyslipidemia by a health-care professional, ‡Treatment: self-report current use of cholesterol lowering medication, §Distribution of very high LDL-C among the total subjects. LDL-C: low-density lipoprotein cholesterol, TLC: therapeutic lifestyle changes, CHD: coronary heart disease, NCEP ATP III: National Cholesterol Education Program Adult Treatment Panel III

Elevated ox-LDL levels in postmenopausal women with the metabolic syndrome

- **Study subjects**

This cross-sectional study was carried out in 355 subjects with MS and 954 normal subjects in postmenopausal women, aged 60-79 years.

- **Object**

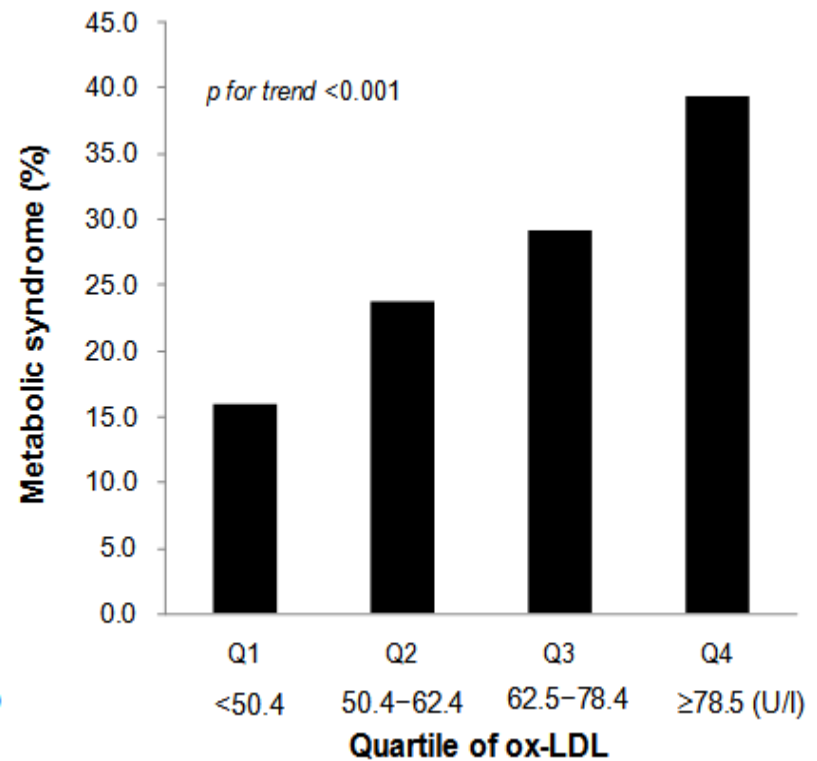
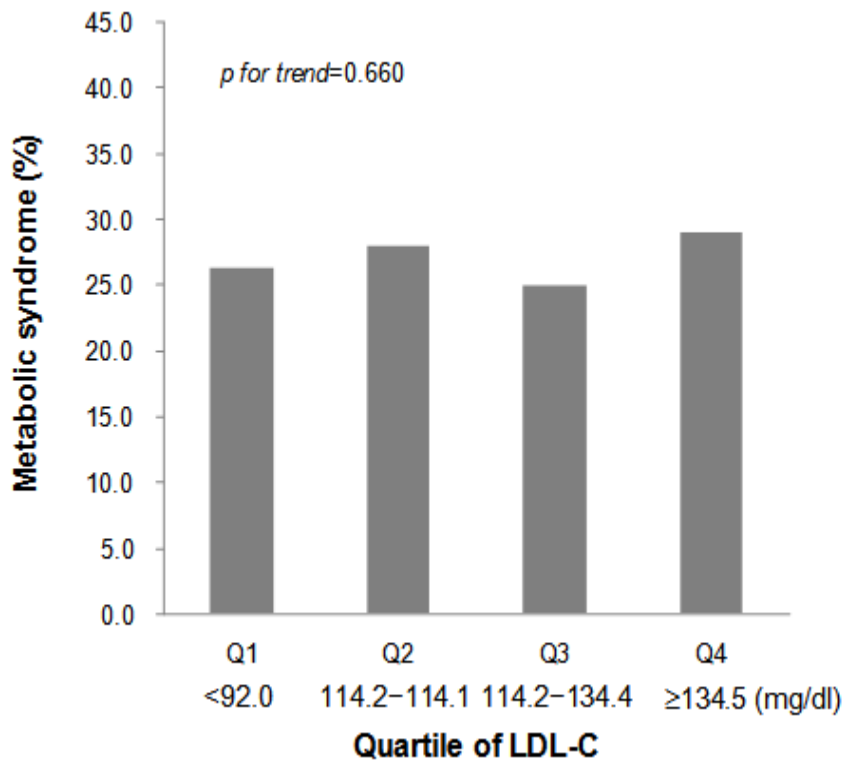
To assess the association between ox-LDL and metabolic syndrome in postmenopausal women.

Park SH, In submission

Characteristics of the study subjects according to the number MS components

	Number of metabolic syndrome components				p value
	0 (n=154)	1 (n=387)	2 (n=413)	≥3 (n=355)	
Age (years)	63.6 ± 4.0 ^c	64.9 ± 4.5 ^b	65.6 ± 4.7 ^{ab}	65.7 ± 4.6 ^a	<0.001
BMI (kg/m ²)	21.7 ± 2.1 ^d	23.7 ± 2.6 ^c	24.7 ± 2.7 ^b	25.5 ± 2.6 ^a	<0.001
WC (cm)	78.4 ± 4.5 ^d	86.7 ± 7.5 ^c	90.7 ± 7.0 ^b	92.7 ± 6.5 ^a	<0.001
SBP(mmHg)	117.1 ± 8.4 ^d	124.5 ± 12.9 ^c	134.2 ± 14.2 ^b	139.4 ± 14.0 ^a	<0.001
DBP(mmHg)	71.7 ± 6.1 ^d	74.7 ± 8.6 ^c	78.6 ± 9.0 ^b	81.5 ± 8.4 ^a	<0.001
FPG (mg/dl)	81.2 ± 8.1 ^c	83.1 ± 9.3 ^b	83.3 ± 8.5 ^b	86.3 ± 11.2 ^a	<0.001
TC (mg/dl)	193.2 ± 29.3	194.9 ± 32.7	195.5 ± 35.3	194.8 ± 36.6	0.915
HDL-C (mg/dl)	67.4 ± 11.9 ^d	60.6 ± 12.9 ^c	57.4 ± 12.8 ^b	44.8 ± 8.9 ^a	<0.001
LDL-C (mg/dl)	108.8 ± 26.6 ^b	115.0 ± 29.0 ^a	114.5 ± 31.6 ^a	114.6 ± 32.2 ^a	0.160
TG (mg/dl)	84.9 ± 26.4 ^d	96.4 ± 31.0 ^c	118.0 ± 50.2 ^b	177.4 ± 63.9 ^a	<0.001
Ox-LDL (U/l)	58.2 ± 19.2 ^c	62.9 ± 20.5 ^b	66.3 ± 22.5 ^b	72.3 ± 22.1 ^a	<0.001
Adiponectin (μg/ml)	10.62 ± 4.22 ^d	8.68 ± 3.62 ^c	7.54 ± 3.44 ^b	6.59 ± 3.21 ^a	<0.001
IL-1β (pg/ml)	1.27 ± 0.85	1.26 ± 0.80	1.23 ± 0.64	1.20 ± 0.67	0.655
IL-6 (pg/ml)	2.87 ± 5.12	2.77 ± 4.66	2.90 ± 5.96	2.95 ± 5.05	0.969
TNF-α (pg/ml)	4.96 ± 4.15 ^{ab}	4.99 ± 2.92 ^{ab}	4.61 ± 2.36 ^b	5.30 ± 3.14 ^a	0.017

Prevalence of MS according to the quartiles of LDL-C or Ox-LDL



Multivariate-adjusted OR for MS by quartile of low-density lipoprotein cholesterol or ox-LDL

Cases/No.	Quartiles of LDL (mg/dl)				<i>p</i> for trend
	Q1 (< 92.0) 86/326	Q2 (92.0-114.1) 92/328	Q3 (114.2-134.4) 82/328	Q4 (≥ 134.5) 85/327	
Model 1	1.00	1.08 (0.75-1.55)	0.89 (0.62-1.29)	1.07 (0.75-1.54)	0.961
Model 2	1.00	0.87 (0.60-1.26)	0.65 (0.44-0.95)*	0.62 (0.41-0.93)*	0.008
Model 3	1.00	0.90 (0.62-1.32)	0.69 (0.47-1.03)	0.68 (0.45-1.02)	0.032
Cases/No.	Quartiles of oxidized LDL (U/L)				<i>p</i> for trend
	Q1 (< 50.4) 52/327	Q2 (50.4-62.4) 78/327	Q3 (62.4-78.4) 96/328	Q4 (≥ 78.5) 129/327	
Model 1	1.00	1.65 (1.10-2.47)**	2.12 (1.43-3.14)***	3.28 (2.23-4.81)***	<0.001
Model 2	1.00	1.95 (1.28-2.95)**	2.80 (1.83-4.29)***	4.81 (3.09-7.50)***	<0.001
Model 3	1.00	1.78 (1.17-2.73)**	2.49 (1.61-3.86)***	4.02 (2.55-6.33)***	<0.001

Data are presented as odds ratio (95% confidence interval).

Model 1, adjusted for age, body mass index, smoking status, and alcohol intake.

Model 2, adjusted for model 1 variable and LDL-C or oxidized LDL.

Model 3, adjusted for model 2 variable and adiponectin.

Summary

- 여성에서 심혈관계질환으로 인한 사망은 **60대 이후 급격히 증가**한다.
- 여성에서의 **사망원인 1위는 심혈관계질환**(뇌졸중, 심장질환)이다.
- 60세 이후에는 남자보다 여성에서 **고혈압과 당뇨병, 비만의 유병률이 높다**.
- 고령여성에서의 고혈압, 당뇨의 조절율은 낮다.
- 50대 이후에는 **고콜레스테롤혈증의 유병률이 여성에서 보다 많다**.

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