DYSLIPIDEMIA FACT SHEETS IN KOREA, 2018
Dyslipidemia Fact Sheets in Korea from the Korean Society of Lipid and Atherosclerosis (KSoLA)

Economic and social developments in Korea have significantly impacted lifestyles and diet of its people, thus resulting in an increase in non-communicable diseases such as dyslipidemia, atherosclerosis, cardiovascular diseases as well as diabetes. KSoLA is a nonprofit organization, founded in 2001. KSoLA’s mission is to prevent and treat atherosclerosis, and to improve public awareness of atherosclerosis and its risk factors.

In effort to uphold its mission, since 2015, KSoLA has been publishing Dyslipidemia Fact Sheets based on the nationwide survey, the Korea National Health and Nutrition Examination Survey (KNHANES) conducted by the Ministry of Health and Welfare and the Korean Centers for Disease Control and Prevention (KCDC). These Fact Sheets contain nation-representative statistics of dyslipidemia, along with medical issues associated with dyslipidemia. The purpose is to increase public awareness of the disease as well as encourage those in healthcare professions to collaborate and communicate with each other to accomplish KSoLA’s mission.

President
Myung Ho Jeong

Chairman
Hyo-Soo Kim
## Contents

### Chapter 1
**Prevalence and Management of Hypercholesterolemia**
- 05 Prevalence of Hypercholesterolemia
- 06 Awareness of Hypercholesterolemia
- 07 Treatment Rate of Hypercholesterolemia
- 08 Control Rate of Hypercholesterolemia

### Chapter 2
**Dyslipidemia in Korea, 2018**
- 11 Lipid Profiles in Korean Adults
- 13 Prevalence of Dyslipidemia
- 14 Hyper-LDL cholesterol
- 15 Hypertriglyceridemia
- 16 Hypo-HDL cholesterol
- 17 Dyslipidemia in Adults with Obesity
- 18 Dyslipidemia in Adults with Diabetes
- 19 Dyslipidemia in Adults with Hypertension

### Chapter 3
**Treatment of Dyslipidemia**
- 22 Treatment of Dyslipidemia
- 24 Changes in Prescription of Anti-Dyslipidemic Drugs
- 26 Trend in Monotherapy
- 28 Trend in Dual Therapy

### Chapter 4
**Trends in Dietary Intake in Korea from 2007 to 2016**
- 32 Total Energy Intake
- 33 Excessive Energy Intake
- 34 Dietary Macronutrient Intake

### Chapter 5
**Treatments of Dyslipidemia, Diabetes, and Hypertension in Korea: Joint Statement of KSoLA, KDA, and KSH**
- 37 Treatments of Dyslipidemia, Diabetes, and Hypertension in 2016
- 38 Ten Years of Trend of Treatments for Dyslipidemia, Diabetes, and Hypertension

**Summary and Conclusion**
Chapter 1

Prevalence and Management of Hypercholesterolemia
Definitions

Hypercholesterolemia was defined by total cholesterol \( \geq 240 \text{ mg/dL} \), previously diagnosed, or taking any anti-dyslipidemic drug(s).

Data Sources

The estimates were derived from the 2012–2016 Korea National Health and Nutritional Examination Survey (KNHANES) of the Korea Centers for Disease Control and Prevention (KCDC) and the National Health Insurance Service.
Prevalence of Hypercholesterolemia

The prevalence of hypercholesterolemia in adults 30 years or older is 19.9% in 2016. “Nearly 1 out of 5 adults has hypercholesterolemia.”

Changes of prevalence of hypercholesterolemia in Korea from 2012-2016

**Men**
- 2012: 12.2%
- 2013: 13.6%
- 2014: 13.9%
- 2015: 16.4%
- 2016: 19.3%

**Women**
- 2012: 16.3%
- 2013: 15.9%
- 2014: 14.9%
- 2015: 19.1%
- 2016: 20.2%

**Total**
- 2012: 14.4%
- 2013: 14.9%
- 2014: 14.6%
- 2015: 17.9%
- 2016: 19.9%

The Korean Society of Lipid and Atherosclerosis
Awareness of Hypercholesterolemia

The awareness rate of hypercholesterolemia is 58.4%.

“Four out of 10 adults with hypercholesterolemia are not aware of their condition.”

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>KNHANES IV (2007-2009)</td>
<td>37.0%</td>
<td>40.3%</td>
</tr>
<tr>
<td>KNHANES V (2010-2012)</td>
<td>45.2%</td>
<td>49.1%</td>
</tr>
<tr>
<td>KNHANES VI (2013-2015)</td>
<td>51.4%</td>
<td>62.4%</td>
</tr>
<tr>
<td>KNHANES VII (2016)</td>
<td>56.0%</td>
<td>60.5%</td>
</tr>
</tbody>
</table>

*Total Awareness Rate: 58.4%*
The treatment rate among adults with hypercholesterolemia is 49.1%. "Less than half of adults with hypercholesterolemia take medications."
Control Rate of Hypercholesterolemia

The control rate among adults with hypercholesterolemia is 41.3% for target goal of total cholesterol <200 mg/dL.

“Only 2 out of 5 adults with hypercholesterolemia achieve target cholesterol levels.”
Chapter 2

Dyslipidemia in Korea, 2018
Definitions

- Hyper-low density lipoprotein (LDL) cholesterolemia was defined as serum LDL-cholesterol $\geq 160$ mg/dL or taking antidyslipidemic drug(s).
- Hypo-high density lipoprotein (HDL) cholesterolemia was defined as serum HDL-cholesterol $< 40$ mg/dL.
- Hypertriglyceridemia was defined as serum triglycerides $\geq 200$ mg/dL.
- Dyslipidemia was diagnosed as having one of the definitions stated above, taking any medication for dyslipidemia, or previously diagnosed.

Data Sources

The estimates were derived from the 2014-2016 Korea National Health and Nutritional Examination Survey (KNHANES) of the Korea Centers for Disease Control and Prevention (KCDC).
Lipid Profiles in Korean Adults

The mean serum total cholesterol levels in adults aged 30 years or older are 192.8 mg/dL in men and 193.4 mg/dL in women.
Lipid Profiles in Korean Adults

**(Mean levels)**
- Total Cholesterol: 193.4
- Triglyceride: 118.4
- HDL-C: 54.0
- LDL-C: 116.2

**Women**

<table>
<thead>
<tr>
<th>Percentile</th>
<th>Total Cholesterol</th>
<th>Triglyceride</th>
<th>HDL-C</th>
<th>LDL-C</th>
</tr>
</thead>
<tbody>
<tr>
<td>5th</td>
<td>67.9</td>
<td>35.2</td>
<td>43.0</td>
<td>38.2</td>
</tr>
<tr>
<td>10th</td>
<td>77.6</td>
<td>44.9</td>
<td>51.0</td>
<td>44.9</td>
</tr>
<tr>
<td>25th</td>
<td>94.3</td>
<td>68.0</td>
<td>68.0</td>
<td>68.0</td>
</tr>
<tr>
<td>50th</td>
<td>114.1</td>
<td>98.0</td>
<td>98.0</td>
<td>98.0</td>
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<tr>
<td>75th</td>
<td>136.1</td>
<td>144.0</td>
<td>144.0</td>
<td>144.0</td>
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<td>90th</td>
<td>157.7</td>
<td>172.2</td>
<td>172.2</td>
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<tr>
<td>95th</td>
<td>176.6</td>
<td>206.0</td>
<td>206.0</td>
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Prevalence of Dyslipidemia

Four among 10 adults aged 30 years or older have dyslipidemia.

“About 5 out of every 10 men and 3 out of every 10 women are dyslipidemic.”

**Men**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Prevalence</th>
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<tbody>
<tr>
<td>30-39</td>
<td>38.9%</td>
</tr>
<tr>
<td>40-49</td>
<td>48.0%</td>
</tr>
<tr>
<td>50-59</td>
<td>52.0%</td>
</tr>
<tr>
<td>60-69</td>
<td>55.0%</td>
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<tr>
<td>≥70</td>
<td>46.4%</td>
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</table>

**Women**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-39</td>
<td>14.9%</td>
</tr>
<tr>
<td>40-49</td>
<td>19.8%</td>
</tr>
<tr>
<td>50-59</td>
<td>41.4%</td>
</tr>
<tr>
<td>60-69</td>
<td>56.4%</td>
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<tr>
<td>≥70</td>
<td>52.9%</td>
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**Total**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Prevalence</th>
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<tbody>
<tr>
<td>30-39</td>
<td>26.1%</td>
</tr>
<tr>
<td>40-49</td>
<td>32.8%</td>
</tr>
<tr>
<td>50-59</td>
<td>46.3%</td>
</tr>
<tr>
<td>60-69</td>
<td>55.8%</td>
</tr>
<tr>
<td>≥70</td>
<td>50.1%</td>
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</table>
Hyper-LDL cholesterolemia

The prevalence of hyper-LDL cholesterolemia among adults aged 30 years or older is 17.6%. It increases with age, where 1 out of every 4 men and 2 out of every 5 women aged 60 years or older have hyper-LDL cholesterolemia.

“The proportion of women with hyper-LDL cholesterolemia in their 50s is 6 times higher than those in their 30s.”
Hypertriglyceridemia

The prevalence of hypertriglyceridemia among adults aged 30 years or older is 17.5%. “The proportion of men with hypertriglyceridemia in their 40s is 4 times higher than those of women within the same age group.”
Hypo-HDL cholesterolemia

The prevalence of hypo-HDL cholesterolemia among adults aged 30 years or older is 19.4%.

*The proportion of women with hypo-HDL cholesterolemia in their 50s is 1.5 times higher than those in their 30s.*
Dyslipidemia in Adults with Obesity

Even within the normal range of body weight (Body mass index 18.5-22.9 kg/m²), 1 out of every 4 adults has dyslipidemia. In cases with abdominal obesity, 3 out of every 5 adults show dyslipidemic profiles. “About half of overweight or obese adults have dyslipidemia.”

Prevalence (%) of dyslipidemia according to body mass index

<table>
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<tr>
<th>BMI Range</th>
<th>Prevalence (%)</th>
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<td>&lt;18.5</td>
<td>13.1</td>
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<td>18.5-22.9</td>
<td>27.9</td>
</tr>
<tr>
<td>23-24.9</td>
<td>43.0</td>
</tr>
<tr>
<td>≥25.0</td>
<td>55.3</td>
</tr>
</tbody>
</table>

Prevalence (%) of dyslipidemia according to abdominal obesity

<table>
<thead>
<tr>
<th>Obesity Status</th>
<th>Prevalence (%)</th>
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<tr>
<td>Abdominal Obesity (-)</td>
<td>33.5</td>
</tr>
<tr>
<td>Abdominal Obesity (+)</td>
<td>57.5</td>
</tr>
</tbody>
</table>

Abdominal obesity was defined by using waist circumference ≥90 cm for men, ≥85 cm for women.
Dyslipidemia in Adults with Diabetes

“The proportion of diabetic adults with dyslipidemia is 2.3 times higher than non-diabetics.”

<table>
<thead>
<tr>
<th></th>
<th>Non-diabetic (LDL-C ≥160 mg/dL)</th>
<th>Diabetic with LDL-C ≥160 mg/dL</th>
<th>Diabetic with LDL-C ≥100 mg/dL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage</td>
<td>37.3%</td>
<td>65.7%</td>
<td>86.6%</td>
</tr>
</tbody>
</table>

Diabetes was defined by fasting plasma glucose ≥126 mg/dL, previously diagnosed, or taking any anti-diabetic medication.
Dyslipidemia in Adults with Hypertension

“The proportion of hypertensive adults with dyslipidemia is 2.1 times higher than normotensives.”

33.6%  
Normotensive with LDL-C ≥160 mg/dL

55.8%  
Hypertensive with LDL-C ≥160 mg/dL

71.0%  
Hypertensive with LDL-C ≥130 mg/dL

Hypertension was defined by systolic/diastolic blood pressure ≥140/90 mmHg or taking any anti-hypertensive medication.
Chapter 3

Treatment of Dyslipidemia
Definitions

- Diagnosis of dyslipidemia was based on the disease-classification codes (ICD-10 code E78) of the health insurance claim forms and database on health screening service.
- Treatment was defined based on both ICD-10 code (E78) and prescription of anti-dyslipidemic drug(s).
- Adherence to treatment was defined as the condition wherein anti-dyslipidemic drug(s) was prescribed more than 290 days within a year (≥80% of year).

Data Sources

The total number of people diagnosed or treated with dyslipidemia was determined using the National Health Insurance Big Data from 2002 through 2016 made by National Health Insurance Service (NHIS).
Treatment of Dyslipidemia

Diagnosis  Treatment  Adherence to treatment

(n)

12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
0

1,520,449
1,932,497
2,317,480
2,929,632
3,319,843
3,789,172
4,122,869
4,353,029

602,253
817,356
1,024,699
1,359,948
1,751,710
2,469,054

76,145
127,105
189,027
284,150
434,607
612,381
837,413

2002  2003  2004  2005  2006  2007  2008

The Korean Society of Lipid and Atherosclerosis
About 10.7 million Korean people have dyslipidemia in 2016. The number of people adhered to treatment for dyslipidemia has markedly increased over the last 15 years (47.7 times).

“Only 1 of 3 people with dyslipidemia adheres to treatment.”
Changes in Prescription of Anti-Dyslipidemic Drugs

- **Monotherapy**
- **Dual therapy**
- **Triple therapy**

Year | Monotherapy | Dual therapy | Triple therapy |
--- | --- | --- | --- |
2002 | 74,499 | 1,638 | 0 |
2003 | 124,479 | 2,619 | 0 |
2004 | 185,579 | 3,442 | 0 |
2005 | 278,763 | 5,371 | 16 |
2006 | 418,858 | 15,405 | 344 |
2007 | 577,196 | 34,022 | 1,163 |
2008 | 780,503 | 54,878 | 2,032 |
Most people (87.8%) with dyslipidemia have been treated with monotherapy. People with dyslipidemia receiving dual therapy have steadily increased since 2002, and the proportion was 11.6% in 2016. Only 0.6% of people with dyslipidemia are receiving treatment with triple therapy.

“In 2016, monotherapy, dual therapy and triple therapies for dyslipidemia are 87.8%, 11.6%, and 0.6%, respectively.”
Trend in Monotherapy

- Statin
- Fibrate
- Omega-3
- Ezetimibe
- Others (niacin or cholestyramine)

Year | Statin | Fibrate | Omega-3 | Ezetimibe | Others
--- | --- | --- | --- | --- | ---
2002 | 489 | 0 | 13,601 | 60,409 | 0
2003 | 492 | 0 | 18,809 | 105,178 | 0
2004 | 507 | 0 | 23,492 | 161,580 | 0
2005 | 588 | 46 | 31,092 | 247,037 | 0
2006 | 699 | 376 | 39,668 | 377,728 | 0
2007 | 1,558 | 595 | 5,095 | 45,603 | 710,618
2008 | 2,794 | 757 | 11,236 | 55,098 | 710,618

The Korean Society of Lipid and Atherosclerosis
Statin comprises a large proportion of monotherapy, which is 93.8% in 2016. The use of fibrates has decreased from 18.3% in 2002 to 4.0% in 2016, while the use of omega-3 has increased from 0.1% in 2006 to 2.0% in 2016.
Dual therapy with statin and ezetimibe has increased since 2006 and comprises 56.3% of dual therapy in 2016. The use of fenofibrate or omega-3 in combination with statin has also increased and are 23.0% and 20.3% in 2016, respectively.
Chapter 4

Trends in Dietary Intake in Korea from 2007 to 2016
Definitions

• Energy intake was estimated using the 24h dietary recall data from the 2007–2016 Korea National Health and Nutritional Examination Survey (KNHANES).

• Excessive energy intake was defined as the condition wherein the percentage of energy intake was greater than 125% of the estimated energy requirement (EER) recommended by the Korean Dietary Reference Intake (KDRI).

• The percentage of energy intake from carbohydrate, protein, and fat was calculated using the following method: e.g.) The percentage of energy intake from protein = (g of protein intake x 4) / {(g of protein intake x 4) + (g of fat intake x 9) + (g of carbohydrate intake x 4)} x 100

Data Sources

The data for the estimated energy intake and the proportion of macronutrients were obtained from the 2016 National Health Statistics and 2017 Chronic Disease and Issue (the Korea Centers for Disease Control and Prevention, KCDC, and the Korean Ministry of Health and Welfare 2017). The reported data in the 2016 National Health Statistics and 2017 Chronic Disease and Issue were determined using data from the 2007–2016 Korea National Health and Nutritional Examination Survey (KNHANES) conducted by the Korea Centers for Disease Control and Prevention (KCDC).
Total energy intake has steadily increased in men since 2007, while it has been maintained at a relatively constant level in women.

1) Reference 2016 National Health Statistics (KCDC)
2) Data source 2007-2016 Korea National Health and Nutritional Examination Survey (KNHANES) conducted by KCDC.
3) Subjects Koreans aged 1 year or older. The amounts of energy intake were standardized to the age structure of the Korean population in the fall, 2005.
Excessive Energy Intake

The proportion of people with excessive energy intake has continuously increased both in men and women since 2007. In 2015, the percentages of people with excessive energy intake are 27.8% in men and 18.8% in women. **“One of 4 men and 1 of 5 women take excessive energy in Korea (125% of the KDRI).”**

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1) Excessive energy intake: Energy intake that is greater than 125% of the estimated energy requirement (EER) recommended by the Korean Dietary Reference Intake (KDRI).

2) Subjects: Korean people aged 19 years or older. The incidence of excess energy intake was standardized to the age structure of the Korean population in the fall, 2005.

3) Reference: 2017 Chronic Disease and Issue, KCDC

4) Data source: 2007-2015 Korea National Health and Nutritional Examination Survey (KNHANES) conducted by KCDC.

5) The data should be interpreted with caution. The results were calculated from 1 day dietary records and the energy intake could have been overestimated.
Dietary Macronutrient Intake

The percentage of energy intake from fat has increased from 18.4% in 2007 to 22.9% in 2016, while the percentage of energy intake from carbohydrate has decreased from 66.9% in 2007 to 62.2% in 2016. The percentage of energy intake from protein has remained relatively constant over the last 10 years.

Percentages of energy intake from macronutrients

1) Reference 2016 National Health Statistics (KCDC)
2) Data source 2007-2016 Korea National Health and Nutritional Examination Survey (KNHANES) conducted by KCDC.
3) Subjects Koreans aged 1 year or older. The amounts of energy intake were standardized to the age structure of the Korean population in the fall, 2005.
Chapter 5

Treatments of Dyslipidemia, Diabetes, and Hypertension in Korea: Joint Statement of KSoLA, KDA, and KSH
Definitions

Treatment for each disease was defined based on both ICD-10 code and the prescription of relevant medications more than once.

Data Sources

The total number of people treated with dyslipidemia, diabetes and hypertension were derived from National Health Insurance Service (NHIS).

KSoLA, the Korean Society of Lipid and Atherosclerosis
KDA, Korean Diabetes Association
KSH, the Korean Society Hypertension
Treatments of Dyslipidemia, Diabetes, and Hypertension in 2016

Treatment of dyslipidemia (n), 6,603,754
Treatment of diabetes (n), 3,253,183
Treatment of hypertension (n), 8,219,104

- Hypertension 3,551,878
- Hypertension + Dyslipidemia 2,621,509
- Diabetes 480,092
- Diabetes + Dyslipidemia 727,374
- Hypertension + Diabetes + Dyslipidemia 1,407,011
- Hypertension + Diabetes 638,706
Ten Years of Trend of Treatments for Dyslipidemia, Diabetes, and Hypertension

Total (n) 11,274,430

- Hypertension+Diabetes+Dyslipidemia: 1,407,011
- Diabetes+Dyslipidemia: 727,374
- Hypertension+Dyslipidemia: 2,621,509
- Hypertension+Diabetes: 638,706
- Dyslipidemia: 1,847,860
- Diabetes: 480,092
- Hypertension: 3,551,878
Summary and Conclusion

- In Korea, 4 among 10 Korean adults aged 30 years or older had dyslipidemia. Specifically, nearly 5 and more than 3 in 10 men (47.9%) and women (34.3%), respectively, were dyslipidemic.
- Prevalence of dyslipidemia increased with age in both sexes, and it was more prominent in women aged 50 years or older.
- The number of people adherent to treatment with anti-dyslipidemic drug(s) was increased by 47.7 times in 2016 compared to those in 2002.
- About 1 in every 6 adults aged 30 years or older had hyper-LDL cholesterolemia, and it was more common in women than in men. The prevalence increased with age in both sexes, so that 1 in every 5 men and every 3 women aged 60 years or older had hyper-LDL cholesterolemia.
- In all age groups, prevalences of hypertriglyceridemia and hypo-HDL cholesterolemia in men were approximately twice as high as those in women. Especially, in the age group of 40–49 years, the percentage of men with hypertriglyceridemia was 4 times higher than that of women.
- Dyslipidemia was observed in 1 out of every 4 adults with normal body weight and in about half of overweight or obese adults. More than 3 out of every 5 adults with abdominal obesity were also dyslipidemic.
- Nearly 2 out of every 3 adults with diabetes had dyslipidemia. When the LDL-C cut-off value was strictly set to 100 mg/dL, nearly 9 out of every 10 every adults with diabetes were diagnosed with dyslipidemia.
- Nearly 2 out of every 3 adults with hypertension had dyslipidemia.
- One in every 4 men and every 5 women consumed more energy than the body required.
- The percentage of energy intake from fat has increased by 1.2 times in 2016 (22.9%) compared to those in 2007 (18.4%).
<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Affiliation</th>
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<tbody>
<tr>
<td>Chairman</td>
<td>Hyo-Soo Kim</td>
<td>Seoul National University</td>
</tr>
<tr>
<td>Secretary General</td>
<td>Kyung Woo Park</td>
<td>Seoul National University</td>
</tr>
<tr>
<td>Treasurer</td>
<td>Ki Hoon Han</td>
<td>University of Ulsan</td>
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<td>Director</td>
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<tr>
<td>Planning Committee</td>
<td>Goo Taeg Oh</td>
<td>Ewha Womans University</td>
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<td>Food and Nutrition Committee</td>
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<td>Myung Ho Jeong</td>
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<td>2018 Vice-president</td>
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<td></td>
<td>Myoungsook Lee</td>
<td>Sungshin University</td>
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# Public Relations Committee

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<td>Secretary</td>
<td>Jong Chul Won</td>
<td>Inje University</td>
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<td>Members</td>
<td>Ji Cheol Bae</td>
<td>Sungkyunkwan University</td>
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<td>Daegu University</td>
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<td>Sung Hoon Yu</td>
<td>Hanyang University</td>
</tr>
</tbody>
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