

# **"Overview of National PHR in Korea"**

## **Introduction of South Korea's national PHR Portal, My Health Bank**

**Jul 7, 2016**

**soon Ae Shin\*, Jae-Woo Lee\*\*, Kyung-Hee Cho\*\***

Big data Steering dep, NHIC\*  
NHIC Ilsan Hospital, Yonsei University\*\*

# APAMI 2016

2016.11.02 - 11.05  
The K-Hotel, Seoul, Korea

**Submission Deadline**  
**: July 24, 2016**

## Social Program


- Smart Hospital Tour
- Galar Dinner
- K-ICT IoT Open Lab Tour & Seoul City Tour

Connecting the Dots for  
Better Health through Informatics

**APAMI 2016**  
2-5 NOVEMBER, 2016 | SEOUL, KOREA


2016 Conference of  
**Asia Pacific Association for Medical Informatics**

2016. 11. 02 ▶ 05  
The K-Hotel, Seoul, Korea



**Submission Deadline is July 10, 2016**  
Win an opportunity to publish your submission  
in the **Computer Methods and Programs in Biomedicine**!

APAMI 2016 SPC will select high quality submissions and recommend them as prospective manuscripts to be published in the **"Computer Methods and Programs in Biomedicine (CMPB)"**, CMPB is a peer-reviewed journal with Impact Factor 1.89 based on the 2015 Thomson Reuters Journal Citation Reports.





**APAMI 2016**  
2-5 NOVEMBER, 2016 | SEOUL, KOREA

**Submit Your Abstract Now!**

**Win Best Paper and Poster Awards!**

APAMI 2016 SPC will select high quality submissions for the following two categories of Award.


- Best Paper Award
- Best Poster Award



**Social Program** More +


**Smart Hospital Tour & Welcome Reception**

Date: November 2, 2016  
Venue: Seoul National University Bundang Hospital



**Farewell Dinner**

Date: November 4, 2016  
Venue: Korean House



**QUICK LINK** Program at a glance | Abstract Submission | Registration | Travel Information

**KOSMI / (사)대한의료정보학회(대표자: 최진욱, 사업자번호: 208-82-03892)**  
1618 Kyungheegung Achim Bldg 3, 72 Naesoo-dong Chongro-ku, Seoul 110-872, Korea  
(서울특별시 종로구 내수동 72 경희궁의 마임 3단지 오피스텔 1618호)  
kosmi@kosmi.org for more information  
Tel: (82-2) 739-7657, (82-2) 734-7637 Fax: (82-2) 734-7763

**Organized by**  
**KOSMI**  
Korea Society of Medical Informatics

**Hosted by**  
**APAMI**  
Asia Pacific Association for Medical Informatics

**APAMI 2016 Secretariat** [Privacy Policy](#) [Terms of Use](#)  
Daso B/D 5F, 330, Yangjae-dong, Seocho-gu, Seoul 137-897, Korea  
info@apami2016.org for more information  
Tel: 82-70-4820-4830 Fax: 82-2-579-8761

# Contents



## Introduction



## NHI's Big Data



## My Health Bank

# Introduction



**Introduction**






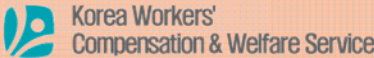
NHI's Big Data



My Health Bank

# Characteristics of NHI

## Single Insurer

Social Security System	Collecting Contribution	Insurer	Review & Assessment
Health Insurance			
Long-Term Care Insurance			
Pension Insurance			
Unemployment Insurance			
Industrial Accident Compensation Insurance			

## Universal Coverage

- Beneficiaries of NHI : 97.1%(50.3 mil) of the Total Population

※ Medical aid 1.4 mil. (2.8%)



Employee Insured (68.7%)

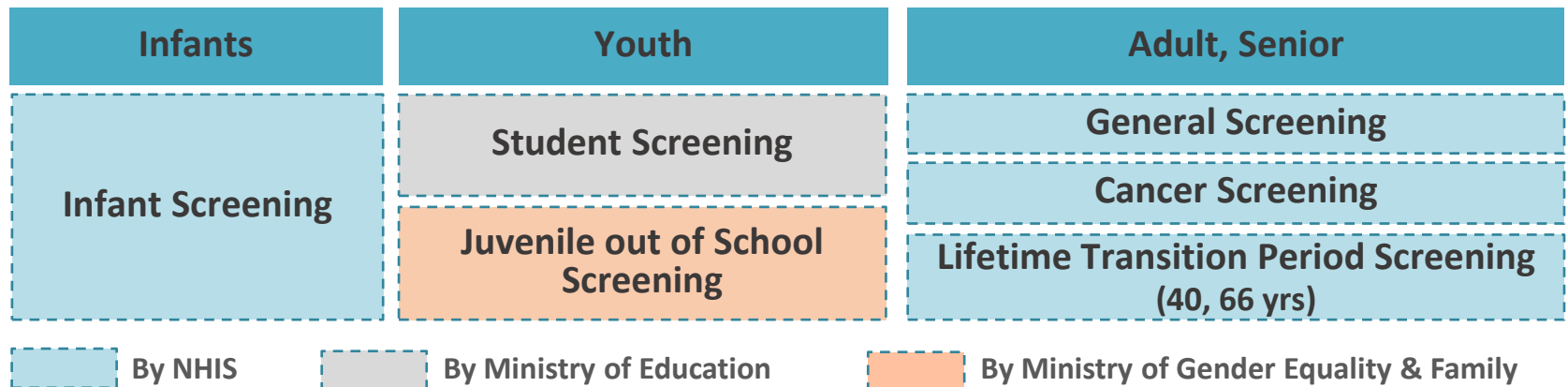


Self-employed Insured (28.4%)



# Characteristics of NHI

## Health Screening covering whole life cycle

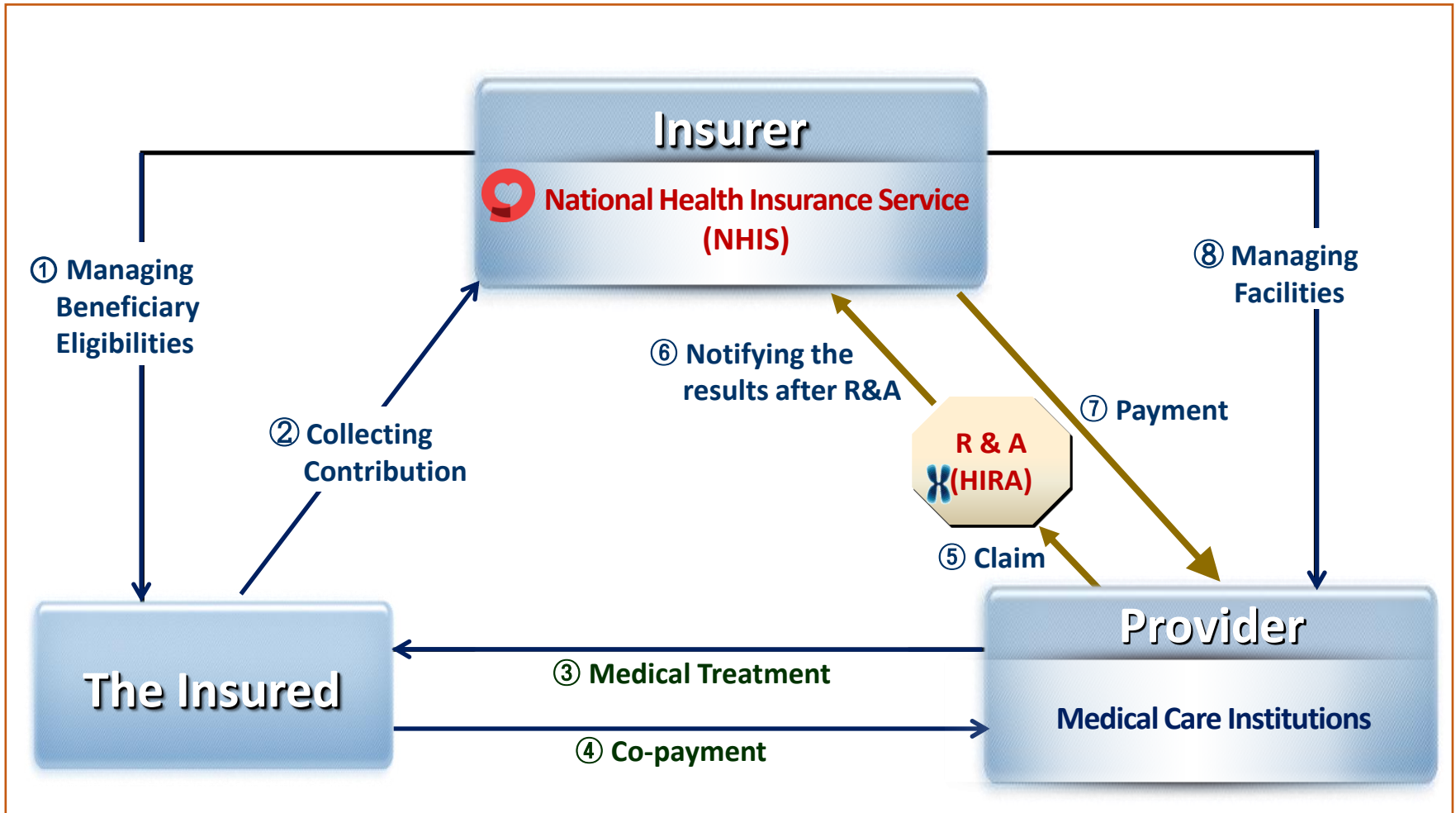


## Depends largely on Fee-For-Services

Service Type	Payment Type	% of Spending
Outpatient	Fee For Service	100.0
Inpatient	Fee For Service	80.3
	DRG for 7 minor surgical disease categories	7.2
	Per Diem for long-term care hospitals	12.5

# Operating System of NHI

## Health Insurance



# NHI's Big Data

I

Introduction

II

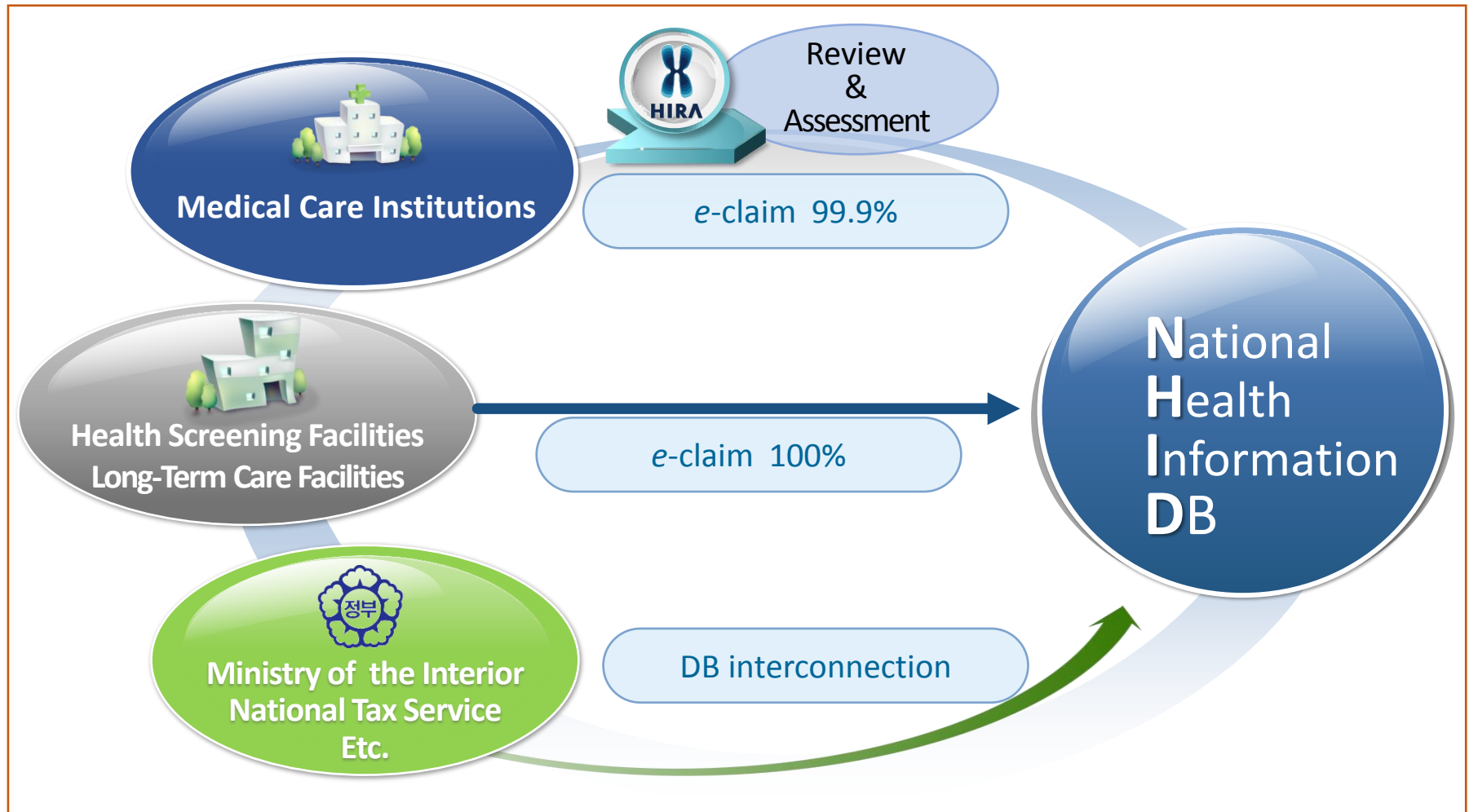
**NHI's Big Data**

III

My Health Bank



# Collecting NHI's Big Data



# Key Variable of NHI's Big Data

## Demographic & Social Variables

Demographic Variables	
Sex	Male / Female
Age	At visit / At year-end
Birth	Birth date
Death	Death date
Disability	15 disability types
	6 disability grade (severity)
	Registration date
Residential Area	of Patient / Workplace / Medical institution
	District level / Geocode level

Social Variables	
Beneficiary Type	Industrial workers & dependents
	Self-employees & dependents
	Medical Aid
Contribution	Amount
	Decile distribution ratio
	Adjusted amount
Workplace Type	Category of industry
	Size of workplace

# Key Variable of NHI's Big Data

## Health behavior & Biomedical Variables

Health Behavior Variables		Biomedical Variables	
Smoking	Smoking history	Body Measure	Height / Weight / Waist circumference
	Amount / Duration		Visual & Hearing acuity
Alcohol	Drinking history		BP (Systolic / Diastolic)
	Amount / Duration		FBS / CHOL / HDL / TG /LDL
Physical Activity	Walk / Moderate degree / Vigorous	Lab Test	Liver & Kidney function test
Disease History	Past & Family history of Cardiovascular disease & Cancer		Cancer
Mental Health	Recognition / Depression	Sigmoid or Colposcopy	
		Bx	

# Key Variable of NHI's Big Data

## Utilization & Provider Variables

Utilization		Provider	
<b>Disease</b>	ICD-10 code	<b>General Info.</b>	Founder(owner), Type of institution
<b>Utilization</b>	Inpatient / Outpatient	<b>Manpower</b>	No. of doctor, nurse, therapist
	ER / ICU		Type of license / qualification
	Length of stay (LOS)		
	Prescription days	<b>Facility</b>	Wards / Beds / ICU / ER
<b>Cost</b>	Payment / Copayment	<b>Device</b>	CT / MRI / PET ...
<b>Details</b>	Medical procedure & material		
<b>Medicine</b>	Ingredients		
	Brand name		
	Dosage		

# My Health Bank

I

Introduction

II

NHI's Big Data

III

**My Health Bank**

# PHR Based on NHI's Big Data

## NHI's Big Data

Health Screening	Questionnaire	Treatment	Prescription	Institution	Patient Registry	Eligibility
General, Cancer, Infant, etc.	General, Cancer, Infant, etc.	Type of Treatment, Date of Treatment, Length of Stay, etc.	Name of pharmacy, Date of Prescription, etc.	Institution Level, Location, Manpower, Medical Device, etc.	Severe Disease, Cancer, Rare Disease, etc.	RRN, Medical Aid, etc.



## Personal Health Record

### Internet Portal: [hi.nhis.or.kr](http://hi.nhis.or.kr)

- ✓ Membership : 5 million(~2015.8.30)
- ✓ Ranking No.1. among institutions under Ministry of Health and Welfare

### Web-based IT Knowledge and Experience



### Medical Professionals - Doctors, Nurses



# My Health Bank (main page)

Health Screening

My Health Bank

Healthy Life

Health Info.

A Story of Health

Junior Health Info.



Step1

A Guide to Screening

- 검진대상 조회
- 문진표 작성
- 발달선별 검사지 작성
- 건강검진 실시안내

Step2

My Health Bank

건강검진 결과 및 문진

개인별 맞춤형 건강관리 프로그램

생활습관 / 검진결과 건강예측 (건강나이/ 뇌졸중/ 심장질환/ 골다공증성 골절)

진료 및 투약정보

건강입력정보

자가건강진단

Step3

Healthy Life

비만개선

금연프로그램

운동과 생활

영양과 건강

건강증진센터

건강백세운동

건강수첩 찾기 >

검진기관/병원찾기

기관명칭 (병원, 의원, 보건소)

국민건강

다양하고 올바른

**건강정보 건강 IN**

2015년 건강IN  
메인이미지 공모전 수상작

2015  
우수상

건강IN 매거진



건강 **IN**  
magazine  
2015. 12

당당한 커리어 우먼  
이정진 씨의 발 쫓기

Good Times 100

# 1<sup>st</sup> Step- Health Screening Result

## Providing results accumulated for the latest 5 years



Health Screening

My Health Bank

Healthy Life

Health Info.

A Story of Health

Junior Health Info.

분야별 업무사이트 보기

인증서 로그인 | 이용약관

건강검진 > 건강검진실시안내 > 일반건강검진

My Health Care

나의건강정보

건강검진결과 및 문진정보

검진결과 맞춤형건강서비스

진료 및 투약정보

의약품 부작용 신고

본인건강정보입력

예방접종정보

개인별 맞춤형 통합 건강관리 프로그램

자가건강진단

증상평가

질환평가

여성건강

노인건강

정신건강

음주/영양/운동

건강상담/복약상담

건강상담

복약상담

Health Screening Results & Questionnaire info.

건강검진결과정보는 최근 5년간 국민건강보험공단에서 실시한 일반건강검진, 생애전환기건강진단, 암검진, 영유아 검진의 정보를 제공합니다.

문진정보는 해당년도와 전년도에 검진기관에서 공단으로 청구한 일반건강검진, 생애전환기 건강진단, 암검진, 영유아 건강검진 관련 문진정보를 제공합니다.

본인정보

영유아 정보

운전자적성검사용

John Smith's Health Screening Results

검진대상 | 본인

Listing Results

Counseling

Screening Type	Year	Date (yyyy.mm.dd)	Name of Facility	Physician's Opinion	Results	Details of Questionnaire
General / Life 1 <sup>st</sup>	2012	2012.09.11	John's Pumpkins Hospital	suspected Dyslipidemia		
일반/생애1차	2014	2012.09.11	대행병원	이상지질혈증의심 상담 및 추적검사 요망.		
일반/생애1차	2014	2012.09.11	대행병원	이상지질혈증의심 상담 및 추적검사 요망.		
일반/생애1차	2014	2012.09.11	대행병원	이상지질혈증의심 상담 및 추적검사 요망.		
일반/생애1차	2014	2012.09.11	대행병원	이상지질혈증의심 상담 및 추적검사 요망.		

인터넷 민원발급 프린터 목록 >

인터넷 민원발급 프린터 FAQ >

16



# 1<sup>st</sup> Step- Health Questionnaire

Providing questionnaires accumulated for the latest 5 years

Questionnaire Info.

Examinee Name

John Smith

RNN

771212-\*\*\*\*\*

Phone

82-10-123-4567

E-mail

JS@gmail.com

Address

Seoul

General Screening

Questions about your medical history

1. Disease history

Disease	Stroke (paralysis)	Heart Disease (cardiac infarction / angina)	Hypertension	Diabetes	Dyslipidemia	Tuberculosis	Others (including cancer)
Diagnosed or not	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medication or not	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. Family history

Disease	Stroke (paralysis)	Heart Disease (cardiac infarction / angina)	Hypertension	Diabetes	Others (including cancer)
---------	-----------------------	---	--------------	----------	------------------------------

Counseling

Results

Details of  
Questionnaire

# 1<sup>st</sup> Step- Medical Treatment & Medication

## Providing details claimed by providers for the latest 1 years

[Health Screening](#)[My Health Bank](#)[Healthy Life](#)[Health Info.](#)[A Story of Health](#)[Junior Health Info.](#)[홈](#) > [건강검진](#) > [건강검진실시안내](#) > [일반건강검진](#)

### My Health Care

#### 나의건강정보

[- 건강검진결과 및 문진정보](#)[- 검진결과 맞춤건강서비스](#)[- 진료 및 투약정보](#)[- 의약품 부작용 신고](#)[- 본인건강정보입력](#)[- 예방접종정보](#)

#### 개인별 맞춤형 통합 건강관리 프로그램

#### 자가건강진단

[- 증상평가](#)[- 질환평가](#)[- 여성건강](#)[- 노인건강](#)[- 정신건강](#)[- 음주/영양/운동](#)

#### 건강상담/복약상담

[- 건강상담](#)[- 복약상담](#)

### Information on Medical Treatment & Prescription

진료및투약정보는 최근 1년간 본인이 의료기관 및 약국을 방문한 내역으로 진료일자, 진료형태, 처방횟수, 투약일수 정보를 제공합니다. 본 정보는 병원약국에서 청구한 진료비/약제비 정보를 바탕으로 제공되므로 청구되지 않은 최근의 진료내역/약물정보는 바로 조회되지 않을 수 있습니다.

#### Your Data

#### Children's Data

검진대상 |

본인

검진기관/병원 통합검색 ▶ | 병원명을 입력하세요.

검색

최신순



No	Name of Clinic & Hospital (Pharmacy)	Date (yyyy.mm.dd)	Type of Service	Length of Stay	Day of Prescription	Day of Medication	Details of Medication
956	SNUH	2015.7.30	Outpatient	1	1	1	
955	Walblues	2015.7.30	Dispensing	1	1	1	
954	가람내과의원	2015.07.30	일반외래	1	1	1	
953	갈릴리치과의원	2015.07.30	처방조제	2	2	2	
952	강남정신과의원	2015.07.30	일반외래	1	1	1	

# 1<sup>st</sup> Step- Medical Treatment & Medication

Health Screening
My Health Bank
Healthy Life
Health Info.
A Story of Health
Junior Health Info.

건강검진 > 건강검진실시안내 > 일반건강검진

My Health Care
Information on Medical Visit & Prescription

Details of Treatment & Prescription
건강 *IN*
처방회수, 제공되므로

No.	Date (yyyymmdd)	Type of Institution	No. of Px	Name of Medicine	Efficacy	Day of Medication	Details of Medicine
1	20151104	Pharmacy	0	Alzetin Tab	For Allergy	3	🔍
2	20151104	약국	0	한국콜마록소프로펜나트륨 정 (Kolma Loxoprofen Sodium Tab. 60mg)	해열, 진통, 소염제	3	🔍
3	20151104	약국	0	레토프라정20mg	소화성궤양용제	3	🔍
4	20151104	약국	0	아세락캡슐200mg (Acera c Cap. 200mg)	진해거담제	3	🔍

닫기

953
갈릴리치과의원
2015.07.30
처방조제
2
2

952
강남정신과의원
2015.07.30
이바이제
1
1

검색

원신순

Day of Medication
Details of Medication

# 1<sup>st</sup> Step- Medical Treatment & Medication

## Drug Details



Name	Alzetin Tab		
Ingredients	Azelastine HCl 1mg		
ETC/OTC	ETC	Single / Complex	
MFR. / IMP.	Wonju Bio.	Seller	Wonju Bio.
Dosage Form	tablet	Route of Administration	oral
MOHW Classification	for allergy		
Benefits Info.	₩176 / 1 tab (2015-12-01)		
ATC code	R06AX19 AZELASTINE		
KPIC Drug Classification	Azelastine-HCl: allergy(including rhinitis, itching, etc.) > antihistamine > 2G		
DUR	[Contraindicated in combination] <i>nothing</i> [Age contraindication] under 6 years old [Contraindicated in pregnancy] azelastine HCl 2 <sup>nd</sup> grade: use carefully only if there are obvious clinical evidence/reason		



건강 iN	
Day of Medication	Details of Medicine
allergy	3

Efficacy

Dosage

Warning

Medication Counseling

### ▼ Efficacy

bronchial asthma, allergic coryza, urticaria, eczema, dermatitis, atopic dermatitis, pruritus cutaneous & itch

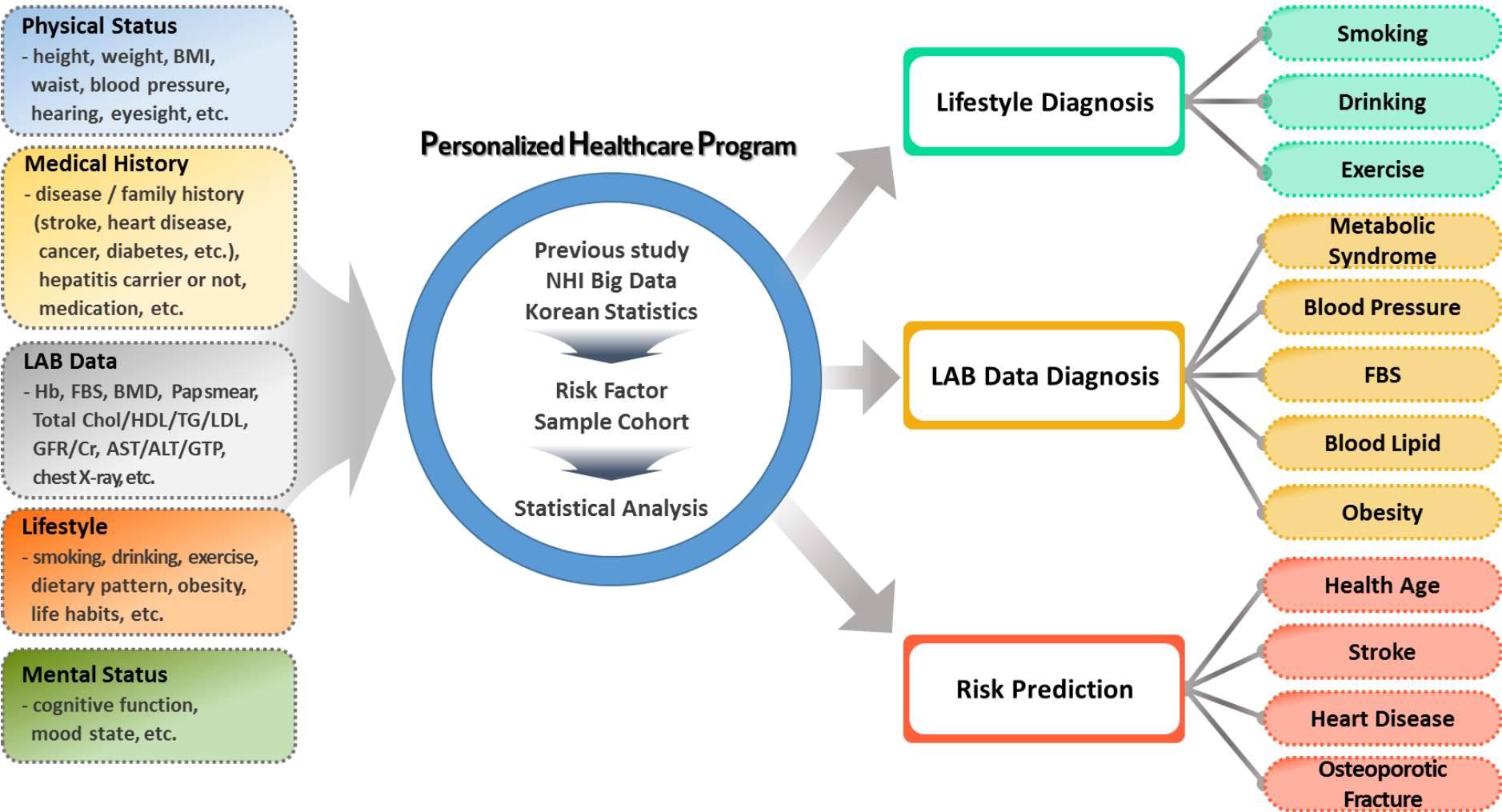
Efficacy

Dosage

Warning

Medication Counseling

# 2<sup>nd</sup> Step- Analysis



# 3<sup>rd</sup> Step- Diagnosis Summary

Health Age [More Info](#)

**34** yrs

Real Age  
**36** yrs

## Lifestyle Diagnosis

Fill-in

Smoking	You are smoker. Stop smoking!	<a href="#">diagnosis</a>
Drinking	Good job. Keep on your habits.	<a href="#">diagnosis</a>
Exercise	You need more exercise for your health.	<a href="#">diagnosis</a>

## Clinical Diagnosis

Fill-in

Metabolic Syndrome	N/A	<a href="#">diagnosis</a>
Blood Pressure	Your blood pressure is slightly higher than normal pressure.	<a href="#">diagnosis</a>
FBS	FBS is normal.	<a href="#">diagnosis</a>
Blood Lipid	LDL/TG/HDL is normal.	<a href="#">diagnosis</a>
Obesity	Normal weight/waist circumference	<a href="#">diagnosis</a>

## Risk Prediction

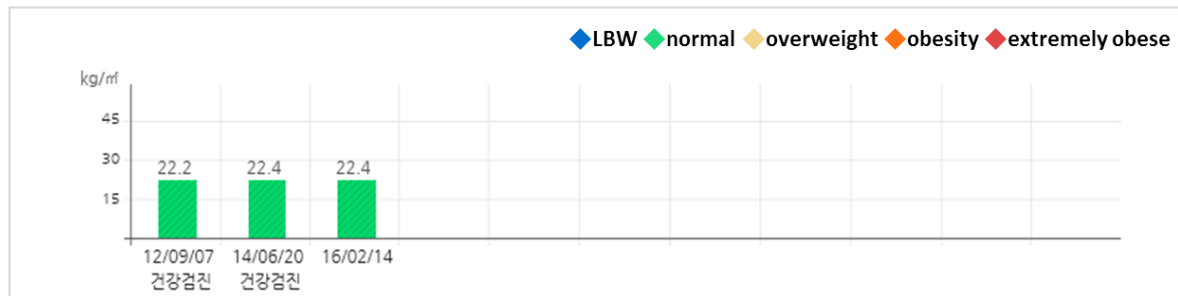
# 3<sup>rd</sup> Step- Diagnosis Summary

Providing time-series graphs to check the progress effectively

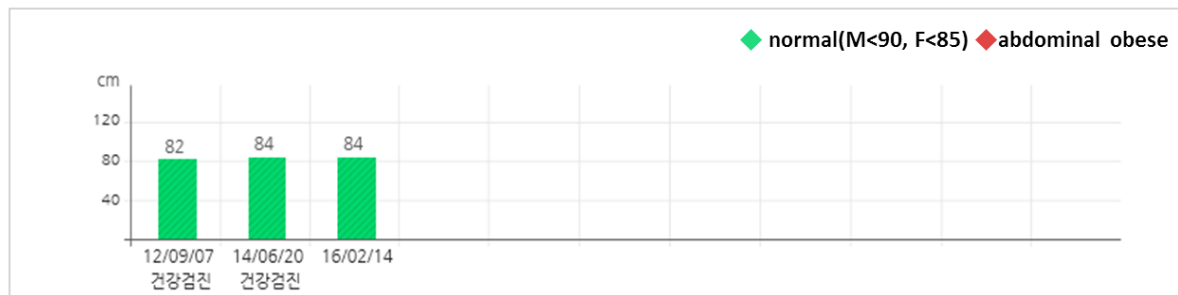


## Comparison of screening results

### BMI



### Waist



### Blood Pressure(systolic/diastolic)



# 3<sup>rd</sup> Step- Lifestyle Diagnosis (smoking)


HealthMore Info

Lifestyle Diagnosis


Fill-in

Smoking Lifestyle

2016/05/07

 **You are a smoker. Stop smoking** Anti-smoking-program

Diagnosis message Check your habits



흡연은 나와 주변인들의 건강을 해치는 나쁜 습관이며, 중독성 질환입니다. 담배와 담배연기에는 중독을 일으키는 니코틴을 포함하여 69종의 발암 물질과 4,000종 이상의 화학물질이 포함되어 있는 것으로 알려져 있습니다. 그 중에는 잘 알려진 발암물질(벤젠, 벤조피렌, 페놀 등) 뿐 아니라 독극물(청산가스, 비소 등)도 포함되어 있습니다. 이 물질들은 혈관을 통해 흡수되어 전신으로 퍼지게 됩니다. 따라서, 흡연은 다양한 암(폐암, 위암, 자궁경부암, 후두암, 췌장암 등)을 비롯해, 심혈관질환(동맥경화증, 뇌혈관질환 등), 호흡기질환(만성폐쇄성폐질환, 폐렴, 천식 등), 생식기계질환(임신 합병증 등), 피부질환 등의 발생원인이 됩니다. 주변 사람들 또한 간접흡연으로 인해 위와 같은 피해를 볼 수 있습니다. 금연을 하면 암을 비롯한 여러 질환 발생의 위험이 감소되고 건강하고 깨끗한 인상을 만드는 데 도움이 됩니다. 그 밖에도 입과 옷 머리 등에 밴 나쁜 냄새가 없어지며, 치아가 하얗고 건강해지며, 손가락의 착색이 사라집니다. 후각이 돌아와 식욕도 좋아지며, 계단을 오를 때 숨이 덜 차게 되는 등 흡연으로 인해 제대로 기능하지 못했던 신체가 회복되므로 꼭 금연하시기 바랍니다.

Willingness to stop smoking Check your willingness

You haven't filled in the questionnaire yet.

Risk Prediction

diagnosis

diagnosis

diagnosis

diagnosis

diagnosis

diagnosis

diagnosis



# 3<sup>rd</sup> Step- LAB Data Diagnosis (obesity)

**You have normal weight.**

Your BMI is 22.4kg/m<sup>2</sup>.

## Diagnosis message

Basic Survey



The formula of BMI is as the following :  
 **$BMI = \text{Weight}(kg) / [\text{Height}^2(m^2)]$**   
And normal range is between 18.5 and 23.

## Abdominal Obesity

**Your waist circumference is normal.**

Your waist is in normal range. It reflects the degree of abdominal obesity. If the waist of Korean male/female is more than 90cm/85cm, we call it as Abdominal Obesity.

## Dietary Life

Dietary Life  
Survey

**You have to fill in the questionnaire above all.**

## Optimal Calorie

Optimal Calorie  
Survey

Fill-in

diagnosis

diagnosis

diagnosis

Fill-in

diagnosis

diagnosis

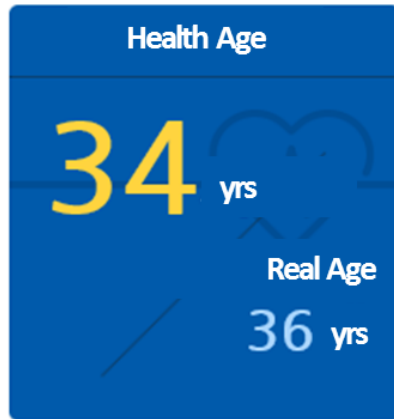
diagnosis

diagnosis

diagnosis

# 3<sup>rd</sup> Step- Health Risk Appraisal

## Providing health age compared to real age



You condition is good.

But you have some risk factors caused by bad lifestyle.

Smoking & lack of exercise will threaten your health in the future.

Managing of the following risk factor is necessary to prevent diseases.


Aerobic exercise is recommended for your healthy life.

(moderate: 150 M per week, intense: 75 M per week)

### Manage your risk factor

Risk factor	Your Status	If you manage your risk factor as below	Your status will be promoted as below	Recommendation
Smoking	Smoker	If you stop smoking	1.0 yrs younger	No smoking
Drinking	Drinker	If you drink a little alcohol	0.5 yrs younger	No drinking
Exercise	enough	If you exercise regularly	0.0 yrs younger	enough
BMI	22.4	If you keep ur weight on	0.0 yrs younger	18.5~23

# 3<sup>rd</sup> Step- Risk Prediction (stroke)

**Stroke** Risk Prediction

※ This program is not for medical disease diagnosis, but reference for self-care.

2016/05/07

Basic InfoBasic Survey

If you keep on your habit for the next 10 years?

The predicted degree of stroke risk is in the **Normal** range.  
There is a **2.19%** probability that you have stroke for the next 10 years.  
Your probability is **Higher** than the average of your age group, which is **1.8%**.

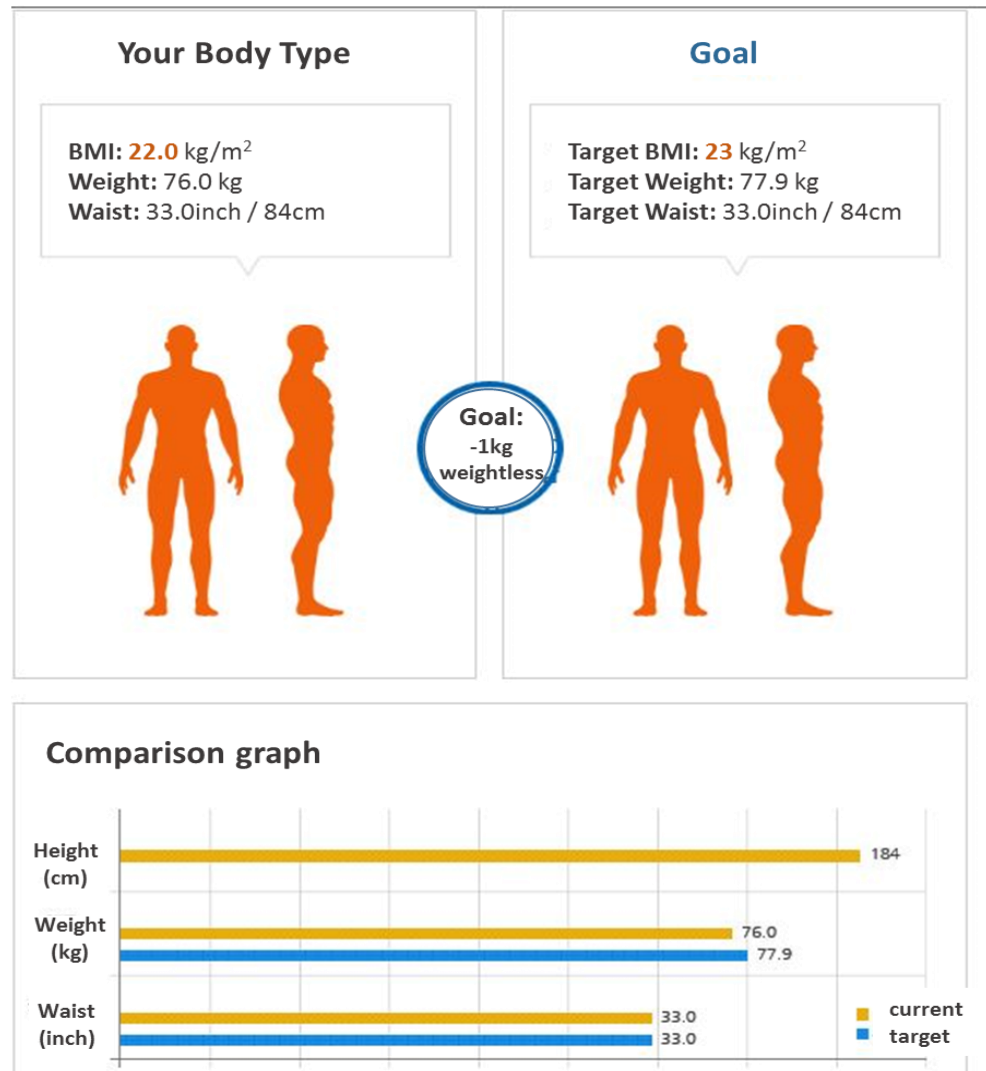
**Lifestyle you have to change**  
- To promote your health, you should manage risk factors of **Smoking, Exercise & Blood Pressure.**

view prescriptionview chart

Risk Factor	Your Status	Diagnosis	Recommendation
Smoking	Smoker	normalcaution <b>danger</b>	No smoking
Drinking	Drink a little bit	<b>normal</b> cautiondanger	No drinking
Exercise	more needed	normalcaution <b>danger</b>	enough
BMI	22.4	<b>normal</b> cautiondanger	under 23

# 4<sup>th</sup> Step- Self-Care Program (obesity)

## Goal setting by user



**Thank You  
For Listening**

**Kyunghee Cho, M.D.,MPH, Ph.D**  
**khchomd@gmail.com**

# APAMI 2016

2016.11.02 - 11.05  
The K-Hotel, Seoul, Korea

**Submission Deadline**  
**: July 10, 2016**

## Social Program


- Smart Hospital Tour
- Galar Dinner
- K-ICT IoT Open Lab Tour & Seoul City Tour

Connecting the Dots for  
Better Health through Informatics

**APAMI 2016**  
2-5 NOVEMBER, 2016 | SEOUL, KOREA


2016 Conference of  
**Asia Pacific Association for Medical Informatics**


2016. 11. 02 ▶ 05  
The K-Hotel, Seoul, Korea



**Submission Deadline is July 10, 2016**  
Win an opportunity to publish your submission  
in the **Computer Methods and Programs in Biomedicine**!

APAMI 2016 SPC will select high quality submissions and recommend them as prospective manuscripts to be published in the **"Computer Methods and Programs in Biomedicine (CMPB)"**, CMPB is a peer-reviewed journal with Impact Factor 1.89 based on the 2015 Thomson Reuters Journal Citation Reports.






**APAMI 2016**  [Submit Your Abstract Now!](#)

**Win Best Paper and Poster Awards!**


APAMI 2016 SPC will select high quality submissions for the following two categories of Award.

- Best Paper Award
- Best Poster Award




 **Social Program** [More](#)

**Smart Hospital Tour & Welcome Reception**




Date: November 2, 2016  
Venue: Seoul National University Bundang Hospital

**Farewell Dinner**




Date: November 4, 2016  
Venue: Korean House

 **QUICK LINK** [Program at a glance](#) | [Abstract Submission](#) | [Registration](#) | [Travel Information](#)

**KOSMI / (사)대한의료정보학회**(대표자: 최진욱, 사업자번호: 208-82-03892)  
1618 Kyungheegung Achim Bldg 3, 72 Naesoo-dong Chongro-ku, Seoul 110-872, Korea.  
(서울특별시 종로구 내수동 72 경희공의 미암 3단지 오피스텔 1618호)  
[kosmi@kosmi.org](mailto:kosmi@kosmi.org) for more information  
Tel: (82-2) 733-7657, (82-2) 734-7637 Fax: (82-2) 734-7763

**APAMI 2016 Secretariat** [Privacy Policy](#) [Terms of Use](#)  
Daso B/D 5F, 330, Yangjae-dong, Seocho-gu, Seoul 137-897, Korea  
[info@apami2016.org](mailto:info@apami2016.org) for more information  
Tel: 82-70-4820-4830 Fax: 82-2-579-8761

Organized by  
 **KOSMI**  
Korea Organization for Statistical Medicine Informatics

Hosted by  
**APAMI**  
Asia Pacific Association for Medical Informatics