

# The Asian Pharmacometrics Network: The historical background, establishment, objectives and roles, and recent activities

**The Asian Pharmacometrics Network (APN) has been established to enhance regional development in pharmacometrics by holding annual regional symposiums and to provide training opportunities across Asia by hosting educational workshops. Starting with nine member countries in 2017, APN has been expanded to include up to 16 countries as of December 2021. We are presenting this article to describe the historical background, establishment, objectives, roles, and recent activities of APN.**

## ORIGIN OF APN

### World Conference on Pharmacometrics

The establishment of the Asian Network in Pharmacometrics dates back to 2012 when the first World Conference on Pharmacometrics (WCoP) was held in Seoul, Korea, on September 5–7, 2012.<sup>1</sup>

The WCoP in 2012 (WCoP2012), comprising the satellite workshops and the main symposium, was a big success with 333 participants; among them, the number of foreign participants was 218 (65%), including 98 (29%) from outside Asia, which is the largest number and percentage of foreign participants in any pharmaceutical meeting held in Korea to date. The satellite workshops provided opportunities for hands-on training in the use of pharmacokinetic–pharmacodynamic modeling software such as NONMEM, Phoenix WinNonlin, Phoenix NLME, and Monolix, and learning newly emerging modeling approaches such as physiologically based pharmacokinetic (PBPK) and target-mediated drug disposition models.

As a result of such success, it turned out that WCoP2012 contributed to fueling the interest in pharmacometrics among Asian countries.

### Regional Advisory Committee of WCoP2012

During the WCoP2012 period, the members of the regional Advisory Committee (AC) of WCoP2012 (Atsunori Kaibara for Japan, Feng Guo for China, Chun-Jung Lin for Taiwan, Lai-San Tham for Singapore, Surulivel Rajan for India, and Kyungsoo Park for Korea) initiated a discussion on how to develop and promote pharmacometrics in the Asian region. This marked the beginning of the creation of the Asian Network in Pharmacometrics.

## PHARMACOMETRICS STATUS IN ASIA BEFORE WCOP2012

The extent of pharmacometrics development of a region can be judged by the existence of pharmacometrics groups and the experience in hosting international pharmacometrics meetings and workshops. For pharmacometrics groups, four formal groups existed in Asia before WCoP2012, namely, the Professional Committee of Pharmacometrics of China (PCPC) founded in 1979, the Population Approach Group in Japan (PAGJA) founded in 1985, the Population Approach Group in Korea (PAGK) founded in 2006, and the Population Approach Group India (PAGIN) founded in 2008.

International pharmacometrics meetings and workshops held before WCoP2012 are summarized in Table 1. It is apparent that continually growing interest in pharmacometrics existed in the East Asian region before WCoP2012.

## JOINT INTERNATIONAL SYMPOSIUMS EMERGING AFTER WCOP2012

Building on the success of WCoP2012, efforts were made to establish international symposiums jointly organized

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**TABLE 1** International pharmacometrics meetings and workshops held in Asia before WCoP2012

<b>(a) Pharmacometrics meetings</b>			
<b>Title</b>	<b>Place</b>	<b>Month/year</b>	
Lewis Sheiner Memorial Symposium in Modeling & Simulation <sup>8,a</sup>	Seoul, Korea	November 2006	
The International Symposium on Quantitative Pharmacology (IQSP) <sup>b</sup>	Nanjing, China	October 2007	
<b>(b) Pharmacometrics workshops (selected)</b>			
<b>Title</b>	<b>Instructors</b>	<b>Place</b>	<b>Month/year</b>
PAGANZ with hands-on NONMEM Workshop (PAWS)	Nick Holford, Carl Kirkpatrick, Bruce Green	Singapore	February 2007
Intermediate NONMEM Workshop	Dennis Fisher, Steve Shafer	Seoul, Korea	February 2008
Sheiner/Rowland Advanced PK/PD Course <sup>9</sup>	Leon Aarons, Nick Holford, Mats Karlsson, France Mentre, Steve Duffull	Seoul, Korea	September 2009
Uppsala NONMEM Workshop <sup>10</sup>	Mats Karlsson, Andrew Hooker, Radokja Savic	Seoul, Korea	September 2010
NONMEM Workshop	Nick Holford Steve Shafer	Beijing, China	October 2010
Hands-On Workshop on Basic Pharmacokinetics and Pharmacodynamics Modeling	Nick Holford	Kuala Lumpur, Malaysia	February 2012
Workshop on Population Pharmacokinetics and Pharmacodynamics	Marc Gastronguay et al.	Taiwan	2012

WCoP2012, World Conference on Pharmacometrics in 2012; PAGANZ, The Population Approach Group of Australia and New Zealand.

<sup>a</sup>Lewis Sheiner Memorial Symposium: with 24 speakers invited, consisting of 19 international (12 outside Asia) and five domestic experts, it was a forerunner that set the momentum for Asian countries in hosting international pharmacometrics meetings.

<sup>b</sup>The second and third ISQPs were held in 2010 and 2011, respectively.

by different countries or pharmacometrics groups in Asia. The first outcome of such efforts was the first PAGJA-PAGK Joint Symposium, which was held on November 28, 2013, in Seoul, Korea,<sup>2</sup> followed by the second PAGJA-PAGK Joint Symposium held on November 7, 2014, in Kobe, Japan. With PCPC joining, the PAGJA-PAGK Joint Symposium then developed into Asian Pharmacometrics Conference (APC) in 2017.

## ESTABLISHMENT OF APN

Influenced by such joint activities to network between local organizations of the three countries, in December 2014, Kyungsoo Park was elected as the first International Society of Pharmacometrics (ISoP) board member representing the Asian region, and ISoP's inviting him to be a board member was part of its mission to extend its role in promoting pharmacometrics to the Asian region.

Motivated by this, in 2015 the AC members resumed the discussion they initiated during WCoP2012 on developing

and promoting pharmacometrics in the Asian region. In doing so, two Southeast Asian countries, namely, Thailand and Malaysia, joined the AC, resulting in the number of AC members increasing from six to eight, and the AC was renamed the APN.<sup>3</sup>

Later in January 2017, as Vietnam joined the APN, the number of APN member countries increased from eight to nine, and the representatives of each country formed the inaugural APN board. Then, after the first APN symposium in 2019, five new representatives from Indonesia, Myanmar, Nepal, Sri Lanka, and Cambodia joined the APN board, and in 2021, Pakistan joined APN in January and Brunei in November, expanding the number of APN member countries up to 16 (Table 2).

The establishment of APN was endorsed by the APN steering committee, which consists of representatives of local pharmacometrics groups of PAGJA, PAGK, PCPC, and PAGIN.

APN and APC are independent from each other and run differently. How they differ is described in detail in the Supplementary Information.

**TABLE 2** APN board members

Name	Affiliation <sup>a</sup>	Country
Kyungsoo Park <sup>b</sup> (Chair)	Yonsei University	Korea
Atsunori Kaibara <sup>b</sup>	Eli Lilly	Japan
Rujia Xie <sup>b,c</sup>	Pfizer	China
Keyue Ma <sup>d</sup>	Pfizer	China
Ao Peng <sup>e</sup>	Pfizer	China
Chun-Jung Lin <sup>b</sup>	National Taiwan University	Taiwan
Yunn-Fang Ho <sup>f</sup>	National Taiwan University	Taiwan
Lai-San Tham <sup>b</sup>	Eli Lilly	Singapore
Surulivelrajan Mallayasamy <sup>b,g</sup>	Manipal College of Pharmaceutical Sciences (MCOPS), Manipal Academy of Higher Education	India
Korbtham Sathirakul	Mahidol University	Thailand
Yoke-Lin Lo	International Medical University	Malaysia
Van Toi Pham	Oxford University Clinical Research Unit	Vietnam
Manh Hung Tran <sup>h</sup>	University of Medicine and Pharmacy	Vietnam
Akhmad Kharis Nugroho	Universitas Gadjah Mada	Indonesia
Khin Myo Oo	University of Mandalay	Myanmar
Bimal Kunwar	Nobel College of Health Science	Nepal
Uthpali Mannapperuma	University of Colombo	Sri Lanka
Kimheang Ya	University of Puthisastra	Cambodia
Muhammad Usman	University of Veterinary and Animal Sciences	Pakistan
Long Chiau Ming	Universiti Brunei Darussalam	Brunei

Abbreviations: APN, Asian Pharmacometrics Network; WCoP2012, World Conference on Pharmacometrics in 2012; AC, regional Advisory Committee of WCoP2012.

<sup>a</sup>Board members' affiliation history with local pharmacometrics groups: Kyungsoo Park: president of Population Approach Group in Korea (2011–2014) and board member of Korean Society of Clinical Pharmacology and Therapeutics (2009–); Atsunori Kaibara: vice president of Population Approach Group in Japan (2003–2018) and leader of Model-Informed Drug Development (MIDD) Task Force in Japan–Pharmaceutical Research and Manufacturers of America (PhRMA) (2020–); Rujia Xie: committee member of Professional Committee of Pharmacometrics of China (2013–2017); Surulivelrajan Mallayasamy: secretary of Population Approach Group India (2010–2020); Yoke-Lin Lo: chairperson of the Population Approach Group of Malaysia (2019–2021 February) and committee member (February 2021–).

<sup>b</sup>AC members of WCoP2012.

<sup>c</sup>Rujia Xie replaced Feng Guo, a founding AC member of China.

<sup>d</sup>Keyue Ma replaced Rujia Xie as of November 2020.

<sup>e</sup>Ao Peng replaced Keyue Ma as of August 2021.

<sup>f</sup>Yunn-Fang Ho replaced Chun-Jung Lin as of August 2019.

<sup>g</sup>Surulivelrajan Mallayasamy replaced Ram Sankaran, a founding AC member of India.

<sup>h</sup>Manh Hung Tran replaced Van Toi Pham as of August 2019.

## OBJECTIVES AND ROLES OF APN

The APN has started with the following objectives and roles:

### Objectives

- (i) Enhance and expand regional development and networking opportunities in pharmacometrics by holding annual symposiums outside Japan, China, and Korea and thereby giving a local stimulus.
- (ii) Provide training opportunities to future pharmacometricians by holding regular and affordable educational workshops.

Compared with WCoP's objectives,<sup>1</sup> one can see that, in addition to the similar objective of enhancing development and networking opportunities in pharmacometrics, APN has an additional objective of training future pharmacometricians by holding educational workshops in the region.

The symposium venue will rotate among member countries; however, considering a series of international symposiums and workshops already held in China, Japan, and Korea, these three countries will not be preferred locations in the beginning years. This is to facilitate the development of pharmacometrics outside the three countries, thereby giving a local stimulus. Thus, APN will be working toward having an annual

continental meeting that is an educational opportunity open to all globally similar to Population Approach Group in Europe (PAGE), the flagship regional meeting on the globe.

## Roles

Through annual symposiums and workshops, the APN is expected to become the main channel to promote networking and training opportunities for pharmacometrics communities in the Asian region, similar to PAGE. In addition, by accumulating real-world data within the network, APN will build up a regional Big Health Data network, thereby creating real-world evidence useful for drug development and treatment in the region. Last but not least, APN will develop a program to collaborate with the two other regional pharmacometrics networks, the Ibero-America Pharmacometrics Network and the Pharmacometrics Africa, thereby bridging collaborations between Asia and the rest of the world.

## RECENT ACTIVITIES OF APN

### The 2019 APN symposium

The first APN symposium, hosted by the Faculty of Pharmacy, Mahidol University, under the direction of Dr. Korbtham Sathirakul, was held on November 19–20, 2019, in Bangkok, Thailand, along with satellite workshops on November 18.<sup>4</sup>

In this inaugural 2019 APN symposium, approximately 200 people participated, which implies that in terms of launching APN, the inaugural APN symposium was an overwhelming success.

Also, speaker allocation was well balanced across countries, with 18 speakers invited from nine APN countries (six from Thailand; two each from India, Japan, Korea, and Taiwan; and one each from Malaysia, Nepal, Singapore, and Sri Lanka).

This balanced speaker allocation is attributed to APN's efforts to enhance and expand regional development and networking opportunities by holding the symposium outside Japan, China, and Korea. Therefore, APN 2019 achieved its goal of providing a pan Asian networking opportunity, which cannot be seen in other international meetings in Asia, including APC.

Two satellite workshops were held, one focusing on PBPK instructed by Dr. Korbtham Sathirakul of Mahidol University, Thailand, and the other on quantitative systems pharmacology instructed by Dr. Dongwoo Chae of Yonsei University, Korea.

### The 2020 APN symposium

The second APN symposium, hosted by the Society of Pharmacometrics and Health Analytics of India under the direction of Dr. Surulivelrajan Mallayasamy of the Manipal Academy of Higher Education, was held on November 18–19, 2019, as a virtual meeting because of COVID-19 restrictions, with registration fees waived to encourage participation.<sup>5</sup>

The 2020 APN symposium was also a success, with 365 people registered. Among the 18 invited speakers, 16 were from eight APN countries (India, Japan, Korea, Singapore, Thailand, Indonesia, Nepal, and Sri Lanka), also showing a balanced distribution of speaker participation among APN countries.

In this symposium, eight student speakers were also invited from APN member countries to provide presentation opportunities for future pharmacometricians for education and training purposes.

The satellite workshop, instructed by Dr. Vijay Ivaturi of the University of Maryland School of Pharmacy, United States, was held on November 20 with the topic "A New Age Modeling and Simulation Platform Pumas."

### The 2021 APN workshop

The 2021 APN educational workshop titled "Basic Pharmacometrics Course Using Monolix," hosted by the Faculty of Pharmacy Universitas Gadjah Mada, Indonesia, under the direction of Dr. Akhmad Kharis Nugroho, was held virtually on June 3, 2021.<sup>6</sup> The course was intended to focus on familiarizing students and scientists who are new to or wish to advance their knowledge in the area of pharmacometrics. In the workshop, the maximum capacity of 200 participants registered.

### The 2021 APN symposium

The third APN symposium, hosted by the College of Medicine, National Taiwan University under the direction of Dr. Yunn-Fang Ho, was also held virtually because of COVID-19 restrictions on November 25–26, 2021, along with satellite workshops on November 21–24.<sup>7</sup>

Similar to the 2019 and 2020 symposiums, the 2021 APN symposium was also a success, with 268 people registered and speakers invited equally from 10 APN countries (two from Taiwan and one each from Japan, China, Korea, Singapore, India, Malaysia, Indonesia, Vietnam, and Pakistan), and seven student speakers were invited from APN countries.

For satellite workshops, Dr. Vijay Ivaturi gave a Pumas workshop on November 21–24 with the same topic as his 2020 APN satellite workshop but with advanced material, and Dr. Holford gave a satellite workshop on November 24 with the topic “Disease Progress and Drug Action,” which was organized for those to be trained as future workshop instructors.

## INFLUENCE OF RECENT ACTIVITIES OF APN







The high attendance at APN symposiums so far has been positively correlated with academic achievements in the region. Although this might have been attributed to other drivers, as an example, we noted that the number of pharmacometrics-related publications in APN countries, except for China, Japan, and Korea, doubled from 21 to 41 during the period from 2019 to 2021 when searched in PubMed.

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## CONFLICT OF INTEREST

The authors declared no competing interests for this work.

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