

First steps in an uncharted territory

by WFNMB

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A new era of World Federation based on new statutes

The World Federation of Nuclear Medicine and Biology (WFNMB) has evolved into its new governance while establishing a new vision, which basically focuses on getting back to its foundational spirit of decades ago. Almost two generations have passed between the birth of the Federation and when the statutes were revised in 2015, which has framed anew the future of the Federation. After the new executive leadership was elected in 2016 according to the revised statutes, we the elects prepared ourselves for the coming term of 2 years. The core of the revised statutes is to separate the job of the congress and the Federation tasks. The congress chair was independently elected and is now preparing the quadrennial World Congress. This initially appeared as simply a separation of the roles of the president and president's congress. However, the intention of introduction of the new statutes has gradually emerged in recent years and now it is that the Federation will work continuously for the member countries via establishing the real-time communication with the country leaders, and coordinating global endeavors to help the country leaders to help their own people via globally promoted nuclear medicine. Therefore, the tradition of the foundation of the Federation revived as a new spirit in this amendment, and in 2016, for the first time, 49 countries expressed

their sincere interest to support this change while participating in the election of a new breed of the leaders in the Federation.

Current global status of nuclear medicine

The current status of nuclear medicine was already reported in the International Atomic Energy Agency (IAEA) NUMDAB as a database and other publications on the Internet, and visualized in a way that every country delegate could recognize easily (Fig. 1). This included the number of nuclear medicine physicians (Fig. 1a) and the clinical volume of imaging and therapy of nuclear medicine (Fig. 1b)[1]. We could see the Great Divide and polarization between the advanced countries and the developing nations in both the number of nuclear medicine experts and the volume of the current clinical nuclear medicine procedures. Furthermore, the log-log plot of the relationship between the number of nuclear medicine physicians and the country's population (Fig. 2a) and between the clinical volume and the country's GDP (Fig. 2b) immediately showed the needs of each country, for example, some countries need to raise the next generation nuclear medicine experts to keep up with the necessary number of nuclear medicine physicians, while other countries need to increase the volume of nuclear medicine practices with already sufficient

number of nuclear medicine physicians [2].

Obviously, these figures do not show any quality of performance of nuclear medicine or the future-prospective basic and clinical researches, which should have been done by all the current experts all over the world, but has been done only by the pioneering leaders of the advanced countries. These pioneering leaders include physicians and physicists who opened the era of hybrid imaging, chemists and pharmacists who invented all the radiopharmaceuticals for imaging and recently are leading us to theranostics future of nuclear medicine. Nevertheless, such figures do not consider other factors such as how to start new departments or new institutions launch nuclear medicine facilities or how to persuade the public, governments, and regulatory bodies, and finally peer clinicians who are taking care of patients on their everyday routine. The IAEA has supported, is

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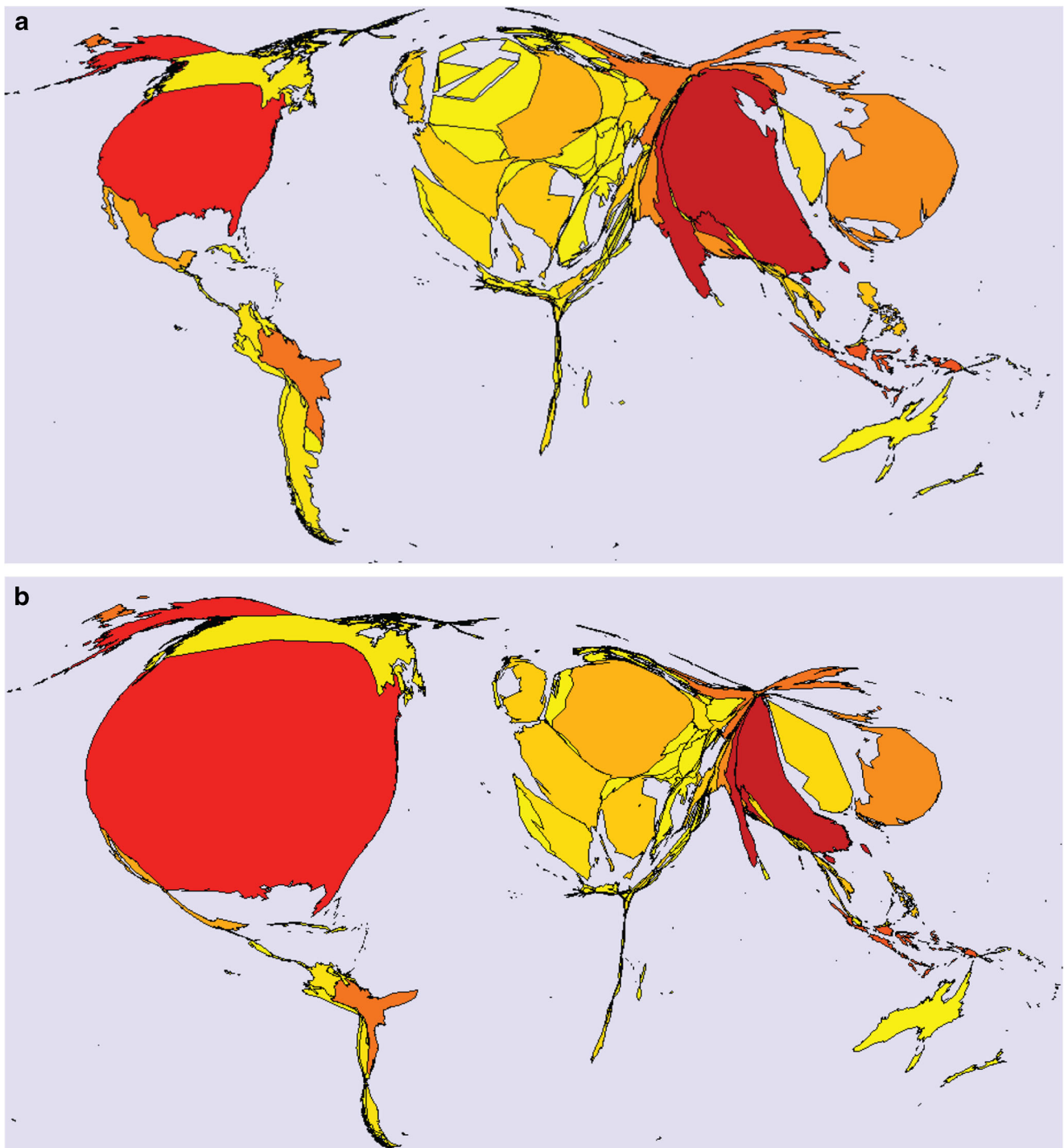


Fig. 1 a) Global Status of Nuclear Medicine: Physicians. Each country's area was transformed to represent the number of physicians. b) Global Status of Nuclear Medicine: Clinical Volume. Each country's area was transformed to represent the annual number of clinical procedures of nuclear imaging and therapy. The number of physicians and clinical

volumes are based on the NUMDAB IAEA, 2015 and DDM2 Report EU, 2015 and the documents on the Internet. The map was generated using MAPresso (<http://www.mapresso.com>) which was an open source software program [1]

currently helping and will continue to nudge/encourage the global community of nuclear medicine. However, the World Health Organization (WHO) does not yet recognize nuclear medicine in the category of 'essential medicines and

technology'. Thus, the member countries have suffered from a lack of experience or resistance of inertia of their own society's socio-cultural developmental status when they were trying to promote nuclear medicine. How to determine the

imminent and solvable issues for these countries lie on the doorstep of the new leadership.

New leadership on board of the WFNMB

As of the 1st of January 2019, the new leadership of the WFNMB will be on board. In accordance with the revised statutes of the WFNMB on August 2015, Dong Soo Lee will start his term as the president from 2019 to 2020. Patricia Bernal Trujillo and Savvas Frangos will serve from 2019 to 2021 as the secretary general and the treasurer, respectively. The World Federation was established on October 26, 1970, in Mexico. Hideo Ueda was elected as the first Federation president, with Masahiro Iio as the secretary general and Sadatake Kato as the treasurer [3]. Since the first election, presidents, secretary generals and treasurers have been elected with the main scope to organize the World Congress of Nuclear Medicine and Biology, which had been held every 4 years, parallel to taking care of Federation tasks [4].

The new leadership seeks to propagate the development of nuclear medicine at first through the better communication with countries (and their leaders) all over the world. This communication will be initiated through an online platform called WFNMB Portal, <http://www.wfnmbportal.org/>. In the portal, there is a place for each country to share their opinions and the news of their countries and regions. There are also places for regional activities such as the World Health Organization (WHO) Liaison Task Force Team, Trans-Eurasia Information Network (TEIN), and any other new projects. It is important to share and connect the educational materials and training programs that we already have and distribute this information using the advanced information networks. This valuable asset will help the next generation of nuclear medicine in the Asian, Latin American and African countries, where nuclear medicine is still developing. We started two projects through this global communication; one is TEIN [5], information technology infrastructure and the other is the collaboration with WHO. TEIN is a high-speed research and education network (REN) which receives funding support from the European Union (EU). It uses the information and communication technologies to increase regional cooperation with Asian countries and to bridge the digital divide of less developed regions [6]. AfricaConnect2 is another REN promotion project run by the EU for African countries.

Internal networking of global nuclear medicine community

We have already seen the great progress of nuclear medicine and the pioneering efforts of European leaders to

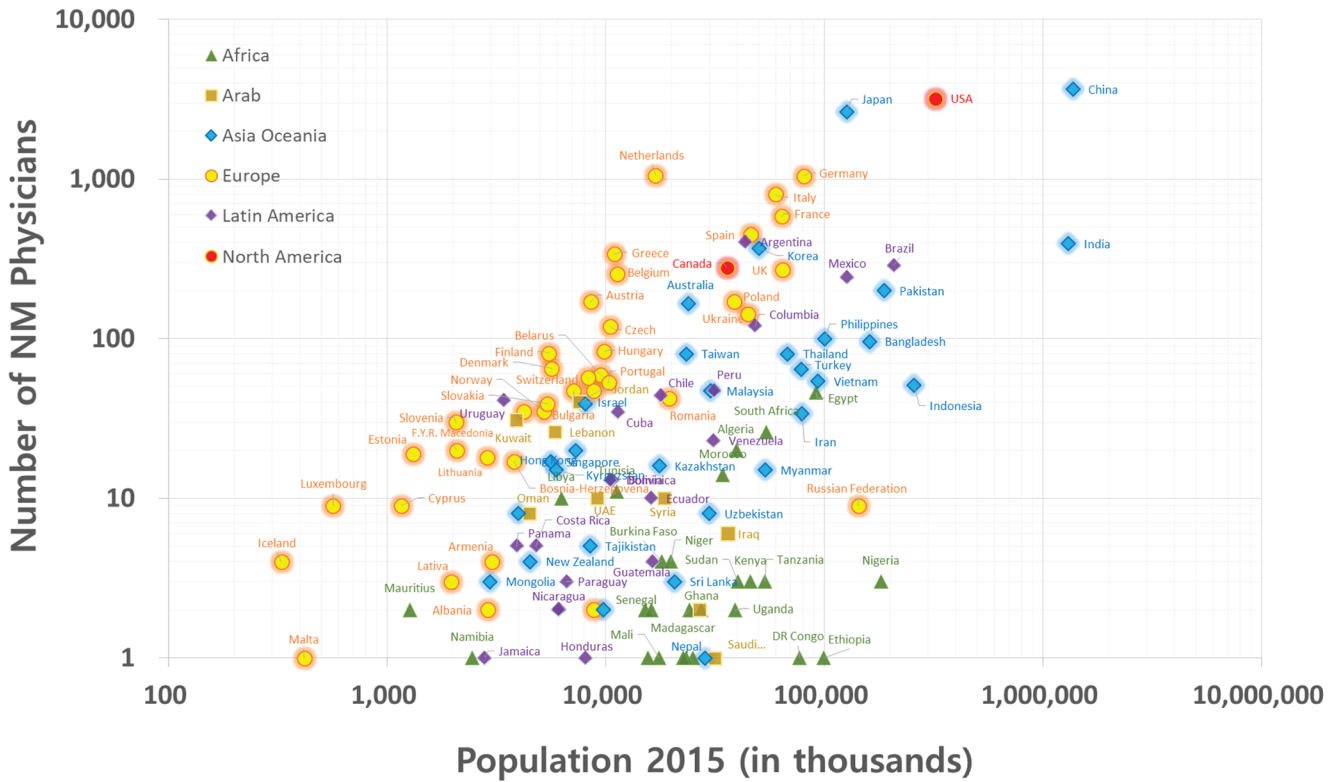
herald the prospect of the future of nuclear medicine, which is theranostics. After the surge of hybrid imaging with PET/CT, PET/MRI and SPECT/CT which obligated the nuclear medicine society to install the costly instruments globally, we are now reinventing our discipline as therapy-oriented and combined therapy and imaging to facilitate personalized medicine. It also includes the invention of new radiopharmaceuticals and easy ways of evaluating radiation doses and safety as well as incorporating those inventions into the well-established evidence-based treatment procedures against any kind of diseases from which the people of the world, regardless of their economic status, are suffering.

We have many guidelines and research results or appropriate use criteria, as well as guidelines to comply with published by advanced countries when we try to start the new treatments with radionuclide and radiopharmaceuticals. This is sometimes a help, in other times an obstacle in developing countries. The limited number of dedicated excellent scientists reside only in the advanced institutions in advanced countries, which makes it difficult to introduce this new discipline of theranostics around the global community of nuclear medicine. Industry support would have been mandatory in diffusing our high-tech hybrid imaging technology to developing countries and thus we are still seeing, at global level, the Great Divide in implementing nuclear medicine.

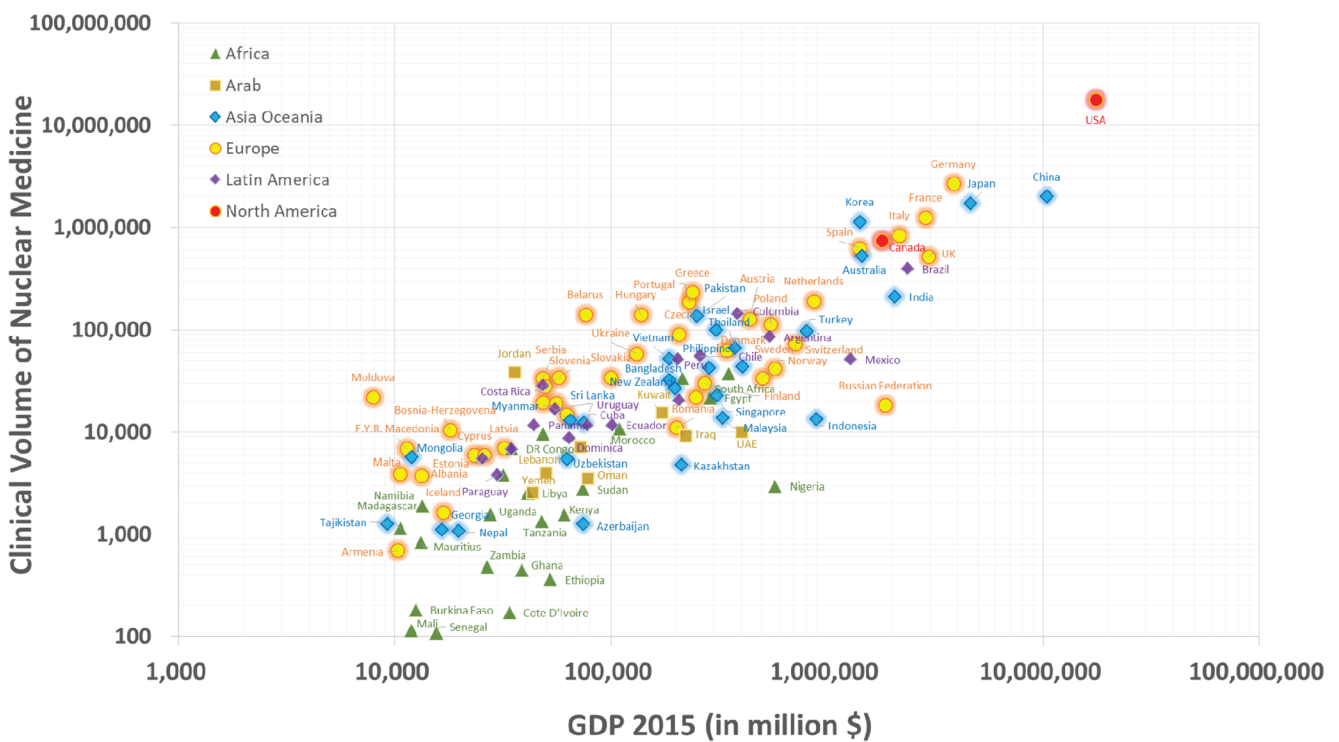
In the middle-income countries, Nigeria, for example, needs start-up nuclear medicine institutions (otherwise the patients must fly to Ghana from Nigeria to be treated with radioiodine), whereas Bangladesh needs physicists and chemists to level up the running of cyclotrons and better use of PET/CT, while Malaysia needs a user perspective of installing new treatment of theranostics in new institutions with limited GMP resources only after successful persuasion of the Ministry of Health (even though they treated 58 Korean neuroendocrine tumor patients in 2017, who flew from Korea to Malaysia because of the regulatory approval of use of Lu-177 treatments on waiting in Korea).

Likewise, every country has different problems to solve in order to help their patients at least in adopting novel or well-established treatments in nuclear medicine. As a global organization, WFNMB should contribute to understand, communicate and solve these problems. The Federation does not have any infrastructure of governance and it is not a UN organization. It is based on the volunteers' efforts to take on this almost intractable responsibility. However, fortunately, this Federation is composed of the leaders of the continental Federation (AOFNMB)/ Associations (EANM, ALASBIMN, AANM)/ Societies (SNMMI, ARSNM, ANZSNM)/ even Council (ARCCNM) in its Executive Board, so they can incorporate the efforts of this continental leadership. The WFNMB can nudge the constituting executive board

a Number of NM Physicians vs. Population 2015



b Clinical Volume of NM Procedures vs. GDP 2015



◀ **Fig. 2** a) Number of NM Physicians vs. Population 2015. b) Clinical Volume of NM Procedures vs. GDP 2015. The number of nuclear medicine physicians and clinical volumes are based on the NUMDAB IAEA, 2015 and DDM2 Report EU, 2015 and the documents on the Internet. The population data are from UN, 2015 and GDP data from the World Bank [2]

members to help their member countries and further coordinate inter-continental activities, for example, to help Sub-Saharan African countries or to attend to the countries which belong to the CIS (Commonwealth of Independent States).

We call this endeavor ‘internal networking’. Interestingly, the EU had started their Official Developmental Assistance (ODA) in order to install and expand National Research and Education Network (NREN) infrastructure in Asian developing countries for over a decade ago by the help of experts in Singapore and Hong Kong and recent contributions of Korea by running its fixed office (TEIN-CC). The EU also installed NREN infra several years ago in the African countries in order to help the Arab states (ASREN), the Western and Central African countries (WACREN), and the Southern and Eastern African countries (Ubutunet). We can use this infrastructure or even a mobile environment to prepare the next-generation leaders to be capable of connecting to the events, either regional or national, and learn the recent progress customized to the regions or the nations.

Last July, a workshop was held in Seoul with the TEIN [7]’s support, and over 17 nuclear physicians from Bangladesh, Indonesia, and Vietnam and other Asian countries were invited. This workshop was multicasted to other Asian countries. The AfricaConnect2 [8] in Africa and RedCLARA [9] in Latin America, which are also related to the TEIN, can supply a similar breakthrough for the developing countries. This network is important because, once we develop a solid program to strengthen the infrastructure of nuclear medicine in one region, the education opportunity is likely to return to a large number of neighboring countries’ nuclear medicine societies. Asian countries such as Bangladesh, Vietnam, and Indonesia are the ones that are equipped with the facilities, infrastructure, and governance of nuclear medicine only lacking the experiences and update opportunities of not only nuclear medicine practice but also nuclear medicine research, either clinical or basic. So, it is necessary to build up the education network (TEIN-Asi@Connect, AfricaConnect2) for strengthening the effectiveness of education, reducing costs, and securing opportunities to participate in education for a wide range of people, and expand the learning opportunities to the next-generation leaders of the neighboring countries.

Outreach mostly via WHO to the national authorities and finally to the public

The UN has developed new Sustainability Development Goals (SDGs) which are being implemented throughout the world from 2016 to 2030, among which SDG3 is ‘human health and well-being’. The WHO is in charge of this endeavor and IAEA joined its efforts. As it shifted from the Millennium Development Goals (MDGs, 2001–2015), non-communicable diseases, which cause the most death and disability, have been newly designated as a major challenge.

Of course, the WHO is working hard against the pandemic diseases such as Ebola, Middle East Respiratory Syndrome (MERS), Severe Adult Respiratory Syndrome (SARS) and Avian Influenza (AI). However, in addition to this endeavor, the WHO deals with many aspects of human health including non-infectious diseases as well as environmental and occupational health problems. Above all, the WHO took countermeasures against non-communicable diseases by specifically addressing the period, by 2030, to reduce occurrence by one-third or premature mortality due to non-communicable diseases in the world, of course, in all the developing countries.

Based on the average life expectancy and per capita national income, the underdeveloped and developing countries are now transitioning from suffering mostly from infectious and communicable diseases to suffering from non-communicable chronic diseases. The brain and heart diseases and tumors are the main targets, to which nuclear medicine has contributed significantly to the diagnoses and the prediction of the prognosis, and now we are devoting ourselves to try to achieve success in treating neuroendocrine tumors and castration-resistant prostate cancers [10]. The WHO has the section in charge of this endeavor for which the field specialties are called ‘essential medicines and technology’ and ‘integrated service delivery’. Even though nuclear medicine has a critical role to prevent non-communicable diseases, there is still a preconception that nuclear medicine is the tertiary care and solely imaging, which is very costly and high-tech and thus can be affordable only to rich people in advanced countries. This situation would have made sense even a decade ago, but is not correct now. This absurdity should now be taken care of by working with the WHO, which is long overdue.

For several years ago, more specifically during last and this year, the Federation has tried to establish an official relationship with the WHO. As the WHO is working at the level of regional offices as well as the headquarter level (in Geneva), the Federation is trying to get approval of the WFNMB as an official non-state actor by the WHO. Once approved as a non-state actor, the Federation will assist the WHO in implementing its General Programme of Work GPW13, focusing on improving access to high-quality universal affordable nuclear medical care and enhancing the education and training of the health workforce for nuclear medicine practice.

At the regional level, we will designate the liaison representatives of our Federation in addition to Angelika Bischof-Delaloye of Lausanne for headquarters, Ana Ugrinska of Skopje for EURO (European Regional Office), Rakesh Kumar of New Delhi for SEARO (South East Asia Regional Office), and others [11]. Once it is set up, the sincere efforts from our parties will be at liaison with each of six WHO regional offices and headquarter for any matter of common interests. We found that the WHO is currently working on the Radiation Safety Culture in Health Care, which we support by help them learn about the reality of the clinical practice of molecular internal radiotherapy and nuclear medicine imaging. Also, we are going to inform them about the appropriate use and the affordable make-up of the new institutions and facilities, especially in developing countries. The WFNMB and the WHO are expected to work together, for example, to support new endeavors to establish novel therapy and theranostics using radiopharmaceuticals from the patients' or users' perspectives.

Benefits to the member countries regardless of their good standing

According to both the old and the new statutes, our World Federation is based on the countries. It is a humble but eloquent manifestation of the spirit of Federation that the people in each country can and should be taken care of by the nuclear medicine experts of each country. And thus the mission of our Federation should lead to the benefits for the nuclear medicine experts in each country by enabling them to help their own people. The country representatives form the 'general assembly' of the Federation to elect leadership, the so-called Executive Leadership, to serve this purpose. The first thing for the Executive Leadership (in this case, us, the authors) to do is to devise the platform for communication, hopefully bi- and multi-directionally between the elected leadership and the country representatives during their term of entitlement as the president, the secretary general, and the treasurer.

In our case, whenever we call for the strategic plan in order to improve current global status of nuclear medicine, such as 'global reach (to do something)', 'global initiative (to achieve other things)', 'teach the teachers (to be able to help their people)', etc., we needed to define the benefits to the member countries by every one of the Federation's moves and their efficiency of materialization by the currently limited resources. What we upheld in our first move was the constitution of the platform which is now called 'WFNMBportal' (<http://WFNMBportal.org>). It includes all the countries regardless of their relative standing. Many countries, whether or not they have good standing in membership, need help from the Federation. Each country is running the nuclear medicine expertise according to the current global

minimum standard and good standing only depends upon the minimal payments set traditionally by the Federation decades ago. This membership is just the nominal one and the Federation is expected to be comprehensive. Simply speaking, the non-member country's situation should also be improved by any efforts just like that of the Federation's member countries. Of course, the member country's status should be monitored and shared and also the necessity and urgency will call upon the remedy. The countries in good standing have an active participation in decision making through voting. Statistics have noted these countries to number 49 in 2016, which dropped to nearly half that in 2017 and back up to 41 in 2018. Obviously, this does not mean that the number of those countries in need and requiring support from the Federation has changed, but the attention of the contributing countries has just fluctuated.

By using our new platform of WFNMBportal.org, this will be changed very soon. The representatives or co-representatives will receive information about global status as well as the moves and announcements of the results of the move in real-time, and finally find their own way of participation in contribution to the Federation's efforts and endeavors. The establishment of the Federation in the early 1970s was a monumental accomplishment achieved by our ancestors. It was based on the belief that our discipline of nuclear medicine will help and save people all over the world and is strongly associated with biology (collective calling of physics, chemistry, and biology is the current reinterpretation). The polarization of the practice endangers the ideal of this belief, so we now need to cooperate within ourselves and also with the other international organizations and efforts that are trying to improve essential medicines and technology, such as WHO or the ODA of the EU (Asi@Connect or Africaconnect2), or ODA of individual countries (for example, KOICA, Korea International Cooperation Agency, which is the Korean ODA agency [12]).

The benefits for participating (or even non-participating) countries will be based on how the countries all over the globe will participate and whether we, the elected leadership, can let the country representatives and co-representatives comprehend the goals and the strategic plans. It is an awakening that the currently polarized practice of nuclear medicine globally without proper encouragement of the propagation of appropriate nuclear medicine practice to the remote areas of the globe will finally weaken the *raison d'être* of our discipline causing the risk of becoming obsolete in the age of personalized medicine. In our opinion, the principle behind nuclear medicine, tracer principle, is responsible for the past prosperity of diagnostic imaging of nuclear medicine but essentially therapeutic nuclear medicine including theranostics is the breakthrough for the future. To implement this breakthrough, we, the global community of nuclear medicine, need the participation of many more people from every country in the world. The

pioneers of the current leaders from advanced countries in North and Latin America, Europe, and Asia and Oceania should proceed faster with the due and keen attention to the followers in the remote countries, regardless of their membership or good standing, who will soon attain the level of quality of clinical performance like Korea, as well as clinical research, basic research and even policy-making in each country, which will make nuclear medicine plentiful all over the world.

Message to the current country representatives and leaders

There is a message from the new endeavor explained above to the current leaders of each country, either big or small, with large or with small populations, highly advanced or developing, either with sound infrastructure or with scanty ones. We need to tackle the problem of the Great Divide of nuclear medicine practice as was just the case with the current country leaders when they would have sought to propagate better nuclear medicine practice to the country's remote areas in his/her own country. The remoteness does not lie only in geography but also in the unprepared policy, adversary regulation, lack of materials (instruments, facility, radionuclides, and radiopharmaceuticals) or most importantly lack of human resources.

Once he/she has tried to help promote nuclear medicine for his/her own people, it is then the time to participate in constructing the tie and leadership for a better world to help people through nuclear medicine. Within the next 6 years, we will need nine leaders, whose titles are president-elect, secretary general-elect, treasurer-elect, and congress-chair, as all have single terms, so within 10 years, we will need 15 leaders [13]. The world consists of six continents though each continent has different composition. But there are populations of several billion on four continents, so every country from every continent should raise and produce the new breed of the next leaders, with at least four per each of the four continents. This is a strategic stimulus from the new governance system of the revised statutes.

We, the new leaders of the Federation, realized this after preparing ourselves to take on the given roles by the member countries via the election in 2016. We encourage the country

representatives to solve the problems of his/her own countries and the continents and proceed further to nominate her/himself for the global job of promoting nuclear medicine and thus helping people of the world until the next election. We prepared the exemplar within the Federation such as networking online and offline, and beyond the Federation such as the WHO liaison, and with that we will start our term. We will be all ears to listen sincerely to the advice and recommendations from the next or next-generation leaders from all the countries, either currently in good standing or not.

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