

Radiation medicine R&D strategy in accordance with new southern policy

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1. Introduction

The government has been pushing for the New Southern Policy with 3P (People, Peace, Prosperity) as its core value to raise the cooperation with ASEAN Member States to the four major countries.

From the trade diversification through the New Southern Policy and rapid economic growth of ASEAN Member States, medical and science & technology exchanges between Korea and ASEAN will expand.

The ASEAN governments have promoted the development of nuclear and radiation technology. Countries not generating nuclear power have been also supporting R&D on nuclear and radiation technology.

In November 2019, 'The strategy for creating the future radiation industry' was announced. This policy was planned to create a new market for radiation technology and promote commercialization of radiation industry field.

Based on the above understanding, with goal of creating the new market of R&D on radiation medicine, this study was planned to investigate the status of imports on radiation medicine field in ASEAN and analyze R&D strategy. The result is expected to be used in designing R&D based on the New Southern Policy.

2. Methods of the Analysis

This study investigated the current status of radiation medicine by ASEAN Member States, the import items of radiation medicine, and the size of imports. Based on these data, radiation technology development program was classified based on the HS code related to radiation medicine. As major ASEAN imported products by radiation medicine apparatus considered, research budget focusing on government funding was analyzed.

2.1 Scope

Among the countries subject to the New Southern Policy, we focused 10 ASEAN Member States (Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam)

2.2 Investigate and Analysis

Using the IAEA database (NUMDAB, DIRAC) and presentations by ASEAN national representative, we analyzed radiation medicine infrastructure by ASEAN countries.

Based on the HS Code in the field of radiation medicine, the imports of ASEAN countries in 2019, the size of imports, and Korea's market share were investigated at the website of ITC TradeMap.

Table I: HS code list

Classification	HS code	Code name
Medicine	901814	Scintigraphic apparatus
	902212	Computed tomography apparatus
	902213	Other, for dental uses
	902214	Other, for medical, surgical or veterinary uses
	902221	For medical, surgical or veterinary uses
	902290	Other, including parts and accessories
RI	284440	Radioactive elements and isotopes and compounds
Detector or Measurement equipment	903010	Instruments and apparatus for measuring or detecting ionizing radiations

HS code 284440(Radioactive elements and isotopes and compounds) and 903010(Instruments and apparatus for measuring or detecting ionizing radiations) included both medical and industrial use. Therefore, this study considered and analyzed these HS codes for medical use.

Radiation technology development program from 2015 to 2019 on National Science & Technology Information Service (NTIS) was analyzed to correlate major imported items in the radiation medicine field of ASEAN countries.

3. Result

3.1 Status of radiation medicine infrastructure by ASEAN Member States

The infrastructure for radiotherapy and nuclear medicine by ASEAN countries was shown in Table 2 and Table 3 respectively.

Table II : Status of Radiation therapy Infrastructure in ASEAN Member States*

Country	RT Center	LINAC	Brachy therapy	Gamma knife	Cyber knife	Tomo therapy
Brunei Darussalam	1	2	0	0	0	0
Cambodia	2	2	1	0	0	0
Indonesia	45	58	18	2	0	1
Laos	1	1	0	0	0	0
Malaysia	32	56	11	3	2	5
Myanmar	8	15	7	0	0	0
Philippines	43	46	15	1	0	6
Singapore	8	23	6	1	0	2
Thailand	43	80	28	0	3	4
Vietnam	32	60	10	0	1	0

* This table was adapted from 3 data sources. 1) IAEA DIRAC, 2) Presentations by IAEA/RCA mid-term review meeting in Myanmar (2017.11), 3) Presentations by ASEAN members attending trainer-trainee courses held at KIRAMS (2019.11)

Table III: Status of Nuclear Medicine Infrastructure in ASEAN Member States*

Country	NM Center	SPECT SPECT/CT	Gamma camera	PET/CT	Cyclotron
Brunei Darussalam	1	1	0	1	1
Cambodia	1	0	1	0	0
Indonesia	13	9	10	2	3
Laos	0	0	0	0	0
Malaysia	23	24	14	14	4
Myanmar	7	9	10	2	2
Philippines	65	82	42	5	5
Singapore	16	15	4	16	3
Thailand	29	47	45	11	5
Vietnam	41	35	20	6	5

* This table was adapted from 3 data sources. 1) IAEA NUMDAB, 2) Presentations by IAEA/RCA first coordination meeting in Korea (2019.04), 3) Presentations by ASEAN members attending regional training courses held at KIRAMS (2019.12)

3.2 Radiation medicine apparatus market in ASEAN

In 2019, the imports amount related to radiation medicine of ASEAN countries was 911 million dollars, and the import from Korea was 45.9 million dollars, 5% of the total imports.³

The items that ASEAN countries mainly imported were 902290(Other, including parts and accessories), 902214(Other, for medical, surgical or veterinary uses), and 902212 (Computed tomography apparatus). The ratio of imports from Korea for each item was 3.38%, 6.19%, and 1.85%, respectively.³

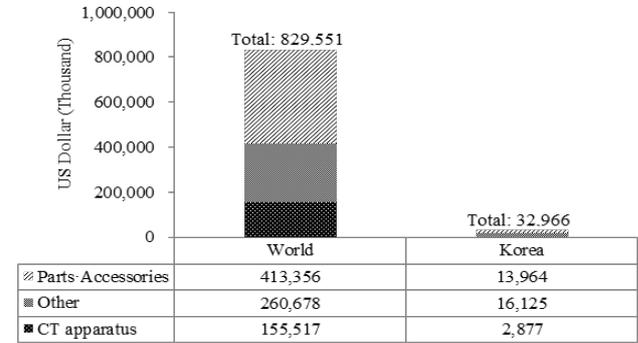


Fig. 1. Cost of radiation medicine apparatus imported by ASEAN in worldwide and Korea in 2019 (HS code: 902212, 902214, 902290)³

The ASEAN's imports of radioactive isotopes and radiation measurement instruments in 2019 were \$59.4 million and \$6.109 million, respectively. The ASEAN's imports from Korea were 1.17 million dollars and 370 thousand dollars, which were 3.37% and 0.62% of the total import volume.

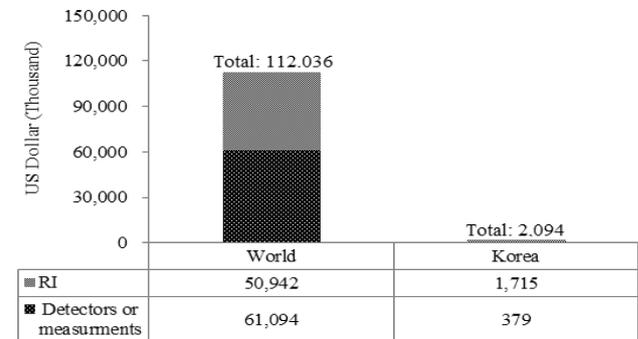


Fig. 2. Cost of radiation isotope and radiation measurement equipment imported by ASEAN in worldwide and Korea in 2019 (HS code: 284440, 903010)³

3.3 Radiation therapy and nuclear medicine apparatus market in ASEAN

The HS codes related to radiotherapy and nuclear medicine equipment were 901814(Scintigraphic apparatus) and 902221(For medical, surgical or veterinary uses). The proportions imported from Korea were 7.2% and 0.77% of the total cost.³ Among ASEAN Member States, 6 countries (Indonesia, Thailand, Singapore, Malaysia, the Philippines, and Vietnam) had imported most equipment related to radiation therapy and nuclear medicine apparatus.³

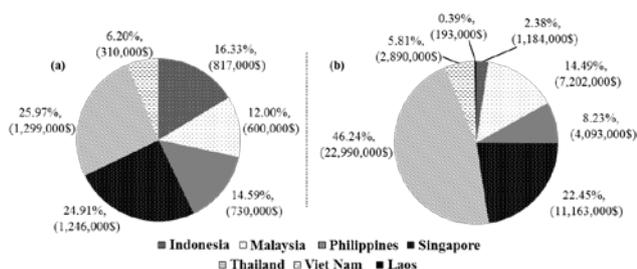


Fig. 3. Cost proportion of radiation therapy and nuclear medicine apparatus imported by ASEAN countries in 2019 (a) 901814(Scintigraphic apparatus), (b) 902221(For medical, surgical or veterinary uses)³

3.4 Status of national research project of radiation medicine in Korea

From 2015 to 2019, a total of 794 research projects were conducted through the radiation technology development program, and the total amount of research funding was 187.4 billion KRW based on the government investment.⁴

Table 4 shows the categorization of radiation technology development program based on HS code. There were 190 research projects related to the fields of radiation medicine, radioisotopes, and radiation measurements, which accounted for 47 billion KRW (25.11%) of the total research budget. However, the analysis revealed that there had been no sign of the market driven research strategy.

Table IV: Number of R&D project by HS Code 2015-2019⁴

Classification	HS Code	No.
Medicine	901814	9
	902212	25
	902213	6
	902214	3
	902221	14
	902290	36
RI	284440	50
Detector or Measurement equipment	903010	47
Total		190

4. Conclusions

As the increase of incidence of geriatric diseases such as cancer, cardiovascular disease, dementia and the rising demands for medical services due to high economic growth, the radiation medicine market in ASEAN is expected to continuously expand.

Korea has ranked in the top 10 among ASEAN countries' major import items, 902212 and 902290, but its market share is lower than that of major competitors such as US, China, Japan and Germany.

We should consider making a profitable national research project plan that can be connected to ASEAN

market demands in the fields of CT, X-ray equipment, and radiation measuring instruments.

The radiation therapy and nuclear medicine markets of ASEAN have high growth potential in the health care markets. These two product groups have strong possibility to be imported from Korea because of geographical advantage.

In order to preoccupy the ASEAN radiation medicine market, the cooperation of national level between Korea and ASEAN should be continuously promoted. Also policy makers and researchers should exert the policy studies such as the importing and exporting system of radiation medicine apparatus by ASEAN countries.

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