



NUCLEAR ENERGY COMMISSION

FNCA 20th Ministerial Level Meeting
5 December 2019

Country report

MONGOLIA

MAVAG CHADRAABAL

Executive Office

**Nuclear Energy Commission,
the Government of Mongolia**

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Status on Nuclear Energy Field

- No Nuclear facilities;
- Wide range of nuclear non-power applications;
- Substantial uranium resources: Preparatory work for uranium exploitation is in progress.

DEPOSITS OF STRATEGIC IMPORTANCE



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Legal Framework in nuclear energy

- ❖ National Security Concept of Mongolia /2010/
- ❖ Mongolia's Sustainable Development Visions-2030 /2016/
- ❖ Law on Nuclear Weapon Free Status /2000/
- ❖ State Policy on Exploitation of Radioactive Minerals and Peaceful Uses of Nuclear Energy /2009/
- ❖ Program for Implementation of the State Policy /2009/
- ❖ Nuclear Energy Law /2009/
- ❖ Government's Action Plan for 2016-2020



LAWS & POLICIES

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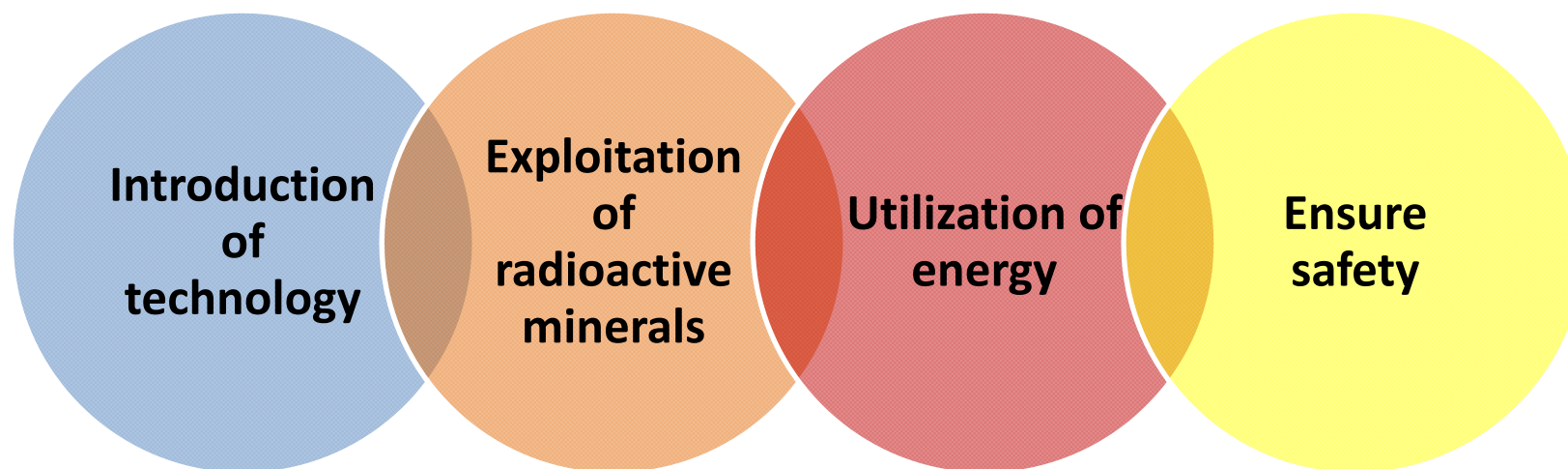
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State Policy on Nuclear Energy

The main objectives of the State Policy on exploitation of radioactive minerals and peaceful use of nuclear energy follow as:



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Strengthening of nuclear legal environment in 2019

- Amendment to Nuclear Energy Law in progress;
- Regulation on Transport of Radioactive Material is adopted;
- Draft regulation on NORM (Naturally Occurring Radioactive Material);
- Draft regulation on Control and Accountability of Nuclear Materials and;
- Draft Emergency Preparedness Plan.





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Nuclear applications in Healthcare



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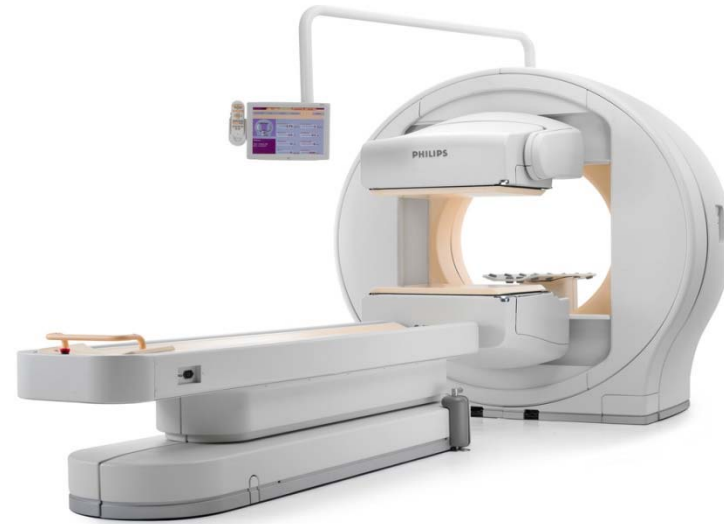
Human healthcare

Nuclear Medicine

- ☐ X-ray machines, CT
- ☐ SPECT/CT
- ☐ PET/CT (in installation)

Radiation Therapy

- ☐ Cobalt machines
- ☐ Linacs
- ☐ SBRT (in plan)

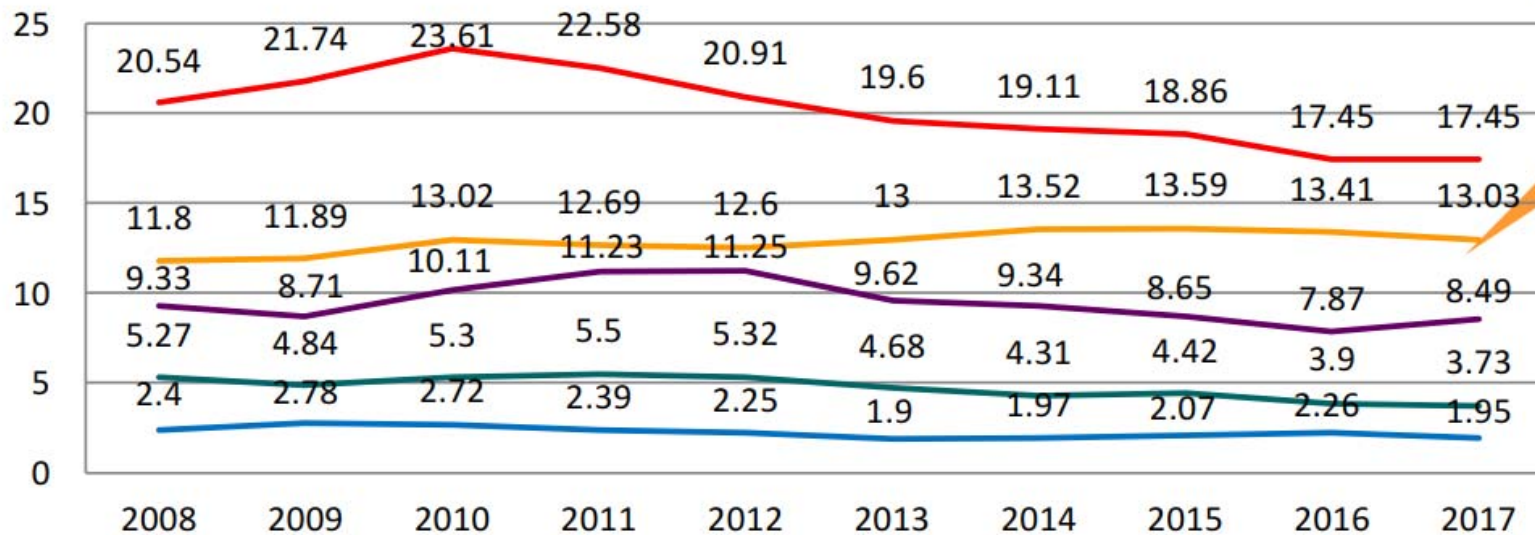




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LEADING CAUSES OF POPULATION MORTALITY

Per 10,000 persons



National Cancer Center, 2017

- Diseases of cardiovascular or circulatory system
- cancer
- diseases of the digestive system
- Injury, poisoning and certain other consequences of external causes
- Diseases of the respiratory system

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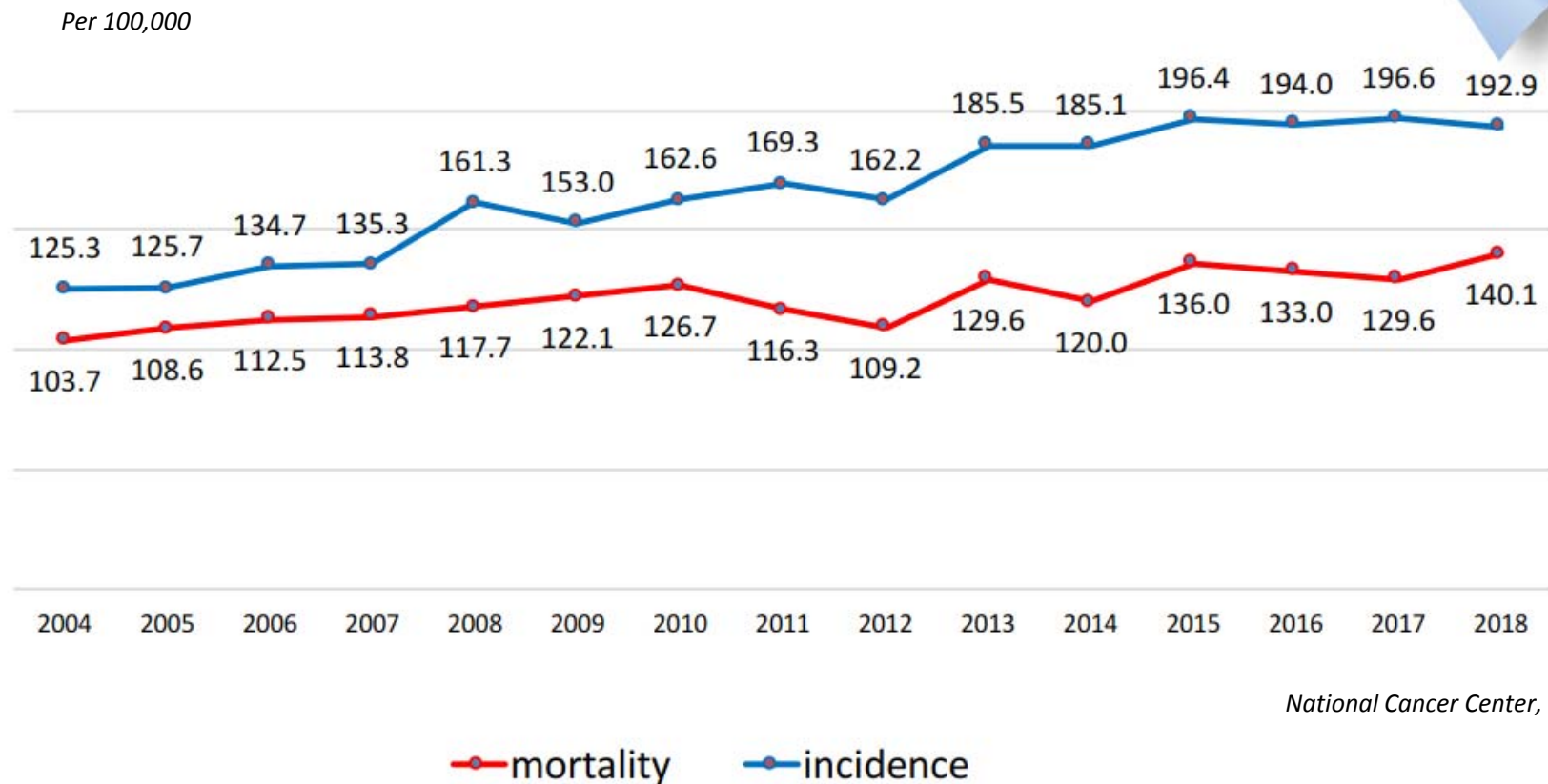
POLICY AND PROGRAMME ON CANCER PREVENTION AND CONTROL

- **Law on Health /updated in Oct.2019/**
- **National Programme on Prevention and Control of Non-communicable Diseases /2017-2021/**
- **Healthy Liver National Programme /2017/**
- **Cervical Cancer Screening Programme /2012/**
- **Breast Cancer Screening programme /2012/**
- **Cervical Cancer Elimination Initiative, UN Joint Global Program /2018-2023/**



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TRENDS IN CANCER INCIDENCE AND MORTALITY

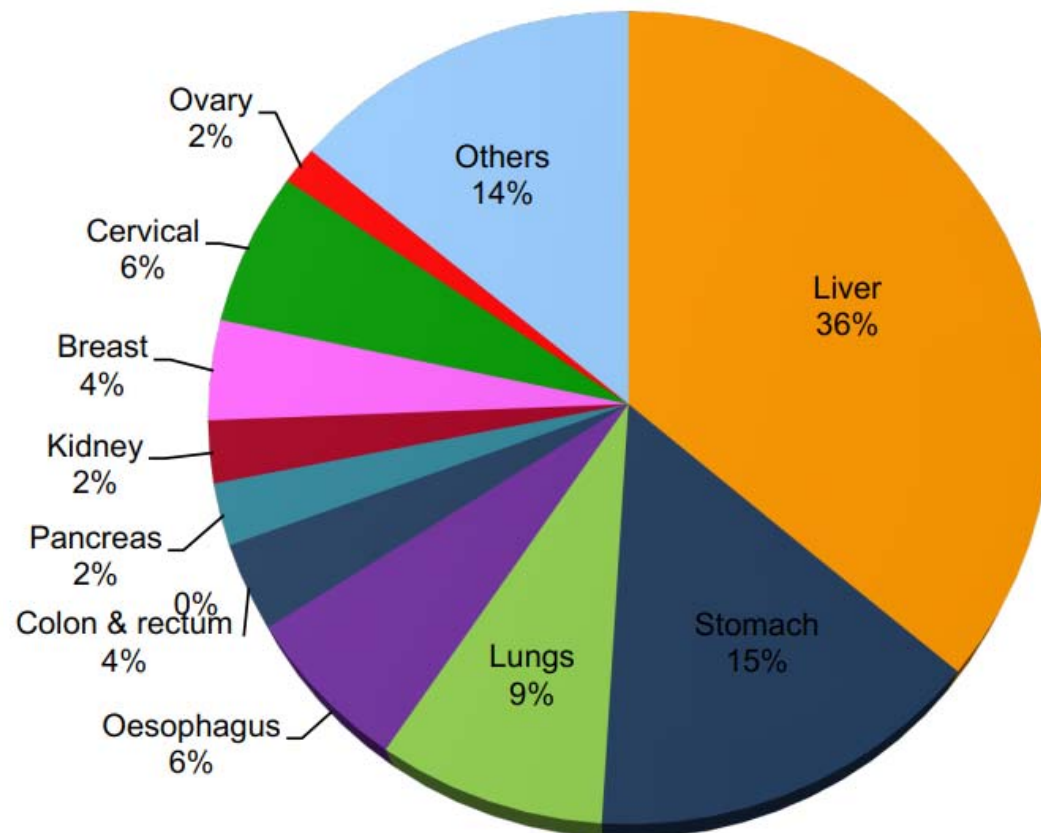


National Cancer Center, 2018



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COMMON CANCER TYPES, 2018



Total population **3 200 000**

Number of new cases **6073**

Number of deaths **4412**

Number of prevalent cases **19 427**

Survival rate (5 year) **35.3 (6860)**

National Cancer Center, 2018

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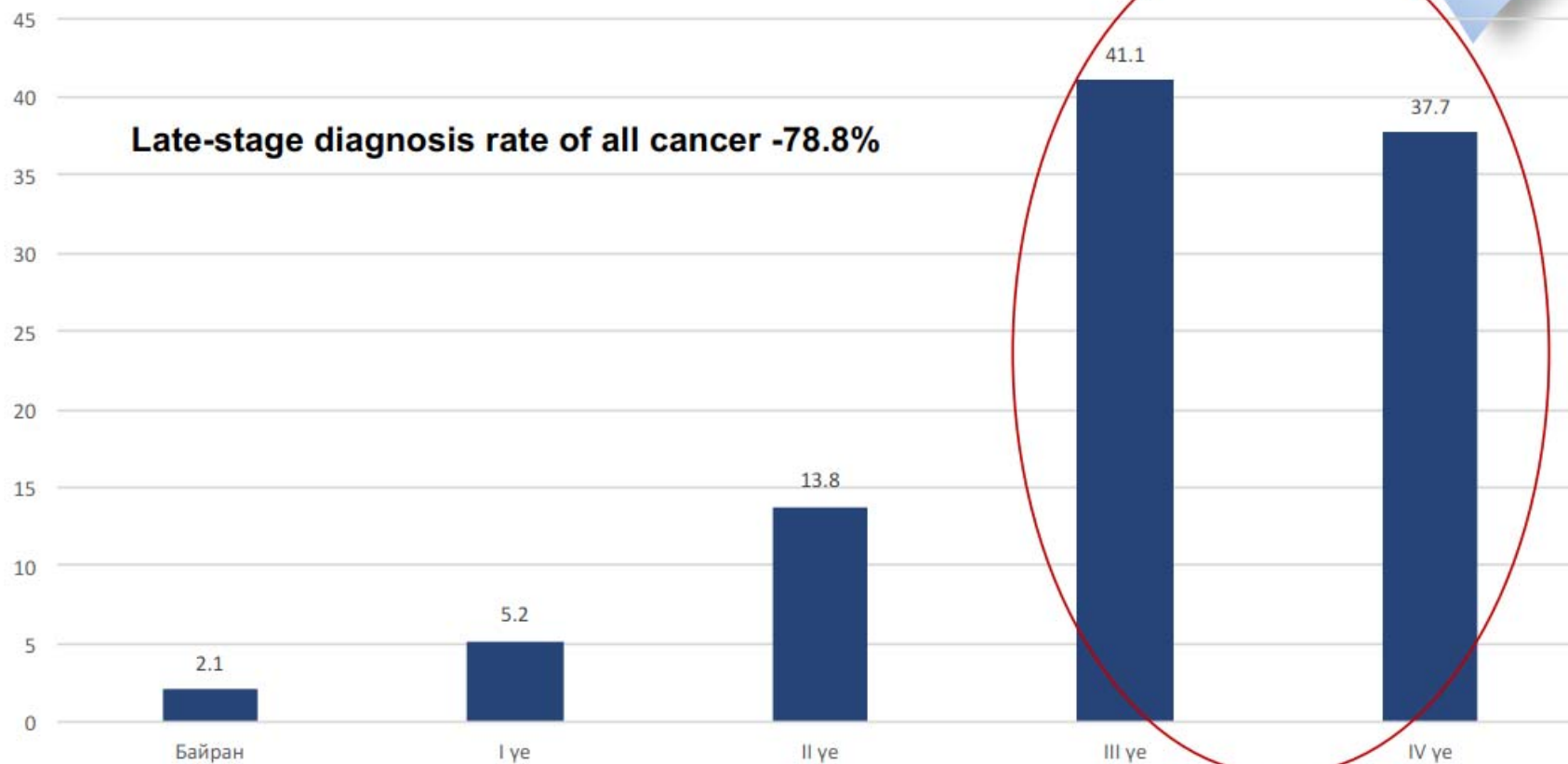
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LATE-STAGE DIAGNOSIS RATE OF ALL CANCER (%), MONGOLIA, 2018



National Cancer Center, 2018

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Opening ceremony to launch the Linear accelerators





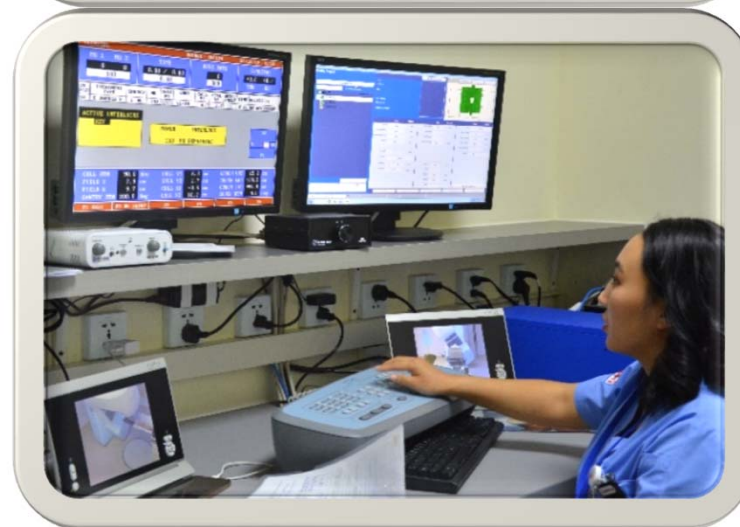
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Linacs at National Cancer Center

❖ Clinac iX, 6/10 MV (Varian)

❖ Unique, 6 MV (Varian)

- Through entering into service, the quality of RT service is upgraded in 2019;
- Since then 257 patients were treated with radiation therapy. Treatment categorization follows as:
 - 38% Cervix uteri
 - 14% Head and neck
 - 13% Breast cancer
 - 13% Esophagus
 - 8% Brain cancer
 - 14% Other cancer



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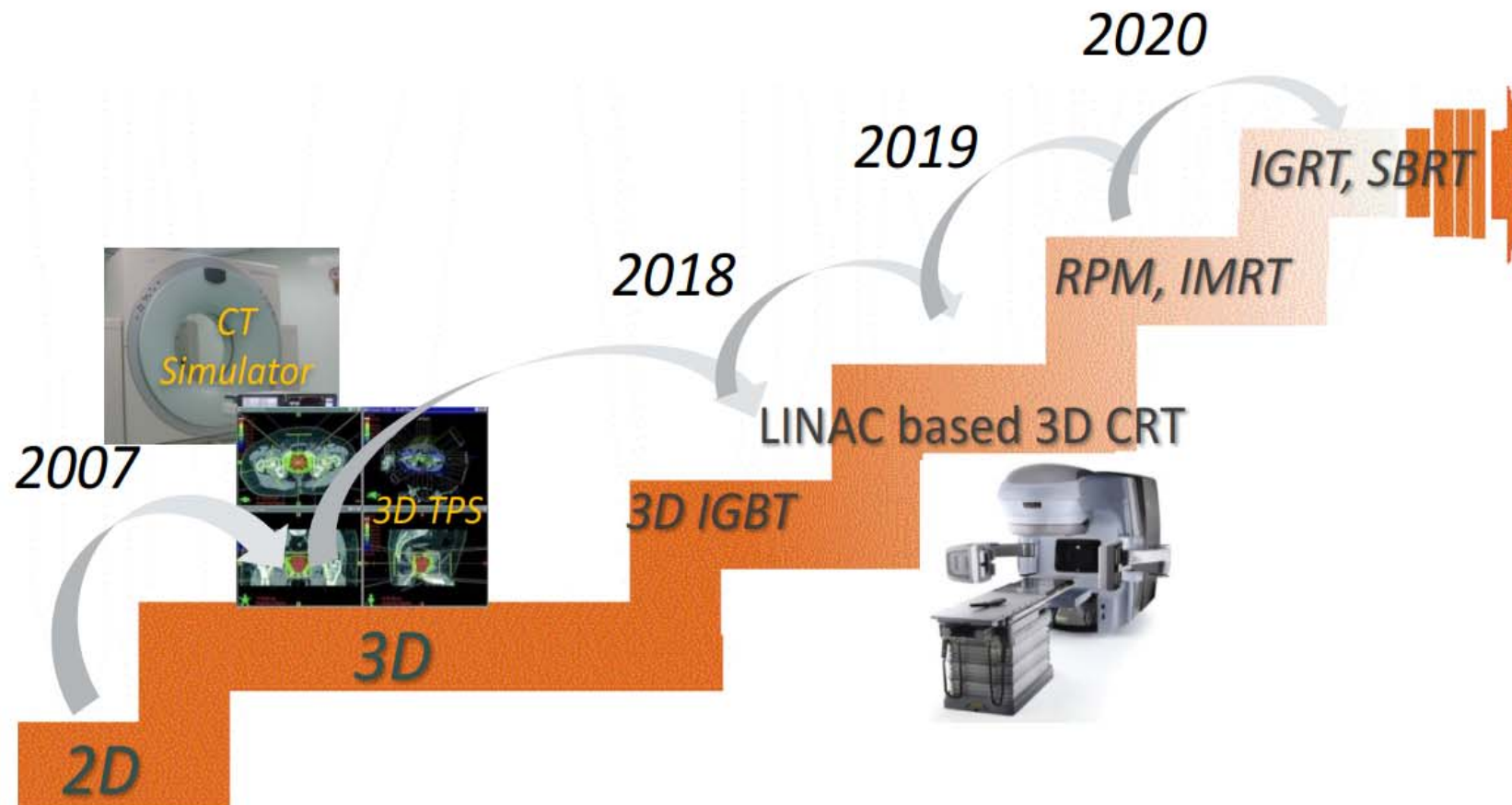
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National Cancer Center, 2018



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Near term perspectives





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National Diagnostic and Treatment Center project (MON-8)



- Loan Agreement between the Government of Mongolia and the Government of Republic of Korea in 2012;
- Export-Import Bank of Korea (\$49.7 million);
- Main facilities including Nuclear medicine with PET/CT with cyclotron and SPECT/CT
- Construction is completed and installations and calibrations of major equipment are being conducted;
- Trainings are conducted in Korea;
- Expected to fully function in the beginning of Feb, 2020;



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PET/CT at National Diagnostic and Treatment Center

- Cyclotron: GE MINI Quilin, 9.6MeV
- PET/CT, GE Discovery IQ,





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Summary

- To develop and strengthen national legal and regulatory frameworks for nuclear energy infrastructure, systematic measures such as amendment to laws, introduction of necessary regulations and standards are taken;
- Nuclear innovative technologies are entering into service, especially in nuclear medicine and radiation therapy. Major investments in healthcare sector expected to support in improving the medical services in the country dramatically;
- Skilled HRs and supplementary instrumentations, which will enable the installed equipment to function fully, are essential for healthcare sector in Mongolia.
- Mongolia is aiming to introduce modern medical applications based on nuclear technologies including SBRT, IGRT and IMRT in near future.

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THANK YOU FOR YOUR ATTENTION



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Equipment capacity

	Investor	Equipment	Manufacturer	Installation year
Teletherapy	Government of Mongolia	GWXJ-80 (Co ⁶⁰)	Nuclear Energy Industry corporation, China	2014
	Government of India	Bhabhatron-II (Co ⁶⁰)	Panacea Medical Technologies, India	2016
	Government of Mongolia	UNIQUE (6 MV)	Varian, USA	2019
	Government of Mongolia	CLINAC iX 6/10 MV	Varian, USA	2019
Brachy-therapy	IAEA MON/6012	Gynaesource HDR afterloading unit (Co ⁶⁰)	Bebig, Germany	2009

National Cancer Center, 2018

	Investor	Equipment	Manufacturer	Installation year
Treatment planning system	IAEA (MON/6/011)	TheraPlan Plus	Nucletron, Netherland	2005
	Government of Mongolia	CMS XiO 4.4 with Focal worstation	Elekta, Sweden	2009
	IAEA - PACT	2 CMS XiO TPSs with 3 Monaco Sim workstations	Elekta, Sweden	2016
	Government of Mongolia	Eclipse	Varian, USA	2019
Simulator	Government of Mongolia	HMD-IB	Nuclear Energy Industry corporation, China	2014
	Government of India	Imagin	Panacea Medical Technologies, India	2016
	Government of Mongolia	Somatom Emotion 6	Siemens, Germany	2007
	Government of Mongolia	Somatom Emotion 16	Siemens, Germany	2018