



NUKLETRIM
PERFECT
ABILITIES
FOR BRACHYTHERAPY

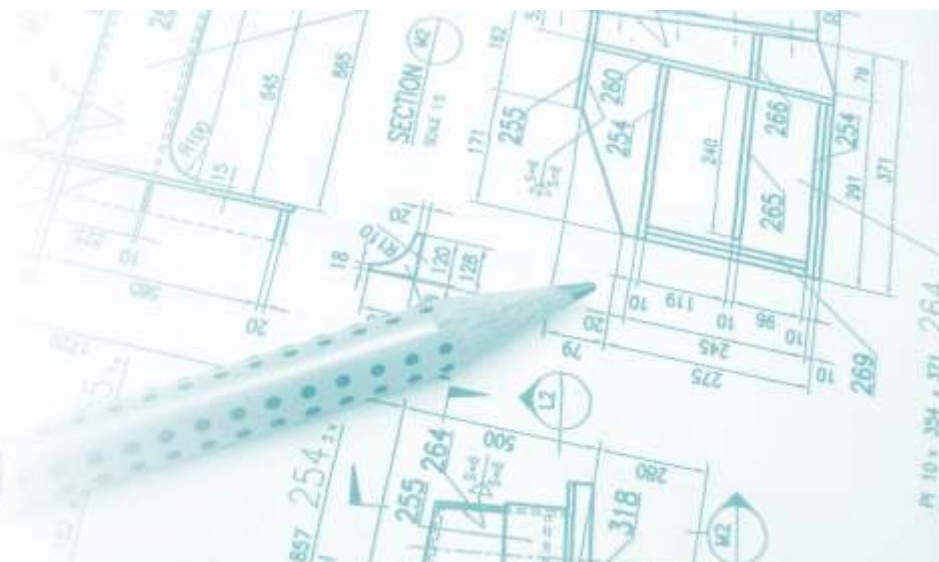
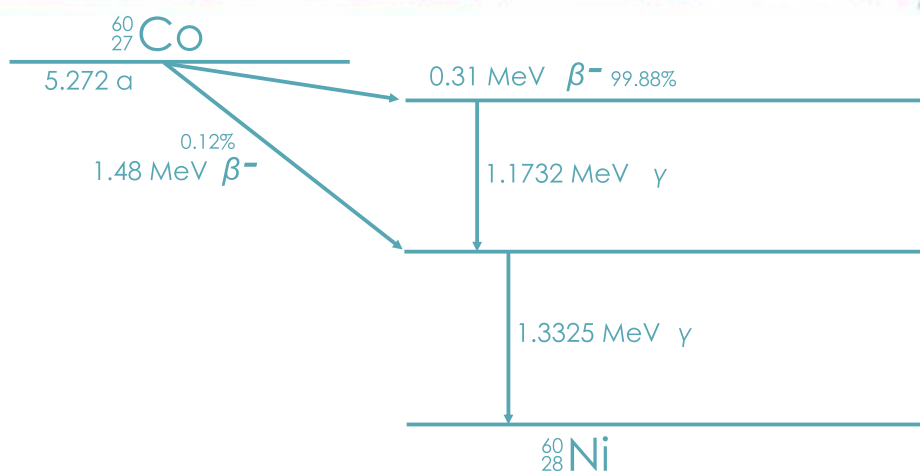
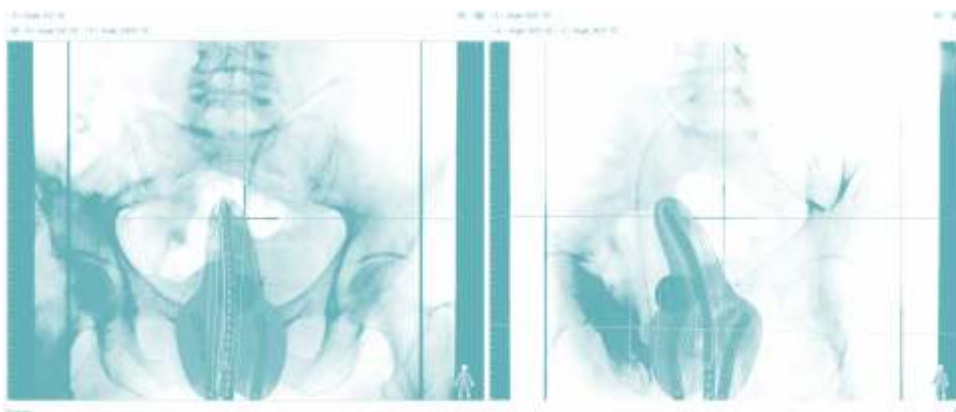
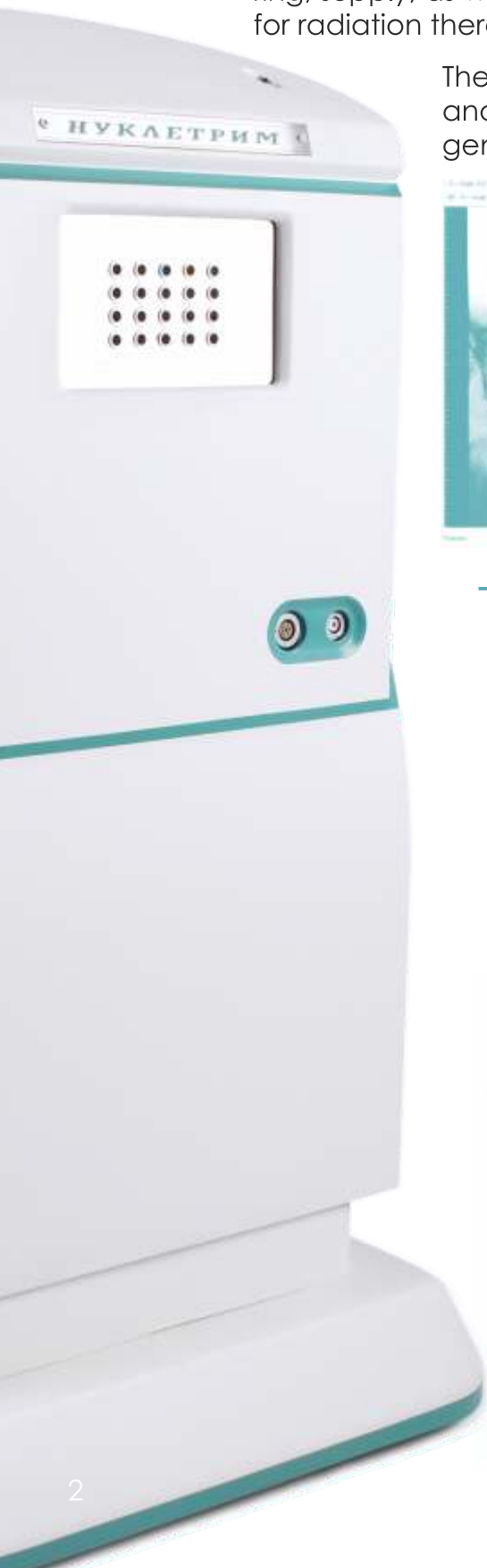


NUKLETRIM

The company “**Radiotherapy technologies**” Ltd. provides a full cycle of research and development works, engineering, manufacturing, assurance of quality, efficiency and safety of medical devices for radiation therapy and nuclear medicine.

The main directions of the company's activity are: development, manufacturing, supply, as well as warranty and post-warranty service of medical devices for radiation therapy and nuclear medicine.

The company's specialists have enough knowledge, experience and skills for the development of medical radioisotope and generating sources for medical installations.



PERFECT ABILITIES FOR BRACHYTHERAPY



In 2015 company is proud to rank justifiably among the leading world producers of radiotherapy equipment.

Nowadays **NUKLETRIM** brachytherapy complex is a perfect device, equipped with all accessories necessary for implementation of all known methods of **HDR** (high dose rate) **brachytherapy**¹.

NUKLETRIM's high quality, established technical characteristics and reliability are assured due to the company's long-term experience in delivery and maintenance of various radiotherapy systems. Safety, high accuracy and efficiency of **NUKLETRIM** are proved by clinical testing in the leading oncologic

centers of Russia. In the course of the testing performed for more than 2 years, the possibility of intracavitary, intraluminal, interstitial, superficial and intra-operative after loading techniques was demonstrated.

As per **WHO** criteria, to deliver on-time and high quality medical care for oncology patients it is necessary to have at least one unit similar to **NUKLETRIM** per each 750 thousand of population. Depending on capacity of the medical treatment facility and amount of population it treats, a typical oncological clinic should have from one to three devices like **NUKLETRIM** complex.

¹ **HDR brachytherapy** is a contact radiotherapy techniques based on repeatable short-term placement of radioactive source(s) directly into the patient's lesion zone. Possibility of maximal dose delivery directly into the tumor reduces injury risks of critical organs (i.e. surrounding intact tissues) , and makes HDR brachytherapy indispensable in many cases, both as mono- or combined therapy. During HDR brachytherapy procedures, unlike other methods of radiotherapy, the medical personnel practically does not suffer any radiation exposure.

STRUCTURE of **NUKLETRIM** COMPLEX

- Irradiation unit;
- Control panel;
- Work station with the computer-assisted control system;
- Source position videoverification system;
- Service-emergency container;
- Wide range of accessories and applicators providing HDR brachytherapy procedures quality and comfort;
- Dosimetry systems and safety systems.

SOURCES TYPES

There are two types of radioactive sources available for use in **NUKLETRIM** complex, based on isotopes Ir-192 or Co-60 (the latter having a number of advantages, also from the economical point of view).

Flexible functionality inherent to **NUKLETRIM** complex allows using one or another type of source, permitting the user to choose the source type to be delivered, depending on the clinical tasks planned.

THE SOURCES'SPECIFICATIONS

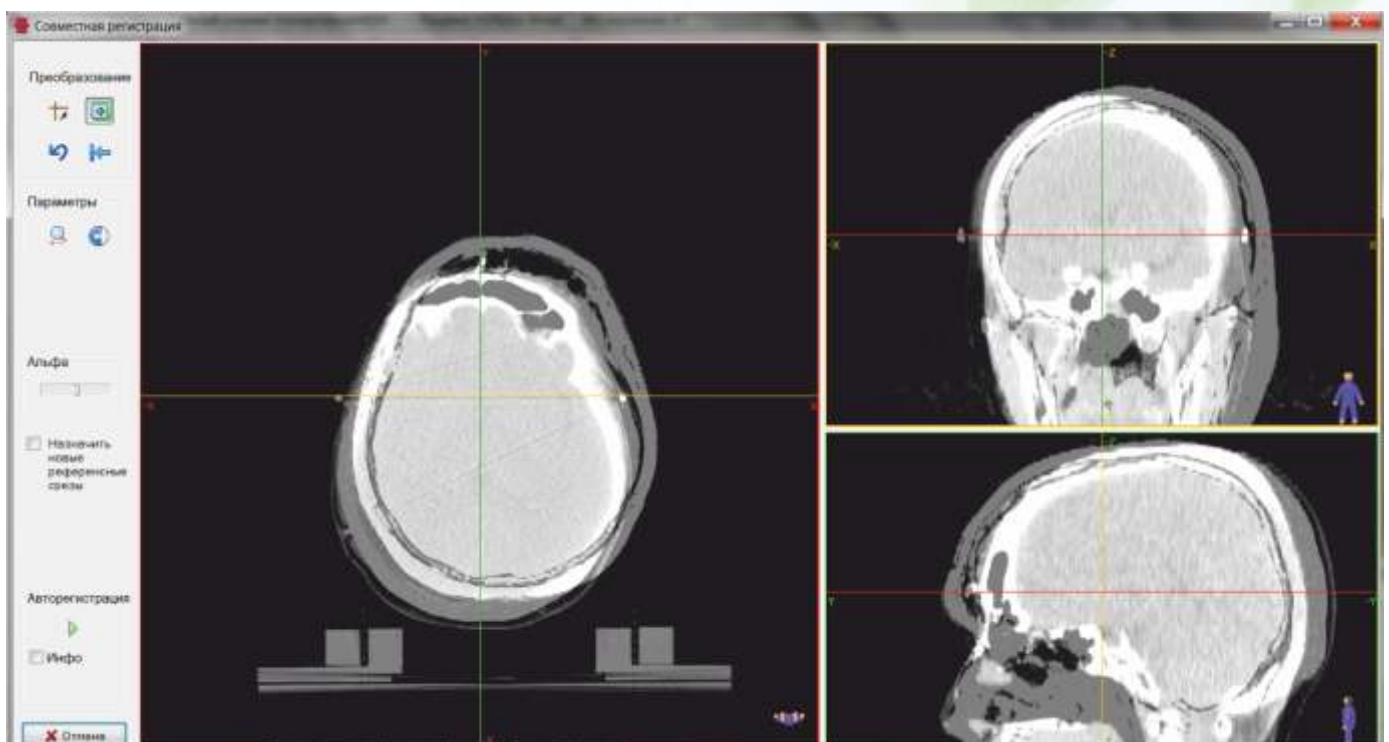


	Co-60 source	Ir-192 source
Application	HDR afterloading brachytherapy	
Type	Co0.A86	Ir2.A85-2
Design	Single shell; radioactive granules sealed in a welded stainless steel capsule	
Half-life period	1925,3 days	73,83 days
Nominal activity	74 GBq $\pm 10\%$	370 GBq $+30\% / -10\%$
Recommended time of use	100 000 operating cycles or maximum 5 years at normal maintenance conditions	25 000 operating cycles or maximum 4 months at normal maintenance conditions
Source external dimensions, including drive wire	Diameter - 1,0 mm Length - 2180 mm	Diameter - 0,9 mm Length - 2180 mm
Active part dimensions	Diameter - 0,5 mm Length - 3,5 mm	Diameter - 0,6 mm Length - 3,5 mm

BRACHYTHERAPY PLANNING SYSTEM

The HDRplus planning system from Eckert & Ziegler BEBIG, Germany is used for planning of radiotherapy with **NUKLETRIM** complex:

- Fast, flexible & precise 3D planning system
- Applicator and applications database;
- TG43 and multi core processor support;
- User friendly interface;
- Customizable interface, depending on the lesion localization;
- Customizable form of final reports;
- Support of all types of DICOM images and DICOM RT objects allowing user to exchange data between HDRplus planning system and other planning and dose verification systems of the clinic;
- Integrated prostate module
- Real-time online planning on demand.



SAFETY SYSTEM

NUKLETRIM complex includes several systems to provide patient and personnel safety during HDR-brachytherapy procedures:

- Video surveillance system for the patient;
- Intercom system;
- Independent dosimetry system;
- System for verification of applicator connection;
- Automatic and manual drives for source removal in emergency;
- Light indicator system;

NUKLETRIM complex is safe and meets both Russian and European requirements for medical equipment.

NUKLETRIM

RADIATION DOSE MONITORING SYSTEM

During operation with **NUKLETRIM** complex the user has an access to the systems providing clinical dosimetry procedures of **QA**:

- absolute dosimetry device;
- in-vivo dosimetry device;
- brachytherapy phantom.



IMAGING, CT/MR COMPATIBILITY, U/S

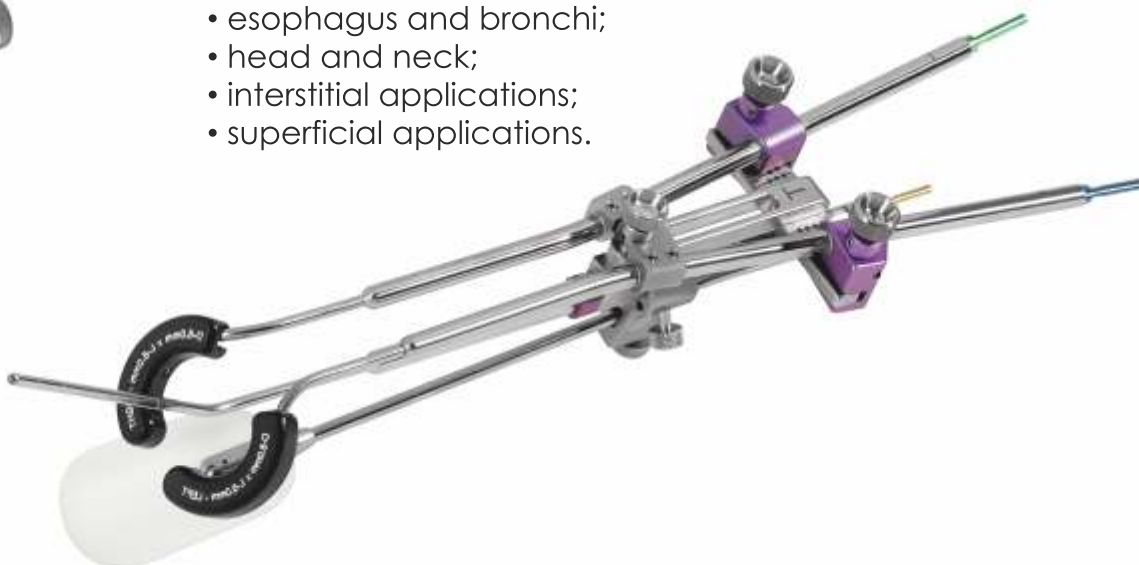
For purposes of quality assurance of radiotherapy, **NUKLETRIM** complex is able to obtain data and images from various imaging and control systems:

- CT/MR compatible applicators;
- CT markers for applicators;
- possibility to implement prostate irradiation procedures under US control;
- availability of a reconstruction rack for C-arm.

APPLICATORS

NUKLETRIM complex makes it possible to implement various tasks of HDR-brachytherapy, it can be equipped with a wide range of applicators upon the customer's request, for irradiation of various lesions:

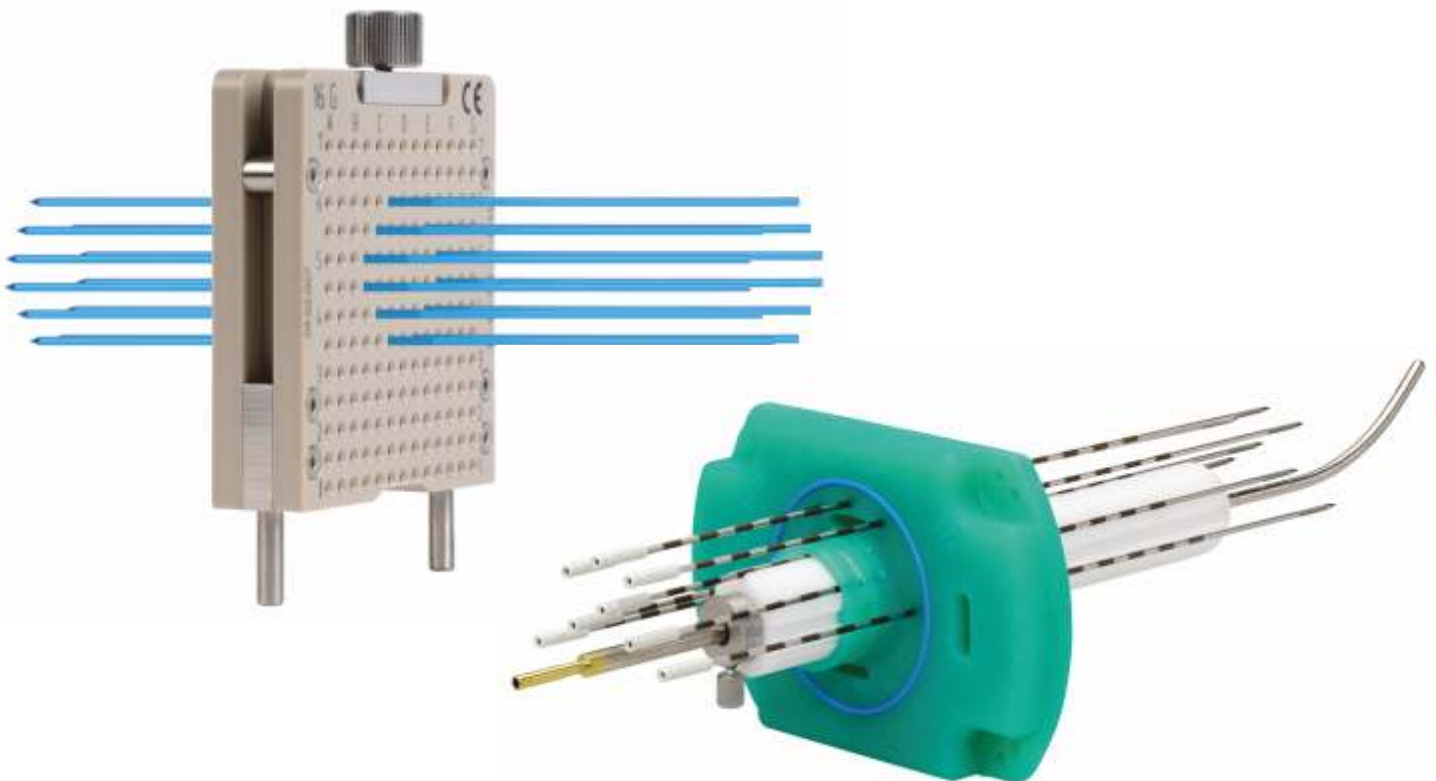
- gynaecological and rectal localizations;
- prostate;
- breast;
- esophagus and bronchi;
- head and neck;
- interstitial applications;
- superficial applications.



PERFECT ABILITIES FOR BRACHYTHERAPY

TECHNICAL CHARACTERISTICS

Dimensions of irradiation unit	(L×W×H) 600×850×1400 mm
Unit weight	300 kg±
Mains voltage L/N/PE	100V/115V/220V ± 10%, 50Hz
Power consumption	1200 VA
Allowable variation of the source dwell time in planned positions, not more than	0,1 s
Source step increment	1 mm
Absolute accuracy of the source dwell position, not more than	± 1mm
Source movement direction	- from distal to proximal position
Relative accuracy of the dwell time	1%
Dose rate at 1 m from the irradiation unit surface	<0,01 mSv /h





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