

Nizhny Novgorod State Technical University n. a. R. E. Alekseev

The main technical principles of neutron-capture therapy

Made by: student of M16-ЯЭ
Sitnikova E.V.

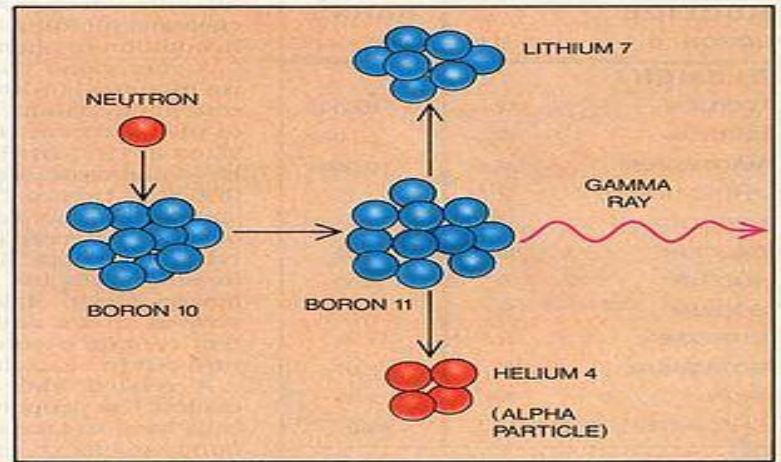
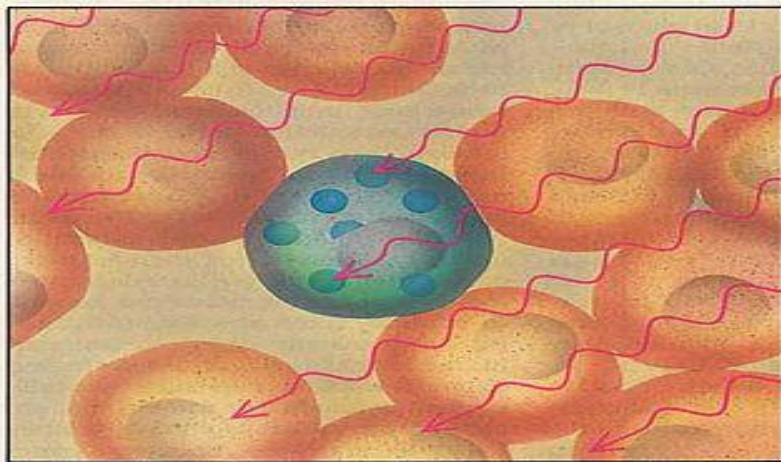
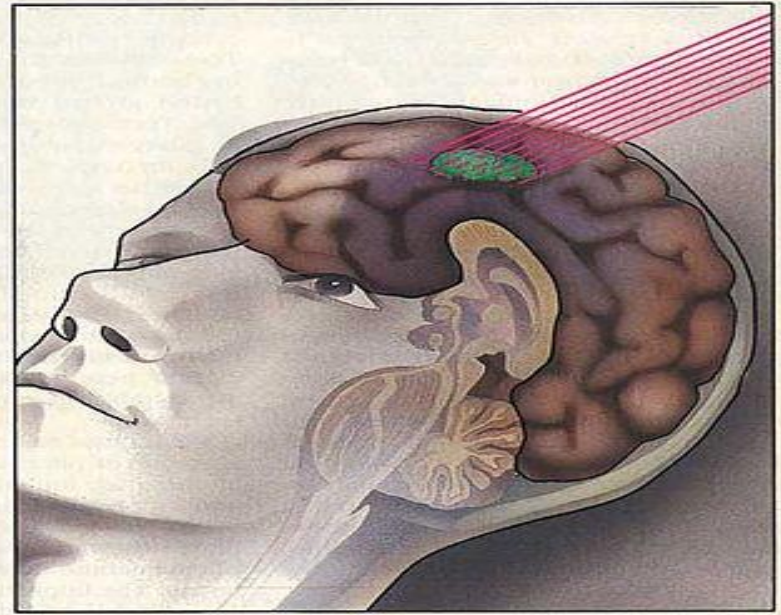
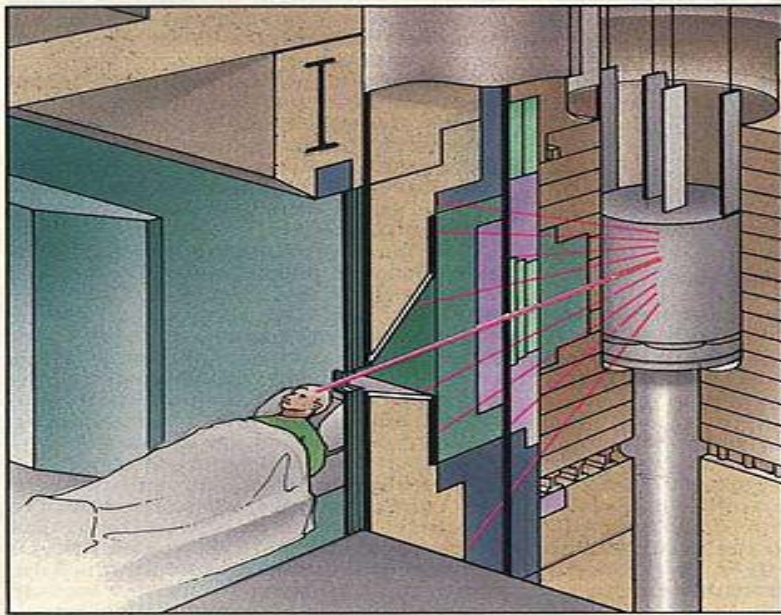
НИЖЕГОРОДСКИЙ ГОСУДАРСТВЕННЫЙ
ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ
им. Р. Е. Алексеева



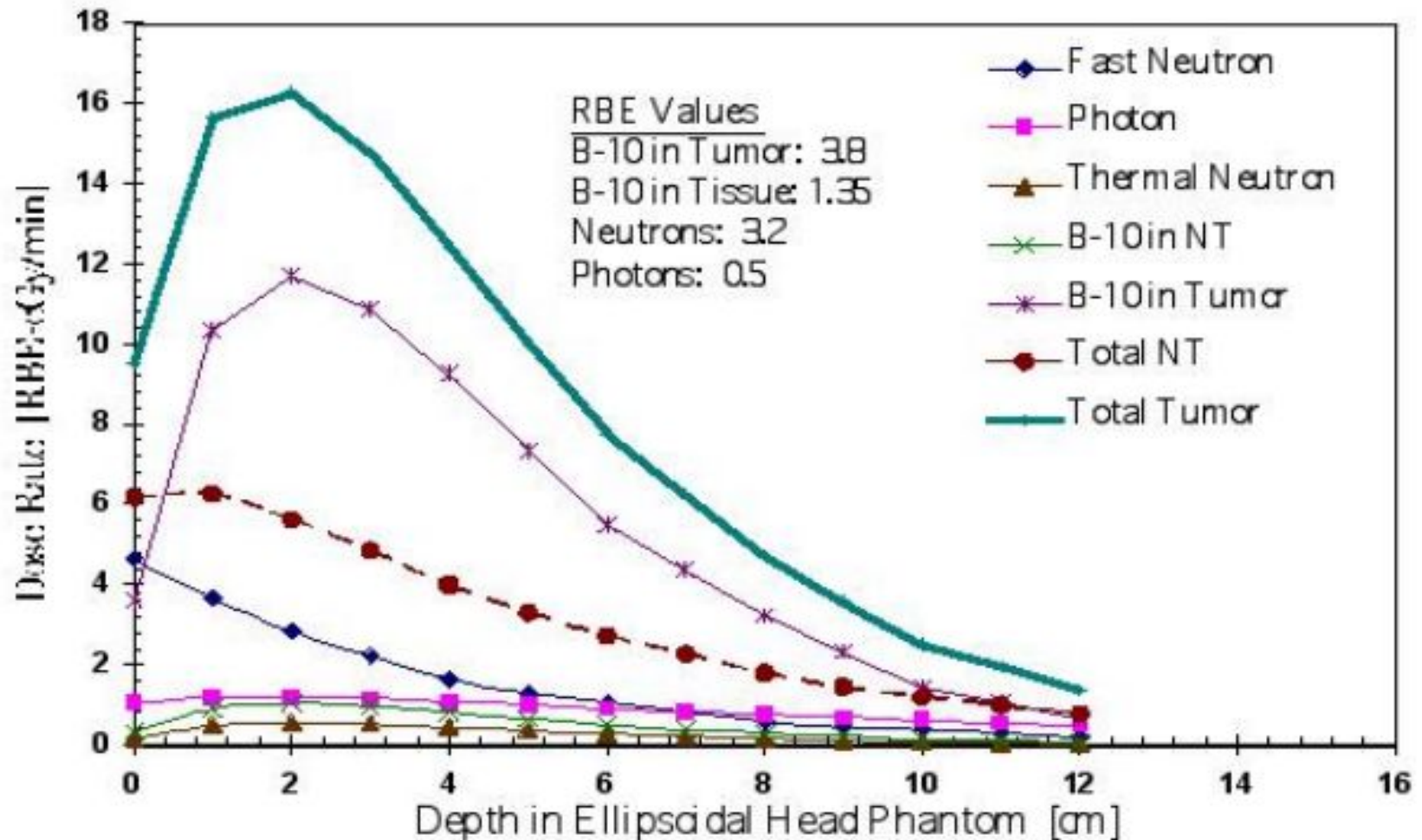
Institute of Nuclear Power Engineering and Applied Physics



Boron neutron capture therapy (BNCT)



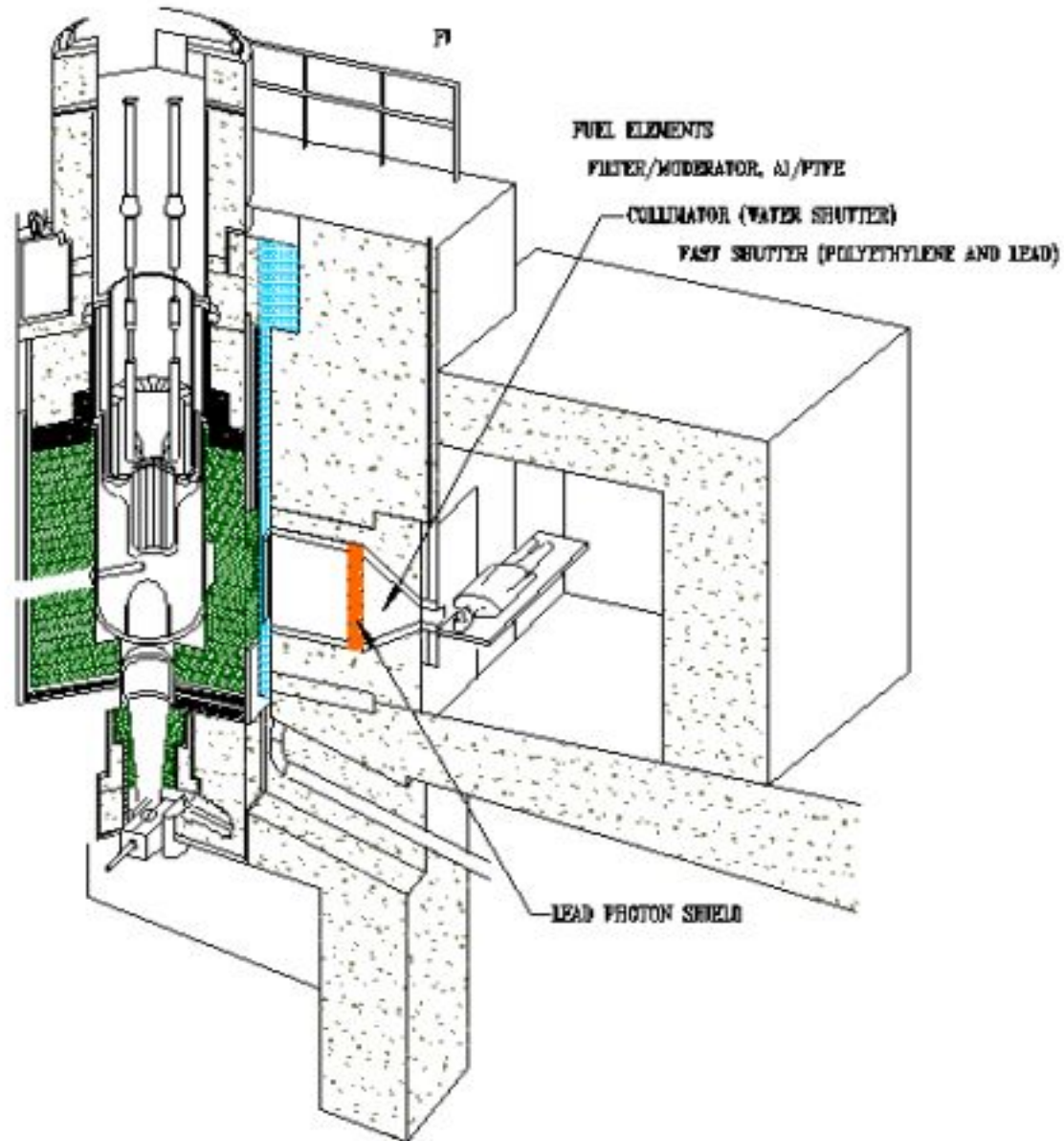
Weighted depth dose curves showing the various components



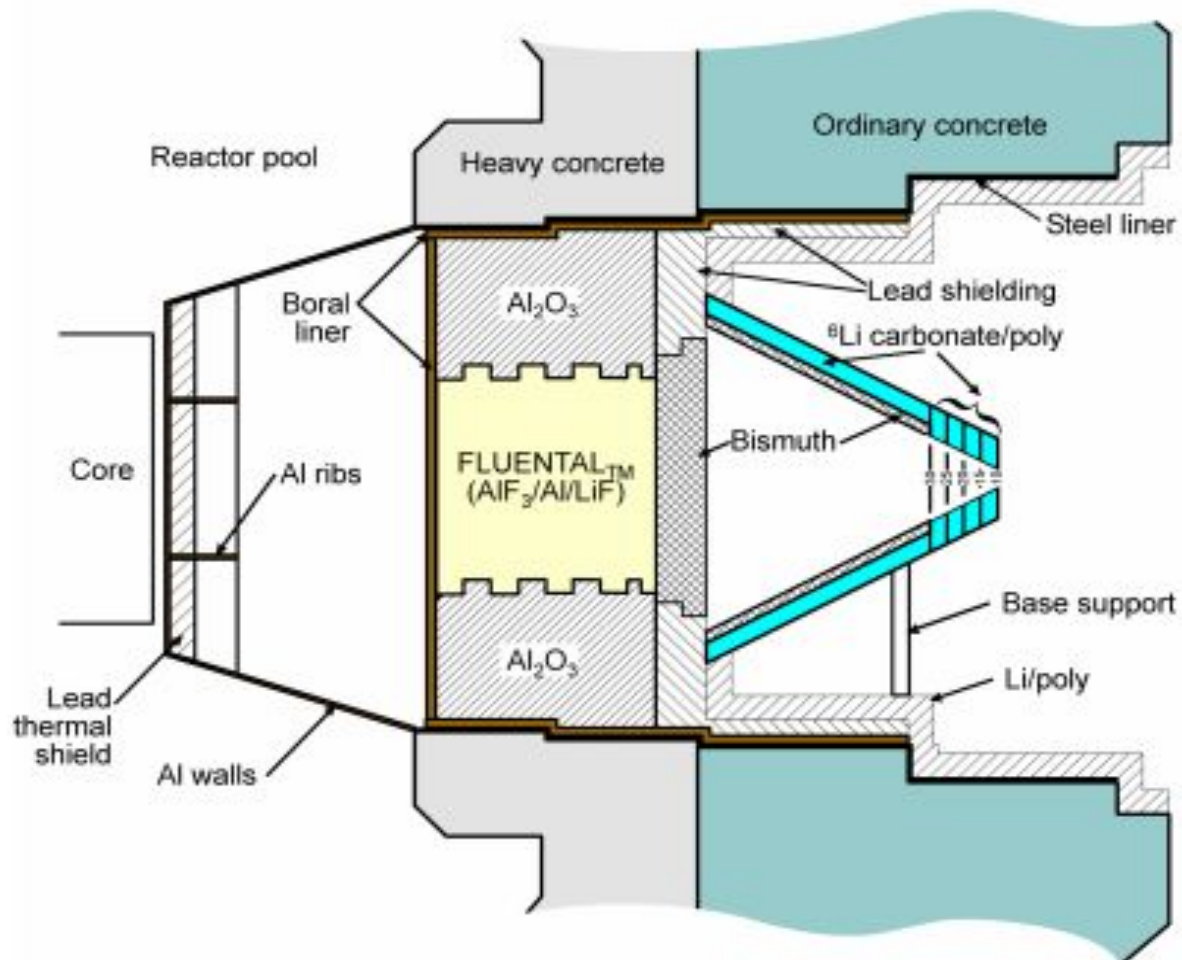
Neutron sources for capture therapy

- ❖ *Converted thermal reactors using spectrum shifting and filtering*
- ❖ *Fast reactors*
- ❖ *Fission converters*
- ❖ *Accelerators*
- ❖ *Californium source*

Example of a fission converter system

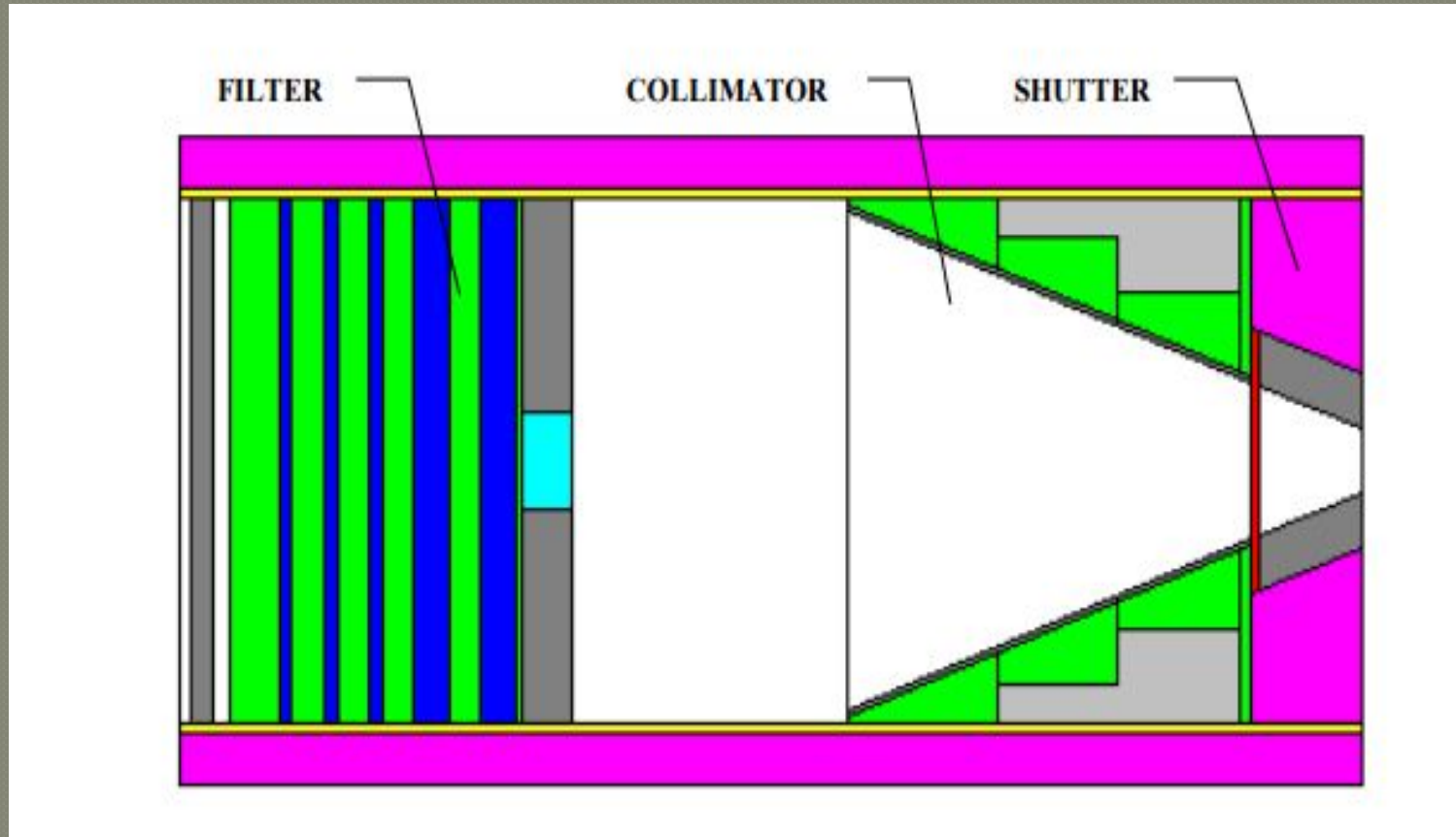


Example of an effort to minimize core to patient distance.



Not to scale
GC99 0173 3

Typical spectrum shift arrangement



The main criteria for safe operation

- ❖ *Reliability*
- ❖ *Availability*
- ❖ *Continuous versus intermittent operations*

Personnel at the NCT facility

- ❖ Reactor operations staff
- ❖ NCT operations staff
- ❖ Medical staff

Resume

Neutron-capture therapy is a promising method in the treatment of severe forms of cancer. To implement it, it is required to create a specialized medical reactor facility, the purpose of which is to form a neutron beam to irradiate the patient. To this end, multipurpose research reactors can also be used, but a specialized installation has several advantages over them: achieving the required technical parameters, location directly in the clinic, limiting reactor failures and hence greater reliability. The disadvantages include the high cost of such installations.

Thank you for
attention