

Radiation Oncology and Proton Beam Therapy in the Czech Republic

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Equipment 1999 - 2018

Machine	1999	2001	2003	2004	2007	2013	2015
LA	17	18	24	28	34	43	44
Cobalt	30	28	25	21	16	10	7
Betatron	3	2	0				
Tomotherapy	0	0	0	0	0	0	2
Cyberknife	0	0	0	0	0	1 od 2010	1
Proton therapy	0	0	0	0	0	1	1
X ray therapy	34	28	24	24	25		29
AFL	15	16	18	21	17	17	16

IGRT 56%, IMRT 63%, 70% < 8 years
56% CT simulator

ESTRO –HERO 2014

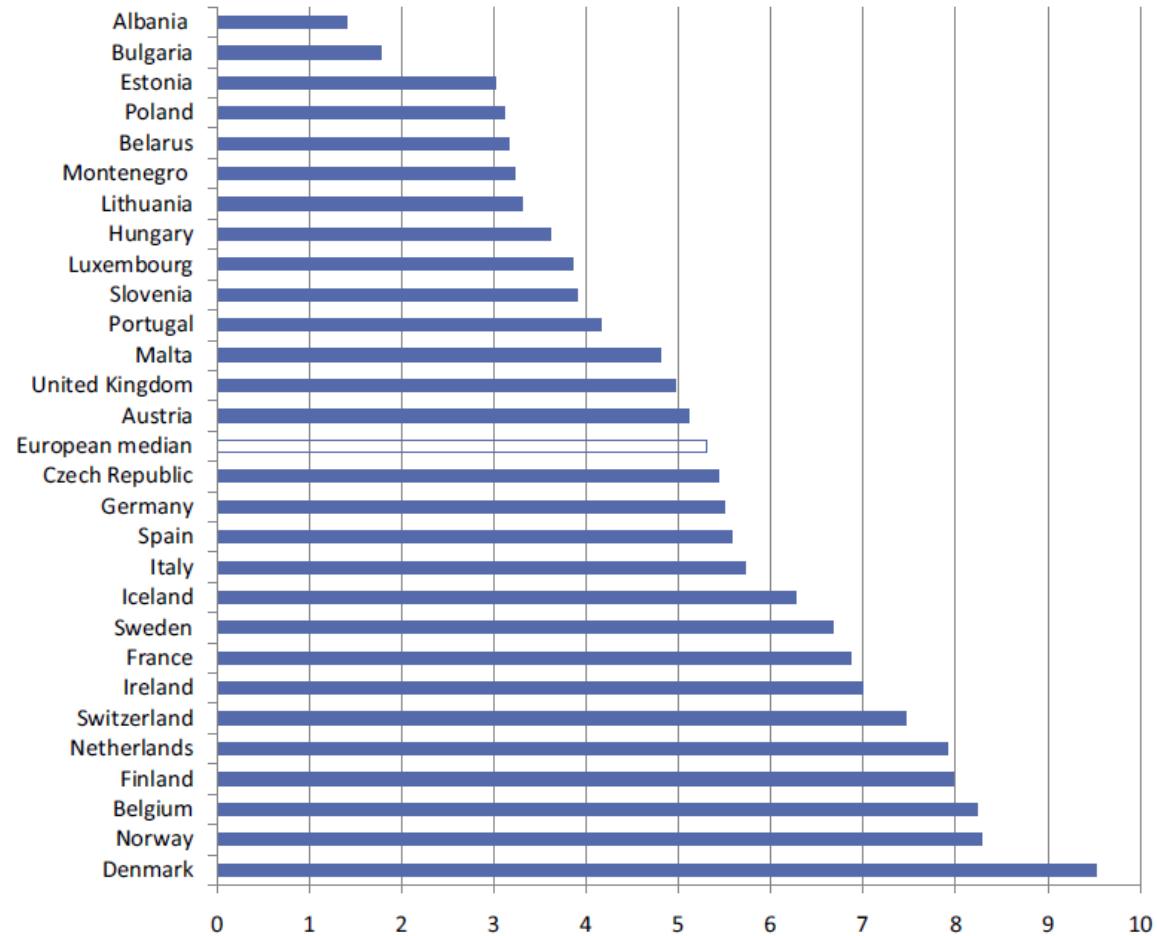


Fig. 2. Histogram showing the average number of radiotherapy treatment machines (MV units) per million inhabitants in 28 European countries.

Staff

year	2003	2006	2010	2017
Oncologists	256	300	320	418
RO	169	156	147	170 full specialisation 46 in preparation
Combination of RO and MO	80	60	45	
Physicists	63	84	76	90
RA	170	262	289	390

Number and percentage of new oncological patients treated by RT

% irradiated new patients (absolute number)	2001	2006	2010	2012	2017
	40 (19361)	41,1 (21245)	32,2 (19477)	32,9 (20299)	33,1 (22455)

Reimbursement

- IMRT prostate: 5000 Euro
- 2 HDR fraction prostata: 744 Euro
- Glioblastoma (30 F, 3 fields): 2214 Euro
- Breast 25 fractions: 1485 Euro
- Electron boost 5 F: 241 Euro
- HDR boost: 411 Euro
- Preoperative rectum (28 F, 3 fields): 2598 Euro
- Cervix (28 F, 4 fields): 2598 Euro
- UVAG 4 fractions: 1489 Euro

Proton therapy

- **Private Proton Therapy Center Prague established 2013** despite negative statement of the Czech Society of Radiation Oncology
- IBA Proteus 235
- Capacity 1500 – 2000 patients per year
- The budget of General Health Insurance Company (70 - 80% of patients in the Czech Rep) for whole radiotherapy is 1.3×10^9 Czech Crowns (CZK) per year (48 mil Euro)
- General Health Insurance Company payed in 2016 75.2 mil CZK (2.9 mil Euro) for 65 patients with PBT (= 1.16 mil CZK/patient= 45 000 Euro/patient)
- Military Insurance Company payed during 1-9/2017 210.3 mil CZK (8.15 mil Euro) for 464 patients (including highly hypofractionated prostate) (= 450 000 CZK/patient = 17440 Euro/patient)
- The mean cost per patient = 538 000 CZK (20850 Euro)
- 1500 patients with PBT/year = 31 mil Euro = threat for radiotherapy service

Approved indication for proton therapy by the Radiation Oncology Society - **children**

- Proton therapy in children can be considered in the following cases:
- **Craniospinal axis**
- **Brain tumors and tumors of paranasal cavities**, if it is impossible to achieve adequate sparing of healthy tissues by photon therapy
- **Pelvic tumors**, if it is impossible to achieve adequate sparing of healthy tissues by photon therapy
- **Paraspinal sarcomas** and other tumors, if it is impossible to achieve adequate sparing of healthy tissues by photon therapy
- **In selected cases of mediastinal lymphomas**, if it is impossible to achieve adequate sparing of healthy tissues by photon therapy
- In **eye tumors**, if it is impossible to achieve adequate sparing of healthy tissues by photon therapy

Approved indication for proton therapy by the Radiation Oncology Society - **adults**

- **Selected CNS tumors (chordomas and base of skull tumors)** and **paranasal sinuses**, if it is impossible to achieve adequate sparing of healthy tissues by photon therapy
- **Eye tumors** (uveal melanoma), if it is impossible to achieve adequate sparing of optic tract by photon therapy
- **Localized hepatocellular carcinoma**, if it is impossible to achieve adequate sparing of healthy tissues by photon therapy
- Impossibility to keep dose limits to critical structures even with modern techniques of photon therapy (IMRT, stereotactic radiotherapy, radiosurgery).

Process of approval of proton therapy

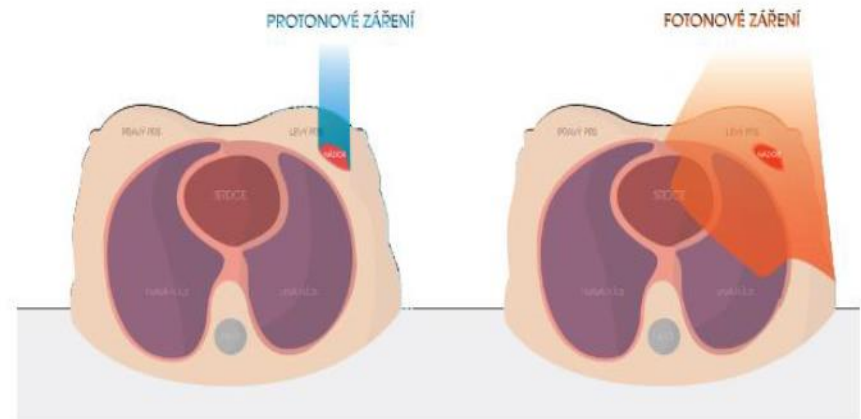
- Request of multidisciplinary oncological committee of oncological center signed by head of oncological center and chief radiation oncologist
- Approval by health insurance company

Agressive advertising campaign of proton centre results in proton treatment of a large scale of tumors

- Beer tray



- Comparison of proton and photon therapy of breast cancer on the web of PTC



Thank you for your attention

