Overview of radiation oncology in the Czech Republic

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SUMMARY

BACKGROUND: Modern radiotherapy (RT) plays a very important role in both curative and palliative treatment of tumours. There are large variations among the EU countries and even regional variations within countries in the provision of RT.

AIM: In this report we present an overview of the current infrastructure, organisation, education and quality programme of radiotherapy in the Czech Republic.

MATERIAL AND METHODS: Data from the National Cancer Registry, Institute of Health Information and Statistics of the Czech Republic and from questionnaires and clinical audits of radiotherapy departments were used for evaluation of radiotherapy equipment, numbers of patients treated by radiotherapy and workload of radiotherapy facilities.

RESULTS: Radiotherapy of malignant diseases is provided in 28 facilities in the Czech Republic. There are 35 linear accelerators and 16 cobalt units for the population of 10.3 million inhabitants, which represents one megavoltage unit for 200 000 inhabitants. Fourteen departments are equipped for brachytherapy with high dose rate afterloading machines. Forty-three percent of newly reported cancer patients undergo radiotherapy as part of oncological treatment.

CONCLUSION: The main problem of radiation oncology in the Czech Republic is insufficient centralisation and the persistence of small, under-equipped departments.

KEY WORDS: radiation oncology, Czech Republic, infrastructure, national standards, main problems

The Czech Republic has a population of 10.4 million inhabitants. The cancer incidence is very high. In 2005 the total number of cases of malignant neoplasms and carcinoma in situ (ICD-10 codes C00–C97 and D00–D09) newly reported to the National Cancer Registry was 71 449. The mortality was 28 033 cases. While the level of incidence of malignant neoplasms in the Czech Republic increases, mortality has exhibited an opposite trend since the second half of the 1990s (1).

The history of radiotherapy in Bohemia starts in the year of 1906 when the first radon spa in the world was founded in Jachymov (Joachimsthal). The uranium mines in Jachymov were a source of ^{226}Ra for brachytherapy until the nineteen sixties. The former Czechoslovakia in the second half of the 20th century was also a producer of cobalt and caesium units and betatrons, which helped to establish a national network of radiotherapy departments. In the 1990s it became evident that this network was too dense and it was difficult to equip all radiotherapy facilities with modern technology. The Czech Society for Radiation Oncology, Biology and Physics (SROBF) prepared in the year 1995 technical and staff requirements and a quality assurance/control programme for radiotherapy departments and started to support centralization of curative radiotherapy to well equipped centres. This process is very slow, because until recently there was insufficient support from the Ministry of Health and of health insurance companies. The large state and university hospitals had only a limited budget for development of

radiotherapy, while small hospitals were very interested to keep radiotherapy departments and not to be forced to send their patients away. In the years 2004–2006 the SROBF prepared national standards of radiation oncology and proposal of clinical audit of radiotherapy departments. This project was supported by the Ministry of Health. The standards define minimal infrastructure of radiotherapy departments and requirements for the quality of the process of radiotherapy. The standards are published on the website of the SROBF (www.srobf.cz) and were accepted by the Ministry of Health and health insurance companies; they are very helpful in negotiations about reimbursement and the future of radiation oncology in the Czech Republic. The National Cancer Register has collected data about incidence and mortality of cancer in the Czech Republic since the 1950s and is a useful source of information about numbers of patients treated by radiotherapy and about the required capacity of radiotherapy.

At present, radiotherapy of malignant diseases is provided in 28 facilities (Fig. 1), but only half of them have at least two linear accelerators. Both external beam radiotherapy

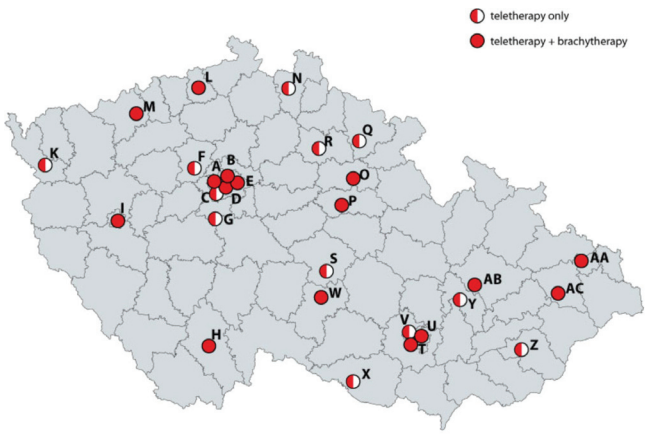

Fig. 1. Network of Czech radiotherapy facilities in 2007/2008 (A) UH Kralovske Vinohrady /Prague/, (B) General UH /Prague/, (C) Thomayer UH /Prague/, (D) UH in Motol /Prague/, (E) UH na Buloyce /Prague/, (F) Kladno, (Ci) Institute of Oncology and Rehabilitation Ples, (H) Ceske Budejovice, (1) UH Pilsen, (K) Cheb, (L) Usti nad Labem, (M) Chomutov, (N) Liberec, (0) UH Hradec Kralove, (P) Pardubice, (Q) Trutnov; (R) Jicin, (S) Havlickuv Brod, (T) Masaryk memorial Cancer Institute /Brno/, (U) UH Brno, (V) St. Anne's UH Brno, (W) Jihlava, (X) Znojmo, (Y) Prostejov, (Z) Holesov (AA) UH Ostrava, (AB) Uf I Olomouc, (AC) Novy Jicin. (Noto: UH = University Hospital)

Table 1. Numbers of RT machines in the Czech Republic over the period 1999–2008

RT machine	1999	2001	2003	2004	2008
Linear accelerator	17	18	24	28	35
60Co unit	30	28	25	21	16
Betatron	3	2	0	0	0
X-ray therapy	34	28	24	24	25
Afterloading brachytherapy	15	16	18	21	17
Simulator	17	18	19	22	28
Treatment planning system (TPS)	36	37	50	55	

Table 2. Radiotherapy equipment in the Czech Republic compared to the European data

Parameter[1]	European average 2003[(2)]	Czech Republic2003	Czech Republic 2008
Number of MV per 10^6 of inhabitants	5.9	4.8	5
1MV/n	170 000	208 000	202 000
LA/Co	3.26	0.96	2.2
1LA/n	222 222	416 000	294 000

[1] MV = megavoltage unit; n = number of inhabitants; LU = linear accelerator; Co = cobalt unit
[2] Source: Bentzen, Radiotherapy and Oncology, 75(2005), 355 – 365