PHYSICAL ACTIVITY AS AN EFFICIENT MEANS OF NON-PHARMACOLOGICAL CARE IN ONCOLOGY

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PHYSICAL ACTIVITY AS AN EFFICIENT MEANS OF NON-PHARMACOLOGICAL CARE IN ONCOLOGY

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FOREWORD

Significance of physical exercise for human health had been known to doctors since the Ancient Times. Proof of the link between physical activity and prevention of malignity occurrence first appeared more than 100 years ago and first physical activity recommendations were created in the year of 1950 short after the American College of Sports Medicine (ACSM) came into being. Despite the long history, the term of physical activity as prevention or therapy of tumours was known only to a small circle of scientists, which remained that way to the beginning of the 21st century. Nowadays, the theme of using physical activity as non-pharmacological means is becoming topical again and it has been reacted to by many professional medical societies (e.g. American College of Sports Medicine, 2017, World Cancer Research Fund/American Institute for Cancer Research, 2010).

It is becoming clear that regular physical activity relates to significant benefits for human health and that physical intervention could become one of the pillars of non-pharmacological treatment of tumorous diseases.

This material has been created due to the absence of similar material in the local market. Currently, there is no similar complex text in Czech language.

The theoretical part of the monography speaks about the subject matter of the occurrence of oncology diseases, biological effects of both tumours as well as therapy upon the organism. A significant part is dedicated to the existing research in the possible influence of directed physical activity upon human organism as well as the description of physical interventions.

The second part of the monography deals with the previous research, which is the area that has been the focus of the authors for many years.

1 Theoretical part

1.1 Oncological diseases epidemiology

Iva Hrnčiříková

The chances of survival in oncology patients has increased significantly thanks to early detection of oncological diseases, highly specialised and targeted treatment, and operation of comprehensive oncology centres. Even though occurrence of oncological diseases is on the rise (in the Czech Republic in 2011 +32 % in males, +22.8 % in females when compared with 2001), oncological diseases mortality has been increasing (in the Czech Republic in 2011 –4.7 % in males and –5.6 % in females when compared with 2001).

Oncological treatment carries various health consequences and reduces the quality of life of survivors. Therefore, it is essential to focus on follow-up care for oncology patients to improve their quality of life.

On average 87,000 malignant tumours are diagnosed every year in the Czech Republic (in 2017 there were 86,819 patients). Approximately 27,000 patients die of malignant tumour annually (in 2017 there were 27,320 patients). In total there are about 600,000 people in the Czech Republic with a malignant neoplasm or a history of the disease. (/https://www.linkos.cz/narodni-onkologicky-program/co-musite-vedet/ceska-republika-a-rakovina-v-cislech/)

The incidence of malignant neoplasms in the Czech Republic has been increasing in the long-term. The most frequent newly diagnosed malignant disease in 2017 were **skin tumours excluding melanoma**, i.e., bazaliomas and squamous cell carcinomas. Thanks to the prognostically relatively favourable nature of the disease and their frequent early diagnosis, the mortality rate for this type of malignant tumours is consistently very low.

The incidence rate is higher in men than in women. The prevention of this disease is primarily limiting UV exposure and screening for skin changes.

Other most frequent diagnoses include **colorectal and rectal carcinoma, prostate malignant tumours in men, breast carcinoma in women and tumours of trachea bronchus and lungs** (https://www.linkos.cz/narodni-onkologicky-program/co-musite-vedet/ceska-republika-a-rakovina-v-cislech/).

The increasing number of reported cases is probably related to the increasing average age of the population (life expectancy at birth). Age is the major risk factor for malignancies, partly due to the cumulative effect of risk factors.

Other possible influences on the increasing absolute incidence are the higher incidence of both physical and chemical carcinogens. Paradoxically, it is the improved malignant neoplasm diagnostics and the overall quality of medical care that contribute to the increased number. Mammography screening (breast cancer in women) was officially launched in the Czech Republic in 2002, cervical screening (cervical cancer in 2008 and colorectal carcinoma screening in January 2009 (https://www.linkos.cz/narodni-onkologicky-program/co-musite-vedet/ceska-republika-a-rakovina-v-cislech/).

In 2016, a total of 96,500 cases of malignant neoplasms and neoplasms in situ (dg. (diagnosis number) C00–C97 and D00–D09 according to MKN-10), were newly reported to the National Cancer Registry of the Czech Republic (NCR) out of which 49,302 cases were in men and 47,198 cases were in women.

Positive trends of stagnation or even a slight decline in some major diagnoses (lung cancer in men, colorectal cancer) are offset by an increase in breast cancer in women and by an increase in skin cancer in both sexes. Mortality from cancer has shown a relatively clear decline since 2003.

Since 1979 in situ neoplasms (pre-invasive tumours) have been monitored in the National Cancer Registry. This is the initial state of malignancy, i.e., the pre-malignant state, when the cells that make up the lesion show certain atypia (failure of differentiation, mitotic figures) but are still localized intraepithelially and do not penetrate deep into the surrounding tissue. This is crucial for the patient as an individual with the tumour in situ should not have any metastases (Novotvary, 2016).

1.1.1 Malignant neoplasm of the colon and rectum

one of the most common oncological diagnoses in the Czech Republic is malignant neoplasm of **the colon and rectum (dg. C18–C20)**. Globally, the Czech Republic has the sixth highest incidence of this disease. In 2016, 7,610 colorectal malignities were reported (i.e., a slight absolute decrease compared to the previous year). Of these, there were 4,582 cases in men (i.e., 88.2 cases per 100,000 men) and 3,028 cases in women (i.e., 56.4 cases per 100,000 women). In both sexes, colorectal cancer is the second most common cancer diagnosis after prostate cancer in men and breast cancer in women, after exclusion of "other malignant neoplasm of the skin" (dg. C44). In 57 % of cases in men and 67 % in

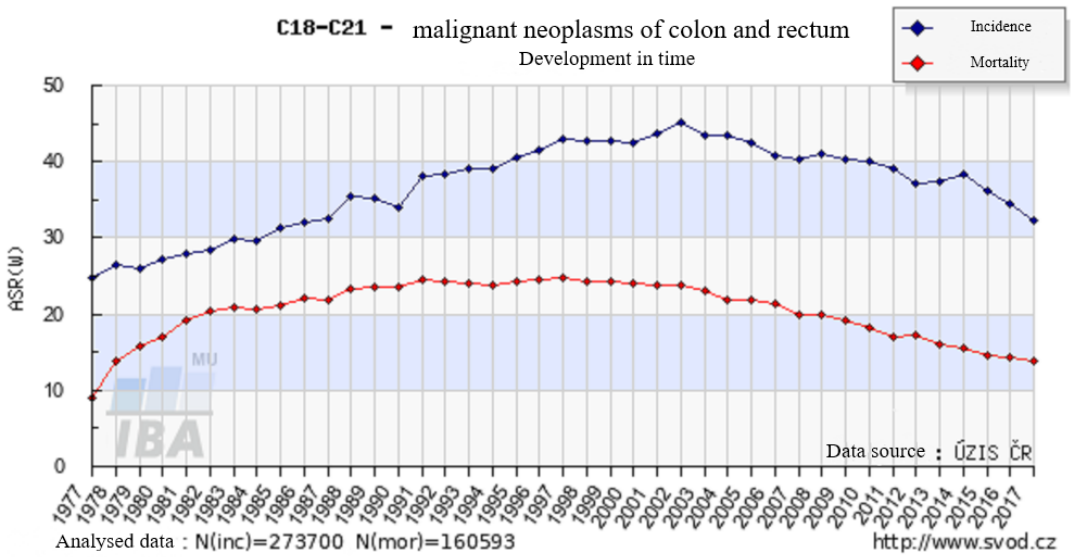

Fig 1 Incidence and mortality of malignant neoplasms of colon and rectum (Dušek et al., 2018)

women, the neoplasm is located in the colon (dg. C18). Compared to 2015 the standardised incidence rates for both men and women have decreased slightly (Neoplasms 2016).

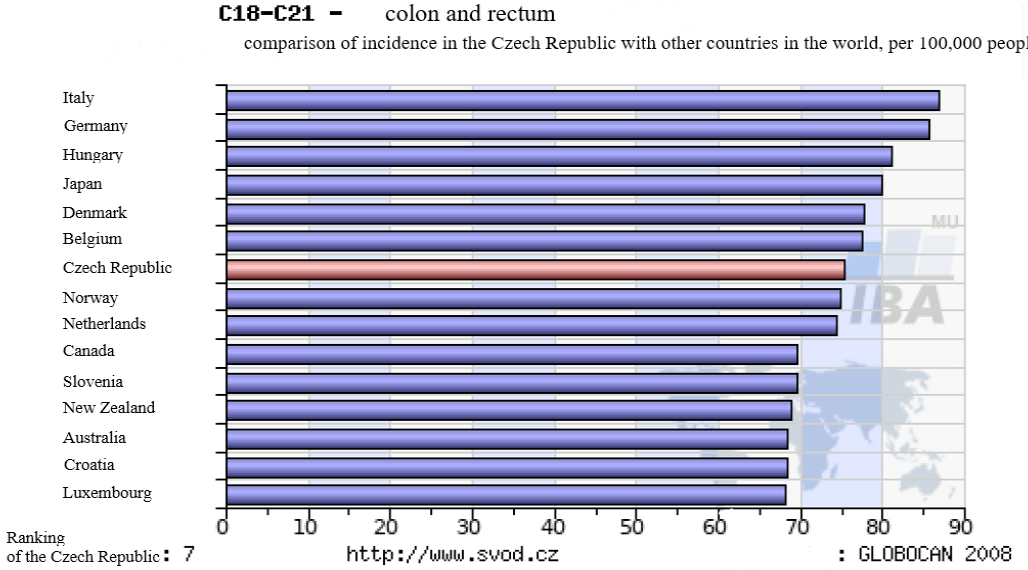

Fig 2 Comparison of the incidence of malignant neoplasms of colon and rectum globally and in the Czech Republic ČR (Dušek et al., 2018)

In terms of age distribution, more than four fifth (82 %) of colorectal malignities are reported in people over 60 years of age. The mean age at diagnosis is higher in women than in men (70 vs. 69 years of age). Most cases were reported in men and women aged 70–74 years of age.

1.1.2 Malignant neoplasm of the lungs

Malignant neoplasms of the trachea, bronchus, and lungs (dg. C33–C34) is the second most commonly occurring malignity. In 2016 a total of 6,782 cases of tumours of this localisation were reported in the Czech Republic (3 % more than in 2015). The prevalence of this type of cancer is higher in men (4,478 cases, i.e., 86.2 cases per 100,000 men) in comparison with the occurrence in women (2,304 cases, i.e., 42.9 cases per 100,000 women). Most cases are detected at an advanced stage. It is the most common cause of death in cancer patients (Neoplasms 2016).

1.1.3 Malignant neoplasm of the breast

Malignant neoplasm of the breast (dg. C50) was the most common cancer in women (except for dg. C44) in 2016. The 7,220 new cases detected (134.4 cases per 100,000 women) represented almost 18.0 % of all reported malignities in women (dg. C00–C97).

Probably in connection with the screening programme, the number of detected in situ breast (dg. D05) has also increased in recent years, in 2016, as in the previous year, 649 cases were registered (i.e., an increase of 41.1 % compared to 2011).

Although the treatment of breast cancer is very successful, especially in the early stages (relative 5-year survival of treated patients is almost 100 % in clinical stage I, and almost 90 % II), breast cancer remains one of the most common causes of cancer deaths in women (second most common after trachea, bronchus, and lung cancer). In 2016 1,685 women died of breast cancer, i.e., 76 more than in the previous year (Neoplasms 2016).

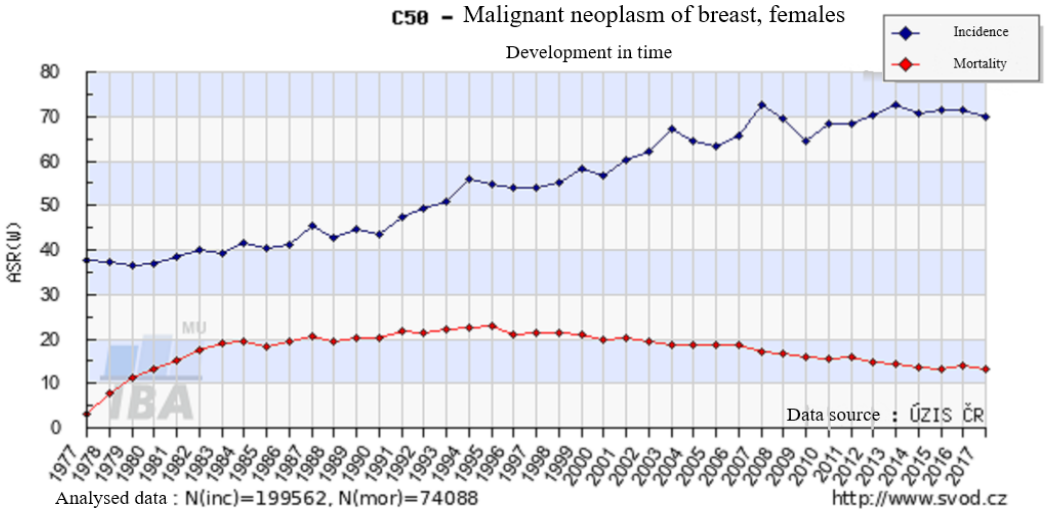

Fig. 3 Incidence and mortality of the malignant neoplasm of the breast (Dušek et al., 2018)

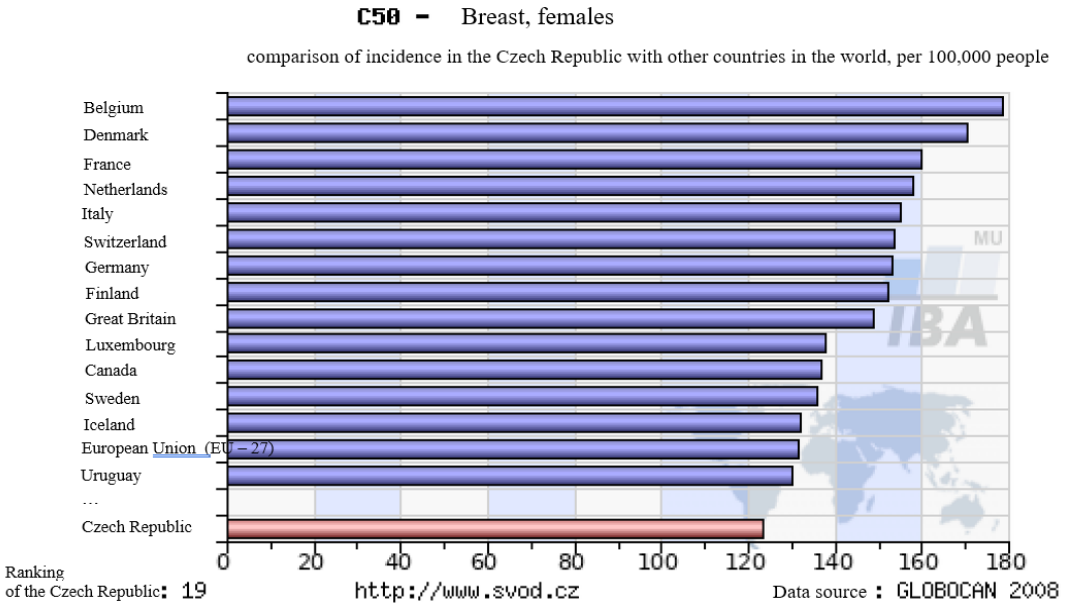

Fig. 4 Comparing the incidence of the malignant neoplasm of the breast in the world and in the Czech Republic (Dušek et al., 2018)

1.1.4 The malignant neoplasm of the prostate

The most frequent malignant tumour in men (except for the diagnosis C44) has been since 2005 the malignant neoplasm of the prostate (dg. C61). In 2016 there were 7,305 cases of the malignant neoplasm of the prostate (i.e., an increase in cases of approximately 3 % when compared with the year of 2015), per capita it was 140.7 cases in 100,000 men. A rapid increase of the malignant neoplasm of the prostate has been monitored since the early 1990s. Currently, it is stabilised. The standardised prostate cancer mortality rate has been declining since 2004, in recent years is stabilised. In 2016, 1,421 men died of the diagnosis C61 in the Czech Republic (27.4 per 100,000 men).

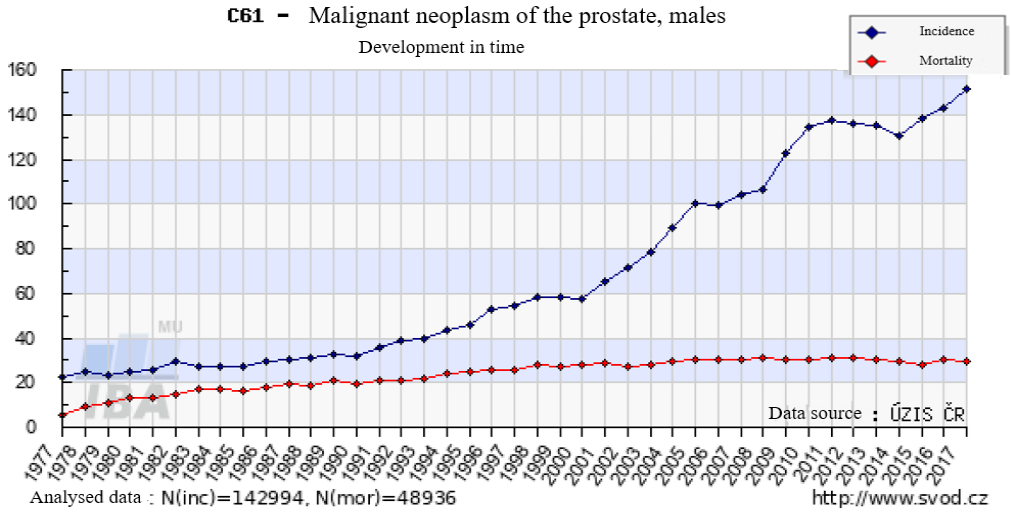

Fig. 5 Incidence and mortality of the malignant neoplasm of the prostate (Dušek et al., 2018)

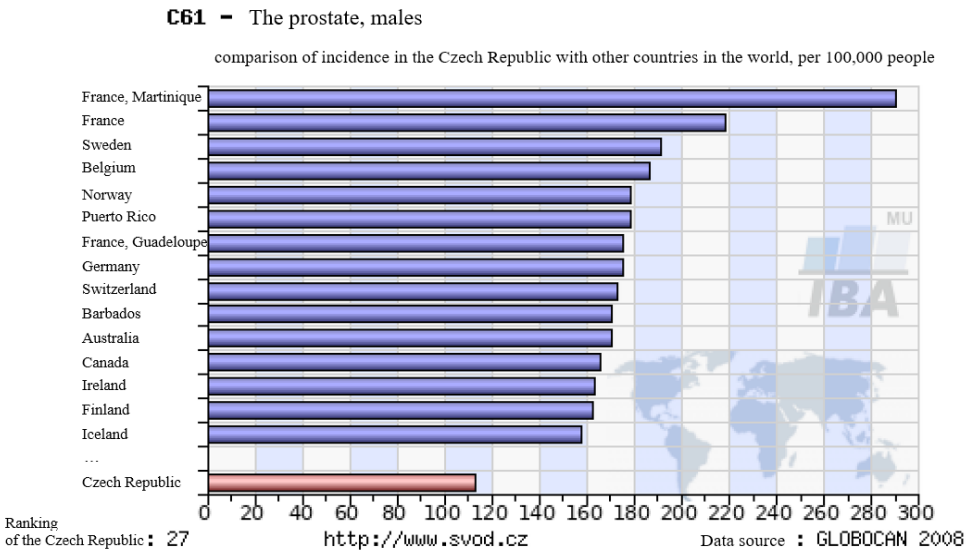

Fig. 6 Comparing the incidence of the malignant neoplasm of the prostate in the world and in the Czech Republic (Dušek et al., 2005)