



Press release

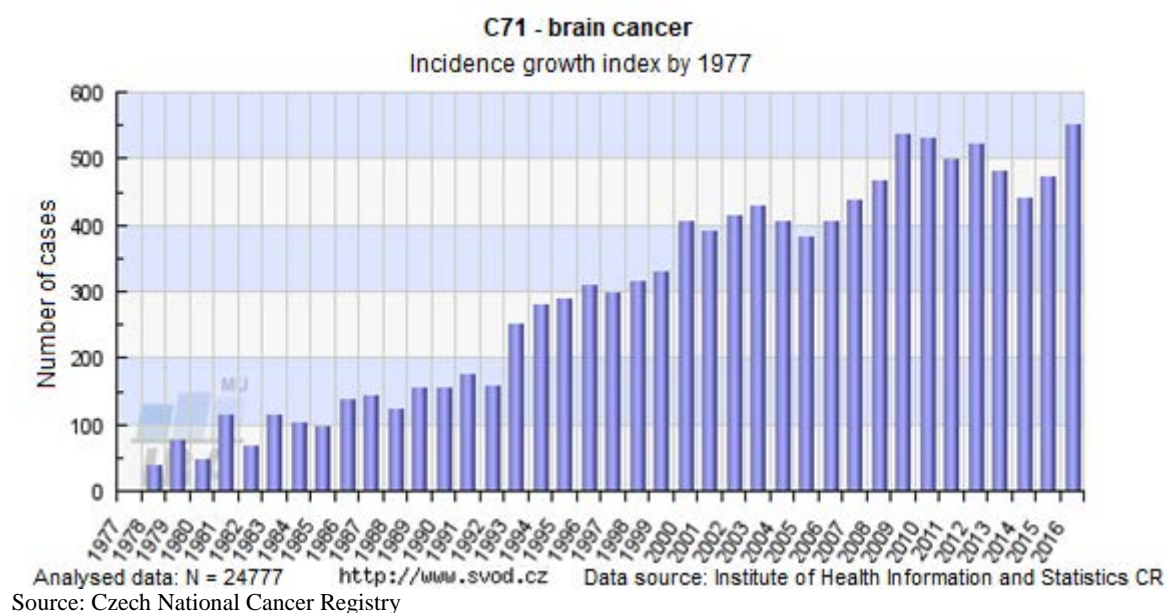
Prague, May 28, 2019

Physicians and Scientists Mark World Brain Tumour Day

On the occasion of World Brain Tumour Day, which is observed on June 8, the Central Military Hospital and First Faculty of Medicine, Charles University are presenting potential new approaches to the treatment of these serious oncology disorders

The incidence of brain and spinal cord cancers has been gradually increasing year after year. Patients may carry tumours directly growing from the brain tissue, or suffer from brain metastases resulting from malignancies in other body sites; in other cases, tumours grow in other tissues and compress the brain tissue. Specialists perceive the brain tumour day as an occasion for primary prevention and impetus for people to get interested in their brain before it is too late.

Increase in brain cancer incidence in the Czech Republic



In case of some highly aggressive brain cancer types, such as glioblastoma, the patient prognosis is still very poor despite the efforts of physicians and scientists. Therefore, enormous endeavours have been invested, both in the field of science and clinical hospital practice, into reversing such difficult situation of these patients. This is, e.g., documented by a recent success of two Czech groups of scientists, whose work on glioblastoma stem cells ranked among one hundred most cited publications in the field of cancer cell and molecular biology research in journal *Scientific Reports* edited by prestigious editorial office *Nature*.

Glioblastoma stem cells decide on the aggressiveness and spread of this tumour and contribute to its resistance to therapy, affecting the length of the patient's survival. "We have found that there is a group of molecules responsible for maintenance of the cell 'stemness',



i.e., self-renewal capacity. We discovered an elevated occurrence of this group of regulatory molecules in samples of human glioblastomas, the most aggressive brain malignancies, with the highest frequency in tumours with poor clinical outcome. Thus, we have demonstrated that the poorer patients' prognosis is associated with higher proportion of cells with stem cell potential. In future, this fact may help physicians to decide on the choice of more or less aggressive therapy," explains Dean of the 1st FM CU, professor Aleksi Šedo, MD, DSc, who is also Head of the Institute of Biochemistry and Experimental Oncology of the 1st FM CU. His scientific group, along with the group of professor Ondřej Slabý from the research centre CEITEC, thus contributed another shred of evidence to the insight into the tumour microenvironment within the framework of activities of the recently established Centre of Tumour Ecology (CNE). Their success also illustrates the national scientific collaboration, aiming to find its fulfilment in establishment of the National Cancer Institute (NCI). This national centre of academic research should come into existence with the aid of European funding allocated by the Ministry of Education, Youth and Sports.

The most recent radiotherapy method used in brain tumour therapy is radiosurgery. "It consists in application of a high dose of radiation to small volumes, with precise localization of the target volume without direct visual control and rapidly decreasing dose affecting the surroundings. Most frequently, the method has been used for the treatment of brain lesions – tumours or metastases, but recently it is also increasingly utilized for the treatment of inoperable tumour foci in the lungs, liver, prostate, and other sites. Radiation is applied in one dose or is divided into a few fractions, i.e., 3-5 doses, 'mimicking' the surgical intervention. In contrast to surgery, however, the therapy lasts for several weeks or months until the lesion necrotized after irradiation has disappeared or fibrotized. The therapeutic effect is therefore not immediate, but usually manifests itself after two or more months," notes Head of the Clinic of Radiation Oncology, Faculty of Medicine of Masaryk University & Masaryk Memorial Cancer Institute in Brno, professor Pavel Šlampa, MD, PhD. As he adds, the advantage of the cyberknife lies in precise localization of the irradiation, because the system is automatically self-navigated during the radiation process. On the other hand, the use of X-knife and tomotherapy is more universal. All these radiosurgery systems are more sparing for the surrounding healthy tissue than, e.g., the proton beam.

Cancer patients are also defended by the Central Military Hospital – Military University Hospital in Prague. As has been already announced, the Hospital will purchase a radiosurgery instrument for the Clinic of Neurosurgery and Neurooncology of the 1st FM CU & Central Military Hospital Prague. "At the beginning of this year, we concluded a contract for purchase of CyberKnife M6. This instrument totally satisfies our exacting requirements concerning medical purposes, utilization, and technical parameters. Patients will also greatly benefit from the SBRT (Stereotactic Body Radiation Therapy) equipment, allowing precise targeting of very high doses directly to the tumour without affecting the surrounding healthy tissue by irradiation. After installation of the instrument scheduled for 2020, the Central Military Hospital Prague will be capable of providing several hundreds of neurooncology patients per year with early, most recent treatment method, thus significantly increasing its quality and success rate," approves Director of the Central Military Hospital Prague, professor Miroslav Zavoral, MD, PhD.

In the field of neurooncology research, the current focus of the Clinic of Neurosurgery and Neurooncology of the 1st FM CU & Central Military Hospital Prague is mostly devoted to the genetics of brain tumours. "We consider it essential for advances in this field. From the aspect



of surgery, our primary interest lies in the relationship and effectiveness of magnetic resonance during the operation and effectiveness of fluorescence techniques. We study the benefit of imaging techniques, functional magnetic resonance, and pre-, per-, and post-operative tractographies. Adenomas of the pituitary are subject of our study particularly in relation to per-operative magnetic resonance and potency of endoscopic endonasal technique. We study its potential in other mid-line diseases of the cranial base. In meningiomas, we are interested in the anatomy of basal cisternae, tumour growth characteristics, and the brain-tumour interface," explains Head of the Clinic of Neurosurgery and Neurooncology of the 1st FM CU & Central Military Hospital Prague, professor Vladimír Beneš, MD, DSc.

Seven symptoms of brain tumour

Impaired vision

Worsening of peripheral vision without being initially identified by the patient is called bitemporal hemianopsia. The first evidence of the tumour disease may be revealed during the examination by an ophthalmologist.

Daily headaches

Long-lasting, persistent headaches, often occurring immediately after waking up, and not responding to common treatment with over-the-counter drugs.

Speech disorder

Stammering or stuttering, but also inability to understand speech, suggest impairment of the speech centres in the brain by the tumour.

Loss of hearing in one ear

The tumour may impair correct activity of the temporal lobe.

Loss of balance and fine motor activity

Patients face problems with walking, balance, and overall body coordination.

Behavioural changes

Compression of the temporal lobe may result in depression, anxiety, aggressive behaviour, as well as apathy.

Infertility

If the tumour is located close to the pituitary, this central endocrine gland responsible for production of hormones cannot function properly.

Source: World Brain Tumor Day

More information on brain tumours, see the Central Military Hospital website:

<https://www.uvn.cz/cs/informace-pro-pacienty-nchk/240-diagnozy/diagnozy-nchk/5188-nadory>

the Linkos website:

<https://www.linkos.cz/pacient-a-rodina/onkologicke-diagnozy/nadory-mozku-a-cns-c70-72/vyskyt-nadoru-mozku-a-cns-v-cr/#>

and

<https://www.linkos.cz/pacient-a-rodina/onkologicke-diagnozy/nadory-mozku-a-cns-c70-72/>



About the First Faculty of Medicine, Charles University

The First Faculty of Medicine, Charles University is the largest Czech medical faculty – being attended by over 4,500 students. The principal study programmes are general and dental medicine, and in addition, the faculty offers study in other fields of medicine, specializations, and life-long education, as well as a number of doctoral programmes. Every year, more than 300 new physicians graduate from the 1st FM CU.

The faculty is also the most productive institution in biomedical and clinical research. Scientific work, pre-graduate and graduate education is carried out at 75 theoretical institutes and clinical departments in common with the General University Hospital, University Hospital in Motol, Central Military Hospital, Thomayer Hospital, Bulovka Hospital, and other interdisciplinary centres.

The 1st FM CU also takes part in project BIOCEV – European scientific centre of excellence in biotechnology and biomedicine – and project Albertov Campus, focused on the development of excellent scientific and educational activities of Charles University in the field of natural and medical sciences.

About the Central Military Hospital – Military University Hospital in Prague (ÚVN)

The Central Military Hospital provides high quality, complex and safe specialized medical care to adult patients, based on most recent therapeutic methods and approaches in all fields excluding cardio surgery, obstetrics, and burn treatment. It is not involved in paediatrics. The Hospital is a contributory organization founded by the Ministry of Defence of the Czech Republic. It permanently develops modern, particularly mini-invasive methods in individual fields of medicine. The Hospital is equipped with up-to-date technologies and reflects the current trends in medicine. As an integral part, it includes a top diagnostic complement. It is a training, educational and specialized medical centre of the Army of the Czech Republic and provides long-term care to military veterans. It has available 677 beds, of which 472 are standard, 68 emergency, and others serve for follow-up and social care. Every year, the hospital performs more than a million of outpatient interventions and counts 26 thousands of hospitalized patients. It includes more than 30 specialized medical departments. The following departments possess the status of a clinic: surgery, neurosurgery and neurooncology, internal medicine, ORL, eye, oncology, infectious diseases, orthopaedics, gynaecology, and anaesthesiology & resuscitation. The Hospital permanently develops pre-graduate and graduate education, which is carried out virtually at all departments.

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