**PRESS RELEASE**

**Brain Tumour:**

**New Magnetic Resonance Imaging (MRI) Technique Uncovers Pathophysiological Process to Help Early Detection of Recurrent Glioblastoma**

**Karl Landsteiner University of Health Sciences in Krems has identified physiological processes that indicate the recurrence of malignant brain tumours six months before clinical diagnosis.**

**Krems (Austria), 19th January 2021 – Lack of oxygen and specific changes in the microvascular architecture are previously undetected and very early indications of the return of a brain tumour following previous surgical intervention. This was the result of a study published by an Austrian and German team headed by Karl Landsteiner University of Health Sciences in Krems. The findings showed that initial signs of a recurrence of glioblastomas could be detected more than six months earlier than otherwise possible using standard clinical methods. Published in Clinical Cancer Research, the study was based on retrospective analysis of special MRI data from 56 patients.**

Glioblastoma is a form of malignant brain tumour with diffuse infiltration into the adjacent brain tissue. This characteristic makes it particularly difficult to fully remove tumours, meaning that supplementary treatments such as chemotherapy and radiotherapy are also required. But even so, in the vast majority of cases the tumours return within a short space of time. Diagnosing recurrence at a very early stage is difficult, but crucial given the decisive role it plays in determining the patient’s life expectancy. A newly published study from Karl Landsteiner University of Health Sciences in Krems (KL Krems) has delivered some surprising insights that could potentially pave the way for earlier diagnosis and personalised therapy.

**190 Days Earlier: novel evidence of a recurring tumour**

The team led by Prof. Andreas Stadlbauer, a researcher from the Institute of Medical Radiology at St. Pölten University Hospital (KL Krems), were able to detect very early and clear indications of recurrence of the tumour. “We were able to identify a change in the vascular architecture where the brain tumour would eventually recur fully 190-days before a conventional MRI diagnosis could be made,” he explained, outlining the key finding of the study. From a technical perspective, this was made possible by measuring biomarkers for certain physiological values in the brain tissue using MRI. As Prof. Stadlbauer noted: “We looked at earlier MRI scans from patients who we knew had had a recurrence of the glioblastoma later on. In the areas of the brain where this was observed, we noticed changes in the physiological biomarkers over a period of a year before the tumour recurred and were able to identify characteristic patterns.”

These patterns included a decrease in vessel density in the brain tissue – which was reflected in reduced blood supply – fully 190 days prior to the radiological diagnosis. Increasing lack of oxygen (hypoxia) which could also be measured using MRI was also among the changes noted. This led to formation of tiny vessels and an increase in vessel density 120 days before the radiological diagnosis. A month later, this led to an increase in oxygen supply. “We observed two different phases in the manifestation of a recurrent glioblastoma” said Prof. Stadlbauer. “Infiltrating tumour cells – that cannot be killed during preliminary treatment – recruit existing microvessels to ensure their own supply, but end up weakening and destroying them. This was the process that we observed in the form of decreased vessel density. The related decline in oxygen supply and the resulting tissue hypoxia triggers formation of microvessels, which – with a delay of 30 days – is seen in the restoration of blood supply and improved oxygen and nutrient supply that plays a decisive role in aggressive tumour growth.”

Overall, the observations made in patients for the first time provide solid foundations for the development of an MRI-based early diagnosis technique for recurrent glioblastoma. A compelling task for Prof. Stadlbauer, but one that still requires a great deal of work. “After all,” he pointed out, “this was a retrospective study that exclusively involved the evaluation of MRI images from patients whose tumours had returned.” When developing more robust diagnostic methods, the next step will be to test the insights gained in a prospective study which predicts recurrence based on the observations made. With this study, KL Krems has once again shown its commitment to promoting research that demonstrably adds value for patients.

**Original Publication**: Tissue hypoxia and alterations in microvascular architecture predict glioblastoma recurrence in humans. A. Stadlbauer, T. M. Kinfe, I. Eyüpoglu, M. Zimmermann, M. Kitzwoegerer, K. Podar, M. Buchfelder, G. Heinz, S. Oberndorfer & F. Marhold. Clinical Cancer Research. 10.1158/1078-0432.CCR-20-3580

**About Karl Landsteiner University of Health Sciences**

Karl Landsteiner University of Health Sciences (KL) is a pioneer for innovation in medical and health sciences education and research, and a catalyst for groundbreaking work which will benefit society at large. Research at KL focuses on niche fields in bridge disciplines such as molecular oncology and hematology, biomedical engineering, psychology and psychodynamics, as well as topics including water quality and related health issues. Study programmes include health sciences, human medicine, psychology, psychotherapy and counselling and have full European recognition. A network of university hospitals in St. Pölten, Krems, and Tulln provides students with quality-assured, research-led education; it. It enables them to do internationally- recognized top-class clinical and translational research that is recognised worldwide. Karl Landsteiner University received accreditation by the Agency for Quality Assurance and Accreditation Austria (AQ Austria) in 2013.

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