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Design of new ^{18}F-labelled radiopharmaceuticals for brain tumor imaging

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Glioblastoma multiforme is the most aggressive type of primary brain tumor with a median overall survival (OS) ofabout 12 months.Brain metastases are the most common form of brain tumors and significantly outnumber primarybrain tumors, with the majority originating from lung cancer, especially non–small cell lung cancer (NSCLC). Despite aggressive treatment, their prognosis is also poor with a median OS of approximately 7 months after diagnosis. Treatment of those tumors remains one of the most challenging tasks in clinical oncology. Although new molecular pathways in tumor biology are being constantly discovered, translation of basic science achievements into clinical practice is rather slow. Major obstacles in resistance to therapy are heterogeneityof brain tumors, multiple genetic alterations, and their diffuse, infiltrative behavior. Hence identifying and investigating pathways related to tumor etiology and growth is highly important. Positron emission tomography (PET) offers the potential to identifykey signaling pathways in brain tumors involving neurotransmitters and -modulators and to discover drugs which may be used for their therapy.

One of the most important prerequisites for PET is the development and evaluation of radio labelled ligands in order to investigate brain functions in living human subjects. Fluorine-18 is currently the most favorable radionuclide that is routinely used for radiolabeling because of its half-life of 109.8 min. The use of PET radio ligands provides brain images of transport, metabolic and neurotransmission processes on the molecular level. PET is currently the most sensitive and specific method for this type of studies. Through integration of chemical/radiochemical, pharmaceutical/radiopharmaceutical, biochemical and radiopharmacological basic research, computational chemistry and with the aid of nuclear medicine diagnostic new approaches in brain tumor treatment will be made available. The presentation will focus on the strategy of radiotracer development bridging from basic science to biomedical application focusing on targets of major importance for the mentioned tumors such as cannabinoid, sigma and nicotinic alpha7 receptors.

Biography:

Peter Brust received his M.S. in Immunology in 1981 and his Ph.D. in Neuroscience from Leipzig University in 1986. He worked as a postdoctoral fellow at Montreal Neurological Institute and Johns Hopkins University Baltimore from 1990-1991. He joined the Research Center Rossendorf (now known as Helmholtz-Zentrum Dresden-Rossendorf, HZDR) in 1992 and headed the Department of Biochemistry. Since 2002 he works in Leipzig first at the Institute of Interdisciplinary Isotope Research and since 2010, after operational transfer, again at HZDR where he leads the Department of Radiopharmaceutical Cancer Research. Since 2010 he is Professor of Radiopharmacy at Leipzig University.