neurogenesis. Concerning quiescence, more Sox2+NSCs express FoxO3 after 30GyFLASH-RT than in CONV-RT groups. Nevertheless, the number of Sox2+FoxO3+NSCs decreases at higher doses probably due to the RT-induced cell death.
Altogether these results suggest that FLASH-WBRT induces different responses in the NSCs compared to CONV-RT. Indeed, FLASH-RT does not induce cognitive impairment two months post-IR compared to CONV-RT. This observation correlates with a preservation of neurogenesis in the SGZ. Moreover, after FLASH-RT, SVZ NSCs show a quiescent status which could explain their preservation after irradiation and their ability to re-induce neurogenesis.

Keywords: Neural Stem Cells ; Whole Brain Irradiation ; FLASH-RT

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J-PET: a novel TOF-PET scanner based on plastic scintillators

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Purpose: The purpose of the reported research is the elaboration of the method for construction of the cost-effective whole-body single-bed positron emission tomography scanner enabling simultaneous PET/CT and PET/MRI imaging.
Material and methods**:** The Jagiellonian Positron Emission Tomography scanner (J-PET) is built out of axially arranged plastic scintillator strips, forming a cylinder [1]. The light signals produced in scintillators are converted to electrical pulses by photomultipliers placed at opposite ends of each strip [2]. The pulses are probed in the voltage domain by a newly developed electronics [1,3], and are collected by the novel trigger-less and reconfigurable data acquisition system [1,4]. The hit-position and hit-time of gamma quanta are reconstructed based on the time of arrival of light signals to the ends of the scintillator strips. The reconstruction procedures make use of the compressing sensing theory [5,6] and the library of synchronized model signals [1,7]. Moreover, for the image reconstruction novel algorithms are being developed and adopted for fast iterations on the graphics processing units [8].
For estimation of the J-PET characteristics the computer simulations were performed [9] using GATE package [10]. Simulations were conducted taking into account known physical and instrumental effects as e.g. photon emission spectrum, time distribution of emitted photons, losses and time spread of photons due to their propagation through the scintillator, as well as quantum efficiency and transit time spread of photomultipliers.
Results: In autumn 2015 a construction of the full scale J-PET prototype was completed. J-PET consists of 192 strips arranged axially in three layers forming a cylindrical diagnostic chamber with the diameter of 85 cm and axial field-of-view (AFOV) of 50 cm, and it is characterized by 300 ps coincidence resolving time.
The performance characteristics, simulated according to standards defined by the National Electrical Manufacturers Association (NEMA-NU-2)**,** indicate a comparable performance of the J-PET with respect to current TOF-PET modalities as regards e.g. accidental coincidences [9], sensitivity, scatter fraction and point spread function.
Conclusions: An axial arrangement of long strips of plastic scintillators, and their small light attenuation allows us to make a TOF-PET scanner with a longAFOV.
The estimated coincidence resolving time changes from 230 ps to 430 ps when extending AFOV from 16 cm to 100 cm.
This result opens perspectives for construction of the cost effective TOF-PET scanner with significantly improved TOF resolution and larger AFOV with respect to the current TOF-PET modalities [11,12].
The talk will include presentation of the J-PET scanner along with the description of its characteristics estimated according to NEMA-NU-2 standards, and presentation of perspectives of combining J-PET with CT and MRI.

Keywords: Time-of-Flight Positron Emission Tomography, Plastic Scintillators, PET/MRI

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Targeted Radionuclide Therapy with ^{161}Tb: Investigation of Anti-Tumor Effects and Undesired Side Effects

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Purpose: The radiolanthanide ^{161}Tb ($T_{1/2}$ = 6.89 d) emits ß$^-$-particles ($E_{ß^-}$ = 154 keV) similar to ^{177}Lu ($T_{1/2}$ = 6.64 d, $E_{ß^-}$ = 34 KeV), but also a significant number of Auger electrons (~12e$^-$/decay). This radiation profile may result in more efficient tumor cell killing, in particular, if the radioconjugate targets the cellular nucleus where DNA is damaged by the short-ranged Auger electrons. Herein, we investigated ^{161}Tb in combination with folate and somatostatin analogs in vitro and in vivo and compared the results to those obtained with the ^{177}Lu-labeled pendants.
Materials/methods: ^{161}Tb was produced via irradiation of a Gd target at the reactor at ILL and separated from the target material by ion exchange chromatography at PSI. A DOTA-folate conjugate (cm10, [1]) was labeled with ^{161}Tb and ^{177}Lu and investigated in mice. The KB tumor sizes were measured and undesired side effects were monitored by determination of body weights and blood plasma parameters (BUN, creatinine), as well as histological investigation, as previously reported [2]. DOTATOC and its analog DOTATOC-NLS, which contains a nuclear localizing signal (NLS), were labeled with