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### NEUROSURGICAL OPERATIONS BY VISUALIZATION AND 3D PRINTING

A new Virtual Reality device has given new possibilities for a 3D imagination in the planning and treatment of various diseases. 3D printing method helps determine which surgery or modality radiation is optimal. 3D printing technology helps to make of prostheses, assistive devices, production of hearing aids, prostheses, nose, ears, eyes, teeth, breast reconstruction of bone substitutes. Method of 3D printing cells (bioprinting) also helps in treating skin injuries and regenerative medicine in which the patient's stem cells form filling printers. We used the 3D printers especially for tumor irradiation near the critical structures for better imagination during the planning treatment at radiosurgery. In this case we can better visualize for neurosurgeons some 3D objects of interest. The history of Virtual Reality (VR) began in the 90s of the last century. Technology Research Company Gartner forecasted mass use of VR after 2010. Company Oculus Rift designed prototype Oculus Rift DK in 2010 and later in 2013 Oculus Rift VR. Company HTC with Valve Corporation announced their virtual reality headset HTC Vive in 2015 and was distributed in 2016, which is the second most widely used VR model today.

Both models Oculus Rift VR and HTC Vive we have successfully implemented in the projects focused on the mapping natural curiosities. The experiences of these VR devices we now apply for neurosurgical planning in which we use software system TomoCon and our NeuroVR system. We used 3D printing in neuro-oncology with radiosurgical planning performance. With the 3D model printing, we increased the accuracy of the therapeutic dose and at the same time we calculated the lowest dose to risk structures. 3D printing method helps determine which modality radiation is optimal. For operations of the eye's melanoma we created a set of 3D physical models of the eye and tumour.

### Biography

Miron Sramka studied at Faculty of Medicine of Charl's University in Prague. He worked as research worker at Institute of Pharmacology of Czechoslovak Academy of Science. He worked as Department head at Department of Stereotactic and functional Neurosurgery from Faculty of Medicine Comenius University, Bratislava. Miron Sramka worked as a Professor at University Public Health and Social Work St. Elisabeth; He acts as head of Clinic of Stereotactic Radiosurgery. He is the member of the European executive committee for stereotactic and functional neurosurgery. New diagnostic methods: Spinal cord stereotaxy, Transplantation of brain tissue by the Parkinsonism and Huntington's chorea, Method of MR guided stereotaxy, Stereotactic radiosurgery of melanoma of eye, Virtual 3D printing by radiosurgical operation of head in collaboration with Dr. Ruzicky (Dean of the Faculty of Informatics PEU) showed the possibilities of 3D printing used in order to decide which modality surgery is most appropriate for the patient in order to maintain the highest quality of life after surgery.

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