

Changes in regional cerebral blood flow in irradiated regions and normal brain after stereotactic radiosurgery

Suzuka TAKI,* Kotaro HIGASHI,* Manabu OGUCHI,* Hiroyasu TAMAMURA,** Shiro TSUJI,***
Kiyotaka OHTA,* Hisao TONAMI,* Itaru YAMAMOTO,* Kazuya OKAMOTO**** and Hideaki IIZUKA****

*Department of Radiology, Kanazawa Medical University

**Department of Radiology, Fukui Prefectural Hospital

***School of Health Sciences, Kanazawa University

****Department of Neurosurgery, Kanazawa Medical University

Objective: To elucidate the radiation effect on the normal brain after stereotactic radiosurgery (SRS), we evaluated the change in regional cerebral blood flow (CBF) in targeted and extra-targeted areas according to the radiation dose given. **Methods:** Thirteen patients who underwent SRS for brain tumors or arteriovenous malformations were included in this study. Maximum radiation doses to the lesion ranged from 24 to 37 Gy. Mean and regional CBF were measured by ^{99m}Tc -HMPAO scintigraphy with graphic analysis, performed at before, 2 weeks and 3 months (5 patients) after SRS. Under the co-registration with the CT with superimposed isodose distribution, ROIs were set on target (37–20 Gy), peri-target (20–5 Gy) and out-of-field (5–2 Gy and less than 2 Gy) areas on the quantitative SPECT images. **Results:** Significant reductions in mean CBF (by 7%) and regional CBF in the peri-target areas (by 5–7%) and out-of-field areas (by 6–22%) were recognized at 2 weeks and 3 months after SRS. Regional CBF in the target and peri-target areas did not significantly change, presumably because there was little or no normal tissue in these areas. **Conclusion:** These results suggest that subclinical regional CBF reduction occurs after SRS in the normal brain in out-of-field of radiation.

Key words: SPECT, ^{99m}Tc -HMPAO, stereotactic radiosurgery, regional cerebral blood flow