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## Original articles

# Efficacy of gamma knife surgery for control of peritumoral edema associated with metastatic brain tumors

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## ▶ Abstract

**Objectives:** To evaluate the efficacy of gamma knife surgery (GKS) for the control of peritumoral edema associated with metastatic brain tumors.

**Methods:** Retrospective study of 280 consecutive metastatic brain tumors, 100 from lung cancers, 100 from breast cancers, and 80 from renal cell carcinomas, associated with peritumoral edema. The peritumoral edema index was measured as  $A*B*C$ , where A (cm) was the maximum diameter of peritumoral edema on the axial image, B (cm) was the maximum diameter perpendicular to A, and C (cm) was the maximum diameter on the coronal image.

**Results:** Edema index of the renal cancer metastases was significantly larger than those of lung and breast cancer metastases ( $p<0.01$ ). Edema index of the renal cancer metastases at final imaging was also larger than those of lung ( $p<0.05$ ) and breast ( $p<0.01$ ) cancer metastases. Delivered marginal dose (22Gy or more) was significantly correlated with tumor growth control by multivariate analysis ( $p=0.03$ ). Primary site (renal or not renal:  $p<0.01$ ) and delivered marginal dose (25Gy or more:  $p=0.04$ ) were significantly correlated with control of peritumoral edema by multivariate analysis.

**Conclusions:** Brain edema around metastatic brain tumors from renal cell carcinomas was more extensive at the time of GKS and at final imaging compared with lung and breast cancer metastases. We suggest that the optimal doses for tumor growth control and brain edema control may differ for metastatic brain tumors from renal cell carcinomas.

**Keywords:** brain edema, gamma knife, metastatic brain tumor, radiosurgery

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