The accumulation levels of $^{201}$TlCl and Na$^+$-K$^+$ ATPase activity in tumor tissue were compared among glioblastoma, benign glioma and meningioma to study the difference in the mechanism of $^{201}$TlCl accumulation. The subjects were 19 cases comprised of 6 glioblastoma, 2 oligodendroglioma, 1 fibrillary astrocytoma, 1 pilocytic astrocytoma and 9 meningioma. Preoperative $^{201}$TlCl SPECT was performed in all the cases, and Thallium Index (TL index) was calculated by a ratio of $^{201}$TlCl in the tumor area and the contralateral area. In addition, cell membrane was extracted from the tumor tissue collected intraoperatively to determine Na$^+$-K$^+$ ATPase activity. No statistically significant difference in TL index was noted between the glioblastoma group (6.97 ± 2.67) and the meningioma group (5.87 ± 1.99). This fact showed that there was no difference in the accumulation level of $^{201}$TlCl between the two groups. On the other hand, the glioblastoma group indicated a higher value of Na$^+$-K$^+$ ATPase activity (49.13 ± 43.76 μmole/hour/mg protein) than the meningioma group (7.73 ± 13.84 μmole/hour/mg protein) (p < 0.05, t test). These results suggested the involvement of Na$^+$-K$^+$ ATPase activity in $^{201}$TlCl accumulation in glioblastoma and the influences of other accumulation mechanism than Na$^+$-K$^+$ ATPase activity such as the volume of intratumoral vascular bed in meningioma.

Key words: $^{201}$TlCl, SPECT, Na$^+$-K$^+$ ATPase activity, Brain tumor.