Capillary physiology of human medulloblastoma. Impact on chemotherapy

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Abstract

BACKGROUND
Advances in the treatment of medulloblastoma have largely been attributed to the introduction of chemotherapy, although Phase III trials have shown advantages for chemotherapy only in subgroups. Because the efficacy of chemotherapy depends on tumor vascularization, the vascular physiology of human medulloblastomas was evaluated.

METHODS
Seven patients with histologically proven medulloblastomas underwent measurements of capillary permeability and vascular plasma volume using contrast-enhanced dynamic computer tomography. Regional blood flow was measured in 5 patients using xenon computed tomography (CT).

RESULTS
The capillary permeability-surface product for water-soluble compounds ranged from $1.7 \pm 5.5$ to $17.6 \pm 12.3 \mu L/g/min$ with a mean of $10.5 \pm 6.3 \mu L/g/min$. The vascular plasma volume ranged from $0.02 \pm 0.021$ to $0.045 \pm 0.049 \text{mL/g}$ with a mean of $0.03 \pm 0.01 \text{mL/g}$. The efflux
rate ranged from $0.012 \pm 0.007$ to $0.065 \pm 0.064$ l/min with a mean of $0.039 \pm 0.020$ l/min. Regional tumoral blood flow showed a mean of $19.86 \pm 6.8$ mL/100g/min as compared with normal cerebellum with $45.4 \pm 12.03$ mL/100g/min ($P < .005$).

CONCLUSIONS

The current study demonstrated a low capillary permeability and blood flow in medulloblastomas that could explain the limited response rates of partially resected tumors even after aggressive high-dose chemotherapy, as recently reported. Cancer 2006. © 2006 American Cancer Society.

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