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Original Article

Capillary physiology of human medulloblastoma. Impact on chemotherapy

Peter C. Warnke, MD^{1*}†, Klaus Kopitzki, MA¹, Jens Timmer, PhD², Christoph B. Ostertag, MD³

¹Department of Neurological Science, Clinical Sciences Centre for Research and Education, University of Liverpool, Liverpool, Merseyside, United Kingdom

²Freiburger Zentrum für Datenanalyse und Modellbildung, Freiburg University, Freiburg, Germany

³Neurochirurgische Universitätsklinik Freiburg, Abteilung Stereotaktische Neurochirurgie, Freiburg University, Freiburg, Germany

email: Peter C. Warnke (pwarnke@bidmc.harvard.edu)

*Correspondence to Peter C. Warnke, Division of Neurosurgery, Harvard Medical School, Beth Israel Deaconess Medical Center, 110 Francis St., Boston, MA 02115

†Fax: (617) 632-9906

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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 ± 5.5 to $17.6 \pm 12.3 \mu\text{L/g/min}$ with a mean of $10.5 \pm 6.3 \mu\text{L/g/min}$. The vascular plasma volume ranged from 0.02 ± 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 ± 0.007 to 0.065 ± 0.064 1/min with a mean of 0.039 ± 0.020 1/min. Regional tumoral blood flow showed a mean of 19.86 ± 6.8 mL/100g/min as compared with normal cerebellum with 45.4 ± 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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