CLAIMS

1. Use of a preparation comprising at least one chemotherapeutic or cytotoxic substance in the manufacture of a medicament for the treatment of a tumor of a mammalian patient, characterized in that

   - a substantially non-cytotoxic dose of microbeam radiation comprising several beams of a microscopic cross-section, is to be transmitted to a tumor tissue of the mammalian patient, wherein the dose of radiation is adapted to generate at least one microscopic damage region comprising a lesion in at least one boundary wall structure of a supply portion of the tumor tissue, the supply portion being a blood vessel, wherein the total energy to be transmitted by the sum of microbeams in the delivery of the dose of microbeam radiation corresponds to the interval of 100 to 4000 Grays; and

   - the medicament is to be administered to the patient after the transmittal of the dose of microbeam radiation, such that the chemotherapeutic or cytotoxic substance and/or a metabolic derivative thereof reaches the at least one microscopic damage region before the at least one microscopic damage region is completely cured by endogenous tissue repair.

2. The use of claim 1, characterized in that the medicament is for the treatment of brain tumors of a mammalian patient, especially in treatment of glioblastoma, or of lung tumors.

3. The use according to any one of the preceding claims, characterized in that the chemotherapeutic or cytotoxic substance is a platinum-containing anti-cancer agent, preferably selected from the group of carboplatin, oxaliplatin or cisplatin.

4. The use according to claim 1, characterized in that the medicament contains an alkylating antineoplastic agent, preferably an imidazotetrazine derivative of the alkylating agent dacarbazine, or that the chemotherapeutic or cytotoxic substance contains or is temozolomide.

5. The use according to any one of the preceding claims, characterized in that the

cross-sections of the beams of a microscopic cross-section comprised in the microbeam radiation form at least one array or fan in at least one imaginary plane inside the tissue or on the tissue surface with each of the cross-sections being separate from each other on said plane.

6. The use according to any one of the preceding claims, characterized in that the microbeam radiation is to be provided by a synchrotron radiation source.

7. The use according to any one of the preceding claims, characterized in that after administration, the chemotherapeutic or cytotoxic substance transpermeates to the supplied portion of said tissue, mainly by diffusing from the supply portion of the tissue to a supplied portion of the tissue via the at least one microscopic damage region formed in a boundary wall structure of said tissue.

8. The use according to any one of the preceding claims, characterized in that the medicament is to be administered to the patient by local intravenous administration.

9. The use according to any one of the preceding claims, characterized in that the medicament is to be administered to the patient between 40 and 300 minutes after radiation, preferably between 45 and 150 minutes after radiation.

10. The use according to any one of the preceding claims, characterized in that during the delivery of the dose of radiation a total beam exposure by a sum of microbeams is to be less than 30 seconds, preferably less than 3 seconds, more preferably less than 1 second.

11. The use according to any one of the preceding claims, characterized in that a single microbeam pulse in the delivery of the dose of radiation has a width of less than 1 second.

12. The use according to any one of the preceding claims, wherein the dose of microbeam radiation comprises short pulsed radiation collimated into arrays of highly parallel beams of microscopic cross-section, preferably with a low

divergence.

13. The use according to any one of the preceding claims, characterized in that the total energy to be transmitted by the sum of microbeams in the delivery of the dose of microbeam radiation corresponds to the interval of 150 to 2000 Grays, preferably 190 to 310 Grays.

14. The use according to any one of the preceding claims, characterized in that in the delivery of the dose of microbeam radiation the microbeams have parallel axes which are spaced by an inter-beam distance from 100 to 400 micrometers, preferably 150 to 250 micrometers, more preferably 190 to 210 micrometers.

15. The use according to any one of the preceding claims, characterized in that in the delivery of the dose of microbeam radiation a spectral range from 33 to 600 keV and more preferably 50 to 350 keV is to be used.

16. The use according to any one of the preceding claims, characterized in that in the delivery of the dose of microbeam radiation an aperture width of a single microbeam lies in the range of 10 to 100 micrometers.

17. The use of claim 16, characterized in that the medicament is for the treatment of an irradiated tumor tissue of a mammalian patient, characterized in that the irradiated tumor tissue comprises at least one microscopic damage region comprising a lesion in at least one boundary wall structure of a blood vessel of the tumor tissue caused by the transmittal of a substantially non-cytotoxic dose of microbeam radiation comprising several beams of a microscopic cross-section, wherein the total energy transmitted by the sum of microbeams in the delivery of the dose of microbeam radiation corresponds to the interval of 100 to 4000 Grays, wherein the at least one microscopic damage region is not yet completely cured by endogenous tissue repair at the time of treatment.

18. Use of a platinum-containing anti-cancer agent and/or an alkylating antineoplastic agent in the manufacture of a pharmaceutical composition for treating an irradiated

tumor tissue in a mammalian patient, wherein the tumor tissue has been irradiated in a boundary wall structure of a supply portion of the tumor tissue by a therapeutically active, substantially non-cytotoxic dose of microbeam radiation comprising several beams of a microscopic cross-section and adapted to generate at least one microscopic damage region comprising a lesion in the boundary wall structure of the supply portion, the supply portion being a blood vessel, wherein the total energy transmitted by the sum of microbeams in the delivery of the dose of microbeam radiation corresponds to the interval of 100 to 4000 Grays, wherein the platinum-containing anti-cancer agent and/or the alkylating antineoplastic agent reaches the at least one microscopic damage region before the at least one microscopic damage region is completely cured by endogenous tissue repair.

19. The use according to claim 18, wherein the microscopic damage region is caused by a substantially non-cytotoxic dose of microbeam radiation from a synchrotron radiation source, wherein the total energy transmitted by the sum of microbeams in the delivery of the dose of microbeam radiation corresponds to the interval of 100 to 4000 Grays.

20. The use according to any one of claims 18-19 in the manufacture of a pharmaceutical composition for treating an irradiated tumor tissue of glioblastoma or of lung tumors in a mammalian patient.

21. The use according to any one of claims 18-20, wherein the platinum-containing anti-cancer agent and/or alkylating antineoplastic agent is selected from the group consisting of carboplatin, oxaliplatin, cisplatin, an imidazotetrazine derivative of the alkylating agent dacarbazine, and temozolomide.