CLAIMS

1. Use of a preparation comprising at least one chemotherapeutic or cytotoxic substance in the manufacture of a medicament for the treatment of ~~cancer~~ 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 ~~a~~ 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; and

   - the medicament is 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 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 a derivative of the alkylating agent dacarbazine, more~~ 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 of the preceding claims, characterized in that the beams of a microscopic cross-section comprised in the microbeam radiation are adapted to

generate microscopic damage regions in the at least one boundary wall structure of the supply portion of the tissue, and/or 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 one of the preceding claims, characterized in that the microbeam radiation is provided by a synchrotron radiation source.

7. The use according one of the preceding claims, characterized in that after administration, the administered 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 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 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 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 less than 30 seconds, preferably less than 3 seconds, more preferably less than 1 second.

11. The use according to 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 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 one of the preceding claims, characterized in that 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, preferably 150 to 2000 Grays, more preferably 190 to 310 Grays.

14. The use according to one of one of 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 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 used.

16. The use according to one of 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, preferably 20 to 50 micrometers, more preferably about 25 micrometers.

17. Use of a preparation comprising at least one chemotherapeutic or cytotoxic substance in the manufacture of a medicament for the treatment of a tumor tissue of a mammalian patient 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 chemotherapeutic or cytotoxic substance and/or a metabolic derivative thereof reaches at least one microscopic damage region before the at least one microscopic damage region is completely cured by endogenous tissue repair.

18. The use of claim 17, characterized in that the medicament is for the treatment of an irradiated tumor tissue of a mammalian patient, preferably of an irradiated tumor tissue of brain tumors, especially glioblastoma, or of lung tumors, 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, wherein the at least one microscopic damage region is not yet completely cured by endogenous tissue repair at the time of treatment.

19. The use according to any of claims 17-18, characterized in that the irradiated tumor tissue comprises at least one microscopic defect caused by ~~a~~ the therapeutically active, substantially non-cytotoxic dose of microbeam radiation, preferably provided by a synchrotron radiation source, the microbeam radiation comprising several beams of a microscopic cross-section ~~and/or by a radiation comprising several beams whose cross-sections 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~~.

20. 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 chemotherapeutic or cytotoxic substance and/or a metabolic derivative thereof reaches at least one microscopic damage region before the at least one microscopic damage region is completely cured by endogenous tissue repair.

21. Use according to claim 20, wherein the irradiated tumor tissue in a mammalian patient comprises at least one microscopic damage region caused by irradiation.

22. Use according to one of claims 20 or 21, wherein the microscopic damage region is caused by a substantially non-cytotoxic dose of microbeam radiation from a synchrotron radiation source.

23. Use according to one of claims 20-22 in the manufacture of a pharmaceutical composition for treating an irradiated tumor tissue of glioblastoma or of lung tumors in a mammalian patient.

24. Use according to one of claims 20-23, wherein the platinum-containing anti-cancer agent and/or alkylating antineoplastic agent is selected from the group of carboplatin, oxaliplatin, cisplatin, ~~a derivative of the alkylating agent dacarbazine,~~ an imidazotetrazine derivative of the alkylating agent dacarbazine, and temozolomide.