

# **CAPACITIVE HYPERTHERMIA PLUS CHEMOTHERAPY IN A CASE OF PREVIOUSLY IRRADIATED UNRESECTABLE GRADE III ASTROCYTOMA. A FEASIBILITY STUDY**

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## **Introduction**

Hyperthermia (HT) has been shown to inhibit glioma growth both in vitro and in vivo, as it reduces the severe hypoxia that is present in these tumors, thus enhancing the effect of radiotherapy and chemotherapy<sup>1</sup>. Various HT techniques have been applied for brain heating (interstitial, nanoparticles), which proved to be safe. While treatment for resectable grade III-IV gliomas is well defined (surgery plus radio-chemotherapy with Temozolomide), the treatment options for unresectable gliomas still vary among institutions. As the prognosis for this group of tumors is dismal, the association of HT to chemotherapy in the presence of progressive disease could be a valid option, though its efficacy is still to be proved by clinical trials.

## **Case description**

We present the case of a 69 years woman, whose clinical history began with left focal seizures; a MRI showed an area of signal alteration in T2 and PD in the territory of right anterior and posterior cerebral arteries, with minimal mass effect and no contrast enhancement; the finding was interpreted as low grade astrocytoma, not suitable for surgery, and the patient was sent to simple wait and see policy. Eleven months later the initial lesion showed to be increased, now occupying the right thalamus-pulvinar region, joining the mesencephalon caudally, with a little mass effect and no contrast enhancement; it was now interpreted as diffuse astrocytoma (grade III) and sent to our department for radiotherapy. We performed a whole brain radiotherapy with a dose of 30 Gy in 10 fractions, 5 days per week for 2 weeks. One month after the end of the treatment, a new MRI showed no change of the diffuse brain lesion and we started chemotherapy with Temozolomide (100 to 150 mg per meter square for 5 days during each 28 day cycle). After 3 cycles, a new MRI showed increasing of the lesion, which now involved the putamen, so the patient was sent to HT treatment in parallel with Temozolomide.

## **Materials and methods**

We performed the HT treatment with a capacitive system (Synchrotherm RF), with a couple of capacitive antennas (13.56 MHz, 600 W). Tests were made on a phantom before treating the patient, to assure the safety of the procedure. External thermometry revealed a temperature of 39-40 °C. Each treatment sessions lasted 20 minutes on average. During the treatment session we performed an intravenous infusion of Mannitol 18% solution, 250 ml, to prevent brain edema. We performed 4 HT sessions, once weekly. Temozolomide therapy went on as planned; Temozolomide-related haematological toxicity was monitored.

## **Results**

No HT-related neurological toxicity was seen during the treatment. During the 4 weeks of the HT therapy, the patient did not complain of seizures or other neurological problems. After the completion of the 4 weeks of HT, the patient started the 5<sup>th</sup> Temozolomide cycle (up to 6 – 12 cycles are foreseen).

## **Conclusions**

HT-chemotherapy proved to be safe in case of non-resectable progressive diffuse astrocytoma after radiotherapy.

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<sup>1</sup> Uesugi S et al. Apoptotic cell death induced by local brain hyperthermia in a rat glioma model. *Acta Neuropathol* (1998) 96: 351 - 356