INTRODUCTION

Available information on the metabolism of brain malignant gliomas is scarce and mostly derived from studies on animal models. Human data are limited to studies employing positron emission tomography (PET) and proton magnetic resonance spectroscopy (MRS), using amino acids synthesised with positron-emitting labels to image tumors\(^1,2\), or analysing tissue specimens obtained at surgery or autopsy. Such studies have reported an increased accumulation of free amino acids in brain tumors, mainly due to increased carrier-mediated active transport in their supporting vasculature, expression of a more active metabolism related to increased cell proliferation, rather than to disruption of the blood brain barrier\(^3,5\).
Higher concentrations of taurine are present in metabolically active tissues, such as retina, brain, heart, neutrophils and eosinophils. In the brain, one of the many functions ascribed to taurine is osmoregulation, characterised by taurine release with accompanying water in response to brain tissue edema. High resolution MRS studies have shown that malignant glioma tissues contain higher levels of taurine than benign astrocytomas or normal brain. Increased taurine levels have been found in other malignant tumors and taurine has been considered as a MRS malignancy marker for colon cancer.

The aim of the present work was to investigate whether the concentrations of endogenous taurine and other amino acids in the extracellular fluid of human brain tumor tissue (TT), a condition where cell proliferation causes brain swelling and edema, were different from those in the adjacent parenchima (AP) or in the normal brain tissue (NBT), using intraoperative microdialysis in patients undergoing surgery for brain glioblastoma resection.

MATERIALS AND METHODS

The work involving human subjects, performed at the Stereotaxic Neurosurgery Unit, Department of Neurosurgery, University of Verona, Italy, was approved by the Hospital Ethical Committee, and complies with the European community guiding policies and principles for experimental procedures.

Fifteen patients (7 males, 8 females; mean age 50 ± 7 and 47 ± 6, respectively) with cortical glioblastoma, who had not previously undergone surgery, radiotherapy, chemotherapy, nor cerebral biopsy, were included in this study. Diagnosis was confirmed by histopathology, according to the W.H.O. classification. Ki-67 immunoreactivity (%) was histologically assessed as an index of the degree of tumor cell proliferation. At surgery for tumor resection, a flexible microdialysis catheter (CMA 70, Solna, Sweden) was inserted in the tumor tissue (TT), the parenchima adjacent to the tumor (AP), and the normal brain tissue (NBT). Following 20 min equilibration period, extracellular fluid from each of the 3 regions was collected every 20 min, using a microinfusion pump (CMA 106, Solna, Sweden) operating at a rate of 2 µl/min.

The concentrations of taurine, and other endogenous amino acids in the microdialysate were measured by HPLC separation followed by fluorimetric detection of their p-orthophtalaldehyde (OPA) derivatives. Statistical analysis of differences between experimental groups was performed by ANOVA for repeated measures followed by Fisher's LSD.