

PubMed

U.S. National Library of Medicine
National Institutes of Health



Display Settings: Abstract

[Med Image Anal.](#) 2009 Dec 3. [Epub ahead of print]

Extrapolating glioma invasion margin in brain magnetic resonance images: Suggesting new irradiation margins.

Konukoglu E, Clatz O, Bondiau PY, Delingette H, Ayache N.

Asclepios Research Project - INRIA, 2004 Route des Lucioles, 06902, Sophia Antipolis, France.

Radiotherapy for brain glioma treatment relies on magnetic resonance (MR) and computed tomography (CT) images. These images provide information on the spatial extent of the tumor, but can only visualize parts of the tumor where cancerous cells are dense enough, masking the low density infiltration. In radiotherapy, a 2cm constant margin around the tumor is taken to account for this uncertainty. This approach however, does not consider the growth dynamics of gliomas, particularly the differential motility of tumor cells in the white and in the gray matter. In this article, we propose a novel method for estimating the full extent of the tumor infiltration starting from its visible mass in the patients' MR images. This estimation problem is a time independent problem where we do not have information about the temporal evolution of the pathology nor its initial conditions. Based on the reaction-diffusion models widely used in the literature, we derive a method to solve this extrapolation problem. Later, we use this formulation to tailor new tumor specific variable irradiation margins. We perform geometrical comparisons between the conventional constant and the proposed variable margins through determining the amount of targeted tumor cells and healthy tissue in the case of synthetic tumors. Results of these experiments suggest that the variable margin could be more effective at targeting cancerous cells and preserving healthy tissue. Copyright © 2009 Elsevier B.V. All rights reserved.

PMID: 20042359 [PubMed - as supplied by publisher]

[LinkOut - more resources](#)