Sílvia Nosàs-Garcia

Dr . med.

Dynamic contrast-enhanced Magnetic Resonance Imaging for assessing the disease activity of multiple myeloma: comparison with histological and clinical markers

Geboren am 27.01.1977 in Sabadell, (Barcelona, Spanien)
Reifeprüfung am 29.06.1995 in Bellaterra (Barcelona, Spanien)
Studiengang der Fachrichtung Medizin vom WS 1995 bis SS 2001
Physikum an der *Universitat Autònoma de Barcelona (UAB)**
Klinisches Studium in *unitat docent Vall d'Hebrón (Universitat Autònoma de Barcelona (UAB))*
Praktisches Jahr: teilweise in der Ruprecht-Karls-Universität Heidelberg als Erasmus und in der *Universitat Autònoma de Barcelona*
Staatexamen an der *Universitat Autónoma de Barcelona**

Promotionsfach: DKFZ (Deutsches Krebsforschungszentrum)
Doktorvater: Priv.- Doz. Dr. med. Stefan Delorme

*jährliche Prüfung nach Studienverlauf der *Universitat Autònoma de Barcelona (UAB)*

MRI has been used for assessing treatment response in MM of the spine. However, it is so far unproven that increased contrast uptake in bone marrow indeed reflects tumor infiltration. Therefore, aim of this study was to examine histologically whether increased contrast enhancement in bone marrow of patients with MM corresponds with local tumor infiltration and increased vessel density.

The *spina iliaca superior posterior* of 24 patients with MM was examined using a dMRI protocol with a pump-controlled infusion of Gd-DTPA. After dMRI, a biopsy of the *spina iliaca superior posterior* was taken. Using a two-compartment model, the pharmacokinetic

dMRI parameters amplitude (A) and (k_{ep}) in the region of the biopsy were calculated. These pharmacokinetic parameters describe the contrast agent behavior in the bone marrow. A reflects the plasma volume and k_{ep} is the exchange rate constant, which is influenced by the vessel permeability and/or perfusion. To reduce possible inter-individual fluctuations in contrast agent dose, all A values of the biopsy regions were normalized to the A obtained of a ROI drawn in the iliac artery. Then, A_n and k_{ep} were prospectively compared in a point-to-point fashion with histological features of the bone marrow obtained, and additionally with clinical data.

First, we examined whether the existence of tumor involvement in the bone marrow was associated with an increased contrast agent uptake. We found that both dMRI parameters (A_n and k_{ep}) were significantly higher in lesions with marked infiltration than with mild or no infiltration ($p<0.05$). Furthermore, A_n, but not k_{ep}, was higher in lesions with high vessel density at histology ($p=0.01$) than in specimens with low vessel densities.

When comparing dynamic parameters with clinical data, we found A_n to be significantly higher in patients with CRP >5mg/dl. Furthermore, k_{ep} levels were higher in presence of increased tumor burden at the moment of the exploration, as reflected by Ig concentration in serum or urine.

It can be therefore be concluded, that areas of increased contrast uptake in the bone marrow of MM patients very probably reflect tumor involvement. Furthermore, the degree of contrast enhancement is correlated with the degree of both tumor infiltration and vessel density. However, dMRI only becomes abnormal when marked bone marrow infiltration is present but is obviously unsuitable to differentiate minimally infiltrated from unaffected bone marrow. With respect to studies related to therapy monitoring using dMRI, our results justify to use measurements in lesions which are conspicuous due to their contrast enhancement, since these very probably reflect areas involved by tumor.