

MRI-GUIDED RADIOTHERAPY FOR ABLATION OF RENAL CELL CARCINOMA IN A SINGLE NON-INVASIVE TREATMENT

M.K. Stam¹, B.W. Raaymakers¹, E.M. Kerkhof¹,
B.A. Zonnenberg², J.J.W. Lagendijk¹, M. Van Vulpen¹

¹*Department of Radiotherapy & ²Department of Internal Medicine, UMC Utrecht, Utrecht, The Netherlands*

We present MRI-guided radiotherapy as a non-invasive curative treatment for primary renal cell carcinomas (RCC) on an outpatient basis. At our department we have a real-time 1.5T MRI-guided 6MV radiotherapy system under development. This system gives real-time feedback on the tumour position to compensate for tumour motion and as such allows high precision targeting of soft tissue tumours. In July 2011 the system will have full functionality. We will investigate the treatment of primary renal cell carcinoma with a single dose of 25Gy on this system using the very precise VMAT-technique. We will start with gated treatments under voluntary breath-hold where real-time MRI is used to detect tumour motion for gating of the treatment. Eventually the treatment will be done with patients breathing freely.

The MRI-guided radiotherapy system will be clinically introduced within our new center for image-guided oncology interventions. This center provides high-precision non-invasive cancer treatments. It will be ready in 2012 and it includes three dedicated rooms for MRI-guided radiotherapy.

MRI-guided radiotherapy is a real paradigm shift. Without compensation of respiration induced kidney motion large radiation fields are needed to ensure tumour coverage during radiotherapy. This leads to a high dose on the renal parenchyma, which can damage the healthy part of the kidney. This is currently prohibiting radiotherapy. However, when accurate motion compensation is present there is no damage to the normal kidney tissue. MRI-guided radiotherapy provides the required guidance. MRI-guided radiotherapy has all the potential to become the most desirable treatment modality for renal tumours.