PoMRI is a radiation dosimeter developed for 3D absorbed dose measurements using magnetic resonance imaging (MRI). The absorbed dose as the degree of polymerisation may be quantified using the MR specific parameter R2 (1/T2). Initially, 3D dose measurements using gel dosimetry and MRI, was performed by the ferrous sulfate system (FeMRI). However, the dose measurements of the FeMRI system, are significantly blurred by time due to diffusion. The obvious advantage of PoMRI compared to FeMRI is the stability of the radiation product.

A safe and reproducible production technique of PoMRI gels has been developed. The preparation is made in a closed system under constant nitrogen pressure. The dose response for PoMRI was studied in samples as well as larger phantoms by using photon radiation (0- 20 Gy). The relaxation time measurements (T1,T2) was carried out both in a MR-analyzer (0.25 T) and a Magnetom Vision (1.5 T). Dose distributions by means of depth dose and profile dose data were obtained by PoMRI for photon and electron beams. Measured dose distributions were compared to corresponding diode data and FeMRI data.

The dose response measured by means of R2 was 0.2 $s^{-1}Gy^{-1}$ in the linear region 0-8 Gy for both MR-systems, although increasing with readout temperature. The effect on R1 was considerably less and this parameter was therefore discarded for further dose measurements. There was a very good agreement between PoMRI and diode data. PoMRI was proven its usefulness in a clinical application using a head phantom and a stereotactic linear accelerator.