

AbstractID: 1476 Title: Study of a normoxic PAG gel dosimeter with tetrakis (hydroxymethyl) phosphonium chloride as an anti-oxidant

A preliminary study was undertaken of polyacrylamide gel (PAG) dosimeter (Baldock 1998) combined with the anti-oxidant tetrakis (hydroxymethyl) phosphonium chloride (THP) (De Deene 2002). Until recently PAG polymer gels dosimeters were manufactured under an oxygen free or hypoxic nitrogen atmosphere. This work describes a method for manufacturing PAG upon the bench top under normal atmospheric or normoxic conditions. The PAG formulation, consisting of N,N'-methylene-bis-acrylamide, acrylamide, gelatine and ultra-pure water, was manufactured with the addition of THP and poured into both glass and plastic vials. Magnetic resonance imaging (MRI) and x-ray computerised tomography (CT) were used to determine changes in the polymer gel induced by ionising radiation. The MRI  $R_2$ -dose response of the polymer gel was found to be linear up to 6 Gy. The  $R_2$ -dose sensitivity was observed to range from  $(0.177 \pm 0.003) \text{ s}^{-1}\text{Gy}^{-1}$  on day 1 post-irradiation to  $(0.197 \pm 0.004) \text{ s}^{-1}\text{Gy}^{-1}$  on day 9 post-irradiation in glass vials and  $(0.167 \pm 0.003) \text{ s}^{-1}\text{Gy}^{-1}$  to  $(0.192 \pm 0.004) \text{ s}^{-1}\text{Gy}^{-1}$  in plastic vials. The CT H-dose response measured 3-days post-irradiation was found to be linear up to 10 Gy with a CT H-dose sensitivity of  $(0.70 \pm 0.03) \text{ HGy}^{-1}$ .

Baldock C, Burford RP, Billingham NC *et al* 1998. *Phys. Med. Biol.* 43 695-702.  
De Deene Y, Hurley C, Venning A *et al* 2002. *Phys. Med. Biol.* 47 3441-3463.