We considered poly(esteramide) hyperbranched polymers (trade names: Hybrane S1200 and Hybrane HA1690) as enhancers of glimepiride solubility and therewith associated dissolution rate. We prepared solid dispersions (SD) of glimepiride with hyperbranched polymers (HB) and compared their solubility with those of crystalline and amorphous glimepiride as well as with the solubility of SD of glimepiride with conventional linear polymers, i.e. Poly(ethylene glycol) and Gelucire (stearoyl macroglyceride)s. Since the solubility and dissolution rate depend also on glimepiride crystallinity we characterized the morphology of solid dispersions by X-ray powder diffraction (XRD) analysis. The nature of molecular interactions involved in complexation of glimepiride with HB was studied by infrared spectroscopy (FTIR).

The comparison of the results of in-vitro dissolution studies show that SD based on poly(ester amide) HB polymers showed significantly enhanced aqueous solubility of glimepiride and its dissolution rate as compared to glimepiride in crystalline or amorphous form as well as its SD with conventional linear polymers. We also calculated the amount of glimepiride complexed with particular HB polymer (loading capacity) in SD using dissolution results. The loading capacity for both HB polymers was estimated to be around 5 %, w/w of glimepiride. SD containing higher amounts of glimepiride appear to be oversaturated, so that non-complexed glimepiride crystallizes as a separate solid phase during the solvent evaporation. X-ray diffraction studies confirmed calculated loading capacity.

IR results indicated that glimepiride forms complexes with HB polymers through hydrogen bonds between the NH groups of glimepiride and carbonyls of ester (O)-C=O and amide (N)-C=O groups of HB polymers. Therefore, the improved glimepiride solubility was ascribed to complex formation between glimepiride and HB polymers.
