QUANTIFICATION OF SULPHASALAZINE IN POLYMER MICROSPHERES USING FT-RAMAN SPECTROSCOPY

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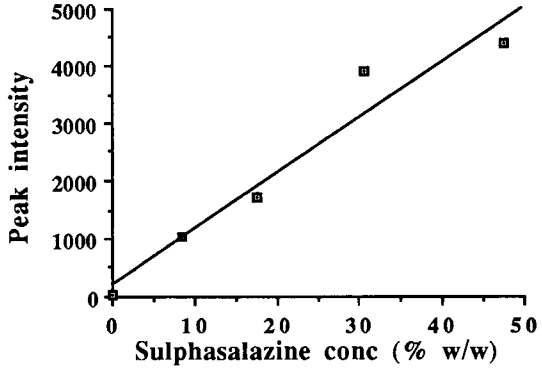
The emerging technique of Fourier Transform (FT)-Raman spectroscopy has a number of potential uses for the analysis of pharmaceutical systems. It can, for example, assist in the elucidation of the molecular structure of drugs and polymers, and also offers the possibility of detecting drug-excipient interactions and quantifying drug in delivery devices (Davies et al 1990).

In this study we have assessed the potential of FT-Raman spectroscopy for quantifying a model drug, sulphasalazine, in microspheres made from the acrylic polymer Eudragit RS. The microspheres were produced by an emulsification-solvent evaporation procedure which results in drug homogeneously dispersed as particles in a matrix of polymer (Watts et al 1990). Microspheres (250-500μm in size) were produced containing 0, 8.5, 17.6, 30.7 and 47.5% w/w of sulphasalazine, the drug content being determined by dissolution in methanol and measurement of the UV absorbance at 366nm, a wavelength at which Eudragit does not absorb. FT-Raman spectra of the microspheres were obtained using a converted Perkin Elmer 1700 FT-IR spectrophotometer with sample irradiation provided by a Nd:YAG laser (1.064μm). To record the spectra, the microspheres were lightly packed into a brass sample holder and analysed at a laser power of 500mW. Each spectrum represented a culmination of 150 scans of the sample.

In comparison with Eudragit RS, sulphasalazine exhibited very intense peaks of Raman scattering, a consequence of the three aromatic groups in its structure. For each spectrum the peak area between 1547 and 1654cm^{-1} (a region where there was no interference from Eudragit) was obtained by integration. In figure 1 the peak area between 1547 and 1654cm^{-1} is plotted against sulphasalazine concentration and a linear regression line drawn through the data. There is a significant correlation between the intensity of Raman scattering and drug concentration (correlation coefficient $r = 0.972$, $p < 0.01$).

Figure 1



It is concluded that FT-Raman spectroscopy has the potential for providing information on the concentration of sulphasalazine, a strong Raman-scattering drug, in microspheres of Eudragit RS, a weakly-scattering polymer. The analysis can be carried out in the solid state without any prior sample preparation.

Davies MC et al (1990) Spectrochemica Acta Vol.46A, No.2: 227-283.
Watts PJ et al (1990) J Controlled Release (submitted).