

Novel methods for the characterisation of nanosponges/drug complexes with fluorimetry. Detection and Quantification in human serum

G Benson, M Maafi, M Grootveld

Leicester School of Pharmacy, De Montfort University, The Gateway, Leicester LE1 9BH, UK

Abstract

Cyclodextrins are oligosaccharides formed from a cyclic structure of 1,4-linked α -D-glucopyranose units, hydrophilic on the outside, and hydrophobic within they are able to form hydrogen bonds, van der Waals forces and hydrophobic interactions with non-polar guest molecules, including pharmaceuticals, altering their solubility and spectral properties, they are able to overcome biological barriers and be absorbed [1]. Cross-linking β -cyclodextrin with epichlorohydrin can create polymers, with modifiable properties, and greater solubility, which can form stronger inclusion complexes through both encapsulation, and adsorbing guest molecules to their exterior. Although this complexation has been investigated with some pharmaceuticals, enhancing their solubility [2], and yielding higher percentage recoveries than when monomeric β -cyclodextrin was used [3], it has also been found that an increase in the intensity of fluorimetric analytical signal also occurs as a result of this interaction, along with a shift in the maximum wavelength peak [4]. The inclusion complex doesn't appear to have been utilised for analytical chemistry purposes, therefore the drug- β -cyclodextrin polymer-complex was explored through fluorimetry, as it is anticipated that this will allow for lower pharmaceutical detection limits; this technique was then applied for the determination of drugs in human serum and canal water. This poster will illustrate how β -cyclodextrin polymer can be utilised to enhance the fluorimetric signal of drugs, and be applied for the detection of pharmaceuticals in human serum and canal water.

Keywords: Cyclodextrins, inclusion complex, human serum, fluorimetry

References:

- [1] Connors KA. The stability of cyclodextrin complexes in solution. *Chem Rev* 1997; 97: 1325 – 1358
- [2] Morin-Crini N, Crini G. Environmental applications of water-insoluble β -cyclodextrin-epichlorohydrin polymers. *Progr Polym Sci* 2012; 38: 344 – 368
- [3] Fukushima T, Naka-Aki E, Guo X, Li F, Vankeirsblick T, Baeyens WRG, Imai K, Toyooka T. Determination of fluoxetine and norfluoxetine in rat brain microdialysis samples following intraperitoneal fluoxetine administration. *Anal Chim Acta* 2004; 522: 99 – 104
- [4] Huang L, He J, Ge X, Lu R, Guo J. Fluorimetric investigation of supramolecular system by modified β -cyclodextrin and its analytical application. *Spectrochim Acta A* 2011; 78: 1553 – 1559