

Preparation of Photosensitizer-Coated Magnetic Fluids for Photodynamic Therapy

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1. Introduction

Magnetic drug delivery system that uses the magnetic property has been suggested by wider et al., the method that albumin micro particle coated with adramycin(anti-cancer drug) was localized in around of blood vessels of cancer cell by external magnetic field was tried first[1,2]. As the magnetic drug delivery system like this increased the localization of magnetic target carrier around target area, they made the distinguishable improvement of remedy effect. Currently, nano-particles of magnetic fluid was developed and applied in various parts such as disease and diagnosis[3,4].

In this study the surfaces of magnetic nano-particle were coated with hematoporphyrin and 5-aminolevulinic acid to increase the efficiency of cancer care by increasing the drug concentration around target part respectively, and their properties were compared and analyzed.

2. Experimental

Magnetite colloid solution was prepared by adding the extra alkali(NH_4OH 12ml) of above pH 12 in mixed solution with the molar ratio of 1 to 2 between Fe^{2+} and Fe^{3+} using the chemical coprecipitation. The added amount of photosensitizer was all $1 \times 10^{-3} \text{ mol/l}$, and in the case of hematoporphyrin decanoic acid 2.4g was added for 1st surfactant to prevent the aggregation of magnetite particles due to the interaction between the particles when magnetites were formed. But 5-aminolevulinic acid was directly coated on the surface nano-particles. After that, nonanoic acid 5ml as a second surfactant was added to prepare the water-based magnetic fluid in the case of hematoporphyrin, but decanoic acid was only added in the case of 5-aminolevulinic acid.

Magnetic property and combining structure of coating surface, microscopic structure analysis and coating efficiency were investigated on magnetic nano-particles coated with each photosensitizer.

3. Result and discussion

Fig. 1 shows magnetization(around 60emu/g)of 5-aminolevulinic acid-coated magnetic particles was about two times higher than hematoporphyrin-coated magnetic particles(around 35emu/g). It seems to be

resulted from the difference of coating process of surfactant between hematoporphyrin and 5-aminolevulinic acid. Also, magnetic nano particles coated with each photosensitizer had sphere shape and the size of nano-particle was about 10nm.

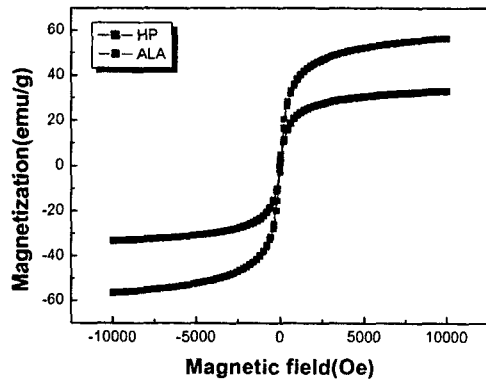


Fig. 1 Magnetization curves of magnetic fluid with two photosensitizer

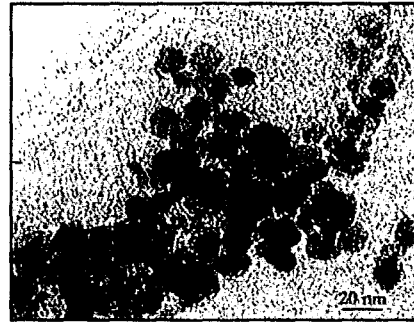


Fig. 2 TEM image of hematoporphyrin-coated magnetic particles

4. Conclusions

Magnetic nano-particles were coated with hematoporphyrin and 5-aminolevulinic acid to improve the efficiency of tumor treatment with the application of PDT, these properties were compared.

5. Reference

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