Study of a Fluorescent Substance Contained in the Murine Tumor C3H/MH 134

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Photoradiation therapy using a porphyrin as the photosensitizer is being widely investigated for treatment of a variety of tumors [1]. In this therapy, it is of importance to accumulate the porphyrins in tumor cells selectively. In nature, porphyrin accumulation in certain tumor cells has been suggested from fluorescence measurements [2]. In this letter we describe the characterization of the fluorescent substance in the murine tumor C3H/MH 134.

The tumor test system consisted of a subcutaneously implanted murine MH 134 tumor, 10–15 mm in size, grown in the mouse. The tumor was homogenized by a homogenizer and then sonicated for 5 min. Acetone (10 ml) was added to extract the substance from the homogenized solution (2 ml). The substance extracted by acetone was dried by evaporation and then suspended again (Solution A) in 5.0×10^{-2} mol dm^{-3} of phosphate buffer (pH 7.3). Fluorescence excitation spectra were measured by a spectrofluorometer. Analytical gel electrophoresis was performed in polyacrylamide gel with Tris-glycine buffer at pH 8.6.

The fluorescence spectrum of Solution A is shown in Fig. 1. The maximum fluorescence band at 630 nm is characteristic of cancer cells [2]. No fluorescence around 630 nm appeared for the extracted solution of normal hepatic tissue cells from the same MH 134 implanted mouse. The excitation spectrum of Solution A is shown in Fig. 2. This spectrum was obtained with a detection wavelength of 638 nm. The peak at wavelength 505 nm is caused by Raman diffraction of water. The excited spectrum, except for the Raman diffraction of water, is characteristic of a type of porphyrin. It was confirmed that no excitation spectrum appeared in the extracted solution of the normal hepatic tissue cells. The spectrum in Fig. 2 is very similar to the absorption spectrum of porphyrins with the Soret band around 410 nm and a Q band (520–610 nm). It is known that some porphyrins,

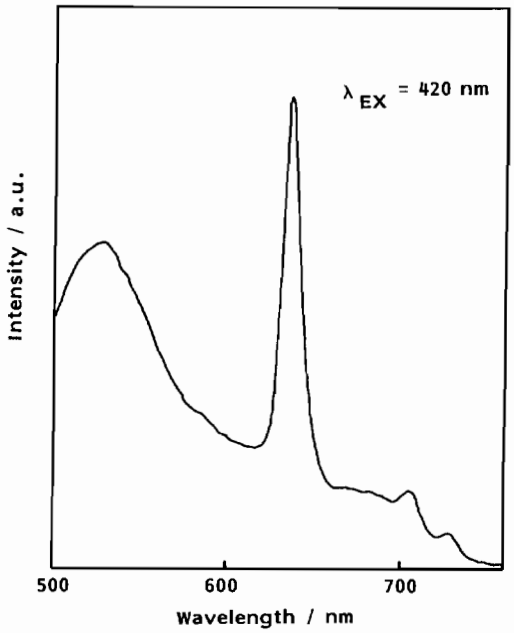

Fig. 1. Fluorescence spectrum of Solution A (see text for the solution preparation).

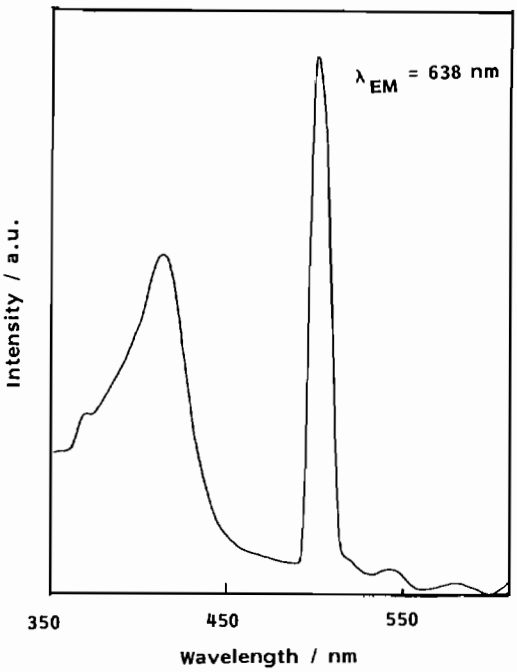

Fig. 2. Excitation spectrum of Solution A (see text for the solution preparation).

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especially metal-free porphyrins, emit strong fluorescence even at room temperature. From the above results the fluorescent substance is probably a type of metal-free porphyrin. The substance exhibits an isoelectric point of 5.7 when examined by electrophoresis.

References

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