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A stable micelle of SMA copolymer encapsulated chlorophyll shows potent photodynamic effect for cancer treatment

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[P17-1-3] Poster Sessions

P17-1 Chemotherapy and endocrine therapy (1)

2021 / 10 / 1 (Fri) 16:30-17:15 Room P(D)/Exhibition Hall A·B Room P(D)

[Chairperson]Kazuo Shin'ya (AIST)

P17-1-3

A stable micelle of SMA copolymer encapsulated chlorophyll shows potent photodynamic effect for cancer treatment

[Speaker]Islam Waliul (Dept. Microb. Kumamoto Univ. Med. Sch./BioDynamics Res. Fdn., Kumamoto.) [Co-author]Rayhanul Islam (Fac. Pharm. Sci. Sojo Univ.), Jun Fang (Fac. Pharm. Sci. Sojo Univ.), Hiroshi Maeda (Dept. Microb. Kumamoto Univ. Med. Sch./BioDynamics Res. Fdn., Kumamoto.)

We developed styrene-co-maleic anhydride (SMA) copolymer encapsulated natural chlorophyll micelle (SMA-Chl) that showed a mean particle size of about 80 and 60 nm by dynamic light scattering and by transmission electron microscopy respectively. This nanomicelle quenched the fluorescence in 100% serum, but in the presence of tween 20 or sodium dodecyl sulfate, the fluorescence intensity was enhanced. This means it will remain stable in circulation and when it will internalize into the cells then micelle will be disrupted upon internalization through the lipid bilayer. SMA-Chl did not show cytotoxicity in the dark, but in the presence of endoscopic light, it generated singlet oxygen and suppressed cancer cell growth significantly in a dose and time-dependent manner of light exposure against HeLa and C26 cells. Intravenous administration of SMA-Chl did accumulate in tumor via the EPR-effect and inhibited the tumor growth in sarcoma S180 and colon C26 tumors in mice. (This work is collaborated with Prof. Takuro Niidome and Prof. Tomohiro Sawa, Kumamoto University)