

Evaluation of cellular influences caused by fullerene C₆₀ and C₇₀

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Abstract

Fullerene is one of the important nanocarbons that is expected to have applications to industry and life science. An understanding of the cellular influences of fullerene is essential for its application to life science such as nanomedicine. C₆₀ and C₇₀ are major fullerenes, and there are many previous reports about the cellular influences of fullerene C₆₀ and C₇₀. In many cases, these fullerenes water soluble derivatives. The insolubility of pristine C₆₀ in water makes the *in vitro* evaluation of cellular responses difficult. In the present study, to overcome this problem, we prepared a stable and uniform C₆₀-medium dispersion for *in vitro* examinations. A stable and uniform C₆₀- and C₇₀-medium dispersion was prepared [1, 2]. The dispersion was stable for the experimental period. Mitochondrial activity (MTT assay), colony forming ability (clonogenic assay), induction of oxidative stress (intracellular ROS and lipid peroxidation levels) and cellular uptake (TEM observation) in human keratinocyte HaCaT and lung carcinoma A549 cells exposed to the fullerenes were examined. The fullerenes did not influence mitochondrial activity. On the other hand, the fullerene dispersion inhibited colony formation at the higher concentration. Additionally, exposure to the fullerene dispersion caused an increase in intracellular ROS and lipid peroxidation levels. The induction of intracellular ROS level was inhibited by pre-treatment of the cells by antioxidants. TEM observations of the fullerene exposed cells showed cellular uptake of the fullerenes. Although C₆₀ and C₇₀ did not cause cell death, it caused the induction of intracellular oxidative stress and inhibited cell growth. Fullerenes, C₆₀ and C₇₀, have potential of intracellular oxidative stress induction. In the application of the fullerene to the nanomedicine, it is necessary to consider the induction of oxidative stress.

References

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- [2] Horie M, Nishio K, Kato H, Shinohara N, Nakamura A, Fujita K, Kinugasa S, Endoh S, Yoshida Y, Hagihara Y, Iwahashi H, Chemosphere, **93** (2013) 1182-1188.

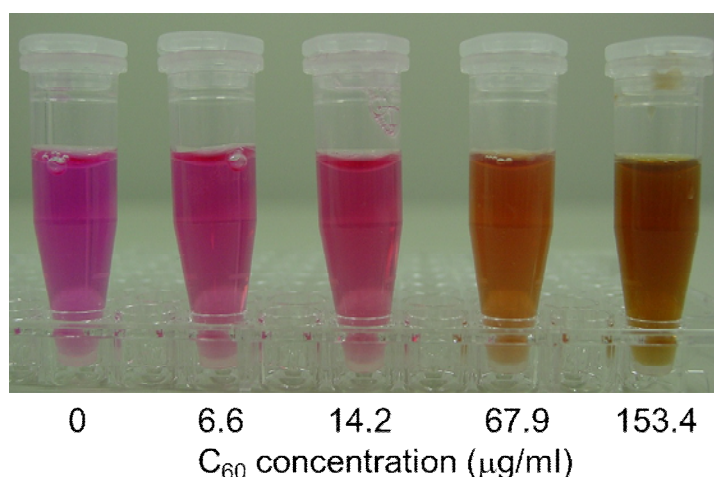


Figure Stable C₆₀-medium dispersion for *in vitro* examinations