

Evaluation of the combined effect of gold nanoparticles and low-molecular-weight carboxymethyl chitosan on their cytotoxicity against cancer cell lines

Chayanaphat Chokradjaroen^a, Ratana Rujiravanit^{a,b*}, Sewan Theeramunkong^c, Nagahiro Saito^d

^{a)}*The Petroleum and Petrochemical College, Chulalongkorn University, Thailand*

^{b)}*Center of Excellence on Petrochemical and Materials Technology, Thailand*

^{c)}*Faculty of Pharmacy, Thammasat University, Pathumthani, Thailand*

^{d)}*Graduate School of Engineering, Nagoya University, Japan*

A non-thermal plasma discharging in a liquid phase, called “solution plasma (SP)”, can generate several highly active species such as free radicals and charged particles in a solution. SP treatment can promote a variety of chemical reactions including degradation of a polymer. Accordingly, SP treatment was used to degrade carboxymethyl chitosan (CMC), which is a water-soluble chitosan derivative, and gold nanoparticle-loaded CMC to obtain the products with low molecular weight. The obtained products were used to study the effects of their size and amount of the loaded gold nanoparticle on anticancer activity against human breast adenocarcinoma cancer cell (MCF-7), human cervical cancer cell (HeLa) and human lung cancer cell (H460) by using MTT assay. The gold nanoparticle-loaded CMC with lower mean hydrodynamic size could significantly reduce the cell viability than that with higher mean hydrodynamic size. The presence of gold nanoparticle inside CMC structure dramatically enhanced the anticancer activity through the induction of the apoptosis which was analyzed by flow cytometry. However, the anticancer activity was slightly improved by increasing the amount of gold nanoparticles loaded into CMC structure.

Corresponding author: ratana.r@chula.ac.th

Author Biography: Dr. Ratana received her Master and Doctoral degree from Hokkaido University, Japan. After being a Post-doctoral fellow at Japan Advanced Institute of Science and Technology, she started working at Chulalongkorn University since 1997.

Name: Associate Professor Dr. Ratana Rujiravanit

University/Institute: Petroleum and Petrochemical College, Chulalongkorn University

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