

2<sup>nd</sup> International Conference and Exhibition on

# NANOMEDICINE AND DRUG DELIVERY

May 21-23, 2018 Tokyo, Japan

## Nanodiamond clusters decorated with folic acid for photothermal tumor therapy

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**Statement of the Problem:** Photothermal Tumor Therapy (PTT) has attracted considerable attention as minimally invasive therapeutic techniques as they have a typical tissue penetration of several centimeters in biological tissues. Nanodiamonds (NDs) have a truncated octahedral composition have emerged as promising materials due to their spherical morphology, versatile functionality, fluorescent property, colloidal stability and high biocompatibility. Herein, we designed ND nanoclusters decorated with Folic Acid (FA) as a targeting moiety and utilized the photothermal effect of NDs upon NIR laser irradiation for tumor therapy.

**Methodology & Theoretical Orientation:** To evaluate the photothermal property of ND nanoclusters with various ND concentrations, samples were prepared and then exposed to NIR laser ( $\lambda=808$  nm) for 5 minutes *in vivo* tumor specificity and therapeutic efficacy also examined by injecting ND and FA-ND nanoclusters into tumor-bearing nude mice through a tail vein.

**Findings:** FA-ND nanoclusters exhibited specific cellular uptake to KB cells. The viability of KB cells treated with FA-ND cluster was reduced to 5.4% (94.6% of ablation ratio) along the light of NIR laser. An *in vivo* study revealed that FA-ND nanoclusters selectively accumulated in tumor tissue and effectively reduced tumor volume from  $36.1 \pm 5.2$  mm<sup>3</sup> to  $21.4 \pm 4.9$  mm<sup>3</sup> by the NIR laser-exposed.

**Conclusion & Significance:** We demonstrated the superior performance of FA-ND nanoclusters for selective photothermal tumor therapy. We believe that FA-ND nanoclusters have great potential for selective photothermal tumor therapy.

### Biography

Sung-Wook Choi has an expertise in design and fabrication of functional nanoparticles for specific tumor therapy. His academic interest included fluidic device, biomaterials, scaffold, tissue engineering as well as nanomedicine. Recently, he has worked on the nanodiamonds and their applications for nanodelivery and tissue engineering.

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