

International Conference and Exhibition on

# NANOMEDICINE AND DRUG DELIVERY

May 29-31, 2017 Osaka, Japan

## Chemiluminescence mediated light free photodynamic therapy

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**Statement of the Problem:** Photodynamic Therapy (PDT) is a treatment modality that employs an extrinsic photosensitive dye that could mediate a photochemical reaction involving conversion of molecular oxygen from triplet state to singlet in the presence of photons of suitable wavelength. However, penetration of the photons to the tumor interstitium is a major concern that limits PDT in majority of the biomedical application. At present, several researchers have developed “self-illuminating” PDT systems, in which photosensitizers are excited by Chemiluminescent Resonance Energy Transfer (CRET) or bioluminescent resonance energy transfer (BRET). In this work, we had demonstrated the use of hydroxybenzyl alcohol-incorporating copolyoxalate peroxalate ester loaded protoporphyrin nano-self-assembly (CDNP) that could mediate Chemiluminescence Dynamic Therapy (CDT).

**Methodology & Theoretical Orientation:** CDNP react with HPOX to generate 1,2-dioxethanedione as an intermediate of high energy. Highly unstable 1,2-dioxethanedione rapidly decomposes and releases energy which could activate PPIX to generate  $1O_2$  that ultimately kill the cancer cells: we termed this POCL dependent event as CDT.

**Findings:** We successfully developed CDNP with average diameter of 200 nm. Morphological assessment, flow cytometric analysis, western blotting and confocal fluorescence micrographs indicates CDNP co-treatment with CA exhibited significant cytotoxicity in SW620 cells (human colorectal adenocarcinoma).

**Conclusion & Significance:** We have validated that CDNP could induce  $1O_2$  in the presence of  $H_2O_2$  without any external photon to exert highly potent anticancer activity. This work provides for the first time, a proof of concept for laser-free PDT as a novel anticancer therapeutic system. We anticipate that CDT could provide solutions to the challenges in PDT and hold great potential as a promising cancer treatment modality.

### Biography

Berwin Singh S V is a PhD student at the Chonbuk National University in Republic of Korea working under the supervision of Prof. Dongwon Lee. He received his Master's in Bio Medical Science from the Bharathidhasan University, India, later he was trained in Bio Medical Technology (MPhil) at the Sri Chitra Institute of Medical Science, India. His current research is focused on smart polymer synthesis-physicochemical characterization, developing and evaluation of nano-carriers *in vitro* and *in vivo*.

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