

Employing Nanoparticles for Drug Delivery: An Effective Platform Technology towards Medical Applications

Nattika Saengkrit^a, Teerapong Yata^a, Katawut Namdee^a, Mattaka Khongkow^a, Kanokwan Sansanaphongpricha^a, Uracha Ruktanonchai^{a*}

^{a)} National Nanotechnology Center, National Science and Technology Development Agency, 111 Thailand Science Park, Phahon yothin Rd, Klong Nueng Klong Luang Pathum Thani 12120.

Nanotechnology implemented in medicine has always gained much attention especially on drug delivery area in which nanoparticles are employed as carriers for loading various payloads including small molecules, drugs, biopharmaceutics and biologics. With this approach, nanoparticles can be used to control release of payloads resulting in a reduction of doses, toxicities and side effects. Active targeting lipid-based nanoparticles (liposome and exosome) were generated for theranostic purposes in brain diseases. The abilities to cross blood brain-barrier (BBB) of these nanoparticles were confirmed in mice after tail-vein injections. Both liposome and exosome showed the promising efficiency to be applied for the treatment of brain-related diseases. We employed a combined polymer-liposome as an adjuvant for peptide-based therapeutic vaccine against human papilloma virus (HPV)-related cervical cancer. Our vaccine candidate was able to eradicate established HPV-16 E7-positive tumor in mice with 80% survival rate after two months-vaccination. The development of a bioinspired-vehicle is also our interest, thus, engineered the bacteriophage-based nanocarrier (derived from a virus of bacteria and non-pathogenic for humans) was constructed. This system has promise in cancer gene therapy to overcome cancer resistant protein. Recently, we has extended our work on applying gold nanoparticle for bone morphogenesis protein-2 (BMP-2) delivery. This work showed the potency of BMP-2-bound gold nano-rod in inducing osteogenic differentiation. This result is promising for bone tissue engineering.

*Corresponding author e-mail: uracha@nanotec.or.th

Author Biography: Dr. Uracha R. Ruktanonchai won a British council Scholarship to pursue her Ph.D. education in UK. She finished her Ph.D. in Pharmaceutical Sciences (Advanced Drug delivery) from University Of Nottingham in 2002. During 2002-2003, she was a post-doctoral research fellow at School of Biomedical Sciences, Queen's Medical center, University of Nottingham working on Biomaterial research. Dr. Ruktanonchai has taken a researcher position at the National Nanotechnology Center (NANOTEC), National Science and Technology Development Agency (NSTDA), Thailand in 2004. Currently, she is a Principal researcher and Deputy Executive Director of R&D at NANOTEC.



Name: Uracha R. Ruktanonchai, Ph.D

Institute: National Nanotechnology Center (Nanotec)

Research Interest: lipid dispersion, biocompatible polymeric nanoparticles and functionalized nanoparticles for Advance drug delivery system