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NEGATIVELY CHARGED MESOPOROUS SILICA NANOPARTICLES PENETRATE THROUGH THE ZEBRAFISH LARVAL BLOOD-BRAIN BARRIER

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This study aimed to investigate how mesoporous silica nanoparticles (MSNs), especially focusing on their surface functional groups, interacted with zebrafish embryos and performed the penetration into blood-brain barrier. Surface properties, such as size, charge and surface chemistry, are a particularly important determinant influencing the biological fate and actions between the nanoparticles and cells. Eight kinds MSNs were synthesized with the uniform and mesoporous structure in ranged from +35.7 to 46.8mV of zeta potential and in size of 50nm or 200nm. By pericardial injection into 72 hpf zebrafish embryos, results observed were plenty of N4-MSN@PEG/THPMP₅₀ entering into larval brain; N1-MSN@PEG₅₀ had some; however, particles in positively charged were hardly found in the brain. It indicated that particles in negatively charged can penetrate blood-brain barrier into larval brain area. The confocal image was also confirmed by the two-proton image. The confocal image of all three N2, N3 and N5-MSN@PEG/THPMP₅₀ particles clearly presented in the larval brain area in similar pattern as N4-MSN@PEG/THPMP₅₀. However, the N4-MSN@PEG/THPMP₂₀₀ had not shown the penetration effect in the brain. The results illustrated that the brain penetration effect is may due to a negatively charged dependent and size-dependent manner.

Biography

Chien-Tsu Chen is a Professor of Department of Biochemistry and Cell Biology at School of Medicine, Taipei Medical University. His academic and research expertise include Nanotechnology, genetic engineering, nanomedicine, protein therapeutics, health promotion, antibody therapy Nanotechnology, Genetic engineering, Nanomedicine, Protein therapy, Health promotion, Antibody therapy. He completed his PhD in 1993 from Brandeis University, Waltham MA and Visiting Scholar in 2006 at University of Washington, Seattle WA. He was the President of St. Mary Medicine, Nursing and Management College in 2007.

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