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Insect virus-derived protein microcrystals for slow-release carriers of functional proteins

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Micron-sized proteinaceous particles called polyhedra are the main vectors by which virus particles transfer from insect to insect. Polyhedra also stabilize virions thereby allowing them to remain viable for long periods in the environment. We developed two targeting strategies for the encapsulation of foreign proteins into polyhedra. Diverse foreign proteins can be encapsulated into polyhedra by fusing a polyhedron-targeting tag sequence at the C or N-terminus of the foreign proteins. The remarkable stability of polyhedra is thought to be applied on slow-release carriers of cytokines and other proteins for tissue engineering or vaccination. Under physiological conditions, polyhedral microcrystals are inert and insoluble. These properties allow us to employ polyhedra as versatile micron-sized carriers. Polyhedra encapsulating bone morphogenetic protein-2 (BMP-2) enhanced chondrogenic and osteogenic differentiation of progenitor ATDC5 cells. Absorbable collagen sponge (ACS) impregnated with BMP-2 polyhedra had enough osteogenic activity to promote complete healing in critical-sized bone defects, but ACS with a high dose of rhBMP-2 showed incomplete bone healing, indicating that BMP-2 polyhedra promise to advance the state of the art of bone healing. Angiogenesis was promoted by polyhedra encapsulating vascular endothelial growth factor. Endostatin-encapsulated polyhedra showed potent anti-endothelial activity, indicating that they may have promise for the treatment of squamous cell carcinoma by inhibiting tumors angiogenesis. Polyhedra show properties of stabilization, retention and long release which are very important for drug delivery systems and therefore I would like to establish optimal protocols including dosage and scheduling for tissue engineering or antiangiogenic therapy.

Biography

Hajime Mori has completed his PhD from Nagoya University and Postdoctoral studies from The National Institute of Agrobiological Sciences. He is a Trustee and Vice-President and also Professor of Kyoto Institute of Technology, Japan. He has published more than 90 papers in reputed journals and has been serving as the Editor of *Journal of Insect Biotechnology and Sericology*.

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