Cell transfection with functionalised calcium phosphate nanoparticles

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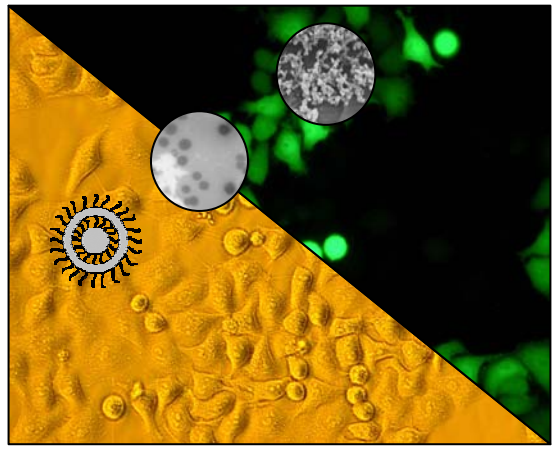

Sokolova et al., 2007

In cooperation with Prof. Dr. M. Epple and Anna Kovtun from the
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State of the art

In molecular biology there is the need to overexpress or silence a special protein of interest. Therefore any DNA or siRNA has to be delivered into cells by one of several transfection reagents. One new possibility is the use of DNA or siRNA functionalised calcium phosphate nanoparticles which are non-toxic and showed high transfection or respectively silencing efficiencies in several secondary cell lines. Due to the use of triple-shell nanoparticles the DNA or siRNA is protected from enzymatic degradation.

Project description

The aim of this project is to investigate the transfection by DNA functionalised calcium phosphate nanoparticles in more detail. Furthermore this transfection technique should be transferred to primary cultures in order to overexpress proteins of actual research interest.

Selected Publication

Welzel et al., J. Mater. Chem., 2004, 14, 2213-2217
Sokolova et al., Biomaterials 2006; 27:3147-3152
Sokolova et al., J. Mater. Chem., 2007; 17:721-727

Investigation of voltage-dependent anion channel 1 (VDAC-1) concerning neuroprotection induced by constitutive activated H-Ras in neurons

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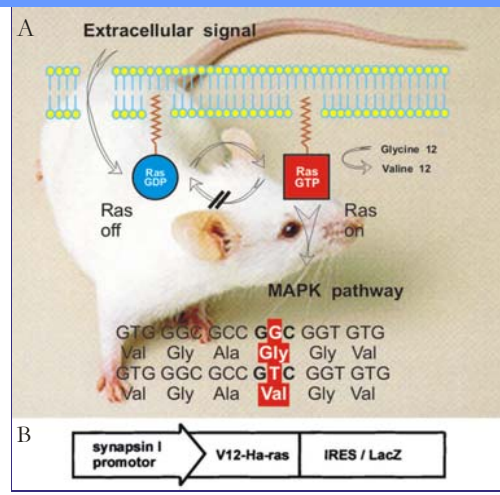

(Heumann et al., 2000)

State of the art

To investigate the role of constitutive activated H-ras in neurons the synRas mouse model was created (1). One of the phenotypic changes of the synRas mice is neuroprotection (1). Proteome studies of cortex and hippocampus of the synRas mice showed changes in the protein expression level of several energy metabolism proteins, e. g. three times decrease of voltage-dependent anion channel 1 (VDAC-1) (2). In mice there are two splice variants of VDAC-1, one is located in the outer mitochondrial membrane (mt-VDAC) and the second one in the plasma membrane (pl-VDAC) (3). VDAC is part of the mitochondrial permeability transition pore which releases cytochrome c during apoptosis (4-6). The pl-VDAC is also involved in apoptosis by an unknown mechanism and anti-VDAC antibodies bounded to the pl-VDAC can prevent apoptosis in neurons (7).

Project description

Cortical cultures of the synRas mice are used to investigate if changes of VDAC-1 expression could be involved in neuroprotection.

Selected Publication

[1] Heumann et al., J Cell Biol 151, 1537-48 (2000)
[2] Kuteykin-Teplyakov et al., Molecular Cellular Proteomics *4*:S188 (2005)
[3] Buettner et al. PNAS 97, 3201-3206 (2000)
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[5] Crompton, M. et al Biochimie 84**,** 143–152 (2002)
[6] Halestrap, A. P. Biochem. Soc. Trans. 34**,** 232–237 (2006)
[7] Elinder et al., Cell Death and Differentiation 12, 1134–1140 (2005)