Cell-penetrating peptides (CPPs) have been successfully used to enhance the intracellular delivery of nanoparticulates, such as superparamagnetic iron oxide, quantum dots, polymeric micelles, liposomes, and polyethyleneimine (PEI) nanoparticles. We have used TAT peptide (TATp) to facilitate the intracellular delivery of drug and gene-loaded liposomes and PEI nanoparticles into various cells in vitro and in tumours in vivo. TATp-modified liposomes (150-200 nm) with low content of a positively charged lipid (for DNA complexation) have been successfully used to transf ect cardiomyocytes, fibroblasts, and various cancer cells in vitro as well as cells in the brain and tumours in vivo. TATp was also used in “double-targeted” stimuli-sensitive pharmaceutical nanocarriers for delivery into acidified pathological areas (tumours and infarcts). In such systems, TATp moieties attached to the nanocarrier and surrounded (sterically shielded) by the chains of the polyethylene glycol (PEG) or antibody-PEG conjugates coupled with the surface via the pH-sensitive bonds. As a result, there is no TATp-mediated uptake of the nanocarrier by non-target cells, and nanoparticles accumulate in tumours and infarcts via the enhanced permeability and retention mechanism or via the antibody targeting. Inside the target, PEG chains detach, TATp exposes and facilitates intracellular penetration of the drug-loaded nanocarriers. The system was used for the enhanced tumour cell transfection with the model GFP plasmid both in vitro and in vivo in different tumour models including intracranial models of brain tumours in mice.