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Application of calcium phosphate nanoparticles in biomedicine

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Calcium phosphate has a high biocompatibility because it is the inorganic component of human hard tissue (bone and teeth). Therefore, its application in biomedicine is widespread. Calcium phosphate nanoparticles can be prepared by rapid precipitation, followed by an immediate functionalization with nucleic acids, polymers, and fluorescing molecules. Calcium phosphate nanoparticles can be applied for transfection (expression of certain proteins), for gene silencing/antisense experiments (selective inhibition of protein expression), for drug delivery (e.g. photodynamic therapy), for specific cell targeting or for imaging of tissues and intracellular structures. In addition, the stimulation of the immune system is possible by custom-made multi-shell calcium phosphate nanoparticles. For some applications (e.g. transfection and gene silencing) calcium phosphate nanoparticles can be studied in 2D and 3D cell culture models, as 3D culture system exploits more realistic spatial, biochemical and cellular parameters compare to 2D monolayer cell culture and serves as a bridge between in vitro and in vivo studies.

連絡先：第108回モデレーター　佐々木啓一（口腔システム補綴学分野）
天雲太一（生体適合性計測工学分野）