

## **PROTEIN NANOCAGES FOR CUTANEOUS DELIVERY**

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The skin protects the body from UV-induced DNA damage by the sun exposure through the pigment, melanin produced by the melanocytes. This pigment is sometimes over-expressed leading to pigmentation disorders such as melasma. Current treatment involves using tyrosinase inhibitors and lasers, leads to complications such as depigmentation, irritation, and dermatitis, with only 50% patient response. This is mainly due the inability of the delivery system to penetrate the stratum corneum layer of the skin and its non-specificity to the melanocytes. This project is aimed at engineering E2 protein nanocage for enhanced penetration into the stratum corneum layer of the epidermis and targeting/penetrating the melanocytes for the delivery of therapeutics. Genetic fusion of SPACE (Skin Penetrating And Cell Entering) peptide to the E2 nanocage helps its transduction through the stratum corneum layer, in vivo and to the interior of the melanocytes in vitro. Further modification of the E2 protein cage with targeting ligands can facilitate its uptake in melanocytes through the corresponding cell membrane receptors. Multiple modifications could also be imparted to the E2 protein cages without affecting its self-assembly, thereby aiding both penetration and targeting functions for drug delivery. Successful delivery of the engineered protein cages can aid the formulation of novel protein-based drug releasing molecules to be applied to the skin, which can be biocompatible with efficient pharmacokinetics.