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Lipid Hybrid Nanoparticles encapsulated VLPVPR: A potential therapeutic approach in Hypertension treatment.

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Objectives: Drugs are administered orally during hypertension therapy. Antihypertensive peptides have outstanding efficacy *in vitro* to activate enzyme inhibitors. However, the poor oral bioavailability and therapeutic effects of antihypertensive peptides were mainly attributable to rapid gastrointestinal degradation and short blood circulation times to be further optimised. The new oral peptide delivery system is therefore urgently needed to improve the oral absorption and effectiveness of peptide drugs.
In this work, the lipid hybrid nanoparticles loaded by Val-Leu-Pro-Val-Pro-Arg (VLPVPR) combines the advantages of lipid and polymer nanoparticles which could substantially improve oral bioavailability and sustained peptide release.

Methods: Double-emulsion internal phase /organic/ external phase (W1/O/W2) solvent evaporation processes have been used for preparations of the VLPVPR loaded lipid polymer hybrid nanoparticles (VLPVPR-LPHNs).

Results: The optimum LPHNs for VLPVPR is 58.71 ± 3.8 nm, 5 ±0.85 mV for zeta potentials, high-capacity, 89±1.23%. Studies of electron microscopic propagation shows that core-shell lipid nanoparticles are spherical types that tend on the surface to contain a lipid bile layer. The VLPVPR progress in the VLPVPR- LPHNs was shown further by differential calorimetry screening. VLPVPR-LPHNs have been consistently released *in vitro* for an optimized preparation with 5 days of long-term *in vivo* antihypertensive benefit.

Conclusions: Briefly, VLPVPR-LPHNs were successfully developed to treat hypertension using oral antihypertensive peptides.