

Peptide-based Phosphate Binder for the Treatment of Hyperphosphatemia

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Technology

Prof. Gottlieb developed a novel phosphate binder (PhB), based on biocompatible silica nanoparticles (NP) decorated with tethered phosphate-binding peptides (NP-pep). The contemplated NP-pep particles synthesized here are expected to be non-systemic as therapeutic agents due to their size. The silica NPs used are 12nm diameter and the particles form branched chain aggregates with a length of approximately 250nm and 40µm sized agglomerates. The phosphate binding peptides are naturally occurring in the human body, responsible for vital biological processes, making silica NP-pep good candidates to deal with hyperphosphatemia. In order to develop this novel system, it was necessary to optimize and characterize the synthesis process and to understand the effectiveness of phosphate binding. To test the efficiency of phosphate-binding in the GI track, experiments were performed in gastric and intestinal fluid simulants at fluid pH and compositions matching the different physiological conditions. The novel PhB was compared to the currently used PhB, lanthanum carbonate, and found to be more efficient. Today, the current solutions available typically use systemic metal ion salts absorbed by the gastrointestinal (GI) walls and into the bloodstream. The high pill burden and potentially harmful side effects of the currently available PhB are the main reasons for the low efficiency of administered treatments and uncontrolled serum phosphate levels, therefore the described technology here offers new and better solution.

Application

- Peptide-based Phosphate Binder for the treatment of chronic kidney disease (CKD) patients, hyperphosphatemia.
- Modulating phosphate consumption by pre-cancerous cells and influence the initiation of malignant growth and suppressing phosphate consumption by malignant cells which could alter tumorigenesis

Advantages

- Low side effects are expected
- Non-systemic administration, rather than local to the GI
- Increase treatment efficiency
- Biocompatible
- The phosphate binding peptides are naturally occurring in the human body
- Compatible for various indications

Patent

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