

Technology Offer

Novel iron-oxide based Nanoparticles for Treating Hyperphosphatemia in Renal Disease Patients

Ref. No.: CH557/2010

Background

Patients with impaired renal function develop a disturbed phosphate and calcium metabolism. The elevated phosphate serum level (Hyperphosphatemia) increases the risks for cardiovascular diseases such as atherosclerosis, myocardial infarction and stroke. Although almost all hemodialysis patients are treated with oral phosphate adsorbents, less than 50% of treated patient reach the recommended target serum phosphate level. State of the art oral phosphate binders which bind phosphate in the gastrointestinal tract, show either adverse effects, such as e.g. calcium-, aluminium- or Lanthanum-based phosphate binders or are not able to lower sufficiently the phosphate serum level such es e.g. currently clinical tested iron oxide based phosphate adsorbents.

Technology

Novel maghemite-based iron oxide nanoparticles have been developed which are highly efficient in lowering phosphate serum level. The special coating of the iron oxide core with mannitol (or other carbohydrates) in combination with inulin and gum fibers as excipient results in a very effective phosphate binding surface and in suitable physicochemical properties of the particles. Analytical *in vitro* results show that the new iron particles (C-PAM) have better phosphate adsorption capacity than the iron based adsorbents PA21 or SBR759. In rats feed with C-PAM (0,5 w/w % iron / g food), the serum phosphate level even becomes lowered under the target serum level (=Hypophosphatemia) in contrast to rats treated with Reneval or the new iron-oxyhydroxide based phosphate lowering drug Velphoro.

Benefits

- ✓ Improved phosphate adsorbing efficiency (> 300 mg PO₃ / g iron)
- ✓ Low manufacturing costs, simple manufacture
- ✓ Adverse effects are not likely to occur
- ✓ Reduced pill burden

Application

Oral phosphate adsorbent for treatment of hyperphosphatemia

Commercial Opportunity

In-licensing or industrial cooperation for further development

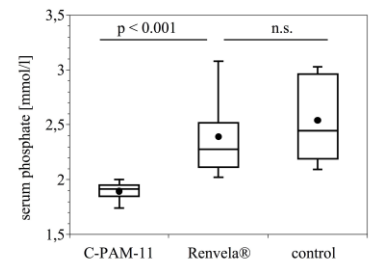


Fig. 1 : Four-week consumption of food with C-PAM 11 with a concentration of 170mg Fe per g standard rat diet results in a under target phosphate serum level (hypophosphatemia) in rats (compared to control or Reneval).

Keywords

Phosphate adsorbent, phosphate binder, iron oxide particle, maghemite, magnetite, hyperphosphatemia, renal disease, kidney disease

Developmental Status

In vivo

IP Status

US and DE priority application
09/2011

Pending patent applications
09/2011: AU, EP, BR, CA, CN, IN,
US, JP, KR, MX, PH, ZA

publication [here](#)

Patent Owner

Charité-Universitätsmedizin Berlin

Contact

Dr. Bettina Büttner
Technology Manager
Tel.: +49 (030) 450 570 874
Fax: +49 30 450 7570 964

bettina.buettner@charite.de
<http://technologietransfer.charite.de>