A Novel System for Oral Delivery of Peptides and Proteins
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Purpose
Peptides and proteins can not be administered via the oral route due to degradation and/or poor absorption in the gastrointestinal tract. Therefore, a new lipid based delivery system has been developed resulting in significantly improved bioavailability of peptides and proteins.

Methods
Liposomes containing membrane spanning tetraether lipids have been manufactured and various peptides/proteins (octreotide, calcitonin, myrcludex, human growth hormone) have been incorporated. Liposomes were characterized by photon correlation spectroscopy, ζ-potential measurements, differential scanning calorimetry and lipid analysis by HPLC. Promising formulations were selected for in-vitro stability assays simulating different gastro-intestinal fluids.

Results
Tetraether lipid containing liposomes were comparable to standard liposomes with respect to shape and size (120-150 nm). Compared to carrier systems consisting of pure phospholipids a significantly improved stability could be achieved in gastric and intestinal fluids when membrane spanning lipids were incorporated.

Matrix stabilisation of the liposomes resulted in a solid dosage form, which was stable for up to at least one year.

Promising candidates of the formulations were selected for in-vivo studies and for all incorporated peptides/proteins a dramatic increase of absolute bioavailability up to 300-fold compared to the peptides in solution could be achieved.

Conclusion
Tetraether lipid containing liposomes offer a promising tool to increase the oral bioavailability of peptides and proteins, which can otherwise only be administered parenterally. Solidification of the liposomes provides a further improvement of the system towards a solid oral dosage form.