

# Genzyme Pharmaceuticals

## PRODUCTS AND SERVICES FOR LIPOPEPTIDES

Lipopeptides, a naturally occurring class of compounds consisting of a peptide joined with a lipid moiety, are often considered by scientists in drug discovery and drug delivery for their special therapeutic effects in areas such as anti-aging, oncology, immune response sensitization (adjuvants) and infectious diseases (wound healing). Also, the chemical modification of therapeutic peptides with covalently linked moieties may result in improved pharmaceutical properties for the conjugate including:

- > Extended circulation time
- > Improved targeting
- > Cell penetration
- > Topological availability
- > Improved microparticle encapsulation properties

Genzyme Pharmaceuticals, a division of Genzyme Corporation, combines specialized core competencies in both peptides and synthetic lipids with world class GMP, regulatory and analytical services to become a distinguished supplier in the custom manufacture of therapeutic lipopeptides at various chemical stages from discovery to commercialization.

### LIPIDS + PEPTIDES = LIPOPEPTIDES

#### Lipids

Genzyme Pharmaceuticals has unique expertise in synthetic phospholipid and sphingolipid chemistry. See the [lipid brochure](#) on our website for a detailed explanation. In addition, we have experienced competency in many other conjugation chemistries involving PEG polymers, cholesterol derivatives, (poly)glycerols, and carbohydrates.

#### Peptides

In peptides, Genzyme Pharmaceuticals has a core strength in providing novel amino acids and other building blocks such as pseudoproline, Dmb derivatives and others. Our peptide experience brings value to customers by encouraging synthetic optimization at the earliest stages to ensure economical scale-up and GMP production (of your peptide API).

#### Lipopeptides

It is the unique combination of skills in both lipid and peptide chemistries that allows Genzyme Pharmaceuticals to provide value-added custom manufacturing services to customers with proprietary lipopeptides.

### LIPOPEPTIDE TECHNOLOGY

Three generic models shown below demonstrate Genzyme Pharmaceuticals' expert capabilities in lipopeptide chemistry.

## N TERMINUS OR C TERMINUS COUPLING

Consider the general chemistry of a lipopeptide as follows with a lipid substitution on the N-terminal of the peptide.



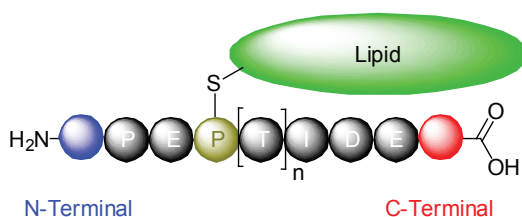
Genzyme Pharmaceuticals has experience in the use of several types of lipid groups for terminal substitution on the peptide:

- > 1,3 DXPE, where X is any of several fatty acids
- > 1,2 DXPE
- > Any fatty acid itself
- > Cholesterol and derivatives

## SIDE CHAIN COUPLINGS

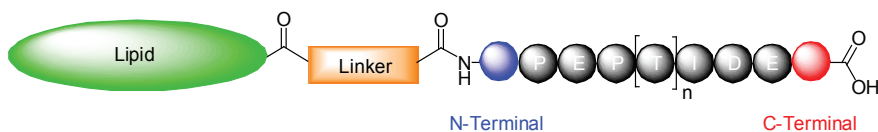
Another general structure often used for lipopeptides are side chain derivatives of the peptide itself. Here, Genzyme Pharmaceuticals has experience in several side chain groups:

- > -SH
- > -NH<sup>2</sup>
- > -COOH



## LINKER COUPLINGS

Frequently, specialized linkers are required to couple the lipid to the peptide. Consider the general structure:



Genzyme Pharmaceuticals has specific experience with the following linkers::

- > DXPE-MCC
- > DXPE-succinyl
- > Lipid Cys
- > Lipid-Lys

## SUMMARY

Genzyme Pharmaceuticals is a premier leader in providing custom chemical services in the area of lipopeptides. Challenge us to manufacture your proprietary lipopeptide. Contact one of our technical representatives for more information.

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