

# Biochemicals Catalogue



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#### Custom peptide synthesis service:

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#### Screening compound collections:

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#### Custom defined synthesis of small molecules:

EMC offers customer specific synthesis of drug-like compounds, methods development and feasibility studies for optimisation of lead structures.

All catalogue products are also available in large amounts.

Please inquire.

## 1. Tools for Toll-like receptor research

### Bacterial lipopeptides activate Toll-like receptors 1, 2 and 6 and interact with TLR10

#### Lipopeptides: Origin and biological activity

Bacterial - including mycoplasmal - lipoproteins (bLP) are characterised by the unusual amino acid dihydroxypropylcysteine (Dhc) acylated by two or three fatty acids. Lipoproteins are part of the outer membrane of Gram negative bacteria, Gram positive bacteria, *Rhodopseudomonas viridis*, and mycoplasma (Hantke and Braun 1973; Gomes-Miguel et al. 1988; Herrmann et al. 1996; Weyer et al. 1987; Mühlradt et al. 1997; Mühlradt et al. 1998; Shibata et al. 2000).

Synthetic analogues (sLP) and the N-terminal part of the lipoprotein of *E.coli* were synthesised for the first time in 1983 (Wiesmüller et al. 1983). They act as potent immunoadjuvants *in vivo* and *in vitro* (Wiesmüller et al. 1992). Immunisation of guinea pigs and swine with a totally synthetic vaccine consisting of the built-in lipotriptide adjuvant Pam<sub>3</sub>Cys-Ser-Ser and of a B and T cell epitope of the foot-and-mouth disease virus lead to a long-lasting protection against virus challenge (Wiesmüller et al. 1989).

The conjugation of class I restricted peptides with Pam<sub>3</sub>Cys-Ser-Ser resulted in efficient priming of virus-specific cytotoxic T cells for the first time in 1989 (Deres et al. 1989).

Potent hapten-specific immune responses were obtained by immunisation with conjugates of lipopeptide, hapten and (haplotype-specific) T helper cell epitopes (Hoffmann et al. 1997; Moran et al. 2002).

The outer membrane lipoprotein (OspA) from *Borrelia burgdorferi* was used in human vaccine trials (Keller et al. 1994) and proved to be protective in a mouse model even after oral immunisation (Huebner et al. 1997).

The efficacy of eight adjuvant formulations to prime cytotoxic T lymphocytes in mice was compared and the water soluble lipohexapeptide analogue of bacterial lipoproteins Pam<sub>3</sub>Cys-Ser-(Lys)<sub>4</sub>, (Fig. 1) proved to be the most effective additive for eliciting a cellular immune response in mice (Hioie et al. 1996).

### Lipopeptides and Toll-like receptor research

Cell activation via lipoproteins and lipopeptides is mediated by their interaction with Toll-like receptors (TLR). Lipoproteins represent one of the molecular links between host defense mechanisms and microbial products (Aliprantis et al. 1999; Means et al. 2000). TLRs share sequence similarities with the cytoplasmic regions of the IL-1 receptor family and function through the same signalling molecules including MyD88, IRAK, TRAF, MAP kinases and NF-κB.

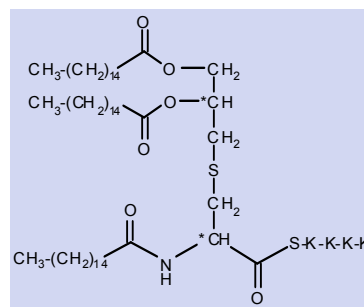


Figure 1: Structure of the water soluble lipopeptide Pam<sub>3</sub>Cys-SKKKK

The N-terminal parts of bacterial lipoproteins are effectors of the innate immune defense. The corresponding mammalian Toll-like receptors TLR1, TLR2, and TLR6 have been identified (Akira 2003).

Lipopeptides like Pam<sub>3</sub>Cys-SKKKK (Fig. 1), MALP-2 and FSL-1 are described to elicit cellular responses through heterodimers formed by TLR1/TLR2 or TLR2/TLR6 (Takeuchi et al. 2001, 2002; Alexopoulou et al. 2002; Okusawa et al. 2004). The crystal structures of the TLR1/TLR2 and TLR2/TLR6 heterodimers with the synthetic ligands Pam<sub>3</sub>Cys-SKKKK (*RR*-stereoisomer) or Pam<sub>2</sub>Cys-SKKKK (*RR*-stereoisomer) have been elucidated (Jin et al. 2007; Kang et al. 2009).

Structure-activity studies with synthetic lipopeptide analogues revealed the structural features of their interaction with TLR1, TLR2 and TLR6 (Buwitt-Beckmann et al. 2005, 2006; Farhat et al. 2007). Recently, the interaction of lipopeptides with TLR10 has been described (Guan et al. 2010).

Check [TLR reference list](#)

## 1.1 Lipopeptides for Toll-like receptor 1 and 2 research

Toll-like receptors 1/2 heterodimers are activated by triacylated lipoproteins and their synthetic lipopeptide analogues.

These triacylated lipopeptides are based on L-cysteine and are provided as lyophilised powders without any additives.

### Pam<sub>3</sub>Cys-SK<sub>4</sub>KKK and analogues

Pam<sub>3</sub>Cys-SK<sub>4</sub>KKK is the mostly used synthetic analogue of naturally occurring lipoproteins and often described in literature as reference compound for TLR2/1 activation.

Pam<sub>3</sub>Cys-SK<sub>4</sub>KKK is provided as stereochemically defined compounds and as mixture of stereoisomers. Additionally, labelled analogues are available.

PHC-SK<sub>4</sub>KKK is recommended as an appropriate negative control. This triacylated lipopeptide does not contain the dihydroxypropyl cysteine residue, which seems to be essential for the interaction with TLR1/2.

Pam <sub>3</sub> Cys-SK <sub>4</sub> KKK		L2000
1 mg	120 €	2 mg 175 € 5 mg 350 €

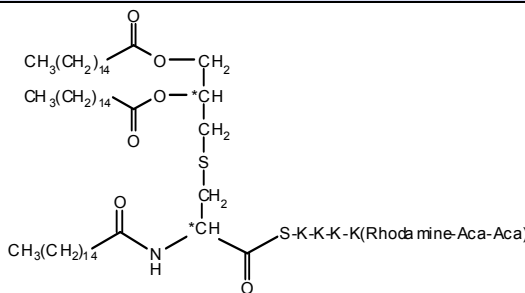
Pam <sub>3</sub> Cys-SK <sub>4</sub> KKK (β-irradiated)		L2000s
		1 mg 180 €

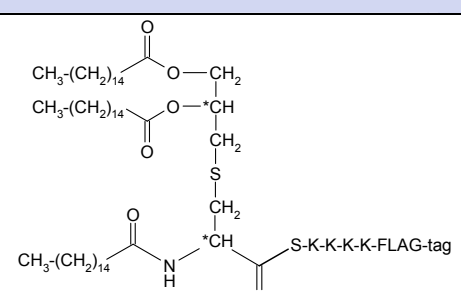
R-Pam <sub>3</sub> Cys-SK <sub>4</sub> KKK		L2048
100 µg	180 €	5 x 100 µg 540 €

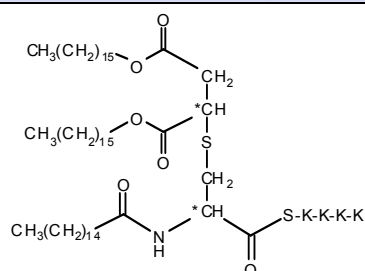
S-Pam <sub>3</sub> Cys-SK <sub>4</sub> KKK		L2049
100 µg	180 €	5 x 100 µg 540 €

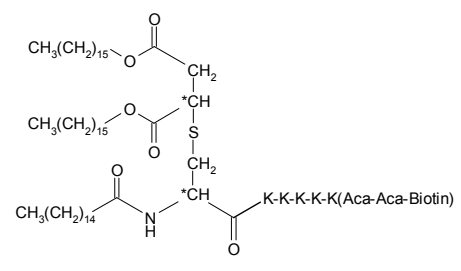
Pam <sub>3</sub> Cys-SK <sub>4</sub> KKK(Biotin-Aca-Aca)		L2031
100 µg	180 €	5 x 100 µg 540 €

Pam <sub>3</sub> Cys-SK <sub>4</sub> KKK(Fluorescein-Aca-Aca)		L2034
100 µg	180 €	5 x 100 µg 540 €

<b>Pam<sub>3</sub>Cys-SKKKK(Rhodamine-Aca-Aca)</b>		<b>L2035</b>
		
100 µg	180 €	5 x 100 µg 540 €

<b>Pam<sub>3</sub>Cys-SKKKK-FLAG-tag</b>		<b>L2064</b>
		
100 µg	180 €	5 x 100 µg 540 €

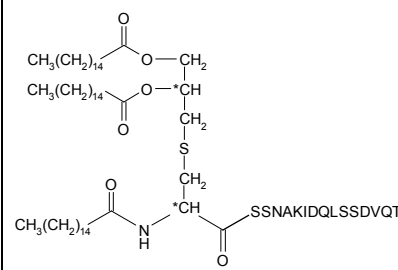
<b>PHC-SKKKK</b>		<b>L2032</b>
		
		1 mg 150 €

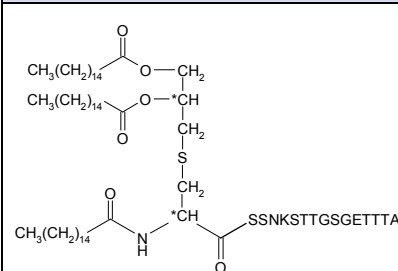
<b>Lipobiotin</b>		<b>L2070</b>
		
1 mg	180 €	10 mg 750 €

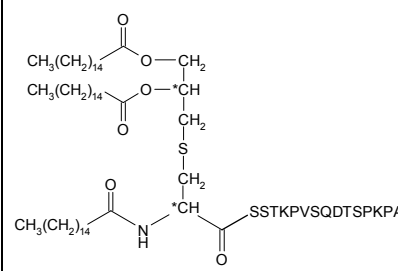
### Synthetic lipopeptides derived from bacterial lipoproteins


The synthetic triacyl lipopeptides represent the N-terminal lipohexadecapeptides Pam<sub>3</sub>Cys-AA<sub>15</sub> or lipononadecapeptide Pam<sub>3</sub>Cys-AA<sub>18</sub> (product L8020) of bacterial lipoproteins. Names of lipoproteins and origin are indicated.

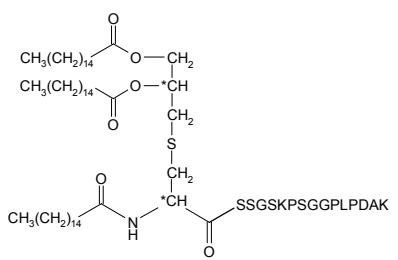
Additionally, customer defined lipopeptides are available on request.

<b>Pam<sub>3</sub>Cys-SSNAKIDQLSSDVQT</b>		<b>bLP001</b>
		Synthetic lipopeptide derived from <i>Escherichia coli</i> ( <i>E. coli</i> ) major outer membrane lipoprotein
		1 mg 395 €

<b>Pam<sub>3</sub>Cys-SSNKSTTGSGETTGA</b>		<b>bLP002</b>
		Synthetic lipopeptide derived from <i>Mycobacterium tuberculosis</i> 19 kDa lipoprotein antigen
		1 mg 395 €


<b>Pam<sub>3</sub>Cys-SSTKPVSQDTSPKPA</b>		<b>bLP MPT83</b>
		Synthetic lipopeptide derived from <i>Mycobacterium tuberculosis</i> cell surface lipoprotein MPT83
		1 mg 395 €

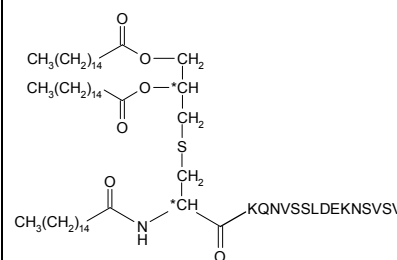
**Pam<sub>3</sub>Cys-SSGSKPSGGPLPDAK** **bLP MT P27** 



Synthetic lipopeptide derived from *Mycobacterium tuberculosis* lipoprotein lprG (27 kDa lipoprotein)


1 mg 395 €

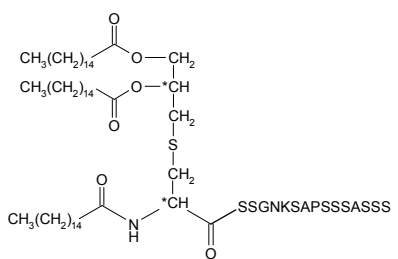
**Pam<sub>3</sub>Cys-KQNVSSLDEKNSVSV** **bLP BB OspA** 



Synthetic lipopeptide derived from *Borrelia burgdorferi* OspA


1 mg 395 €

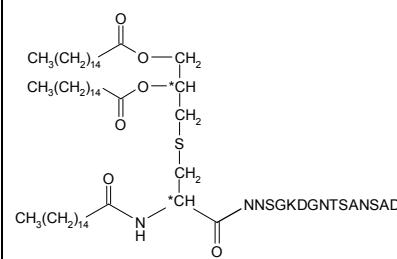
**Pam<sub>3</sub>Cys-SSGNKSAPSSSASSS** **bLP003** 



Synthetic lipopeptide derived from *Mycobacterium avium* 19 kDa lipoprotein antigen


1 mg 395 €

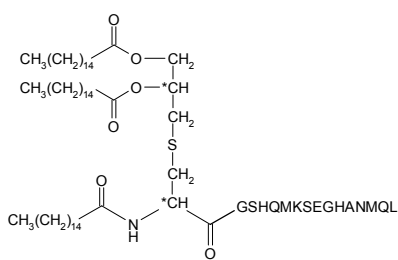
**Pam<sub>3</sub>Cys-NNSGKDGNTSANSAD** **bLP BB OspC** 



Synthetic lipopeptide derived from *Borrelia burgdorferi* OspC


1 mg 395 €

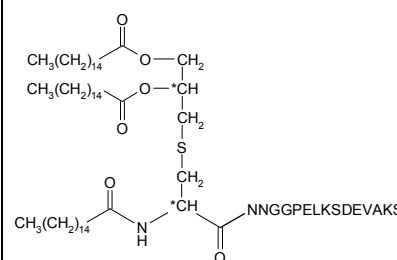
**Pam<sub>3</sub>Cys-GSHQMKSEGHANMQL** **bLP HI P4** 



Synthetic lipopeptide derived from *Haemophilus influenzae* outer membrane protein P4


1 mg 395 €

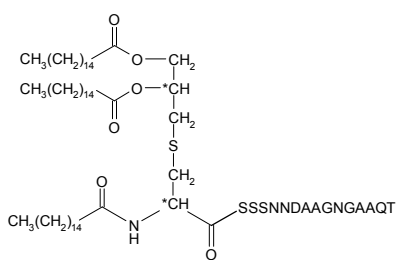
**Pam<sub>3</sub>Cys-NNGGPELKSDEVAKS** **bLP BH 3** 



Synthetic lipopeptide derived from *Borrelia hermsii* outer membrane lipoprotein 3


1 mg 395 €

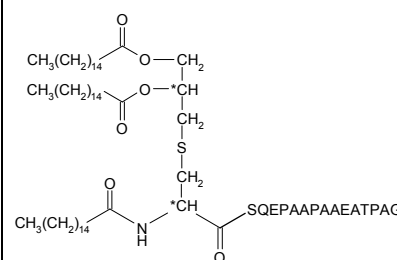
**Pam<sub>3</sub>Cys-SSSNDAAGNGAAQT** **bLP HI P6** 



Synthetic lipopeptide derived from *Haemophilus influenzae* outer membrane protein P6

1 mg 395 €

**Pam<sub>3</sub>Cys-SQEPAAPAAEATPAG** **bLP NG H.8** 



Synthetic lipopeptide derived from *Neisseria gonorrhoeae* H.8 outer membrane protein

1 mg 395 €

<b>Pam<sub>3</sub>Cys-SSSKSSDSSAPKAYG</b>	<b>bLP SP amiA</b>
	<p>Synthetic lipopeptide derived from <i>Streptococcus pneumoniae</i> oligopeptide-binding protein amiA</p>
1 mg	395 €

<b>Pam<sub>3</sub>Cys-AQEKEAKSELDYDQTKKM</b>	<b>L8020</b>
	<p>Synthetic lipopeptide derived from <i>Bacillus cereus</i> spore germination protein D GerD</p>
1 mg	395 €

<b>Pam<sub>2</sub>Cys-SK K K K</b>	<b>L2020</b>
100 µg	95 €
1 mg	265 €

<b>R-Pam<sub>2</sub>Cys-SK K K K</b>	<b>L20201</b>
100 µg	180 €
5 x 100 µg	540 €

## 1.2 Lipopeptides for Toll-like receptor 2 and 6 research

Toll-like receptors 2/6 heterodimers are activated by diacylated lipoproteins and their synthetic lipopeptide analogues.

All offered diacylated lipopeptides are based on L-cysteine and are provided as lyophilised powders without any additives.

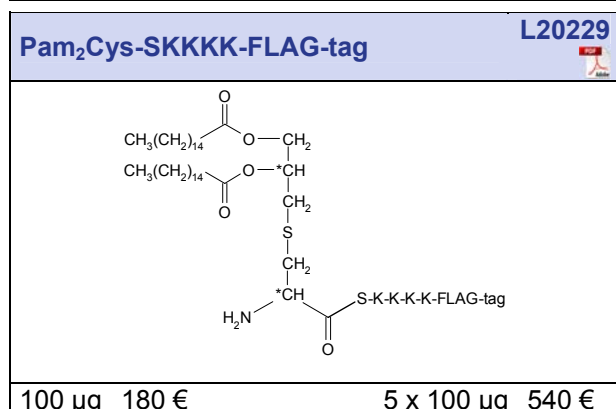
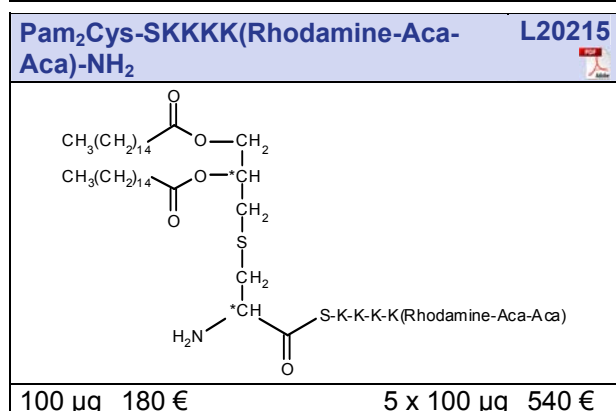
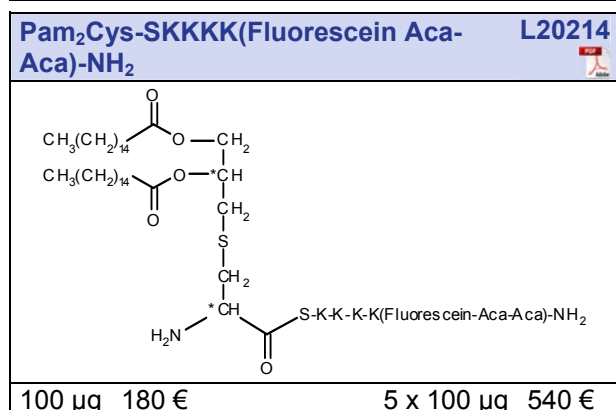
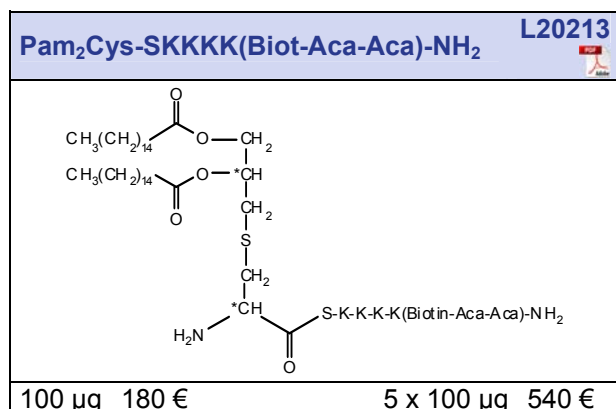
### Pam<sub>2</sub>Cys-SK K K K and analogues

Pam<sub>2</sub>Cys-SK K K K is a frequently used synthetic analogue of naturally occurring mycoplasmal lipoproteins. The amphiphilic lipopeptide is water soluble due to its strongly hydrophilic amino acid sequence SK K K K, which is not derived from natural lipoproteins.

Pam<sub>2</sub>Cys-SK K K K is provided as stereochemically defined compounds and as mixture of stereoisomers. Lipopeptides with the S-dihydroxypropyl moiety are not active and therefore suitable as negative controls. Additionally, analogues with different labels are available.

<b>S-Pam<sub>2</sub>Cys-SK K K K</b>	<b>L20202</b>
100 µg	180 €
5 x 100 µg	540 €

<b>PamCys(Pam)-SK K K K</b>	<b>L2021</b>
100 µg	180 €
5 x 100 µg	540 €



### Improved MALP-2: MALP-2-DI

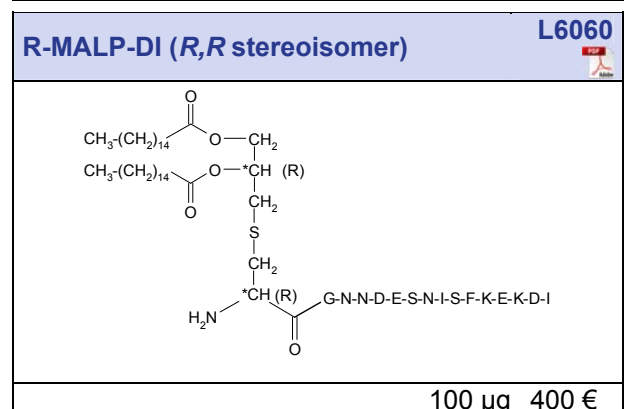
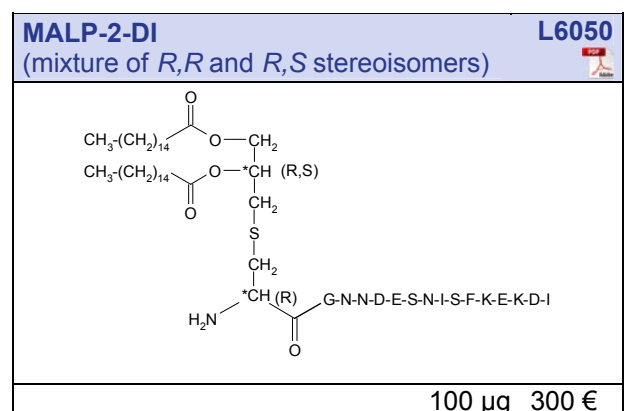
*New*

MALP-2-DI, Pam<sub>2</sub>Cys-GNNDESNIKFKEKDI, represents the N-terminal sequence of the mature macrophage activating lipoprotein 404 originally isolated from *Mycoplasma fermentans*.

MALP-2, Pam<sub>2</sub>Cys-GNNDESNIKFKEK and MALP-2-DI differ in the length of the natural amino acid sequence but not in the N-terminal lipoamino acid Pam<sub>2</sub>Cys.

The C-terminal sequence elongation leads to **improved physicochemical properties** compared to MALP-2. MALP-2-DI can be used without any additives or detergents.

MALP-2-DI is provided in reproducible high quality, as mixture of RR and RS stereoisomers and as stereochemically defined compound R-MALP-2-DI.



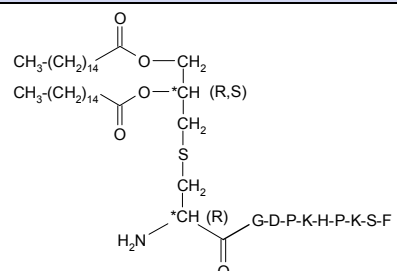


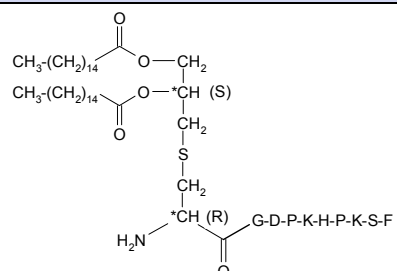
## FSL-1 and derivatives

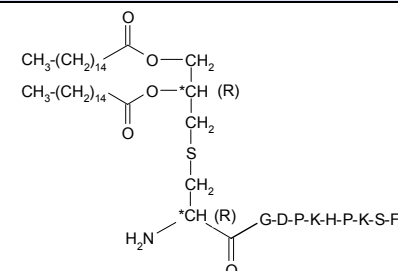
FSL-1, Pam<sub>2</sub>Cys-GDPKHPKSF, represents the N-terminal part of the 44-kDa lipoprotein LP44 of *Mycoplasma salivarium*. Compared to *Mycoplasma fermentans* derived synthetic lipopeptide MALP-2, FSL-1 differs in the amino acid sequence but not in the N-terminal lipoamino acid Pam<sub>2</sub>Cys. FSL-1 is highly active and favourable in comparison to many other lipopeptides derived from naturally occurring lipoproteins with respect to its good solubility in aqueous solutions without any detergent.

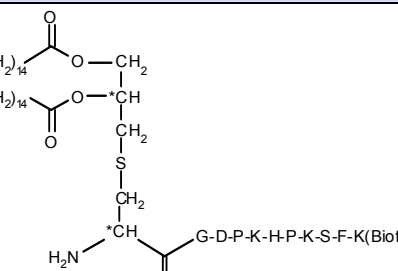
FSL-1 is provided as stereochemically defined compounds and as mixture of stereoisomers. Lipopeptides with the S-dihydroxypropyl moiety are not active and therefore suitable as negative controls. Additionally, analogues with different labels or tags are available.

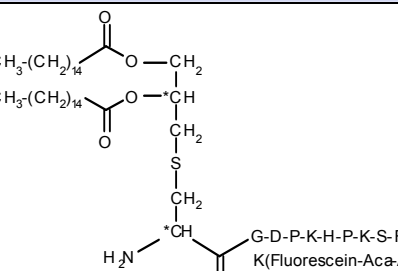
EMC offers further TLR 2/6 ligands with improved physico-chemical features or with neutral charge. Please inquire.

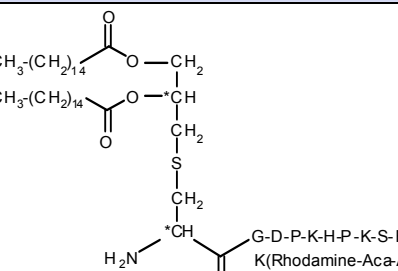
FSL-1 (mixture of <i>R,R</i> and <i>R,S</i> stereoisomers)		L7000
		
1 mg	375 €	

S-FSL-1 ( <i>R,S</i> stereoisomer)		L7021
		
100 µg	180 €	5 x 100 µg 540 €

R-FSL-1 ( <i>R,R</i> stereoisomer)		L7022
		
100 µg	180 €	5 x 100 µg 540 €

FSL-1-Biotin		L7030
		
100 µg	180 €	5 x 100 µg 540 €

FSL-1-Fluorescein		L7031
		
100 µg	180 €	5 x 100 µg 540 €

FSL-1-Rhodamine		L7032
		
100 µg	180 €	5 x 100 µg 540 €

<b>FSL-1-FLAG-tag</b>	<b>L7040</b>
100 µg 180 €	5 x 100 µg 540 €

### 1.3 Miscellaneous peptides and lipopeptides for Toll-like receptor research

Monoacylat lipopeptides, peptides with the unusual amino acid dihydroxypropylcystein (Dhc), or peptides representing the peptide moieties of Pam<sub>3</sub>Cys-SK<sub>4</sub>, Pam<sub>2</sub>Cys-SK<sub>4</sub> or FSL-1 are analogues or substructures of TLR2 ligands and valuable as negative controls. The Dhc is based on L-cysteine. All peptides are provided as lyophilised powder without any additives.

<b>Pam-Dhc-SK<sub>4</sub></b>	<b>L2010</b>
1 mg	150 €

<b>Pam-CSK<sub>4</sub></b>	<b>L2011</b>
1 mg	150 €

<b>SK<sub>4</sub></b>	<b>L2002</b>
1 mg	150 €

<b>GDPKHPKSF</b>	<b>L2004</b>
1 mg	180 €

<b>Dhc-SK<sub>4</sub></b>	<b>L2001</b>
1 mg	150 €

<b>Pam-Dhc-GDPKHPKSF</b>	<b>L2012</b>
1 mg	265 €

<b>Dhc-GDPKHPKSF</b>	<b>L2003</b>
1 mg	180 €

<b>Pam-CGDPKHPKSF</b>	<b>L2013</b>
1 mg	265 €

<b>CD14 (81-100)</b>	<b>P1014</b>
Ac-QVPAQLLVGALRVLAYSRLK-NH <sub>2</sub>	
<b>LPS binding peptide</b>	
Purity	1 mg
≥ 95 %	320 €

*New*

## 2. Adjuvants

Effective immunisation requires two main constituents, the antigen itself and an adjuvant.

The adjuvant stimulates the immune system and enhances the antigen-specific immune response when used in combination with antigens. Without an adjuvant, usually only a poor immune response and low antibody titers are observed after immunisation.

Effective immunisation and vaccination leads to the induction of antigen specific antibodies by B lymphocytes, and cytotoxic CD8<sup>+</sup> T lymphocytes (CTL) that recognise and kill infected cells. The generation and maintenance of the B cell and CD8<sup>+</sup> T cell responses is supported by growth factors and signals provided by CD4<sup>+</sup> T helper lymphocytes. This cellular response and support is in particular important for B cell activation, antibody class switch and for memory immune response.

Toll-like receptors are key components of the innate immune system that detect microbial infection and trigger antimicrobial host defence responses. TLRs also control multiple dendritic cell functions and activate signals that are critically involved in the initiation of adaptive immune response. Promising adjuvants used today in vaccine development are based on natural TLR ligands.

Lipoproteins and their synthetic analogues are known as strong enhancers of the immune system. Lipopeptide vaccinations have been carried out in all relevant animal models. So far, no toxic side effects have been observed (Wiedemann et al 1990, J. Pathology 164, 1–7). The efficacy of eight adjuvant formulations to prime cytotoxic T lymphocytes in mice was compared and the water soluble lipohexapeptide analogue of bacterial lipoproteins Pam<sub>3</sub>Cys-SK<sub>6</sub>, proved to be the most effective additive for eliciting a cellular immune response in mice (Hioe et al. 1996, Vaccine 5, 412–8).

Lipopeptide adjuvant		L4000	
Synthetic TLR2/1 ligand Pam <sub>3</sub> Cys-SK <sub>6</sub> admixed to lipoamino acid conjugate with T helper cell epitope of the sperm whale myoglobin (AA 106-121) FISEAIIHVLHSRHPG			
1.5 mg	150 €	5 x 1.5 mg	490 €

Pam <sub>3</sub> Cys-SK <sub>6</sub>		L2000	
1 mg	120 €	2 mg	175 €
5 mg	350 €		

Pam <sub>3</sub> Cys-SK <sub>6</sub> (β-irradiated)		L2000s	
		1 mg	180 €

Imiquimod		IMI-001	
		5 mg	140 €

GMDP		GMDP	
		1 mg	250 €

### 3. Bioactive peptides

EMC offers customer defined peptides and peptidomimetics. Additionally, EMC offers ex stock biologically active peptides and respective control peptides.

All peptides are provided as lyophilised powders. They are characterised by RP-HPLC and ESI mass spectrometry (analytical data sheet included). If not otherwise specified, the counter-ion of positively charged peptides is trifluoroacetic acid.

#### 3.1 Peptides for Alzheimer disease research

Characteristic of Alzheimer disease is the accumulation of amyloid plaques in the brain. The major components of these plaques are 36-42 residue-long amyloid- $\beta$ -peptides, which form insoluble fibrils via self-assembly.

The amyloid- $\beta$ -peptides are fragments of the broadly distributed, membrane-bound amyloid precursor protein APP, encoded on chromosome 21. They are formed from the proteolytic cleavage of APP by  $\beta$ - and  $\gamma$ -secretases.

One of the most common and intensively studied amyloid  $\beta$  isoforms is amyloid  $\beta$  (1-40), which is present in amyloid plaques.

#### References:

M. Ahmed, J. Davis, D. Aucoin, T. Sato, S. Ahuja, S. Aimoto, J. I. Elliott, W. E. Van Nostrand, S. O. Smith (2010) Nat. Struct. Mol. Biol. 17, 561-567.  
T. Hartmann, S. C. Bieger, B. Brühl, P. J. Tienari, N. Ida, D. Allsop, G. W. Roberts, C. L. Masters, C. G. Dotti, K. Unsicker, K. Beyreuther (1997) Nat. Med. 3, 1016-1020.

#### Amyloid- $\beta$ -peptides and innate immunity

In Alzheimer's disease, deposition of amyloid- $\beta$  triggers a protracted sterile inflammatory response. Chronic stimulation of the innate immune system is believed to underlie the pathology of this disease. It was shown, that amyloid- $\beta$  triggers inflammatory signalling through a heterodimer of Toll-like receptors 4 and 6. Assembly of this recently identified heterodimer is regulated by signals from the scavenger receptor CD36, CD36-TLR4-TLR6 activation was identified as a common molecular mechanism by which atherogenic lipids and amyloid- $\beta$  stimulate sterile inflammation (Stewart et al. 2010, Nature Immunology 11, 155-161 doi:10.1038/ni.1836).

<b>Amyloid-<math>\beta</math> (1-40) human</b>	<b>BAP-012</b>	
DAEFRHDSGYEVHHQKLVFFAEDVGSNKGAIIGLMVGGVV		
Purity	1 mg	5 mg
$\geq 95\%$	145 €	645 €

<b>Amyloid-<math>\beta</math> (1-40) human HCl salt</b>	<b>BAP-013</b>	
DAEFRHDSGYEVHHQKLVFFAEDVGSNKGAIIGLMVGGVV		
Purity	1 mg	5 mg
$\geq 95\%$	240 €	950 €

<b>Amyloid-<math>\beta</math> (1-40) rat</b>	<b>BAP-014</b>	
DAEFGHDSGFEVRRHQLVFFAEDVGSNKGAIIGLMVGGVV		
Purity	1 mg	5 mg
$\geq 95\%$	145 €	645 €


<b>Amyloid-<math>\beta</math> (1-40) rat HCl salt</b>	<b>BAP-015</b>	
DAEFGHDSGFEVRRHQLVFFAEDVGSNKGAIIGLMVGGVV		
Purity	1 mg	5 mg
$\geq 95\%$	240 €	950 €

<b>A<math>\eta</math> 46-peptide</b>	<b>BAP-016</b>	
ADSV PANTENEVEPVDARPAADRGLTTRPGSGLTNIKTEEISEVKM		
Purity	1 mg	5 mg
$\geq 95\%$	240 €	950 €

#### Reverse control peptides of amyloid- $\beta$ -peptides

The negative control peptides represent the reverse amino acid sequences of the corresponding amyloid- $\beta$ -peptides.


<b>Control peptide amyloid-<math>\beta</math> (40-1) human</b>	<b>BAP-022</b>	
VVGGVMLGIIAGKNSGVDEAFFVLKQHHVEYGS DHRFEAD		
Purity	1 mg	5 mg
$\geq 95\%$	145 €	645 €


<b>Control peptide amyloid-<math>\beta</math> (40-1) rat</b>	<b>BAP-023</b>	
VVGGVMLGIIAGKNSGVDEAFFVLKQHRVEFGS DHGFEAD		
Purity	1 mg	5 mg
$\geq 95\%$	145 €	645 €

## Biotinylated amyloid- $\beta$ -peptides

Biotinylated peptides are a useful tool in many important applications. Biotin has a strong affinity for avidin or streptavidin. This interaction can be used for qualitative and quantitative detection, labelling or immobilisation.

The biotinylated amyloid- $\beta$  peptides are N-terminally labelled. Two 6-aminohexanoic acid residues (Aca) are inserted as spacer between the amyloid- $\beta$  peptide itself and biotin. The enlarged distance minimise steric hindrance and improve the availability of biotin for avidin or streptavidin binding.


<b>Biotinylated amyloid-<math>\beta</math> (1-40) human</b>	<b>BAP-031</b>	
Biotin-Aca-Aca- DAEFRHDSGYEVHHQKLVFFAEDVGSNKGAIIG LMVGGVV		
Purity	1 mg	5 mg
$\geq 95\%$	285 €	1150 €


<b>Biotinylated amyloid-<math>\beta</math> (1-40) rat</b>	<b>BAP-032</b>	
Biotin-Aca-Aca- DAEFGHDSGFVRRHQKLVFFAEDVGSNKGAIIG LMVGGVV		
Purity	1 mg	5 mg
$\geq 95\%$	285 €	1150 €


## Peptides as inhibitors of amyloid- $\beta$


Several inhibitors of amyloid- $\beta$  aggregation have been published. Many of them are fragments and modified peptides derived from the native amyloid- $\beta$  sequence. Others were identified by phage display approaches.


An overview about peptides that target amyloid- $\beta$  is described by Stains et al. (2007) ChemMedChem 2, 1674-1692.


<b>KLVFF</b>	<b>BAP-041</b>	
Purity	1 mg	5 mg
$\geq 70\%$		95 €
$\geq 95\%$	95 €	125 €


<b>Ac-KLVFF-NH<sub>2</sub></b>	<b>BAP-042</b>	
Purity	1 mg	5 mg
$\geq 70\%$		95 €
$\geq 95\%$	95 €	125 €


<b>RIIGL</b>	<b>BAP-043</b>	
Purity	1 mg	5 mg
$\geq 70\%$		95 €
$\geq 95\%$	95 €	125 €


<b>DWGKGGRWRLWPGASGKTEA</b>	<b>BAP-044</b>	
Purity	1 mg	5 mg
$\geq 70\%$		125 €
$\geq 95\%$	95 €	285 €

<b>PGRSPFTGKKLFNQEFSDQDQ</b>	<b>BAP-045</b>	
Purity	1 mg	5 mg
$\geq 70\%$		125 €
$\geq 95\%$	95 €	285 €

<b>qshyrhispaqv (D-amino acids)</b>	<b>BAP-046</b>	
Purity	1 mg	5 mg
$\geq 95\%$	125 €	375 €

<b>FYLKVPSSLHHHHGRDKLVFFHHHH</b>	<b>BAP-047</b>	
Purity	1 mg	5 mg
$\geq 70\%$		125 €
$\geq 95\%$	125 €	375 €

<b>NYSKMIFSHHHH</b>	<b>BAP-048</b>	
Purity	1 mg	5 mg
$\geq 70\%$		95 €
$\geq 95\%$	95 €	285 €

<b>HNHKLVFFHHQH</b>	<b>BAP-049</b>	
Purity	1 mg	5 mg
$\geq 70\%$		95 €
$\geq 95\%$	95 €	285 €

## 3.2 Immunologically active peptides

### Peptides for multiple sclerosis research

Multiple sclerosis (MS), an autoimmune disease of the central nervous system (CNS), is characterised by primary demyelination. It is widely thought that this is the result of an autoimmune attack against myelin components.

Potential target antigens in MS are proteins of the myelin sheath such as myelin oligodendrocyte glycoprotein (MOG), myelin basic protein (MBP), and proteolipid protein (PLP). Experimental autoimmune encephalomyelitis (EAE) has proven to be a particularly useful animal model. T cell epitopes of MOG for the induction of EAE in mice have been identified.

#### References:

- T. G. Forsthuber, C. L. Shive, W. Wienhold, K. L. de Graaf, E. G. Spack, R. Sublett, A. Melms, J. Kort, M. K. Racke, R. Weissert (2001) J. Immunol. Dec 15, 167(12), 7119-25.
- R. Weissert, J. Kuhle, K. L. de Graaf, W. Wienhold, M. M. Herrmann, C. Müller, T. G. Forsthuber, K.-H. Wiesmüller, A. Melms (2002) J. Immunol. Jul 1, 169(1), 548-56.
- M. Khare, M. Rodriguez, C. S. David (2003) Int. Immunol. Apr, 15(4), 535-46.
- K. L. de Graaf, S. Barth, M. M. Herrmann, M. K. Storch, C. Otto, T. Olsson, A. Melms, G. Jung, K.-H. Wiesmüller, R. Weissert (2004) J. Immunol. Aug 15, 173(4), 2792-802.
- H. Duyar, J. Dengjel, K. L. de Graaf, K.-H. Wiesmüller, S. Stevanović, R. Weissert (2005) Immunogenetics Apr, 57(1-2), 69-76. Epub 2005 Feb 12.
- J. Klehmet, C. Shive, R. Guardia-Wolff, I. Petersen, E. G. Spack, B. O. Boehm, R. Weissert, T. G. Forsthuber (2004) Clin. Immunol. Apr, 111(1), 53-60.
- K. L. de Graaf, S. Barth, M. M. Herrmann, M. K. Storch, K.-H. Wiesmüller, R. Weissert (2008) Eur. J. Immunol. Jan, 38(1), 299-308.

<b>MOG (35-55) rat/mouse</b>		<b>BAP-101</b>
MEVGWYRSPFSRVVHLYRNGK		
Purity	1 mg	5 mg
≥ 70 %		135 €
≥ 95 %	95 €	280 €

<b>MOG (35-55) human</b>		<b>BAP-102</b>
MEVGWYRPPFSRVVHLYRNGK		
Purity	1 mg	5 mg
≥ 70 %		135 €
≥ 95 %	95 €	280 €

<b>MOG (92-106)</b>		<b>BAP-103</b>
DEGGYTCFFRDHSYQ		
Purity	1 mg	5 mg
≥ 70 %		125 €
≥ 95 %	125 €	280 €

<b>MOG (97-108)</b>		<b>BAP-104</b>
TCFFRDHSYQEE		
Purity	1 mg	5 mg
≥ 70 %		125 €
≥ 95 %	95 €	280 €

<b>MOG (183-191)</b>		<b>BAP-106</b>
FVIVPVLGP		
Purity	1 mg	5 mg
≥ 70 %		125 €
≥ 95 %	95 €	280 €

<b>MOG (91-108)</b>		<b>BAP-107</b>
SDEGGYTCFFRDHSYQEE		
Purity	1 mg	5 mg
≥ 70 %		125 €
≥ 95 %	95 €	280 €

<b>MBP (1-11) human</b>		<b>BAP-110</b>
Ac-ASQKRPSQRHG		
Purity	1 mg	5 mg
≥ 70 %		125 €
≥ 95 %	95 €	280 €

<b>MBP (54-72) human</b>		<b>BAP-111</b>
SHHAARTTHYGSLPQKSQR		
Purity	1 mg	5 mg
≥ 70 %		125 €
≥ 95 %	95 €	280 €

<b>PLP (139-151)</b>		<b>BAP-120</b>
HCLGKWLGHDPDKF		
Purity	1 mg	5 mg
≥ 70 %		125 €
≥ 95 %	95 €	280 €

<b>PLP (178-191)</b>		<b>BAP-121</b>
NTWTTCQSIAPFSK		
Purity	1 mg	5 mg
≥ 70 %		125 €
≥ 95 %	95 €	280 €

### MHC-I restricted peptide epitopes

MHC-I glycoproteins are designed for the recognition of infected cells and tumor cells.

T cell epitopes are presented on the surface of antigen-presenting cells by MHC molecules. T cell epitopes presented by MHC class I molecules are typically peptides between 8 and 11 amino acids in length and exhibiting MHC-specific sequence motifs.

These antigenic peptides are derived from non-structural and structural proteins through proteolysis in the cytosolic compartment. Peptide-MHC-I complexes are then transported to the cell surface of antigen presenting cells and are recognised by CD8+ cytotoxic T lymphocytes (CTL). This interaction induces the differentiation of CTLs. Activated CTL lyse the infected cell, secrete cytokines, and proliferate.

This mechanism ensures that cells infected by viruses or intracellular bacteria or cancer cells can be detected, since pathogen or cancer-specific MHC peptide complexes are displayed on the cell surface. CTL can recognise such abnormal cells and eliminate them.

The genes of MHC I and II molecules are polymorphic. Each MHC allele has a distinct peptide binding motif which favours certain amino acid anchor residues at defined sequence positions.


#### References:


R. Vita, L. Zarebski, J. A. Greenbaum, H. Emami, I. Hoof, N. Salimi, R. Damle, A. Sette, B. Peters (2010) *Nucleic Acids Res.* Jan. 38 D854-62. Epub 2009 Nov. 11 ([www.immuneepitope.org](http://www.immuneepitope.org)).  
 H.-G. Rammensee, J. Bachmann, N.N. Emmerich, O.A. Bachor, S. Stevanović (1999) *Immunogenetics* 50, 213-219 ([www.syfpeithi.de](http://www.syfpeithi.de)).  
 H.-G. Rammensee, T. Friede, S. Stevanović (1995) *Immunogenetics* 41, 178-228.  
 K. Falk, O. Rötzschke, S. Stevanović, G. Jung, H.-G. Rammensee (1991) *Nature* 351, 290 – 296. doi:10.1038/351290a0.


<b>Ova (257-264): SIINF EKL</b>		<b>BAP-201</b>
SIINF EKL		
Purity		5 mg
≥ 70 %		95 €
≥ 95 %		145 €


<b>Influenza A NP (366-374)</b>		<b>BAP-202</b>
ASNENMETM		
Purity		5 mg
≥ 70 %		95 €
≥ 95 %		195 €


<b>Influenza A matrix protein (58-66)</b>		<b>BAP-203</b>
GILGFVFTL		
Purity	1 mg	5 mg
≥ 70 %		125 €
≥ 95 %	125 €	195 €

<b>HIV-1 p17 Gag (77-85)</b>		<b>BAP-204</b>	
SLYNTVATL			
Purity	1 mg	5 mg	
≥ 70 %		95 €	
≥ 95 %	95 €	145 €	

<b>HCV-NS5b</b>		<b>BAP-205</b>	
ALYDVVSKL			
Purity	1 mg	5 mg	
≥ 70 %		95 €	
≥ 95 %	95 €	145 €	

<b>LCMV GP (33-41)</b>		<b>BAP-206</b>	
KAVYNFATM			
Purity		5 mg	
≥ 70 %		95 €	
≥ 95 %		145 €	

<b>MAGE-3 antigen (271-279)</b>		<b>BAP-208</b>	
FLWGPRALV			
Purity		5 mg	
≥ 70 %		95 €	
≥ 95 %		145 €	

<b>Melan-A / MART-1 (26 - 35)</b>		<b>BAP-209</b>	
EAAGIGILTV			
Purity		5 mg	
≥ 70 %		95 €	
≥ 95 %		195 €	

## MHC-II restricted peptide epitopes

MHC-II class molecules are designed for the recognition of epitopes of exogenous antigens and for discriminating self from non-self. They are expressed on the surface of antigen presenting cells.

The peptide binding groove of MHC II molecules is open at both ends, thus allowing MHC II-bound peptides to extend beyond both termini. Therefore MHC II epitopes are usually longer than MHC I epitopes and exhibit considerable length variation of 11–25 amino acids.


MHC class II molecules activate CD4+ helper T lymphocytes, which modulate humoral (B cell) and cell-mediated (CTL) immune response.


Activation of helper T lymphocytes lead to cell proliferation and secretion of cytokines which activate effector cells and trigger B cell proliferation and their differentiation into antibody-secreting plasma cells.


The genes of MHC-I and II molecules are polymorphic. Each MHC allele has a distinct peptide binding motif which favours certain amino acid anchor residues at defined sequence positions. Several promiscuous peptides, capable of binding to many different MHC class II alleles, have been identified.

### References:

R. Vita, L. Zarebski, J. A. Greenbaum, H. Emami, I. Hoof, N. Salimi, R. Damle, A. Sette, B. Peters (2010) Nucleic Acids Res. Jan. 38 D854-62. Epub 2009 Nov. 11 ([www.immuneepitope.org](http://www.immuneepitope.org)).  
H.-G. Rammensee, J. Bachmann, N. N. Emmerich, O. A. Bachor, S. Stevanović (1999) Immun. 50, 213-219 ([www.syfpeithi.de](http://www.syfpeithi.de)).

<b>Ova (323-339)</b>		<b>BAP-250</b>	
ISQAVHAAHAEINEAGR			
Purity	1 mg	5 mg	
≥ 70 %		95 €	
≥ 95 %	95 €	145 €	

<b>PADRE</b>		<b>BAP-251</b>	
AKFVAAWTLKAAA			
Purity	1 mg	5 mg	
≥ 70 %		125 €	
≥ 95 %	125 €	195 €	


<b>LCMV GP (64-80)</b>		<b>BAP-253</b>	
GPDIIYKGVYQFKSVEFD			
Purity	1 mg	5 mg	
≥ 70 %		125 €	
≥ 95 %	125 €	195 €	





### 3.3 Cell penetrating peptides


Cell penetrating peptides (CPPs) are characterised by their ability to promote the receptor-independent cellular uptake of membrane-impermeable macromolecules, such as peptides, proteins, nucleic acids and nanoparticles. CPPs are usually short peptides with less than 30 amino acids. They are mostly amphipathic and highly cationic and usually rich of amino acids arginine and lysine.


Cellular internalisation of CPPs is observed for virtually all cells, although with different efficiencies that depend on the CPP, the cargo and the cell type (Verdurmen and Brock 2011, Trends Pharmacol. Sci. 32, 116-124).


<b>Arg<sub>9</sub> Arg<sub>9</sub>-NH<sub>2</sub></b>		<b>BAP-301</b>	
 <b>BAP-301a</b>			
RRRRRRRRR RRRRRRRRR-NH <sub>2</sub>			
Purity	1 mg	5 mg	
≥ 70 %			95 €
≥ 95 %	95 €	145 €	


<b>D-Arg<sub>9</sub> (r<sub>9</sub>)</b>		<b>BAP-302</b>	
			
rrrrrrrrr			
Purity	1 mg	5 mg	
≥ 70 %			180 €
≥ 95 %	180 €	280 €	


<b>TAT (47-57)</b>		<b>BAP-303</b>	
			
YGRKKRRQRRR-NH <sub>2</sub>			
Purity	1 mg	5 mg	
≥ 70 %			95 €
≥ 95 %	95 €	145 €	


<b>D-TAT (47-57)</b>		<b>BAP-304</b>	
			
ygrkkrrqrrr-NH <sub>2</sub>			
Purity	1 mg	5 mg	
≥ 70 %			180 €
≥ 95 %	180 €	280 €	


<b>TAT (48-60)</b>		<b>BAP-305</b>	
			
GRKKRRQRRRPPQ			
Purity	1 mg	5 mg	
≥ 70 %			95 €
≥ 95 %	95 €	145 €	


<b>Antennapedia (43-58) (penetratin)</b>		<b>BAP-306</b>	
			
RQIKIWFQNRRMKWKK			
Purity	1 mg	5 mg	
≥ 70 %			95 €
≥ 95 %	95 €	145 €	


<b>CyLoP-1</b>		<b>BAP-307</b>	
			
CRWRWKCKK			
Purity	1 mg	5 mg	
≥ 70 %			95 €
≥ 95 %	95 €	145 €	

<b>Transportan 10 (TP10)</b>		<b>BAP-308</b>	
			
AGYLLGKINLKALAALAKKIL			
Purity	1 mg	5 mg	
≥ 70 %			145 €
≥ 95 %	95 €	260 €	

<b>MAP (KLAL)</b>		<b>BAP-309</b>	
			
KLALKLALKALKKAALKLA			
Purity	1 mg	5 mg	
≥ 70 %			120 €
≥ 95 %	95 €	240 €	

<b>EB1</b>		<b>BAP-310</b>	
			
LIRLWSHLIHIWFQNRRLKWKKK			
Purity	1 mg	5 mg	
≥ 70 %			145 €
≥ 95 %	95 €	260 €	

<b>hLF</b>	<b>BAP-311</b>	
		
KCFQWQRNMRKVRGPPVSCIKR-NH <sub>2</sub>		
Purity	1 mg	5 mg
≥ 70 %		145 €
≥ 95 %	95 €	260 €

<b>Pep1</b>	<b>BAP-312</b>	
		
KETWWETWWTEWSQPKKRKV		
Purity	1 mg	5 mg
≥ 70 %		145 €
≥ 95 %	95 €	260 €


### Labelled CPPs, CPP peptide conjugates


Fluorescence based methods are often used e.g. to study the uptake fluorescence microscopy, to quantify the peptides by fluorimetry or to localise the CPPs inside living cells by confocal microscopy.


Our **fluorescently labelled CPPs** are covalently coupled to either 5(6)-carboxyfluorescein (CF) or Cy5. For CPPs with other fluorophores please inquire.


**CPPs for conjugation to a cargo** via click chemistry (azidopeptides or alkyne-modified peptides) or via disulfide formation (peptides with activated Cys(NPYS) (N-terminal) or cysteine) are also available. Please inquire.


For the synthesis of your **peptide conjugated to CPPs** please inquire.


<b>Cy5-TAT (47-57)</b>	<b>BAP-303-Cy5</b>	
		
Cy5-YGRKKRRQRRR-NH <sub>2</sub>		
Purity		1 mg
≥ 95 %		350 €


<b>CF-TAT (48-60)</b>	<b>BAP-305-CF</b>	
		
5(6)-CF-GRKKRRQRRRPPQ		
Purity		1 mg
≥ 95 %		250 €


<b>Cy5-TAT (48-60)</b>	<b>BAP-305-Cy5</b>	
		
Cy5-GRKKRRQRRRPPQ		
Purity		1 mg
≥ 95 %		350 €


<b>CF-Arg<sub>9</sub></b>	<b>BAP-301-CF</b>	
<b>CF-Arg<sub>9</sub>-NH<sub>2</sub></b>	<b>BAP-301a-CF</b>	
		
5(6)-CF-RRRRRRRRR		
5(6)-CF-RRRRRRRRR-NH <sub>2</sub>		
Purity		1 mg
≥ 95 %		250 €

<b>CF-Antennapedia (43-58)</b>	<b>BAP-306-CF</b>	
<b>(CF-penetratin)</b>		
5(6)-CF-RQIKIWFQNRRMKWKK		
Purity		1 mg
≥ 95 %		250 €

<b>Cy5-Arg<sub>9</sub></b>	<b>BAP-301-Cy5</b>	
<b>Cy5-Arg<sub>9</sub>-NH<sub>2</sub></b>	<b>BAP-301a-Cy5</b>	
		
Cy5-RRRRRRRRR		
Cy5-RRRRRRRRR-NH <sub>2</sub>		
Purity		1 mg
≥ 95 %		350 €

<b>Cy5-Antennapedia (43-58)</b>	<b>BAP-306-Cy5</b>	
<b>(penetratin)</b>		
Cy5-RQIKIWFQNRRMKWKK		
Purity		1 mg
≥ 95 %		350 €

<b>CF-TAT (47-57)</b>	<b>BAP-303-CF</b>	
		
5(6)-CF-YGRKKRRQRRR-NH <sub>2</sub>		
Purity		1 mg
≥ 95 %		250 €

<b>CF-CyLoP-1</b>	<b>BAP-307-CF</b>	
		
5(6)-CF-CRWRWKCKK		
Purity		1 mg
≥ 95 %		250 €

<b>Cy5-CyLoP-1</b>	<b>BAP-307-Cy5</b>
Cy5-CRWRWKCKK	
Purity	1 mg
≥ 95 %	350 €

<b>CF-Transportan 10 (CF-TP10)</b>	<b>BAP-308-CF</b>
5(6)-CF-AGYLLGKINLKALAALAKKIL	
Purity	1 mg
≥ 95 %	250 €

<b>Cy5-Transportan 10 (Cy5-TP10)</b>	<b>BAP-308-Cy5</b>
Cy5-AGYLLGKINLKALAALAKKIL	
Purity	1 mg
≥ 95 %	350 €

<b>CF-MAP (KLAL)</b>	<b>BAP-309-CF</b>
5(6)-CF-KLALKLALKALKKAALKLA	
Purity	1 mg
≥ 95 %	250 €

<b>Cy5-MAP (KLAL)</b>	<b>BAP-309-Cy5</b>
Cy5-KLALKLALKALKKAALKLA	
Purity	1 mg
≥ 95 %	350 €

<b>CF-EB1</b>	<b>BAP-310-CF</b>
5(6)-CF-LIRLWSHLIHIWFQNRRLKWKKK	
Purity	1 mg
≥ 95 %	250 €

<b>Cy5-EB1</b>	<b>BAP-310-Cy5</b>
Cy5-LIRLWSHLIHIWFQNRRLKWKKK	
Purity	1 mg
≥ 95 %	350 €

<b>CF-hLF</b>	<b>BAP-311-CF</b>
5(6)-CF-KCFQWQRNMRKVRGPPVSCIKNH <sub>2</sub>	
Purity	1 mg
≥ 95 %	250 €

<b>Cy5-hLF</b>	<b>BAP-311-Cy5</b>
Cy5-KCFQWQRNMRKVRGPPVSCIKNH <sub>2</sub>	
Purity	1 mg
≥ 95 %	350 €

<b>CF-Pep1</b>	<b>BAP-312-CF</b>
5(6)-CF-KETWWETWWTEWSQPKKRKV	
Purity	1 mg
≥ 95 %	250 €

<b>Cy5-Pep1</b>	<b>BAP-312-Cy5</b>
Cy5-KETWWETWWTEWSQPKKRKV	
Purity	1 mg
≥ 95 %	350 €

### 3.4 Microbial and antimicrobial peptides

Antimicrobial peptides (AMPs) offer a broad spectrum of antimicrobial activity against bacteria, viruses, and fungi. They are an evolutionarily conserved component of the innate immune response and are found amongst all life forms. AMPs are usually amphiphilic and positively charged. Microorganisms are affected by AMP through diverse mechanisms.

#### References:

K. A. Brogden (2005) Nature Reviews Microbiology 3, 238-250.  
 M. A. Kohanski, D. J. Dwyer, J. J. Collins (2010) Nature Reviews Microbiology 8, 423-435 doi:10.1038/nrmicro 2333.  
 M. N. Melo, R. Ferre, M. A. R. B. Castanho (2009) Nature Reviews Microbiology 7, 245-250 doi:10.1038/nrmicro2095.

<b>α-Defensin 5 human</b>		<b>AMP-001</b>
ATCYCRTGRCATRESLSGVCEISGRLYRLCCR Disulfide bridges : 3 – 31, 5 – 20, 10 – 30		
Purity	0.1 mg	1 mg
≥ 95 %	140 €	600 €

<b>Histatin 5</b>		<b>AMP-010</b>
DSHAKRHHGYKRKFHEKHSHRGY		
Purity	1 mg	5 mg
≥ 70 %		145 €
≥ 95 %	145 €	435 €

<b>Indolicidin</b>		<b>AMP-020</b>
ILPWKWPWWPWR-NH <sub>2</sub>		
Purity	1 mg	5 mg
≥ 70 %		145 €
≥ 95 %	145 €	435 €

<b>LL-37 human</b>		<b>AMP-030</b>
LLGDFFRKSKEKIGKEFKRIVQRIKDFLRNLPRTES		
Purity	1 mg	5 mg
≥ 70 %		185 €
≥ 95 %	185 €	555 €

<b>Magainin-1</b>		<b>AMP-040</b>
GIGKFLHSAGKFGKAFVGEIMKS		
Purity	1 mg	5 mg
≥ 70 %		145 €
≥ 95 %	145 €	435 €

<b>Pep27</b>		<b>AMP-050</b>
MRKEFHNVLSGQLLADKRPARDYNRK		
Purity	1 mg	5 mg
≥ 70 %		145 €
≥ 95 %	145 €	435 €

<b>Dermcidin DCD-1L</b>		<b>AMP-055</b>
SSLLEKGLDGAKKAVGGLGKLGKDAVEDLESV GKGAVHDVKDVLDSVL		
Purity	1 mg	5 mg
≥ 95 %	290 €	865 €

<b>Dermcidin DCD-1</b>		<b>AMP-056</b>
SSLLEKGLDGAKKAVGGLGKLGKDAVEDLESV GKGAVHDVKDVLDSV		
Purity	1 mg	5 mg
≥ 95 %	290 €	865 €

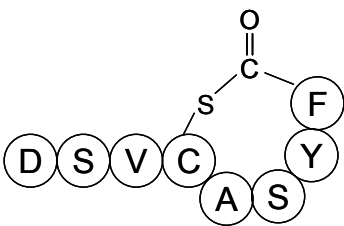
<b>Dermcidin SSL25</b>		<b>AMP-057</b>
SSLLEKGLDGAKKAVGGLGKLGKDA		
Purity	1 mg	5 mg
≥ 95 %	145 €	435 €

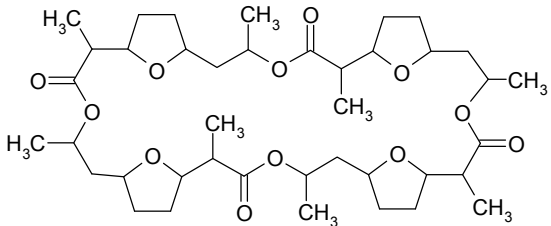
Alamethicin F30		AMP-060
Ac-Aib-Pro-Aib-Ala-Aib-Ala-Gln-Aib-Val-Aib-Gly-Leu-Aib-Pro-Val-Aib-Aib-Glu-Gln-Pheol (Pheol = Phenylalaninol)		
Purity	1 mg	5 mg
≥ 70 %	95 €	145 €
≥ 95 %	95 €	250 €

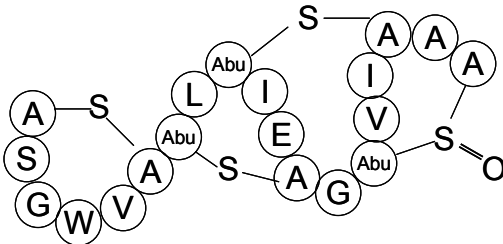
Alamethicin F50		AMP-061
Ac-Aib-Pro-Aib-Ala-Aib-Ala-Gln-Aib-Val-Aib-Gly-Leu-Aib-Pro-Val-Aib-Aib-Gln-Gln-Pheol (Pheol = Phenylalaninol)		
Purity	1 mg	5 mg
≥ 70 %	95 €	145 €
≥ 95 %	95 €	250 €

Omphalotin A		AMP-065
c[Trp-MeVal-Ile-MeVal-MeVal-Sar-MeVal-Melle-Sar-Val-Melle-Sar]		
Purity	1 mg	5 mg
≥ 70 %	150 €	450 €
≥ 95 %	210 €	630 €

Gallidermin		AMP-070
$\begin{array}{c} \text{S-CH=CH-NH} \\   \\ \text{IAAKFLA-Abu-PGAAK-Dhb-GAFNAYA} \\ \text{[S] [S] [S]} \end{array}$ (A-S-A: lanthionine, Abu-S-A: 3-methylanthionine)		
Purity	1 mg	5 mg
≥ 85 %	95 €	195 €

S. epidermidis Pheromone Peptide		MP-010
		
Purity	1 mg	
≥ 95 %	980 €	

Nonactin		AMP-075
		
Purity	1 mg	5 mg
≥ 85 %	95 €	155 €

Actagardin		AMP-090
		
Purity	1 mg	5 mg
≥ 85 %	225 €	790 €

## 4. Antimicrobial compounds (AMCs)

An important concern in health care, especially in clinical practice, is the rapidly growing number of resistant strains, resulting in a demand for novel anti-infectives.

The antimicrobial compounds contain novel, non-cytotoxic benzimidazoles which have been shown to be effective against clinical relevant *Candida* species. The antifungal potency against fluconazole resistant strains of *Candida* makes them a reasonable supplement for antifungal screening and an important tool in antifungal research.

### References:

A. Burger-Kentischer et al. (2011) *Antimicrob. Agents Chemother.* 55, 4789-4801.  
 J. Bauer et al. (2011) *J. Med. Chem.* doi: 10.1021/jm200571e.

<b>CAS 1240099-07-3</b>	<b>AMC-001</b>
1 mg 95 €    5 mg 140 €    10 mg 220 €	

<b>CAS 1116121-82-4</b>	<b>AMC-002</b>
1 mg 95 €    5 mg 140 €    10 mg 220 €	

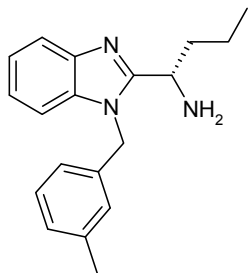
<b>CAS 1332482-87-7</b>	<b>AMC-003</b>
1 mg 95 €    5 mg 140 €    10 mg 220 €	

<b>CAS 1116121-84-6</b>	<b>AMC-004</b>
1 mg 95 €    5 mg 140 €    10 mg 220 €	

<b>CAS 1332482-88-8</b>	<b>AMC-005</b>
1 mg 95 €    5 mg 140 €    10 mg 220 €	

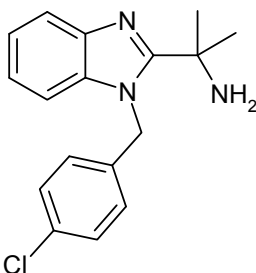
<b>CAS 1332482-86-6</b>	<b>AMC-006</b>
1 mg 95 €    5 mg 140 €    10 mg 220 €	

**CAS 1116121-83-5** **AMC-007**



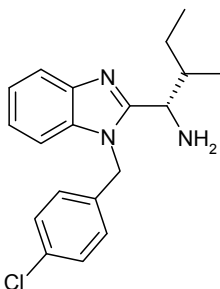
1 mg 95 €    5 mg 140 €    10 mg 220 €

**CAS 1116121-85-7** **AMC-008**



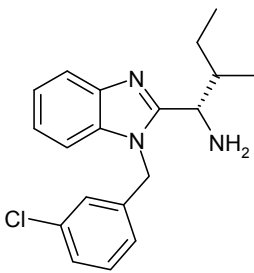
1 mg 95 €    5 mg 140 €    10 mg 220 €

**CAS 1116121-81-3** **AMC-009**



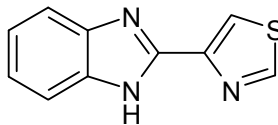
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**CAS 1116121-80-2** **AMC-010**



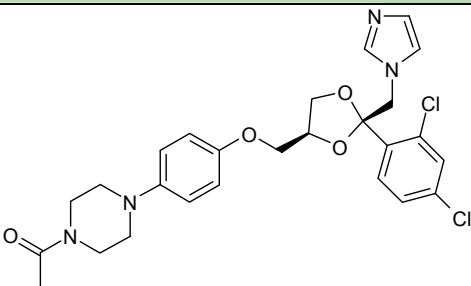
1 mg 95 €    5 mg 140 €    10 mg 220 €

**Thiabendazole** **AMC-011**



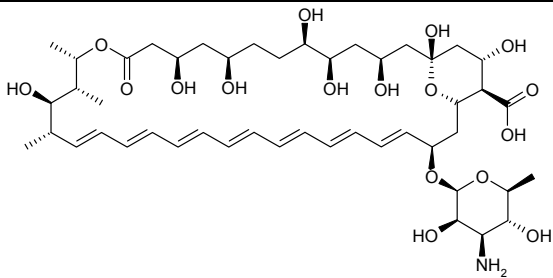
1 g 95 €

**Ketoconazole** **AMC-013**



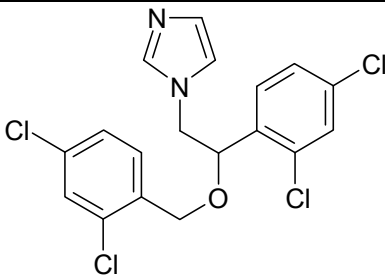
20 mg 95 €    50 mg 140 €

**Amphotericin B** **AMC-014**



10 mg 95 €    20 mg 140 €

**Miconazole** **AMC-015**



20 mg 95 €    50 mg 140 €

## 5. HDAC inhibitors

Histone deacetylases (HDAC) are enzymes which play an important role in the modification of histones. They are involved in different biological pathways in the cell cycle and have been investigated intensively in recent years in epigenetics and cancer research.

The general role of HDACs is to regulate transcription through the removal of acetyl groups from lysines in histones.

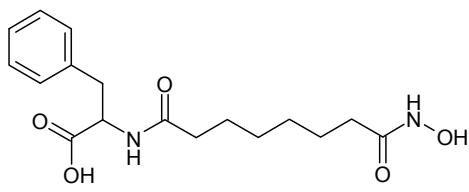
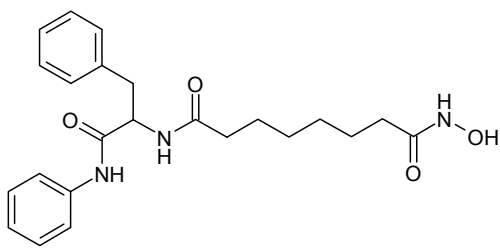
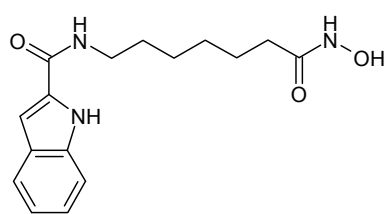
The unique function of the HDAC inhibitors is to modulate the expression of multiple genes and pathways. By modulating genes associated with cellular apoptosis and cell proliferation, these agents may have utility in combination cancer therapy.

HDAC inhibitors are promising therapeutic agents for cancer therapy. Clinical trials are examining the use of HDAC inhibitors as stand-alone therapeutics, or for combination therapy.

For basic research, HDAC inhibitors are versatile tools for investigation of the cell cycle and in screening assays for novel anticancer drugs.

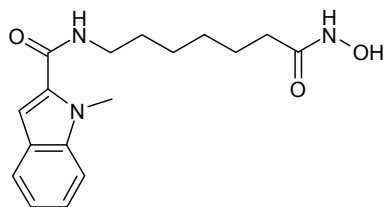
### References:

- L. Ellis, P. W. Atadja, R. W. Johnstone (2009) Mol. Cancer Ther. 8(6), 1409-1420.  
 O. Witt, H. E. Deubzer, T. Milde, I. Oehme (2008) Cancer Lett. 277, 8–21.  
 I. Hoshino, H. Matsubara (2010) Surg. Today 40, 809–815.

<b>CAS 449729-12-8</b>		<b>HDI-001</b>
		
1 mg	95 €	5 mg 140 € 10 mg 220 €
<b>CAS 449729-03-7</b>		<b>HDI-002</b>
		
1 mg	95 €	5 mg 140 € 10 mg 220 €
<b>CAS 593252-26-7</b>		<b>HDI-004</b>
		
1 mg	95 €	5 mg 140 € 10 mg 220 €

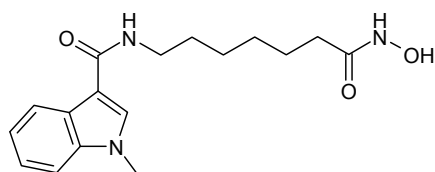


**CAS 593252-20-1** **HDI-005**



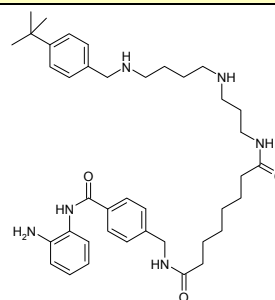
1 mg 95 €    5 mg 140 €    10 mg 220 €

**CAS 593252-21-2** **HDI-006**



1 mg 95 €    5 mg 140 €    10 mg 220 €

**CAS 1020675-37-9** **HDI-007**



1 mg 95 €    5 mg 140 €    10 mg 220 €

## 6. DPP-4 inhibitors

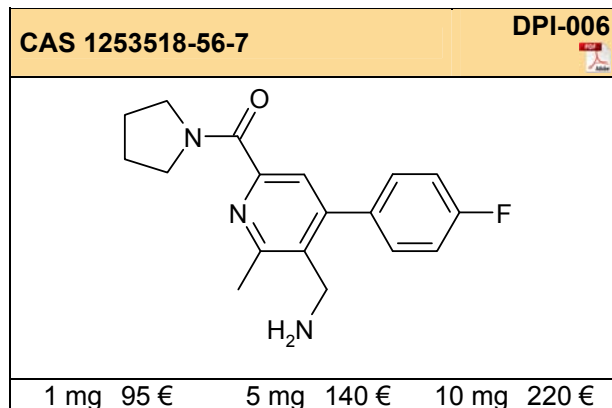
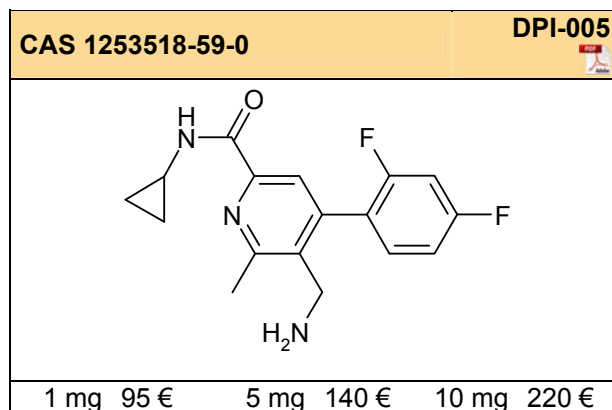
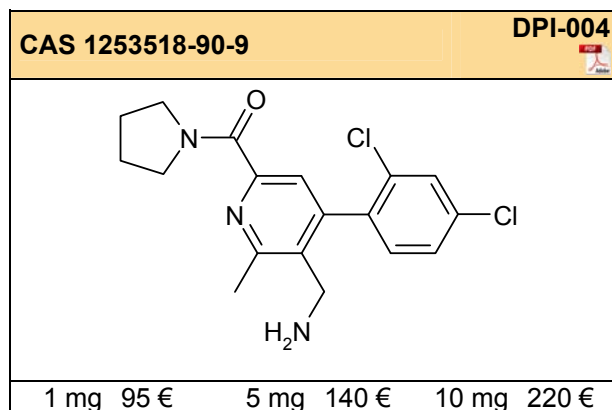
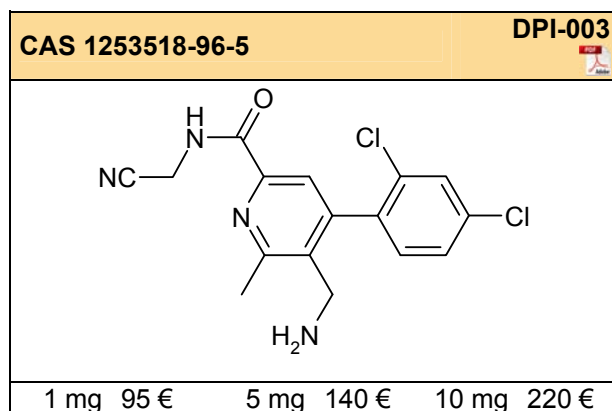
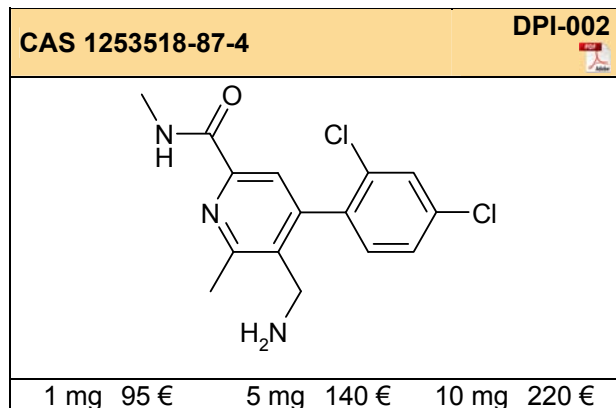
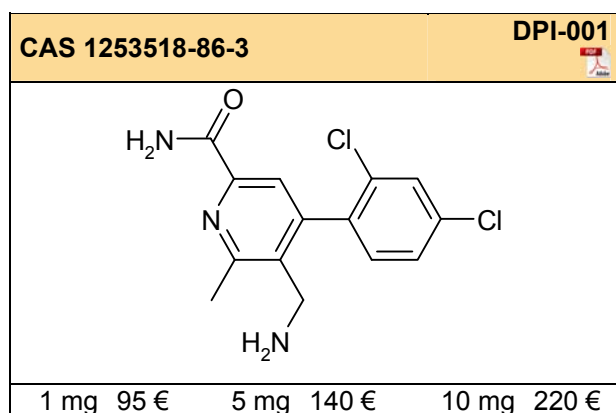
Dipeptidyl peptidase-4 (DPP-4) plays a major role in glucose metabolism. Inhibition of the DPP-4 enzyme prolongs and enhances the activity of incretins that play an important role in insulin secretion and blood glucose regulation.

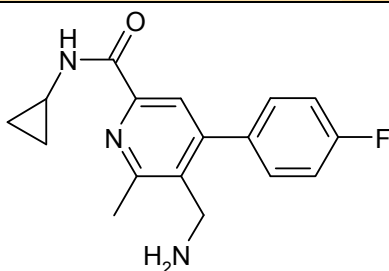
DPP-4 is a target for the treatment of type 2 diabetes, a rapidly emerging chronic metabolic disease. Some DPP-4 inhibitors have entered the market in the recent years showing the importance of this field of antidiabetic medication.

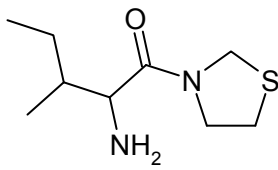
Selective inhibition of DPP-4 is required for an acceptable safety and tolerability profile. EMC DPP-4 inhibitors DPI-001 – DPI-003 show a very high selectivity against DPP-4 in comparison to DPP-8.

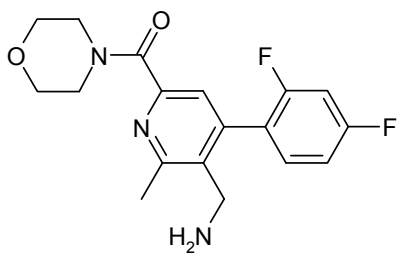
### References:

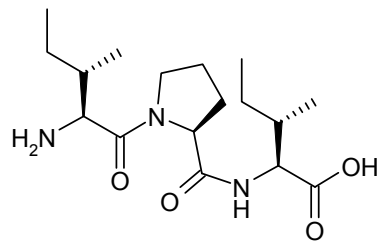
A.-P. Schaffner, K. Kaczanowska, D. Baechele (2011) Eur. Pat. Appl. EP 2308847 A1 20110413.  
K. Kaczanowska, K.-H. Wiesmüller, A.-P. Schaffner (2010) ACS Med. Chem. Lett. 1(9), 530-535.

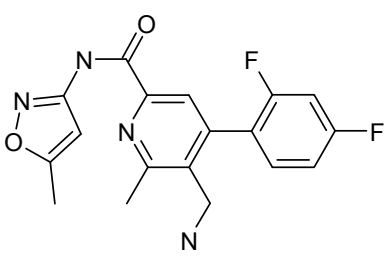


<b>CAS 1253518-55-6</b>	<b>DPI-007</b>
	
1 mg 95 €	5 mg 140 € 10 mg 220 €

<b>CAS 136259-20-6</b>	<b>DPI-010</b>
	
1 mg 95 €	5 mg 140 € 10 mg 220 €

<b>CAS 1253518-62-5</b>	<b>DPI-008</b>
	
1 mg 95 €	5 mg 140 € 10 mg 220 €

<b>Diprotin A</b>	<b>DPI-011</b>
	
1 mg 95 €	5 mg 140 € 10 mg 220 €

<b>CAS 1253518-63-6</b>	<b>DPI-009</b>
	
1 mg 95 €	5 mg 140 € 10 mg 220 €

## 8. Abbreviations

Code	Residue of
Abu	2-aminobutyric acid
Ac	acetic acid
Aca	$\epsilon$ -aminocaproic acid (6-aminohexanoic acid)
AMC	antimicrobial compound
AMP	antimicrobial peptide
APC	antigen presenting cell
APP	amyloid precursor protein APP
BAP	bioactive peptides
Biot	biotin
CF	5(6)-Carboxyfluorescein
DHBS	2,3-dihydroxybenzoylserine
Dhc	S-(2,3-dihydroxypropyl)-(R)-cysteine
DPP	depeptidyl peptidase
ESI-MS	electrospray mass spectrometry
FSL	fibroblast-stimulating lipopeptide
HCl	hydrochloric acid
HDAC	histone deacetylases
HDACI	HDAC inhibitor
HPLC	high-performance liquid chromatography
MAGE	melanoma-associated antigen
MALP	monocyte activating lipopeptide
MBP	myelin basic protein
MHC	major histocompatibility complex
MOG	myelin oligodendrocyte glycoprotein
NAD	nicotinamide adenine dinucleotide
NADPH	nicotinamide adenine dinucleotide phosphate
OVA	ovalbumin
Pam	palmitic acid (hexadecanoic acid)
Pam <sub>3</sub> Cys	N-Palmitoyl-S-[2,3-bis(palmitoyloxy)-(2RS)-propyl]-(R)-cysteine
Pam <sub>2</sub> Cys	S-[2,3-bis(palmitoyloxy)-(2RS)-propyl]-(R)-cysteine
PLP	myelin proteolipid protein
RP (HPLC)	reversed-phase HPLC
TFA	trifluoroacetic acid
TLR	Toll-like receptor research
Amino acids according to one-letter code; upper case: L-amino acids, lower case: D-amino acids	

## 9. General information

### 9.1 Contact information

Mail : EMC microcollections GmbH  
Sindelfinger Str. 3  
D-72070 Tübingen  
Germany

Phone: + 49-70 71-40 74-0

Fax: + 49-70 71-40 74-22

Email: [sales@microcollections.de](mailto:sales@microcollections.de)

Web: [www.microcollections.de](http://www.microcollections.de)

### 9.2 Order information

We deliver directly to our customers all over the world. We will be glad to accept your purchase order or inquiry by

- e-mail
- on-line
- fax
- traditional mail
- phone

To place an order, the following information is needed:

- Institution or company name
- Contact name
- Email address
- Shipping address
- Billing address
- Purchase order number (if available)
- FedEx account number (if available)
- VAT number (for EU customers)
- Product name and catalogue number
- Size, quantity and price of the product
- Credit card information (if desired)

A standard order form is provided on the next page of this catalogue and is also available for [downloading](#) on our homepage.

### 9.3 Pricing and quotations

All prices are in Euro, exclusive VAT and delivery costs, and are subject to change without notice.

Prices do not include shipping and handling charges, shipping insurance, any fees, duties or taxes.

### 9.4 Payment options

Payments are to be made in Euro.

For customer convenience EMC will accept payment by check, bank transfer, Visa, MasterCard, or JCB.



All payments are due within 20 days of the invoice date.

For credit card payment we can only accept orders by fax or traditional mail.

### 9.5 Shipping information

Products are usually shipped by post (air mail) or parcel service. If the customer has a FedEx account, the account number should be provided with the purchase order. In this case we add handling charges of 10.00 Euro to the product invoice. If the customer does not provide a FedEx account number, shipping costs will be added to the product invoice. The shipping costs depend on the destination.

### 9.6 Delivery times

Products in stock:

Shipment usually takes place within 1 to 2 working days after receiving a purchase order with all the needed information.

Non-stock products:

In response to a request for a product not in stock, the customer will be informed of the expected day of shipment.

## EMC FACSIMILE ORDER FORM

Please print and complete this order form and send via facsimile to EMC microcollections GmbH, Germany

**+49-7071 - 40 74 22**

Name			
Company/Institution name			
Shipping address			
Billing address			
E-mail address			
Purchase order number			
FedEx account number			
VAT number*		Date	

\*EU customers must indicate their VAT number. VAT is not payable outside the EU.

Product code	Product description	Size	Qty	Price ex. VAT#	Total

# Shipping/Handling charges will be added to your invoice. They are calculated based on the destination country of your order.

Name of card holder	
Credit card number	
Expiry date	
Card verification number**	
Signature	

\*\*the last three digits of the card number printed in the signature stripe

## 10. Catalogue number index

Product code	Description	Unit [mg]	Price [EUR] excl. VAT
<b>Tools for Toll-like receptor research, adjuvants</b>			
L2000	Pam <sub>3</sub> Cys-SK <sub>4</sub>	1	120
		2	175
		5	350
L2000s	Pam <sub>3</sub> Cys-SK <sub>4</sub> sterilised by β-irradiation	1	180
L2001	Dhc-SK <sub>4</sub>	1	150
L2002	SK <sub>4</sub>	1	150
L2003	Dhc-GDPKHPKSF	1	180
L2004	GDPKHPKSF	1	180
L2010	Pam-Dhc-SK <sub>4</sub>	1	150
L2011	PamCSK <sub>4</sub>	1	150
L2012	Pam-Dhc-GDPKHPKSF	1	265
L2013	PamCGDPKHPKSF	1	265
L2020	Pam <sub>2</sub> Cys-SK <sub>4</sub>	0.1	95
		1	265
L20201	<i>R</i> -Pam <sub>2</sub> Cys-SK <sub>4</sub> ( <i>RR</i> )	0.1	180
		5 x 0.1	540
L20202	<i>S</i> -Pam <sub>2</sub> Cys-SK <sub>4</sub> ( <i>RS</i> )	0.1	180
		5 x 0.1	540
L2021	PamCys(Pam)-SK <sub>4</sub>	0.1	180
		5 x 0.1	540
L20213	Pam <sub>2</sub> Cys-SK <sub>4</sub> (Biotin-Aca-Aca)	0.1	180
		5 x 0.1	540
L20214	Pam <sub>2</sub> Cys-SK <sub>4</sub> (Fluorescein-Aca-Aca)	0.1	180
		5 x 0.1	540
L20215	Pam <sub>2</sub> Cys-SK <sub>4</sub> (Rhodamine-Aca-Aca)	0.1	180
		5 x 0.1	540
L20229	Pam <sub>2</sub> Cys-SK <sub>4</sub> -FLAG-tag	0.1	180
		5 x 0.1	540
L2031	Pam <sub>3</sub> Cys-SK <sub>4</sub> (Biotin-Aca-Aca)	0.1	180
		5 x 0.1	540
L2032	PHC-SK <sub>4</sub>	1	150
L2034	Pam <sub>3</sub> Cys-SK <sub>4</sub> (Fluorescein-Aca-Aca)	0.1	180
		5 x 0.1	540
L2035	Pam <sub>3</sub> Cys-SK <sub>4</sub> (Rhodamine-Aca-Aca)	0.1	180
		5 x 0.1	540
L2048	<i>R</i> -Pam <sub>3</sub> Cys-SK <sub>4</sub>	0.1	180
		5 x 0.1	540
L2049	<i>S</i> -Pam <sub>3</sub> Cys-SK <sub>4</sub>	0.1	180
		5 x 0.1	540
L2064	Pam <sub>3</sub> Cys-SK <sub>4</sub> -FLAG-tag	0.1	180
		5 x 0.1	540
L2070	Lipobiotin	1	180
		10	750
L4000	Lipopeptide Adjuvant	1.5	150
L6050	MALP-2-DI	5 x 1.5	490
		0.1	300
L6060	R-MALP-2-DI	0.1	400

Product code	Description	Unit [mg]	Price [EUR] excl. VAT
L7000	FSL-1	1	375
L7021	S-FSL-1	0.1 5 x 0.1	180 540
L7022	R-FSL-1	0.1 5 x 0.1	180 540
L7030	FSL-1-Biotin	0.1 5 x 0.1	180 540
L7031	FSL-1-Fluorescein	0.1 5 x 0.1	180 540
L7032	FSL-1-Rhodamine	0.1 5 x 0.1	180 540
L7040	FSL-1-FLAG-tag	0.1 5 x 0.1	180 540
IMI-001	Imiquimod	5	140
GMDP	GMDP, N-acetyl-D-glucosaminy-( $\beta$ 1,4)-N-acetylmuramyl-L-alanyl-D-isoglutamine	1	250
P1014	CD14 (81-100)	1	320
<b>Synthetic lipopeptides derived from bacterial lipoproteins (further are available on request)</b>			
bLP001	Pam <sub>3</sub> Cys-SSNAKIDQLSSDVQT from <i>E.coli</i> major outer membrane lipoprotein	1	395
bLP002	Pam <sub>3</sub> Cys-SSNKSTTGSGETTTA from <i>Mycobacterium tuberculosis</i> 19 kDa lipoprotein antigen	1	395
bLP003	Pam <sub>3</sub> Cys-SSGNKSAPSSSASSS from <i>Mycobacterium avium</i> 19 kDa lipoprotein antigen	1	395
bLP BB OspA	Pam <sub>3</sub> Cys-KQNVSSLDEKNSVSV from <i>Borrelia burgdorferi</i> OspA	1	395
bLP BB OspC	Pam <sub>3</sub> Cys-NNSGKDGNTSANSAD from <i>Borrelia burgdorferi</i> OspC	1	395
bLP BH 3	Pam <sub>3</sub> Cys-NNGGPELKSDEVAKS from <i>Borrelia hermsii</i> outer membrane lipoprotein 3	1	395
bLP HI P4	Pam <sub>3</sub> Cys-GSHQMKSEGHANMQL from <i>Haemophilus influenzae</i> outer membrane protein P4	1	395
bLP HI P6	Pam <sub>3</sub> Cys-SSSNDAAGNGAAQT from <i>Haemophilus influenzae</i> outer membrane protein P6	1	395
bLP MPT83	Pam <sub>3</sub> Cys-SSTKPVSQDTSPKPA from <i>Mycobacterium tuberculosis</i> : cell surface lipoprotein MPT83	1	395
bLP MT P27	Pam <sub>3</sub> Cys-SSGSKPSGGPLPDAK from <i>Mycobacterium tuberculosis</i> lipoprotein lprG (27 kDa lipoprotein)	1	395
bLP NG H.8	Pam <sub>3</sub> Cys-SQEPAAAPAAATPAG from <i>Neisseria gonorrhoeae</i> H.8 outer membrane protein	1	395
bLP SP amiA	Pam <sub>3</sub> Cys-SSSKSSDSSAPKAYG from <i>Streptococcus pneumoniae</i> oligopeptide-binding protein amiA	1	395
L8020	Pam <sub>3</sub> Cys-AQEKEAKSELDYDQTKKM from <i>Bacillus cereus</i> spore germination protein D GerD	1	395
<b>Bioactive Peptides (further bioactive peptides are available on request)</b>			
BAP-012	Amyloid- $\beta$ (1-40) human: DAEFRHDSGYEVHHQKLVFFAEDVGSNKGAIIGLMVGGVV	$\geq 95\%$ 1 5	145 645
BAP-013	Amyloid- $\beta$ (1-40) human HCl salt: DAEFRHDSGYEVHHQKLVFFAEDVGSNKGAIIGLMVGGVV	$\geq 95\%$ 1 5	240 950



Product code	Description	Unit [mg]	Price [EUR] excl. VAT
BAP-014	Amyloid- $\beta$ (1-40) rat: DAEFGHDSGFVRRHQKLVFFAEDVGSNKGAIIGLMVGGVV	$\geq 95\%$ 1	145
		5	645
BAP-015	Amyloid- $\beta$ (1-40) rat HCl salt: DAEFGHDSGFVRRHQKLVFFAEDVGSNKGAIIGLMVGGVV	$\geq 95\%$ 1	240
		5	950
BAP-016	A $\eta$ 46-peptide	$\geq 95\%$ 1	240
		5	950
BAP-022	Control peptide amyloid- $\beta$ (40-1) human: VVGGMVLLGIAGKNSGVDEAFFVLKQHHVEYGSDFRFEAD	$\geq 95\%$ 1	145
		5	645
BAP-023	Control peptide amyloid- $\beta$ (40-1) rat: VVGGMVLLGIAGKNSGVDEAFFVLKQHRVEFGSDHGFEAD	$\geq 95\%$ 1	145
		5	645
BAP-031	Biotinylated amyloid- $\beta$ (1-40) human: Biotin-Aca-Aca- DAEFRHDSGYEVHHQKLVFFAEDVGSNKGAIIGLMVGGVV	$\geq 95\%$ 1	285
		5	1150
BAP-032	Biotinylated amyloid- $\beta$ (1-40) human: Biotin-Aca-Aca- DAEFGHDSGFVRRHQKLVFFAEDVGSNKGAIIGLMVGGVV	$\geq 95\%$ 1	285
		5	1150
BAP-041	KLVFF	$\geq 70\%$ 5	95
		$\geq 95\%$ 1	95
		5	125
BAP-042	Ac-KLVFF-NH <sub>2</sub>	$\geq 70\%$ 5	95
		$\geq 95\%$ 1	95
		5	125
BAP-043	RIIGL	$\geq 70\%$ 5	95
		$\geq 95\%$ 1	95
		5	125
BAP-044	DWGKGGRWRLWPGASGKTEA	$\geq 70\%$ 5	125
		$\geq 95\%$ 1	95
		5	285
BAP-045	PGRSPFTGKKLFNQEFSDQ	$\geq 70\%$ 5	125
		$\geq 95\%$ 1	95
		5	285
BAP-046	qshyrhispaqv (D-amino acids)	$\geq 95\%$ 1	125
		5	375
BAP-047	FYLKVSSLHHHHGRDKLVFFHHHH	$\geq 70\%$ 5	125
		$\geq 95\%$ 1	125
		5	375
BAP-048	NYSKMIFSHHHH	$\geq 70\%$ 5	95
		$\geq 95\%$ 1	95
		5	285
BAP-049	HNHKLVFFHHQH	$\geq 70\%$ 5	95
		$\geq 95\%$ 1	95
		5	285
BAP-101	MOG (35-55) rat/mouse: MEVGWYRSPFSRVVHLYRNGK	$\geq 70\%$ 5	135
		$\geq 95\%$ 1	95
		5	280

Product code	Description	Unit [mg]	Price [EUR] excl. VAT
BAP-102	MOG (35-55) human: MEVGWYRPPFSRVVHLYRNGK	≥ 70% 5	135
		≥ 95% 1	95
		5	280
BAP-103	MOG (92-106): DEGGYTCFFRDHSYQ	≥ 70% 5	125
		≥ 95% 1	125
		5	280
BAP-104	MOG (97-108): TCFFRDHSYQEE	≥ 70% 5	125
		≥ 95% 1	95
		5	280
BAP-106	MOG (183-191): FVIVPVLGP	≥ 70% 5	125
		≥ 95% 1	95
		5	280
BAP-107	MOG (91-108): SDEGGYTCFFRDHSYQEE	≥ 70% 5	125
		≥ 95% 1	95
		5	280
BAP-110	MBP (1-11) human: Ac-ASQKRPSQRHG	≥ 70% 5	125
		≥ 95% 1	95
		5	280
BAP-111	MBP (54-72) human: SHHAARTTHYGSLPQKSQR	≥ 70% 5	125
		≥ 95% 1	95
		5	280
BAP-120	PLP (139-151): HCLGKWLGHDPDKF	≥ 70% 5	125
		≥ 95% 1	95
		5	280
BAP-121	PLP (178-191): NTWTTCSIAFPSK	≥ 70% 5	125
		≥ 95% 1	95
		5	280
BAP-201	Ova (257-264): SIINFEKL	≥ 70% 5	95
		≥ 95% 5	145
BAP-202	Influenza A NP (366 – 374): ASNENMETM	≥ 70% 5	95
		≥ 95% 5	195
BAP-203	Influenza A matrix protein (58-66): GILGFVFTL	≥ 70% 5	125
		≥ 95% 1	125
		5	195
BAP-204	HIV-1 p17 Gag (77-85): SLYNTVATL	≥ 70% 5	95
		≥ 95% 1	95
		5	145
BAP-205	HCV-NS5b: ALYDVVSKL	≥ 70% 5	95
		≥ 95% 1	95
		5	145
BAP-206	LCMV GP (33-41): KAVYNFATM	≥ 70% 5	95
		≥ 95% 5	145
BAP-208	MAGE-3 antigen (271-279): FLWGPRALV	≥ 70% 5	95
		≥ 95% 5	145
BAP-209	Melan-A / MART-1 (26-35): EAAGIGILTV	≥ 70% 5	95
		≥ 95% 5	195
BAP-250	Ova (323-339): ISQAVHAAHAEINEAGR	≥ 70% 5	95
		≥ 95% 1	95
		5	145

Product code	Description	Unit [mg]	Price [EUR] excl. VAT
BAP-251	PADRE: AKFVAAWTLKAAA	≥ 70% 5	125
		≥ 95% 1	125
		5	195
BAP-253	LCMV GP (64-80): GPDIYKGVYQFKSVEFD	≥ 70% 5	125
		≥ 95% 1	125
		5	195
BAP-301	Arg <sub>9</sub> : RRRRRRRRRR	≥ 70% 5	95
		≥ 95% 1	95
		5	145
BAP-301a	Arg <sub>9</sub> : RRRRRRRRRR-NH <sub>2</sub>	≥ 70% 5	95
		≥ 95% 1	95
		5	145
BAP-302	D-Arg <sub>9</sub> (r <sub>9</sub> ): rrrrrrrrr	≥ 70% 5	180
		≥ 95% 1	180
		5	280
BAP-303	TAT (47-57): YGRKKRRQRRR-NH <sub>2</sub>	≥ 70% 5	95
		≥ 95% 1	95
		5	145
BAP-304	D-TAT (47-57): ygrkkrrqrrr-NH <sub>2</sub>	≥ 70% 5	180
		≥ 95% 1	180
		5	280
BAP-305	TAT (48-60): GRKKRRQRRRPPQ	≥ 70% 5	95
		≥ 95% 1	95
		5	145
BAP-306	Antennapedia (43-58) (penetratin): RQIKIWFQNRRMKWKK	≥ 70% 5	95
		≥ 95% 1	95
		5	145
BAP-307	CyLoP-1: CRWRWKCKCK	≥ 70% 5	95
		≥ 95% 1	95
		5	145
BAP-308	Transportan 10 (TP10) AGYLLGKINLKALAALAKKIL	≥ 70% 5	145
		≥ 95% 1	95
		5	260
BAP-309	MAP (KLAL) KLALKLALKALKAAALKLA	≥ 70% 5	120
		≥ 95% 1	95
		5	240
BAP-310	EB1 LIRLWSHLIHIWFQNRRLKWKKK	≥ 70% 5	145
		≥ 95% 1	95
		5	260
BAP-311	hLF KCFQWQRNMRKVRGPPVSCIQR-NH <sub>2</sub>	≥ 70% 5	120
		≥ 95% 1	95
		5	260
BAP-312	Pep1 KETWWETWWTEWSQPKRKVK	≥ 70% 5	145
		≥ 95% 1	95
		5	260
BAP-301-CF	CF-Arg <sub>9</sub> : 5(6)-CF-RRRRRRRRRR	≥ 95% 1	250
BAP-301-Cy5	Cy5-Arg <sub>9</sub> : Cy5-RRRRRRRRRR	≥ 95% 1	350
BAP-301a-CF	CF-Arg <sub>9</sub> : 5(6)-CF-RRRRRRRRRR-NH <sub>2</sub>	≥ 95% 1	250
BAP-301a-Cy5	Cy5-Arg <sub>9</sub> : Cy5-RRRRRRRRRR-NH <sub>2</sub>	≥ 95% 1	350

Product code	Description	Unit [mg]	Price [EUR] excl. VAT
BAP-303-CF	CF-TAT (47-57): 5(6)-CF-YGRKKRRQRRR-NH <sub>2</sub>	≥ 95% 1	250
BAP-303-Cy5	Cy5-TAT (47-57): Cy5-YGRKKRRQRRR-NH <sub>2</sub>	≥ 95% 1	350
BAP-305-CF	CF-TAT (48-60): 5(6)-CF-GRKKRRQRRRPPQ	≥ 95% 1	250
BAP-305-Cy5	Cy5-TAT (48-60): Cy5-GRKKRRQRRRPPQ	≥ 95% 1	350
BAP-306-CF	CF-Antennapedia (43-58) (CF-penetratin): 5(6)-CF-RQIKIWFQNRMMKWKK	≥ 95% 1	250
BAP-306-Cy5	Cy5-Antennapedia (43-58) (Cy5-penetratin): Cy5-RQIKIWFQNRMMKWKK	≥ 95% 1	350
BAP-307-CF	CF-CyLoP-1: 5(6)-CF-CRWRWKCKK	≥ 95% 1	250
BAP-307-Cy5	Cy5-CyLoP-1: Cy5-CRWRWKCKK	≥ 95% 1	350
BAP-308-CF	CF-Transportan 10 (TP10) 5(6)-CF-AGYLLGKINLKALAALAKKIL	≥ 95% 1	250
BAP-308-Cy5	Cy5-Transportan 10 (TP10) Cy5-AGYLLGKINLKALAALAKKIL	≥ 95% 1	350
BAP-309-CF	CF-MAP (CF-KLAL) 5(6)-CF-KLALKLALKALKALKLA	≥ 95% 1	250
BAP-309-Cy5	Cy5-MAP (Cy5-KLAL) Cy5-KLALKLALKALKALKLA	≥ 95% 1	350
BAP-310-CF	CF-EB1 5(6)-CF-LIRLWSHLIHIWFQNRRLKWKKK	≥ 95% 1	250
BAP-310-Cy5	Cy5-EB1 Cy5-LIRLWSHLIHIWFQNRRLKWKKK	≥ 95% 1	350
BAP-311-CF	CF-hLF 5(6)-CF-KCFQWQRNMRKVRGPPVSCIQR-NH <sub>2</sub>	≥ 95% 1	250
BAP-311-Cy5	Cy5-hLF Cy5-KCFQWQRNMRKVRGPPVSCIQR-NH <sub>2</sub>	≥ 95% 1	350
BAP-312-CF	CF-Pep1 5(6)-CF-KETWWETWWTEWSQPKKRKV	≥ 95% 5	250
BAP-312-Cy5	Cy5-Pep1 Cy5-KETWWETWWTEWSQPKKRKV	≥ 95% 5	350

### Microbial and anti-microbial peptides (AMPs, MPs)

AMP-001	α-Defensin 5 human: ATCYCRHGRCATRESLSGVCEISGRLYRLCCR Disulfide bridges : 3 – 31, 5 – 20, 10 – 30	≥ 95% 0, 1	140 600
AMP-010	Histatin 5: DSHAKRHHGYKRKFHEKHHSHRGY	≥ 70% 5 ≥ 95% 1 5	145 145 435
AMP-020	Indolicidin: ILPWKWPWWPWRR-NH <sub>2</sub>	≥ 70% 5 ≥ 95% 1 5	145 145 435
AMP-030	LL-37 human: LLGDFFRKSKEKIGKEFKRIVQRIKDFLRNLVPRTES	≥ 70% 5 ≥ 95% 1 5	185 185 555
AMP-040	Magainin-1: GIGKFLHSAGKFGKAFVGEIMKS	≥ 70% 5 ≥ 95% 1 5	145 145 435
AMP-050	Pep27: MRKEFHNVLSSGQLLADKRPARDYNRK	≥ 70% 5 ≥ 95% 1 5	145 145 435
AMP-055	Dermcidin DCD-1L SSLLEKGLDGAKKAVGGLGKLGKDAVEDLESVGKGAHVHDVKD VLDSVL	≥ 95% 1 5	290 865
AMP-056	Dermcidin DCD-1 SSLLEKGLDGAKKAVGGLGKLGKDAVEDLESVGKGAHVHDVKD VLDSV	≥ 95% 1 5	290 865

Product code	Description	Unit [mg]	Price [EUR] excl. VAT
AMP-057	Dermcidin SSL25 SSLLEKGLDGAKKAVGGLGKLGKDA	≥ 95% 1	145
		5	435
AMP-060	Alamethicin F30: Ac-Aib-Pro-Aib-Ala-Aib-Ala-Gln-Aib-Val-Aib-Gly-Leu-Aib-Pro-Val-Aib-Aib-Glu-Gln-Pheol (Pheol = Phenylalaninol)	≥ 70% 1	95
		5	145
		≥ 95% 1	95
		5	250
AMP-061	Alamethicin F50: Ac-Aib-Pro-Aib-Ala-Aib-Ala-Gln-Aib-Val-Aib-Gly-Leu-Aib-Pro-Val-Aib-Aib-Gln-Gln-Pheol (Pheol = Phenylalaninol)	≥ 70% 1	95
		5	145
		≥ 95% 1	95
		5	250
AMP-065	Omphalotin A: c[Trp-MeVal-Ile-MeVal-MeVal-Sar-MeVal-Melle-Sar-Val-Melle-Sar]	≥ 70% 1	150
		5	450
		≥ 95% 1	210
		5	630
AMP-070	Gallidermin	≥ 85% 1	95
		5	195
AMP-075	Nonactin	≥ 85% 1	95
		5	155
AMP-090	Actagardin	≥ 85% 1	225
		5	790
MP-010	Pheromone Peptide	≥ 95% <sup>0.5</sup>	550
		1	980
<b>Anti-microbial compounds (AMCs)</b>			
AMC-001	(S)-2-(1-Aminoisobutyl)-1-(3-chlorobenzyl) benzimidazole CAS 1240099-07-3	1	95
		5	140
		10	220
AMC-002	(S)-2-(1-Amino-3-isopentyl)-1-(4-chlorobenzyl) benzimidazole CAS 1116121-82-4	1	95
		5	140
		10	220
AMC-003	(S)-2-(1-Aminoisobutyl)-1-(3-fluorobenzyl) benzimidazole CAS 1332482-87-7	1	95
		5	140
		10	220
AMC-004	(S)-2-(1-Aminoethyl)-1-(3-fluorobenzyl) benzimidazole CAS 1116121-84-6	1	95
		5	140
		10	220
AMC-005	(S)-2-(1-Aminoethyl)-1-(3-fluorobenzyl) benzimidazole CAS 1332482-88-8	1	95
		5	140
		10	220
AMC-006	(S)-2-(1-Aminoisobutyl)-1-(3-methylbenzyl) benzimidazole CAS 1332482-86-6	1	95
		5	140
		10	220
AMC-007	(S)-2-(1-Aminoethyl)-1-(3-fluorobenzyl) benzimidazole CAS 1116121-83-5	1	95
		5	140
		10	220
AMC-008	(S)-2-(1-Amino-1-methylethyl)-1-(4-chlorobenzyl) benzimidazole CAS 1116121-85-7	1	95
		5	140
		10	220

Product code	Description	Unit [mg]	Price [EUR] excl. VAT
AMC-009	(S)-2-(1-Amino-2-methyl-butyl)-1-(4-chlorobenzyl) benzimidazole CAS 1116121-81-3	1	95
		5	140
		10	220
AMC-010	(S)-2-(1-Amino-2-methyl-butyl)-1-(3-chlorobenzyl) benzimidazole CAS 1116121-80-2	1	95
		5	140
		10	220
AMC-011	Thiabendazole CAS 148-79-8	1000	95
AMC-012	Fluconazole CAS 86386-73-4	20	95
		50	140
AMC-013	Ketoconazole CAS 65277-42-1	20	95
		50	140
AMC-014	Amphotericin B CAS 1397-89-3	10	95
		20	140
AMC-015	Miconazole CAS 22916-47-8	20	95
		50	140
<b>HDAC inhibitors</b>			
HDI-001	2-(7-Hydroxycarbamoyl-heptanoylamino)-3-phenyl-propionic acid CAS 449729-12-8	1	95
		5	140
		10	220
HDI-002	2-(7-Hydroxycarbamoyl-heptanoylamino)-3-phenyl-propionic acid phenylamide CAS 449729-03-7	1	95
		5	140
		10	220
HDI-004	1H-Indole-2-carboxylic acid (6-hydroxycarbamoyl-hexyl)-amide CAS 593252-26-7	1	95
		5	140
		10	220
HDI-005	1-Methyl-1H-indole-2-carboxylic acid (6-hydroxycarbamoyl-hexyl)-amide CAS 593252-20-1	1	95
		5	140
		10	220
HDI-006	1-Methyl-1H-indole-3-carboxylic acid (6-hydroxycarbamoyl-hexyl)-amide CAS 593252-21-2	1	95
		5	140
		10	220
HDI-007	Octanedioic acid 4-(2-amino-phenylcarbamoyl)-benzylamide {3-[4-(4-tert-butyl-benzylamino)-butylamino]-propyl}-amide CAS 1020675-37-9	1	95
		5	140
		10	220
<b>DPP-4 inhibitors</b>			
DPI-001	5-Aminomethyl-4-(2,4-dichloro-phenyl)-6-methyl-pyridine-2-carboxylic acid amide CAS 1253518-86-3	1	95
		5	140
		10	220
DPI-002	5-Aminomethyl-4-(2,4-dichloro-phenyl)-6-methyl-pyridine-2-carboxylic acid methylamide CAS 1253518-87-4	1	95
		5	140
		10	220

Product code	Description	Unit [mg]	Price [EUR] excl. VAT
DPI-003	5-Aminomethyl-4-(2,4-dichloro-phenyl)-6-methyl-pyridine-2-carboxylic acid cyanomethylamide CAS 1253518-96-5	1	95
		5	140
		10	220
DPI-004	[5-Aminomethyl-4-(2,4-dichloro-phenyl)-6-methyl-pyridin-2-yl]-pyrrolidin-1-yl-methanone 1253518-90-9	1	95
		5	140
		10	220
DPI-005	5-Aminomethyl-4-(2,4-difluoro-phenyl)-6-methyl-pyridine-2-carboxylic acid cyclopropylamide CAS 1253518-59-0	1	95
		5	140
		10	220
DPI-006	[5-Aminomethyl-4-(4-fluoro-phenyl)-6-methyl-pyridin-2-yl]-pyrrolidin-1-yl-methanone CAS 1253518-56-7	1	95
		5	140
		10	220
DPI-007	5-Aminomethyl-4-(4-fluoro-phenyl)-6-methyl-pyridine-2-carboxylic acid cyclopropylamide CAS 1253518-55-6	1	95
		5	140
		10	220
DPI-008	[5-Aminomethyl-4-(2,4-difluoro-phenyl)-6-methyl-pyridin-2-yl]-morpholin-4-yl-methanone CAS 1253518-62-5	1	95
		5	140
		10	220
DPI-009	5-Aminomethyl-4-(2,4-difluoro-phenyl)-6-methyl-pyridine-2-carboxylic acid (5-methyl-isoxazol-3-yl)-amide CAS 1253518-63-6	1	95
		5	140
		10	220
DPI-010	2-Amino-3-methyl-1-thiazolidin-3-yl-pentan-1-one CAS 136259-20-6	1	95
		5	140
		10	220
DPI-011	Diprotin A CAS 90614-48-5	1	95
		5	140
		10	220

## 11. General terms and conditions

The following terms and conditions shall exclusively apply to all sales and shall be an integral part of each single agreement concluded between the parties. Verbal agreements are only valid if confirmed in writing. By placing an order the Buyer acknowledges our terms and conditions. Other conditions require our previous consent in writing.

### Offers and orders

Our offers are subject to change without prior notice with respect to price, quantity, delivery time and availability. The Buyer's orders shall become binding for EMC upon receipt by the Buyers of EMC's written order acknowledgment (or invoice or delivery note).

Statements and any details in advertising materials shall not constitute any kind of warranty.

Any information, statements or representations, written or oral, by EMC's employees, agents or representatives are not binding unless confirmed in writing on our business paper signed by a duly authorized officer. EMC reserves the right to insist on a written order and/or references from the Buyer before proceeding the order. There is no minimum order value.

### Prices

All prices of this price list are net prices in Euro (EUR / €) except if otherwise indicated. Our prices are exclusive of VAT. Goods are charged with the prices valid on the date of delivery. Payment in other currency requires a written quotation in the foreign currency.

Any tax, duty or charge imposed by governmental authority or otherwise and any other applicable taxes, duties or charges shall be charged to the Buyer's account.

Freight and packing charges will be added, they can be invoiced as a lump-sum charge.

### Delivery / transfer of perils

Unless otherwise agreed by the Buyer and EMC, the price shall be for delivery ex factory, packing excluded.

From the time of delivery the goods shall be at the risk of the Buyer. We are not liable for damage or loss during transportation. Except when explicitly specified by the Buyer we will decide on the appropriate type of transportation. If the type of transportation is specified, the Buyer has to bear any additional costs. The same shall apply in the case of raised transportation costs, additional expenses incurred by deviation, storage, etc. unless freight free delivery was explicitly agreed upon, after signing the agreement but before delivery.

### Date of delivery / force majeure

EMC intends to ship the goods within 7 working days from receipt of order, if possible within 28 days. There shall be no fixed period of delivery. Notwithstanding the preceding paragraph, if a fixed period for delivery has been agreed upon, and should EMC default with the supply, the Buyer shall grant EMC a reasonable respite, normally four weeks. If EMC is unable to meet Buyers written delivery conditions, or a 28 day delivery, EMC will inform the Buyer at the earliest opportunity. Delivery shall be subject to punctual delivery of the appropriate goods by EMC's own suppliers. The day of delivery shall be the day on which the goods leave EMC's plant or, if that day cannot be ascertained, the day on which the goods are put at the Buyer's disposal.

Force Majeure and unforeseeable hindrances of any kind beyond the control of EMC (e.g. shortage of raw materials and supplies, Force Majeure) shall relieve the party from its obligation to supply as long as and to the extent that the hindrance prevails.

If unforeseeable hindrances of any kind beyond the control of EMC occur (e.g. shortage of raw materials, force majeure) delivery period shall be extended as long as and to the extent that the hindrance prevails.

If delivery is delayed due to the above reasons the Buyer cannot claim any rights.

### Terms of payment

Terms for customers with an open account are 20 days from invoice date unless otherwise agreed in writing. Other terms of payment require our previous written consent. For unpaid invoices 20 days beyond maturity we will charge interest on arrears amounting to the usual bank rate, at least 3 % per annum exceeding the base rate of the European Central Bank. Delayed payment or irregular payments entitle us to discontinue delivery to the Buyer without any compensation. Instead of the agreed terms of payment we can ask for advance payment or security deposit, should doubts as to the solvency of a Buyer arise. In case of liquidation of the Buyer's company, or if EMC learns about an oath of manifestation or a change of ownership due to financial difficulties we reserve the right to withdraw from the contract. We reserve the right to use incoming payments for liquidation of the oldest debts, in sequence as follows: costs, interests and then debt claims. Prepayments and advance payments must be paid plus VAT.

Government/Corporate Visa, MasterCard and JCB credit card may be accepted on approved accounts for payment of the Products. Payment by credit card will only be taken when ordered by fax or mail.

### Intellectual property rights / patents

No warranty or representation is given by EMC that the Products do not infringe any letters patent, trademarks, registered designs or other industrial rights. The Buyer is liable for his infringements of copyrights and industrial or intellectual properties, especially patents and trademarks.

If products are custom-made to specification, the Buyer assumes the responsibility that the manufacture of these products does not infringe any patents or rights of a third party. The Buyer is liable for all damages and claims resulting from such infringement and hold the seller free and harmless from all claims.

The Buyer further warrants to EMC that any use of the Products in the United States of America shall not result in the Products becoming adulterated or misbranded within the meaning of the Federal Food, Drug and Cosmetic Act (or such equivalent legislation in force in the Buyer's jurisdiction) and shall not be materials which may not, under sections 404, 505 or 512 of the Act, be introduced into interstate commerce.

### Retention of title

Title of the goods shall not pass to the Buyer until he has fulfilled all liabilities arising from his business connection with EMC, which shall include settling accessory claims and claims for damages and honouring cheques and bills. In the event of non-payment, we shall have the right to re-sell the goods to a third party. EMC shall have the absolute authority to retake, sell or otherwise deal with or dispose of all or any part of the goods in which title remains vested in the seller. Until such time as the property in the goods passes to the Buyer, the Buyer shall hold the goods as the seller's fiduciary agent, and shall keep the goods properly stored, protected, and insured on his own costs.



## Damages

No claims for compensation may be lodged by the Buyer including those of a non-contractual nature – for any minor negligent breach of duty by EMC, his executive staff or other agents, unless such breach concerns damages resulting from death, injury or damage to health. However, this shall not affect the applicability of compelling statutory liability regulations.

## Notifications of defects

All goods have to be checked immediately on receipt. Damage claims are only acceptable in writing within 8 working days of receipt of all the goods. In case of legitimate claims the Buyer can only require replacement of the goods. If replacement is not possible, the Buyer has the right to choose between alternative products with same value or refund. The Buyer cannot claim further compensation. All returns must first be authorized by us in writing.

## Technical support, use and processing, properties of goods

Technical advice provided by EMC verbally, in writing or by way of trials is given in good faith but without warranty, and this shall also apply where proprietary rights of third parties are involved. EMC's technical advice shall not release the Buyer from the obligation to test the products supplied by EMC as to their suitability for the intended processes and uses. The application, use and processing of the products are beyond EMC's control and therefore entirely in the Buyer's responsibility.

Attention should be paid to the enclosed product descriptions, warnings and instruction leaflets.

Any arbitrary modification of the documents (e.g. instruction leaflets) and/or modification of the product is at your own risk.

## Safety

At the Buyer's firm, all chemicals must be handled only by competent, suitably trained persons, familiar with laboratory procedures and potential chemical hazards. The burden of safe use of the Products of EMC vests in the Buyer. The Buyer assumes all responsibility for warning his employees, and any person who might reasonably be expected to come into contact with the Products, of all risks to person and property in any way connected with the Products and for instructing them in their safe handling and use. The Buyer also assumes the responsibility for the safe disposal of all products in accordance with all applicable laws.

## Product quality, specifications and technical information

Products are sold in gross weight and are analysed in the laboratories of EMC by methods and procedures which EMC considers appropriate. In the event of any dispute concerning reported discrepancies arising from the Buyer's analytical results, determined by the Buyer's own analytical procedures, EMC reserves the right to rely on the results of own analytical methods of EMC. Certificates of Analysis or Certificates of Conformity are available at the discretion of EMC for bulk orders but not normally for pre-pack orders. EMC reserves the right to make a charge for such Certification.

Specifications may change and reasonable variation from any value listed should not form the basis of a dispute. Any supply by EMC of bespoke or custom Product for a Buyer shall be to a specification agreed by both parties in writing.

Technical information provided orally, in writing, or by electronic means by or on behalf of EMC, including any descriptions, references, illustrations or diagrams in any Catalogue or brochure, is provided for guidance purposes only and is subject to change.

## Uses, warranties and liabilities

All products of EMC microcollections GmbH are not for any commercial use or resale. They are intended solely for laboratory research and development purposes and are not to be used for any other purpose. EMC microcollections GmbH offers no warranty regarding the fitness of any Product for a particular purpose and shall not be responsible for any loss or damage whatsoever arising there from.

The Buyer acknowledges that, since the products of EMC are intended for research purposes, they may not be on the Toxic Substances Control Act 1976 ("TSCA") inventory. The Buyer warrants that it shall ensure that the Products are approved for use under the TSCA (or such other equivalent legislation in force in the Buyer's jurisdiction), if applicable. The Buyer shall be responsible for complying with any legislation or regulations governing the use of the Products and their import into the country of destination (for the avoidance of doubt to include, without limitation, the TSCA and all its amendments, all EINECS, ELINCS and NONS regulations).

If any licence or consent of any government or other authority shall be required for the acquisition, carriage or use of the products by the Buyer the Buyer shall obtain the same at its own expense and if necessary produce evidence of the same to EMC on demand. Failure to do so shall not entitle the Buyer to withhold or delay payment. Any additional expenses or charges incurred by EMC resulting from such failure shall be for the Buyer's account.

Workings and syntheses are undertaken with all due care and attention. In case(s) of claims involving negligence, liability for such claims shall be limited to the total amount paid in respect of the invoice. In particular, liability cannot be accepted for results obtained with the product(s) or for loss of profits.

## Applicable law and jurisdiction / miscellaneous clauses

All contracts are subject to the laws of the Federal Republic of Germany. In the case of a legal dispute the jurisdiction of the court in Tübingen (Germany) will be decisive and have exclusive jurisdiction. EMC shall have the right to bring a claim before a court at the Buyer's principal place of business or at his discretion before any other court being competent according to any national or international law.

Application of the Uniform Law on the International Sale of Goods and the Uniform Law on the Formation of Contracts for the International Sale of Goods and of the UN agreement on the sale of goods shall be excluded. Customary clauses shall be interpreted in accordance with the applicable Incoterms.

Even if it has been agreed that EMC pays the customs and import duties of the destination country, any increase in such duties which becomes effective between the date of the order acknowledgement and delivery of the goods shall be borne by the Buyer. All other charges, taxes and costs connected with the purchase contract shall also be borne by the Buyer.

In the event that any provision of these Terms and Conditions is invalid or becomes invalid, the remainder of the Terms and Conditions shall remain unaffected thereby. The invalid provision shall then be replaced by such provision as comes as close as possible to the economic purpose of such invalid provision, taking reasonable account of the interests of both Parties.