

Experimental report

21/09/2026

Proposal: INTER-543

Council: 4/2021

Title: Peptide insertion in liposomes

Research area:

This proposal is a new proposal

Main proposer: Alice PICCININI

Experimental team: Sylvain PREVOST

Local contacts: Sylvain PREVOST

Samples: D2O

NaCl 150 mM

d54-DMPC 1mg/mL (CAS: 78415-49-3)

Synthetic peptides 0.3 mg/mL

Instrument	Requested days	Allocated days	From	To
D11	1	1	30/05/2021	31/05/2021

Abstract:

Experimental report

20/02/2019

Proposal: inter 543

Council:

Title: Peptide insertion in liposomes

Research area: Chemistry

This proposal is a new proposal

Main proposer: Piccinini Alice

Team member: Prevost Sylvain

Local contacts: Sylvain Prevost

Samples: d54-DMPC 1mg/mL (CAS: 78415-49-3)

Synthetic peptides 0.3 mg/mL

Instrument	Allocated days	From	To
D11	1	30/05/2021	31/05/2021

Abstract:

Preliminary analyses were conducted to investigate the interaction between the N-terminal helices of Prohibitin and liposomes of different complexity.

Several insertion methods were employed and the use of 5 % by v of DMSO resulted to be the best approach. Peptide were added as subsequent additions to verify the eventual presence of a concentration threshold.



Institut Laue-Langevin - 71 avenue des
Martyrs
CS 20156, 38042 GRENOBLE Cedex 9 –
France
+ 33 (0)4 76 20 71 11

ILL Experimental Report Form

All ILL experimental reports are software-archived and accessible via the web server as PDF files and fully integrated in the EPS system. The system offers the possibility not only of completing the experimental report directly on the web, but also to view it immediately on your screen as a pdf file.

1 PRINCIPAL INVESTIGATOR <i>Alice Piccinini, UNICAM, Camerino, IT</i>
UNICAM, Via Madonna delle carceri, 62032

2 EXPERIMENT DETAILS	
Reference Number: INTER-543 Title: Peptide insertion into a liposomes Equipment/Facility Used: D11 Dates Scheduled: 30/05/26 1 day	
Date of Experimental Report:	14 September 2026

3 LIKELY OUTCOMES FROM EXPERIMENT <i>Please indicate what the experiment is likely to lead to by putting an 'x' next to one or more of the possible outcomes below.</i>	
Journal publication	X it will be submitted soon in JACS or JCIS. Part of the data was already submitted into JCIS.
Data for thesis	07-07-2023
Follow-up experiment at another facility	
Other	
No outcome anticipated	
<i>If you have indicated 'Other' or 'No outcome anticipated', please provide further details – e.g. what the outcome might be if you ticked 'other', or what the reasons are if no outcome is anticipated.</i>	

4 EXPERIMENT REPORT
The interaction between 50-nm-extruded d54DMPC liposomes and the N-terminal helices of PHB1, PHB2, and their mixture (PHBmix) was investigated by SANS. Measurements were performed at 20 and/or 37 °C using sample-to-detector distances of 1.7, 10.5, and 38 m, providing access to different low- Q ranges. A He^3 MWPC (Multi-Wire Proportional Counter) detector with an active area of $0.96 \times 0.96 \text{ m}^2$ and 256×256 pixels was employed. Samples were loaded into quartz cells (110-QS, Hellma,

Mühlheim, Germany) with a 1-mm path length and an illuminated cross-section of $7 \times 10 \text{ mm}^2$.

Deuterated DMPC (d54DMPC) liposomes dispersed in D_2O -based PBS were investigated in the presence of PHB1, PHB2, and PHBmix. In addition, a more complex lipid formulation composed of DOPC/DOPE/cardiophilin (CL 18:1) at a 40:40:20 wt% ratio was employed to assess the effect of peptide incorporation in a membrane environment with increased lipid complexity. For each peptide formulation, three sequential peptide additions were performed to investigate the possible existence of a concentration threshold for membrane interaction.

Different peptide incorporation strategies were also evaluated, including peptide dissolution in an organic solvent (DMSO) prior to addition to the liposomes and peptide encapsulation during vesicle preparation. Following data analysis, the addition of the peptide using a small fraction of DMSO ($<5\% \text{ v/v}$) was identified as the most suitable approach. Under these conditions, increased peptide incorporation into the membrane was observed for d54DMPC liposomes. Among the peptides tested, PHB2 produced only a minor effect on the membrane structure.

At the highest peptide concentration investigated, the addition of PHB to the more complex DOPC/DOPE/CL lipid mixture resulted in clear variations in the SANS profiles of the vesicles. These changes suggest that PHB incorporation induces structural alterations in the lipid membrane, with the effect becoming more evident at higher peptide concentrations.

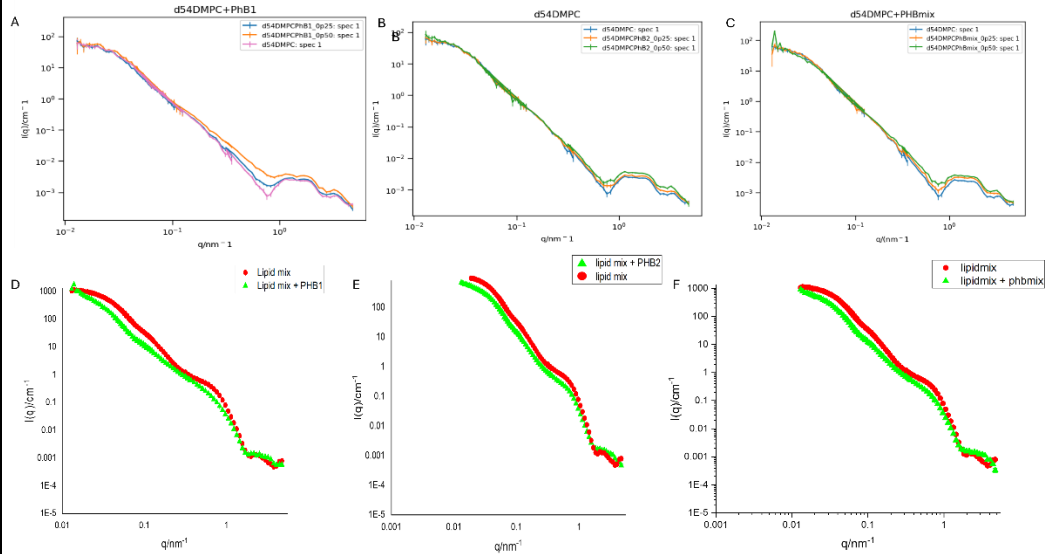


Figure 1: interaction between PHB and a liposome. A) interaction of d54DMPC with subsequently added PHB1, B) PHB2, C) PHB1+2. D) A more complex lipid mixture (DOPC:DOPE:CL 14:0 40/40/20 % w), were analysed with PHB1 (D), with PHB2 (E) and PHB1+2 (F).