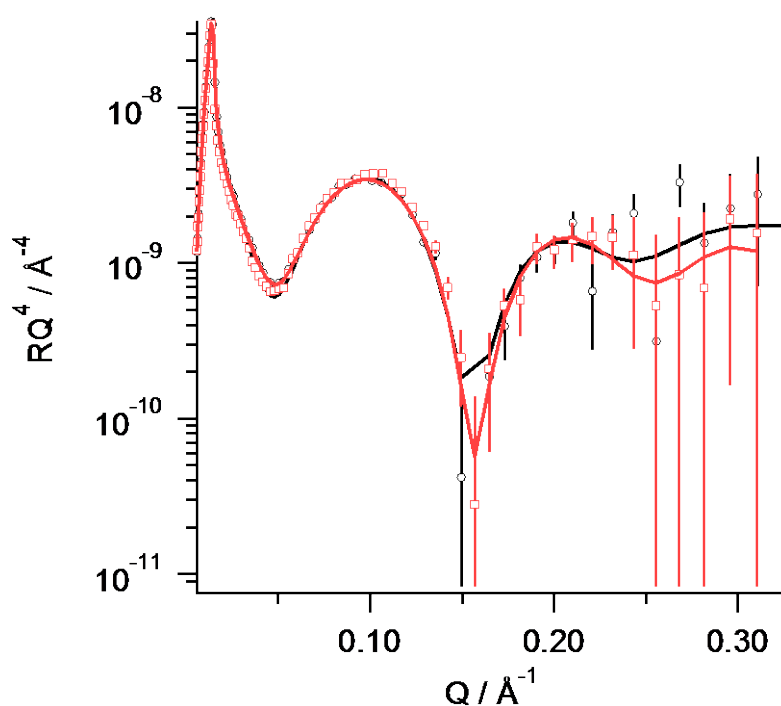


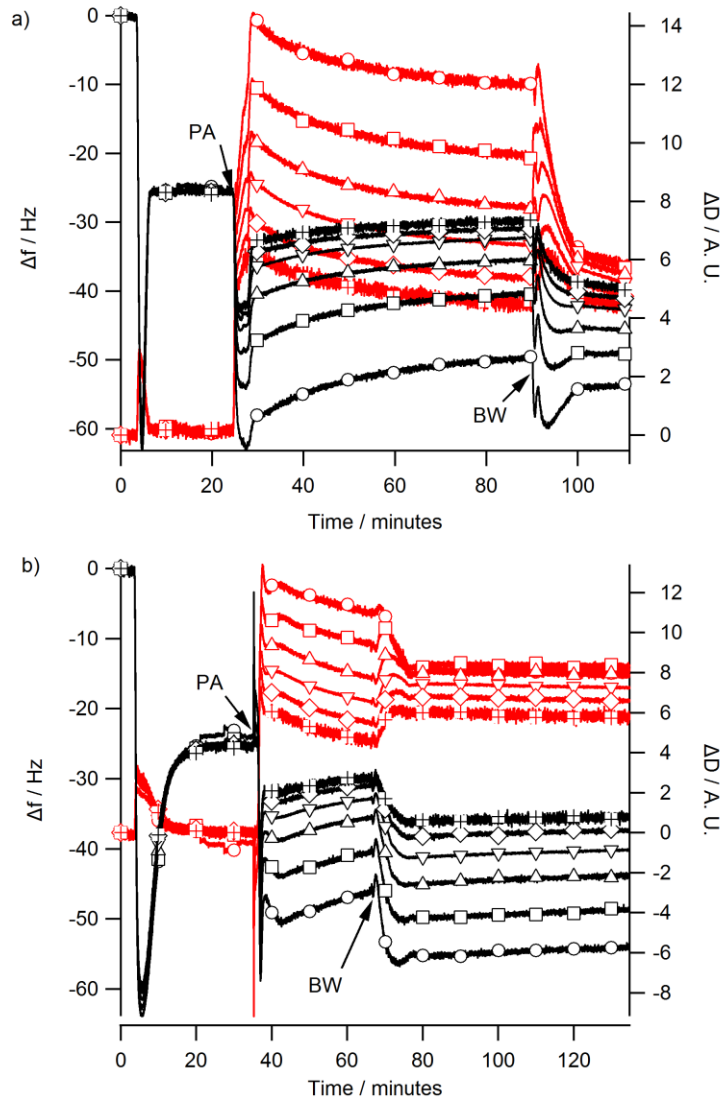
SUPPORTING INFORMATION

Neutron reflectometry studies define prion protein N-terminal peptide membrane binding

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Supplementary Figure 1. Neutron reflectometry of the N2 peptide binding to solid-supported d_{31} -POPC membranes on silicon. The symbols with error bars are the data and the solid lines the fit. Black (\circ) is the bilayer before peptide addition in D_2O and red (\square) is the bilayer in the presence of N2 peptide in D_2O .



Supplementary Figure S2: QCM-D trace of melittin binding to a) POPC/POPS (2:1) bilayer and b) POPC/POPG (2:1) bilayer. The left axis is Δf (black traces) and the right axis is ΔD (red traces). The 3rd (○), 5th (□), 7th (△), 9th (▽), 11th (◇) and 13th (+) overtones are shown. The arrows denote the point of peptide addition (PA) and buffer wash (BW).

Supplementary Table 1. Peptide and lipid properties.

	Molecular weight / Da	Volume / Å ³	nSLD in D ₂ O / ×10 ⁻⁶ Å ⁻²	nSLD in H ₂ O / ×10 ⁻⁶ Å ⁻²	Number of exchangeable protons
N1 peptide	9149	10669	3.88	2.30	162
N2 peptide	6808	7873	3.90	2.38	115
dOR peptide	5297	3494	3.89	2.12	106
d ₃₁ -palmitoyl-oleoyl tails	482	944	3.19	3.19	0
POPC headgroups	311	319	1.88	1.88	0
POPG headgroups	299	257	3.59	2.78	2
POPS headgroups	244	312	3.89	3.47	1

Supplementary Table 2. The fitted parameters for N1 peptide binding to d₃₁-POPC/d₃₁-POPG (2:1) d₃₁-POPC/d₃₁-POPS (2:1) bilayers.

Layer	Before N1 peptide addition			In the presence of N1 peptide			
	Thickness s / Å	nSLD in D ₂ O / ×10 ⁻⁶ Å ⁻²	Roughness / Å	Thickness / Å	nSLD in D ₂ O / ×10 ⁻⁶ Å ⁻²	nSLD in H ₂ O / ×10 ⁻⁶ Å ⁻²	Roughness / Å
d₃₁-POPC/d₃₁-POPG (2:1) bilayer							
Head group one	15 ± 1	2.65 ± 0.07	3	18 ± 1	3.87 ± 0.06	2.14 ± 0.03	4
Tails	20 ± 1	3.19 ± 0.05	3	23 ± 1	3.20 ± 0.03	3.20 ± 0.03	4
Head group two (plus N1 peptide)	10 ± 1	4.73 ± 0.12	3	7 ± 1	4.15 ± 0.05	1.18 ± 0.22	4
N1 peptide only	-	-	-	21 ± 2	5.86 ± 0.04	0.01 ± 0.07	5
d₃₁-POPC/d₃₁-POPS (2:1) bilayer							
Head group one	7 ± 1	2.71 ± 0.17	3	8 ± 1	2.60 ± 0.09	2.52 ± 0.04	4
Tails	20 ± 1	3.19 ± 0.06	3	29 ± 1	3.19 ± 0.03	2.97 ± 0.03	4
Head group two (plus N1 peptide)	11 ± 1	2.73 ± 0.14	3	9 ± 1	4.92 ± 0.09	1.71 ± 0.07	4
N1 peptide only	-	-	-	21 ± 1	5.61 ± 0.05	0.43 ± 0.13	5

Supplementary Table 3. The fitted parameters for N2 peptide binding to d₃₁-POPC/d₃₁-POPG (2:1) d₃₁-POPC/d₃₁-POPS (2:1) bilayers.

Layer	Before N2 peptide addition			In the presence of N2 peptide			
	Thickness s / Å	nSLD in D ₂ O / ×10 ⁻⁶ Å ⁻²	Roughness / Å	Thickness / Å	nSLD in D ₂ O / ×10 ⁻⁶ Å ⁻²	nSLD in H ₂ O / ×10 ⁻⁶ Å ⁻²	Roughness / Å
d₃₁-POPC/d₃₁-POPG (2:1) bilayer^a							
Head group one	7 ± 1	4.13 ± 0.09	3	7 ± 1	4.14 ± 0.17	-	4
Tails	27 ± 1	3.20 ± 0.05	3	31 ± 1	3.04 ± 0.07	-	4
Head group two (plus N2 peptide)	11 ± 1	2.97 ± 0.11	3	12 ± 1	3.70 ± 0.13	-	4
N2 peptide only	-	-	-	27 ± 3	5.85 ± 0.08	-	5
d₃₁-POPC/d₃₁-POPS (2:1) bilayer							
Head group one	13 ± 1	2.93 ± 0.06	3	12 ± 1	3.83 ± 0.08	2.32 ± 0.07	4
Tails	26 ± 1	3.26 ± 0.04	3	27 ± 1	3.28 ± 0.04	2.51 ± 0.04	4
Head group two (plus N2 peptide)	18 ± 1	5.43 ± 0.05	3	16 ± 1	4.26 ± 0.06	2.42 ± 0.06	4
N2 peptide only	-	-	-	20 ± 2	5.81 ± 0.07	0.85 ± 0.17	5

^a No H₂O contrast data for d₃₁-POPC/d₃₁-POPG (2:1) bilayer.

Supplementary Table 4: Results from QCM-D experiments. Numbers in brackets are standard deviation from n = 4.

Bilayer and peptide	Mass of bilayer / mg m ⁻²	Mass of peptide / mg m ⁻²	Moles of bilayer / μmol m ⁻²	Moles of peptide / μmol m ⁻²	Lipid to peptide ratio
POPC/POPG + N1	5.26 (0.19)	0.83 (0.06)	6.73 (0.25)	0.09 (0.01)	0.014 (0.001)
POPC/POPS + N1	4.54 (0.06)	3.19 (1.39)	5.92 (0.07)	0.35 (0.15)	0.059 (0.026)
DMPC/DMPG +N1	5.14 (0.10)	3.08 (1.12)	7.62 (0.15)	0.34 (0.12)	0.044 (0.016)
POPC/POPG +N2	5.17 (0.03)	0.63 (0.25)	6.62 (0.04)	0.09 (0.03)	0.014 (0.006)
POPC/POPS +N2	4.62 (0.09)	1.82 (0.16)	6.02 (0.12)	0.27 (0.02)	0.044 (0.005)
DMPC/DMPG +N2	5.10 (0.13)	0.83 (0.18)	7.56 (0.20)	0.12 (0.03)	0.016 (0.003)