**Supplementary Data**

# CW-EPR studies revealed different motional properties and oligomeric states of the integrin $\beta_{1a}$ transmembrane domain in detergent micelles or liposomes

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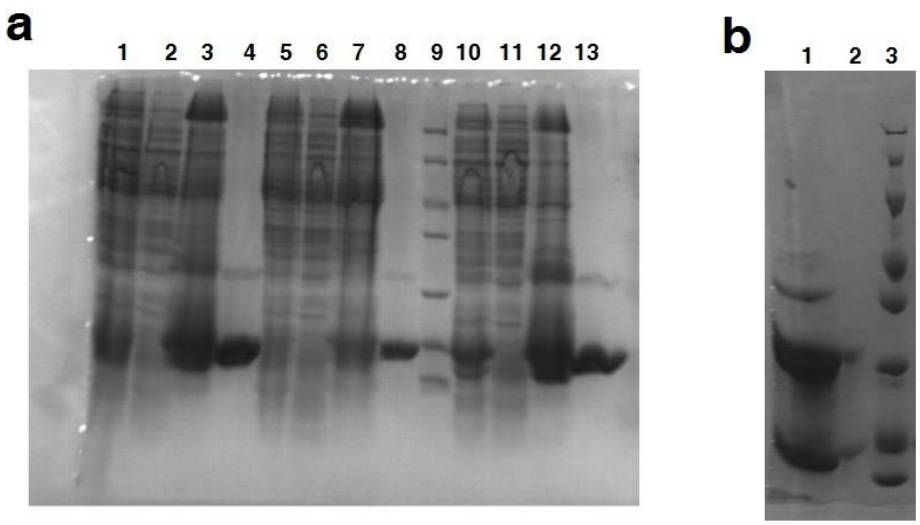
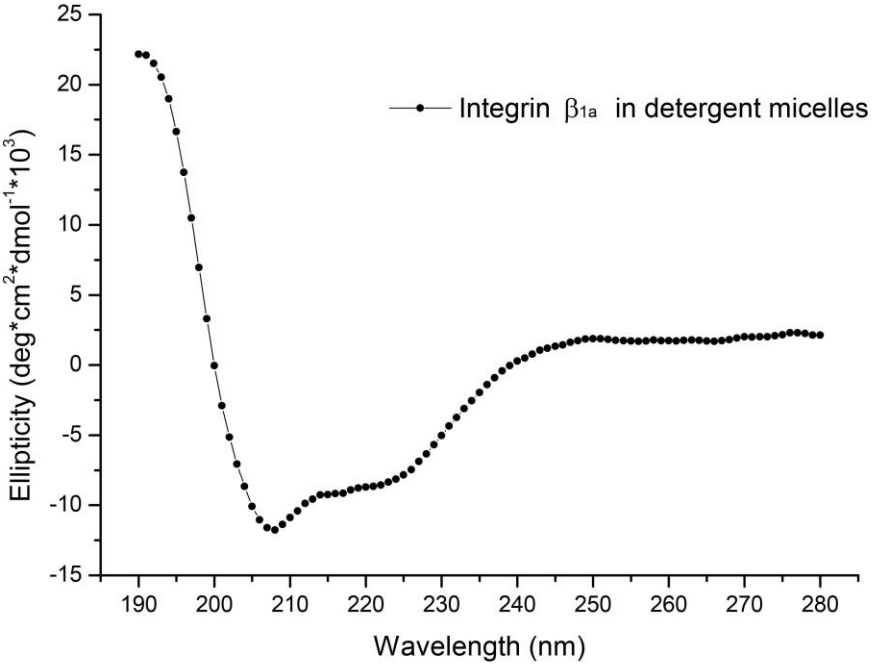


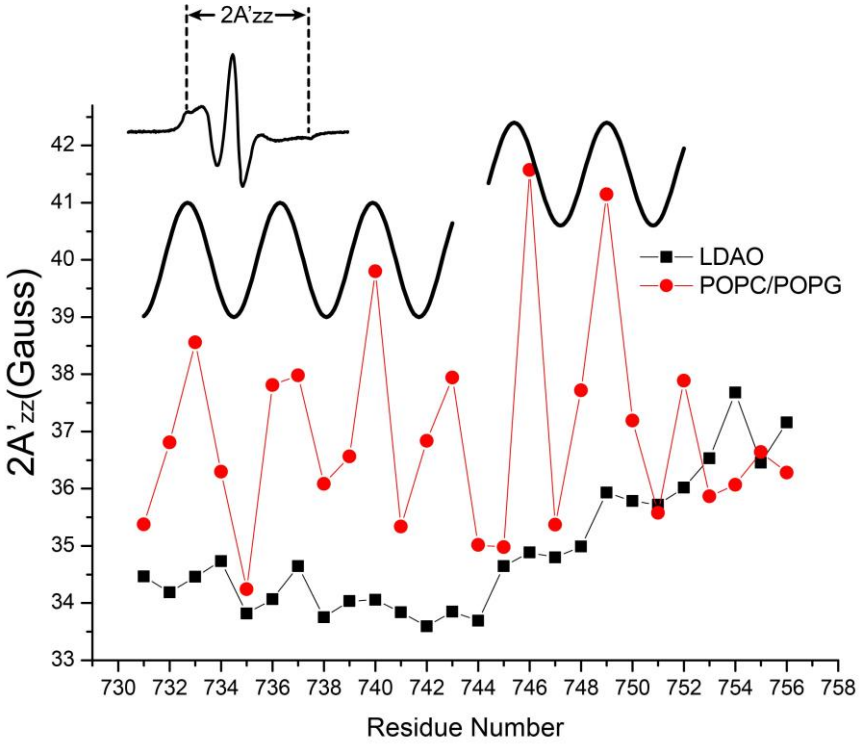

**Supplementary Figure S1:** SDS-PAGE analysis of integrin $\beta_{1a}$-TMC in detergent micelles and lipid liposomes. (a) Integrin $\beta_{1a}$-TMC samples in detergent micelles. Lane 4: integrin $\beta_{1a}$ variant G747C; Lane 8: integrin $\beta_{1a}$ variant L747C; Lane 13: integrin $\beta_{1a}$ variant L749C; Lane 1-3, 5-7 and 10-12 were samples collected during protein purification (whole cell, supernatant, etc.); Lane 9: protein molecular size marker. (b) Integrin $\beta_{1a}$-TMC samples in liposomes. Lane 1: integrin $\beta_{1a}$ variant L749C; Lane 3: protein molecular size marker. Lane 2 is not used because a small fraction of sample in Lane 1 was leaked into Lane 2.




**Supplementary Figure S2:** CD spectra of integrin $\beta_{1a}$-L749R1 in LDAO micelles collected at pH 8.0 and at a temperature of 298 K.


**Supplementary Figure S3:** Sequence alignment between $\beta_{1a}$, $\beta_{1d}$ and $\beta_3$ demonstrated high sequence homology in the transmembrane domain and the cytoplasmic domain.

**Sequence homology analysis among integrin transmembrane and cytoplasmic domains of $\beta_{1a}$, $\beta_{1d}$ and $\beta_3$**




**Supplementary Figure S4:** Plot of the splitting of the outer hyperfine extrema ($2A'_{zz}$) of the EPR spectrum versus the residue number in micelles (black squares) and in liposomes (red dots). $2A'_{zz}$ was measured as shown in the inset.

**Splitting of the outer hyperfine extrema ($2A'_{zz}$) of EPR spectra**

Interactions of the spin label with its environment (micelles or liposomes) lead to various degrees of immobilization[1]. In the absence of motion (in frozen solution), the principal value of the hyperfine tensor ($A_{zz}$) is readily measured by splitting of the outer hyperfine extrema ($2A_{zz}$; Supplementary Figure S4, inset)[2]. For the EPR spectra of spin labeled residues with well-resolved hyperfine extrema at ambient temperature (298K), changes in the overall splitting between the extrema ($2A'_{zz}$, Supplementary Figure S4) provide a measure of changes in mobility, where decreases or increases in $2A'_{zz}$ reflect an increase or decrease in mobility, respectively.

1 Kusnetzow, A. K., Altenbach, C. & Hubbell, W. L. Conformational states and dynamics of rhodopsin in micelles and bilayers. *Biochemistry* **45**, 5538-5550, (2006).

2 Gross, A., Columbus, L., Hideg, K., Altenbach, C. & Hubbell, W. L. Structure of the KcsA potassium channel from Streptomyces lividans: a site-directed spin labeling study of the second transmembrane segment. *Biochemistry* **38**, 10324-10335, (1999).