A comment by Prof. Mibel Aguilar—2018 recipient of the Australian Society for Biophysics' McAulay-Hope Prize for Original Biophysics

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I was very honoured to receive the 2018 McAulay-Hope Prize from the Australian Society for Biophysics for developing new technologies to study model cell membranes.

My group has long been interested in molecular events at the membrane interface and in order to quantify these events in terms of binding constants, we developed surface plasmon resonance (SPR) to allow the binding affinity, kinetics of binding and the relative contribution of electrostatic and hydrophobic forces to membrane binding (Mozsolits and Aguilar 2002, Mozsolits et al. 2001). While this data is critical to understanding the mechanism of peptide and protein-membrane interactions, it was relatively difficult and time-consuming to generate by existing techniques prior to the development of SPR methods.

While high-resolution kinetic data can be obtained using SPR, the application of this data is often limited due to the complex multi-step nature of protein-membrane binding and the structural changes that the membrane bilayer can undergo during peptide or protein binding.

We were therefore very fortunate to have access to a dual polarisation interferometer, and in collaboration with Farfield, who developed the instrument, we established DPI as a new approach to membrane structure analysis during peptide/protein binding. In particular, DPI can be

used to deconvolute changes in mass on the sensing surface into changes in the thickness and density of the material (Hall et al. 2014, Hirst et al. 2013). We believe that DPI represents a new generation of biosensors able to deliver unprecedented molecular detail of cell membranes (Lee et al. 2018).

Biophysics is a quintessentially interdisciplinary area of science, and it has been an exciting journey over the last 20 years. I would like to acknowledge four highly talented graduate students without whom this work would never have been possible and it was a privilege to be their supervisor. They are Dr. Tzong-Hsien Lee, Dr. Henriette Mozsolits, Dr. Kris Hall and Dr. Daniel Hirst. It has also been an honour to be part of the Australian and International Biophysics community over this time, and I look forward to continuing my involvement in these societies and promoting the field of Biophysics.

Compliance with ethical standards

Conflict of interest Marie-Isabel Aguilar declares that she has no conflict of interest.

Ethical approval This article does not contain any studies with human participants or animals performed by the author.

References

- Hall K, Lee TH, Mechler AI, Swann MJ, Aguilar MI (2014) Real-time measurement of membrane conformational states induced by antimicrobial peptides: balance between recovery and lysis. *Sci Rep* 4:5479
- Hirst DJ, Lee TH, Swann MJ, Aguilar MI (2013) Combined mass and structural kinetic analysis of multistate antimicrobial peptide-membrane interactions. *Anal Chem* 85:9296–9304
- Lee TH, Hirst DJ, Kulkarni K, Del Borgo MP, Aguilar MI (2018) Exploring molecular-biomembrane interactions with surface plasmon resonance and dual polarization interferometry technology: expanding the spotlight onto biomembrane structure. *Chem Rev* 118:5392–5487

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- Mozsolits H, Aguilar MI (2002) Surface plasmon resonance spectroscopy: an emerging tool for the study of peptide-membrane interactions. *Biopolymers* 66:3–18
- Mozsolits H, Wirth HJ, Werkmeister J, Aguilar MI (2001) Analysis of antimicrobial peptide interactions with hybrid bilayer membrane systems using surface plasmon resonance. *Biochim Biophys Acta* 1512:64–76

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