ELSEVIER

Biophysical Chemistry 133 (2008) 90–103

Biophysical Chemistry

http://www.elsevier.com/locate/biophyschem

Electrostatically-controlled protein adsorption onto lipid bilayer: Modeling adsorbate aggregation behavior

Valeriya M. Trusova *, Galyna P. Gorbenko

Department of Biological and Medical Physics, V.N. Karazin Kharkov National University, 4 Svobody Sq., Kharkov, 61077, Ukraine

Received 21 November 2007; received in revised form 19 December 2007; accepted 19 December 2007
Available online 27 December 2007

Abstract

Using adsorption models based on scaled particle (SPT) and double layer theories the electrostatically-controlled protein adsorption onto membrane surface has been simulated for non-associating and self-associating ligands. The binding isotherms of monomeric and oligomeric protein species have been calculated over a range of variable parameters including lipid and protein concentrations, protein and membrane charges, pH and ionic strength. Adsorption behavior of monomers appeared to be the most sensitive to the changes in the protein aggregation state. The hallmarks of the protein oligomerization are identified. The practical guides for optimal design of binding experiments focused on obtaining proofs of protein self-association are suggested.

Keywords: Protein adsorption; Lipid bilayer; Protein aggregation