

Drs. David E. Golan and Gilda A. Barabino planned to study further the adhesive properties of sickle erythrocytes. Recent studies in model membranes and intact biological systems have begun to define the biochemical and biophysical properties of adhesion molecules that are necessary for stable adhesion. These properties include adhesion molecule expression, size, lateral mobility, surface density, surface distribution, and affinity for the molecule's cognate ligand. The properties of these molecular interactions that are important for stable adhesion remain to be characterized. Using a unique set of biophysical and imaging techniques to study, at the level of single adhesion molecules, the molecular interactions involved in cell-cell and cell-matrix adhesion, these methods will be applied to the study of (1) membrane protein and lipid dynamics in sickle erythrocytes, (2) adhesive interactions between sickle erythrocytes and activated vascular endothelial cells, and (3) adhesive interactions between sickle erythrocytes and activated T lymphocytes. These studies should lead to a quantitative understanding of important molecular and cellular events in the pathophysiology of sickle cell disease and point the way to targeted therapies that interrupt the most critical aspects of these molecular and cellular events.