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Identification and Characterization of Nuclear Envelope Protein Interactions

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Abstract : The nuclear envelope which surrounds the chromatin of eukaryotic cells contains more than a hundred transmembrane proteins. Mutations in some genes encoding nuclear envelope proteins give rise to human diseases including neurological disorders. The function of many nuclear envelope proteins is not well established. This is partly because nuclear envelope proteins and their interactions are difficult to study due to the inherent resistance to extraction of nuclear envelope proteins. We have developed a novel method called MCLIP, to identify interacting partners of nuclear envelope proteins in live cells. Using MCLIP, we found three new binding partners of the inner nuclear membrane protein Samp1: the intermediate filament protein Lamin B1, the LINC complex protein Sun1 and the G-protein Ran. Furthermore, using in vitro studies, we show that Samp1 binds both Emerin and Ran directly. We have also studied the interaction between Samp1 and Ran in detail. The results show that the Samp1 binds stronger to RanGTP than RanGDP. Samp1 is the first transmembrane protein known to bind Ran and it is tempting to speculate that Samp1 may provide local binding sites for RanGTP at membranes.

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