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Phosphorylation of the BAR domain protein PACSIN2 regulates caveolae morphogenesis and endocytosis

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Bin/Amphiphysin/Rvs (BAR) domain proteins are lipid-binding proteins that form dimers and sense and generate membrane curvatures. One of these BAR domain proteins, protein kinase C (PKC) and casein kinase substrate in neurons protein 2 (PACSIN2), regulates the morphogenesis and endocytosis of caveolae. Here, we found that PACSIN2 is phosphorylated at serine 313 by PKC. We performed analytical ultracentrifugation experiments on both the wild-type and phosphomimetic mutant S313E of PACSIN2, revealing that they both form dimers. We then performed SAXS experiments and found that the PACSIN2 S313E mutant shows no significant conformational changes in protein structure. These results suggest that phosphorylation of PACSIN2 has no significant effect on protein structures, rather decreasing its membrane-binding affinity for caveolae, presumably through electrostatic repulsion against negatively charged membranes, thus regulating the morphogenesis and endocytosis of caveolae.

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