FEZ1 is an unfolded protein and its overexpression causes “flower like” phenotype in human cells.

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The Fasciculation and Elongation protein Zeta1 (FEZ1) is the mammalian orthologue of the *C.elegans* protein UNC-76, necessary for axon growth. FEZ1 can be classified as a hub protein, since it was reported to interact with over 40 proteins. Our experiments of circular dichroism, fluorescence spectroscopy and limited proteolysis suggest that FEZ1 contains disordered regions. Pull down and SAXS experiments confirmed that FEZ1 dimerizes in N-terminus. Shape analysis using SAXS data proved that FEZ1 is a dimer of elongated shape. We further performed *in vitro* phosphorylation assays of FEZ1 and found that phosphorylation occurred mainly in its C-terminal region and inhibited FEZ1 interaction with CLASP2 *in vitro*. Furthermore, we over-expressed GFP-FEZ1 in human cells and observed that over 40% of transfected cells develop “flower-like”nuclei. We further demonstrated that GFP-FEZ1 localizes to both the cytoplasm and the nucleus, and that the appearance of the "flower-like"nuclei depends on intact microtubules. Finally, we show that FEZ1 co-localizes with alpha and gamma tubulin, which localizes as a centrosome like structure at the center of the nuclear lobules. Concluding, our data suggest that FEZ1 is a natively unfolded protein and that its binding and transport functions may be subject to regulation by phosphorylation. FEZ1 seems to have an important centrosomal function and supplies new mechanistic insights to the formation of "flower-like"nuclei, which are a phenotypical hallmark of human leukemia cells. Acknowledgements: FAPESP, LNLS, CNPq for the financial support.