IECBM 2022

MDPI

*Abstract*

# Structural and Conformational Dynamics of a Disordered Protein Motif †

**Mónika Ágnes Tóth *, Péter Gaszler, Andrea Vig, Veronika Takács-Kollár and Beáta Bugyi ***

University of Pécs Medical School; peter.gaszler@aok.pte.hu (P.G.); andrea.vig@aok.pte.hu (A.V.); veronika.kollar@aok.pte.hu (V.T.-K.);

* Correspondence: monika.a.toth@aok.pte.hu (M.A.T.); beata.bugyi@aok.pte.hu (B.B.)

† Presented at the 2nd International Electronic Conference on Biomolecules: Biomacromolecules and the Modern World Challenges, 1–15 November 2022; Available online: https://iecbm2022.sciforum.net/.

SALS (sarcomere length short), a WH2-domain-containing protein was identified in *Drosophila* as an important regulator of the assembly of sarcomeric actin structures (Bai et al. [1]). It contributes to the establishment of sarcomere length and organization by promoting the lengthening of actin filaments at the pointed end. The absence of SALS is already lethal in the embryonic age. This may be due to the shortening of the length of sarcomeric actin filaments, and/or the disruption of their organization.

SALS is a relatively large protein, consisting of 935 amino acids. According to our bioinformatics analysis, it is an intrinsically disordered protein (IDP). IDPs are biologically active proteins, that, however, do not have a well-defined three-dimensional structure. They possess specific physicochemical properties, different from those of ordered proteins (e.g., hydrophilic/charged:hydrophobic amino acid ratio, thermal stability, electrophoretic mobility).

In the case of SALS previous studies have revealed only two motifs consisting of a few 10 amino acids, called Wiscott-Aldrich syndrome homology 2 (WH2) domains, that are intrinsically disordered protein regions (IDR) of low structural complexity. Considering their role, they possess actin-binding properties. Depending on the number and sequence of domains, proteins containing WH2 show multifunctional properties.

In our previous research we completed the functional analysis of the SALS WH2 domains (SALS-WH2) [2]. Based on our results both of the SALS WH2 domains interact with the actin, and through their activities shift the monomer:filament ratio towards monomeric actin. We further aimed to characterize the structural and conformational dynamic properties of SALS-WH2 by using in silico and experimental approaches. Our bioinformatics analysis suggests that the SALS-WH2 domains have IDR elements. Our prediction-based results were experimentally verified by fluorescence spectroscopy and thermal analysis.

**Keywords:** IDP; IDR; WH2; SALS; actin

**Citation:** Tóth, M.Á.; Gaszler, P.; Vig, A.; Takács-Kollár, V.; Bugyi, B. Structural and Conformational Dynamics of a Disordered Protein Motif. *Biol. Life Sci. Forum* **2022**, *2*, x. https://doi.org/10.3390/xxxxx

Academic Editor(s):

Published: date



**Author Contributions:**

**Funding:**

**Institutional Review Board Statement:**

**Informed Consent Statement:**

**Data Availability Statement:**

**Acknowledgments:** New National Excellence Program of the Ministry for Innovation and Technology ÚNKP-21-3-II-PTE-997 (PG), University of Pécs, Medical School, KA-2021-30 (AV). We thank József Mihály (Institute of Genetics, Biological Research Centre) for the SALS plasmid.

**Conflicts of Interest:**

## References

1. Bai, J.; Hartwig, J.H.; Perrimon, N. SALS, a WH2-domain-containing protein, promotes sarcomeric actin filament elongation from pointed ends during Drosophila muscle growth. *Dev. Cell.* **2007**, *13*, 828–842.
2. Tóth, M.Á.; Majoros, A.K.; Vig, A.T.; Migh, E.; Nyitrai, M.; Mihály, J.; Bugyi, B. Biochemical Activities of the Wiskott-Aldrich Syndrome Homology Region 2 Domains of Sarcomere Length Short (SALS) Protein. *J. Biol. Chem.* **2016**, *291*, 667–680.