The Role of Structure Specific Recognition Protein 1 in Chromosome Dynamics in Arabidopsis Thaliana and Humans

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Abstract:

Structure-Specific Recognition Protein 1 (SSRP1) has diverse roles involved with DNA repair response, DNA replication and regulation of transcription machinery. SSRP1 together with SPT16 forms the FACT (Facilitates Chromatin Transcription) complex. However, independent roles for SSRP1 have recently been described in different organisms. This study explores SSRP1's emerging FACT independent evolutionary conserved functions in plants and humans.

In this study, mutants in Arabidopsis thaliana *SSRP1* (At-*SSRP1*) were shown to have chromosome missegregation during the cell cycle and the meiotic process. Human SSRP1 (H-SSRP1) also appears to organize and maintain an accurate spindle to ensure correct chromosome segregation during cell cycle. H-SSRP1 was shown to localize at the centrosome region in the human mitotic spindle forming two structures similar to the centriole pairs. Although the location of At-SSRP1 is diffuse, as plants lack centrosomes and centrioles, its role seem to be similar to that of humans. This function appears to be FACT independent because SUPT16H (SPT16 homolog) co-localization was not detected in the centrioles in human cells and *At-SPT16* mutants in Arabidopsis did not show any phenotype.

Moreover, We have also carried out a Small interfering RNA (siRNA) strategy to reduce the expression of hSSRP1 in endothelial cells. The knocked down cells showed a clear reduction of beta-tubulin microtubules in the mitotic spindle and errors in their organization that led to a poor alignment of the chromosomes and missegregation. Furthermore, DNA repair and cytokinesis were also affected in the siRNA knockdowns. Immunolocalization of hSSRP1 and hSPT16 have shown that both could be involved in DNA repair when localising to the chromatin forming the FACT complex but also they could be deeply involved in spindle formation and organization in higher eukaryotes. Especially, since hSSRP1 localises in the centrioles..