a focal accumulation of H4K20me3 in the nucleolus. No interaction has been found between UBF1/2 and H3K9me3. Interestingly, UVA irradiation decreases the levels of H3K9me3 and H4K20me3 at 28S rDNA. Altogether, the UVA light affects the epigenetic status of ribosomal genes at 28S rDNA and strengthens an interaction between UBF1/2 proteins and H4K20me2/me3. Based on these results, we conclude that the injury in the region encoding 28S rRNA is likely recognized via H4K20me3-dependent repair mechanism. Studied histone signature in this genomic region was, contrary to histone markers at the rDNA promoter, significantly affected by UVA light.

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K-5. Investigation the role in mRNA export of the actin binding protein, Moesin

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Accurate and precise control of gene expression is critical for cell survival in order to respond to cellular stress and environmental stimuli. Gene activity is tightly regulated at the level of transcription and translation but mRNA export which links the two processes also plays key role in gene regulation. During RNA export, several specific proteins are recruited to the transcribed RNA molecule where they form an RNA-protein complex, called messenger Ribonucleoprotein Particle (mRNP). In our laboratory we are studying the nuclear function of Moesin, the single cytoskeletal actin-binding ERM protein in Drosophila melanogaster. ERMs (Ezrin, Radixin and Moesin) compose a highly conserved group of proteins and carry out many crucial cytoplasmic functions including reorganization of the actin cytoskeleton, cell survival, membrane dynamics or cell migration. Previously we demonstrated that the Moesin protein is present also in the nucleus where it shows clear co-localization with mRNA export factors. In a functional assay we observed the accumulation of total mRNA in the nucleus upon RNAi against moesin in cultured cells and *in vivo* as well, demonstrating that the inhibition of Moesin's function impairs mRNA export. As the detailed molecular mechanism underlying the nuclear activity of Moesin is still not known, we aim to identify the nuclear protein interaction partners of Moesin in order to get a deeper insight into the role and significance played by the actin-binding ERM proteins in nuclear mRNA export. Methods: Immunostaining of larval polytene giant chromosomes, Drosophila cell culture, mass spectrometry analysis, protein co-immunoprecipitation Results: In the mass spectrometry analysis Moesin pulled down almost the entire Mediator complex which is a multisubunit protein complex function in gene expression regulation and mRNA export as well. Moesin also showed colocalization with Mediator proteins on Drosophila larval giant

chromosomes. Furthermore, among the candidate nuclear interaction partners we identified several mRNP members and proteins involved in mRNA processing and export, and these hits we could confirm by protein co-immunoprecipitation. Conclusions: Mass spectrometry analysis verified by protein co-immunoprecipitation suggests that Moesin's function is related to the NXF2-mediated mRNA export pathway as a possible new binding partner of the Mediator complex. In vitro assays will further confirm these protein interactions.

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L-1. Mutations in different domains of lamin A change the mechanical properties of the nucleus

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The rigid skeleton of cell nucleus, nuclear lamina (NL) consists mostly of A- and B-type lamins. Such structure maintains the nuclear shape and size and also provides mechanical link between nucleoplasm and cytoplasm. Mutations of structural components of NL are the cause of a wide group of diseases - laminopathies. According to "mechanical" hypothesis, this may be due to a disturbance of the mutant protein polymerization, as shown by the *in vitro* experiments. How NL assembly occurs in living cells is still unclear. Our aims were to visualize the structure of the nucleoskeleton in normal and pathological states and to estimate the mechanical properties of the nuclear envelope (NE) in living cells. In our work we used different types of cells: smooth muscle myocytes, cardiac progenitor cells, rat cardiomyocyte and human fibrosarcoma cells expressing wt lamin A or its mutant forms (G465D, R471C, R482L, R527C) fused to GFP. The resistance of NE of such cells to mechanical stress was studied by treating them with 15/30 % Hanks' solution. The effect of a hypo-osmotic shock causes a mechanical stress inside the nucleus that leads to the formation of stable protrusions of NE - induced nuclear buds allowing us to indirectly estimate determined changes in the NE mechanical properties. Mechanical properties of NE were also measured with a scanning ion-conductance microscope (SICM), which allows to obtain stiffness index with high spatial resolution. In parallel, structural organization of NL was analyzed by structured illumination microscopy. We found the expansion of the distance between the NL microdomains are increased in nuclei containing mutant proteins. Furthermore, before treatment with a hypotonic solution, local disarrangement of the NL and nuclear asymmetry were observed in some