



SCAN ME

MOL231: "Localization memory" of an old nuclear pore complex biomarker Mlp1 after induced stress

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The **nuclear core complex (NPC)** are multiprotein channels in the nuclear membrane that conducts nucleocytoplasmic transport. Interestingly, in budding yeast old and new NPCs are compositionally different. **Old NPCs contain large nuclear basket protein MLP1** (Figure 1) having multiple roles in quality control of transcription, transcriptional memory, chromatin organization and others. **Currently it is unclear how age-dependent compositional diversification of the NPC is established.** In this study we have used quantitative fluorescence microscopy and automated image analysis to explore the effects of heat shock and osmotic stress on Mlp1 incorporation into the NPCs.

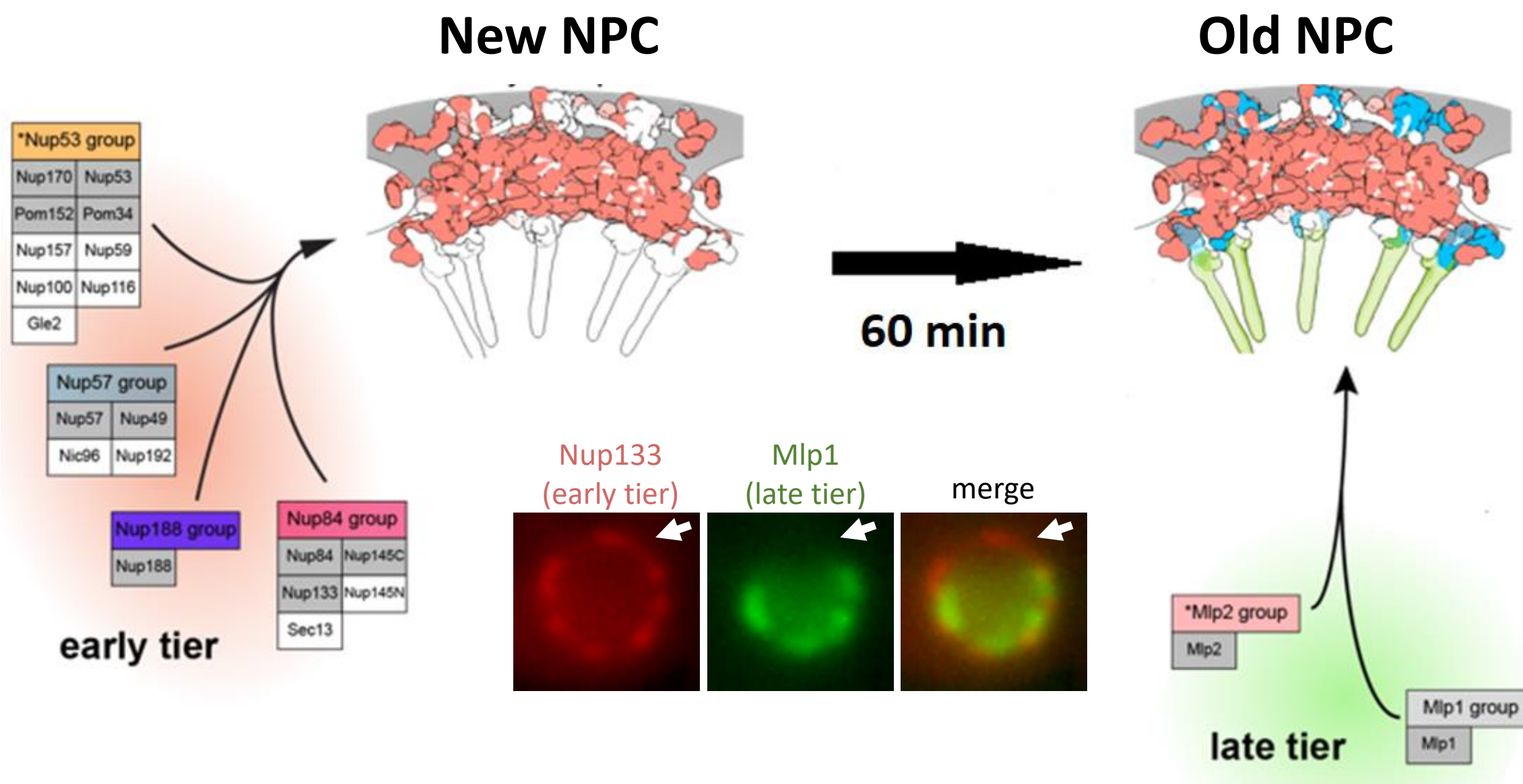
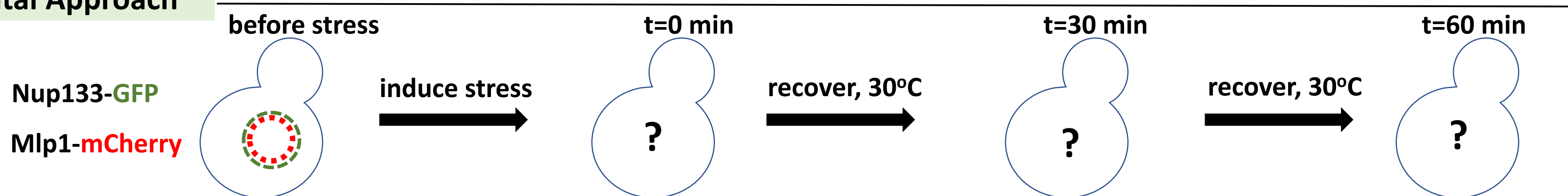


Figure 1: Assembly yeast nuclear pore complex. The NPC is assembled over a time span of approximately 1 hour. The assembly is initiated by recruitment of central ring structures (early tier). Nup133 is one of the proteins recruited during this phase. The nuclear basket protein MLP1 and its paralog MLP2 finalize the assembly (late tier) and are recruited outstandingly late, ~45 minutes after all other NPC proteins have assembled. Because of that yeast cells contain compositionally different populations of new and old NPCs in the same cell [1].

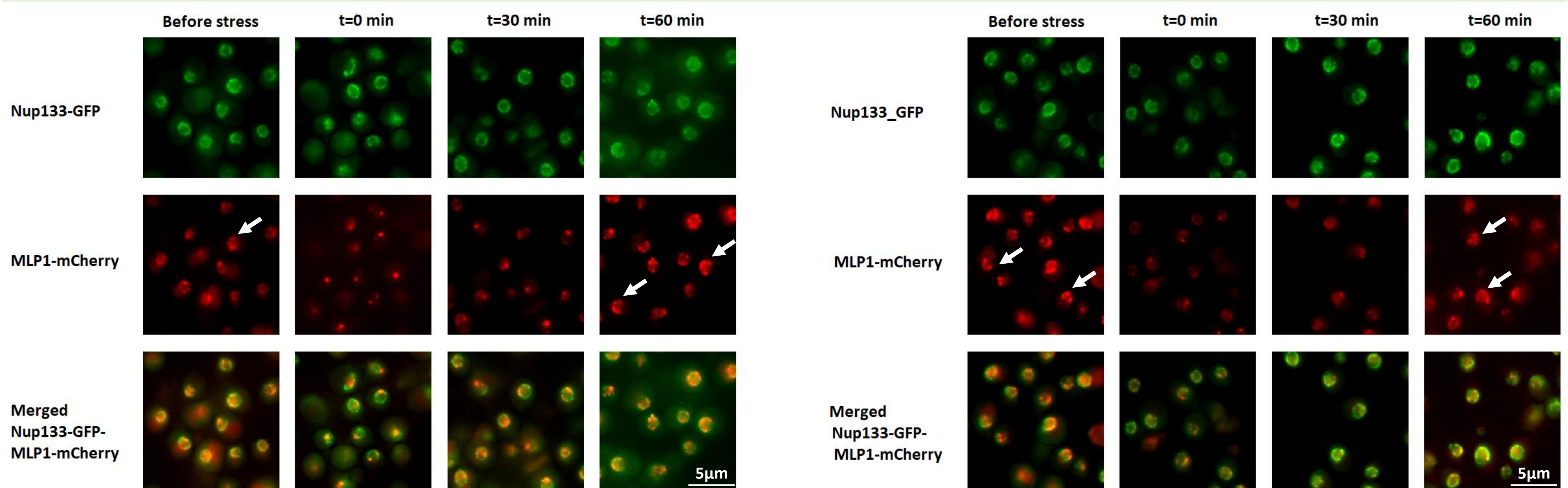
Experimental Approach

Microscopy imaging and co-localization quantification using NuRim [1]

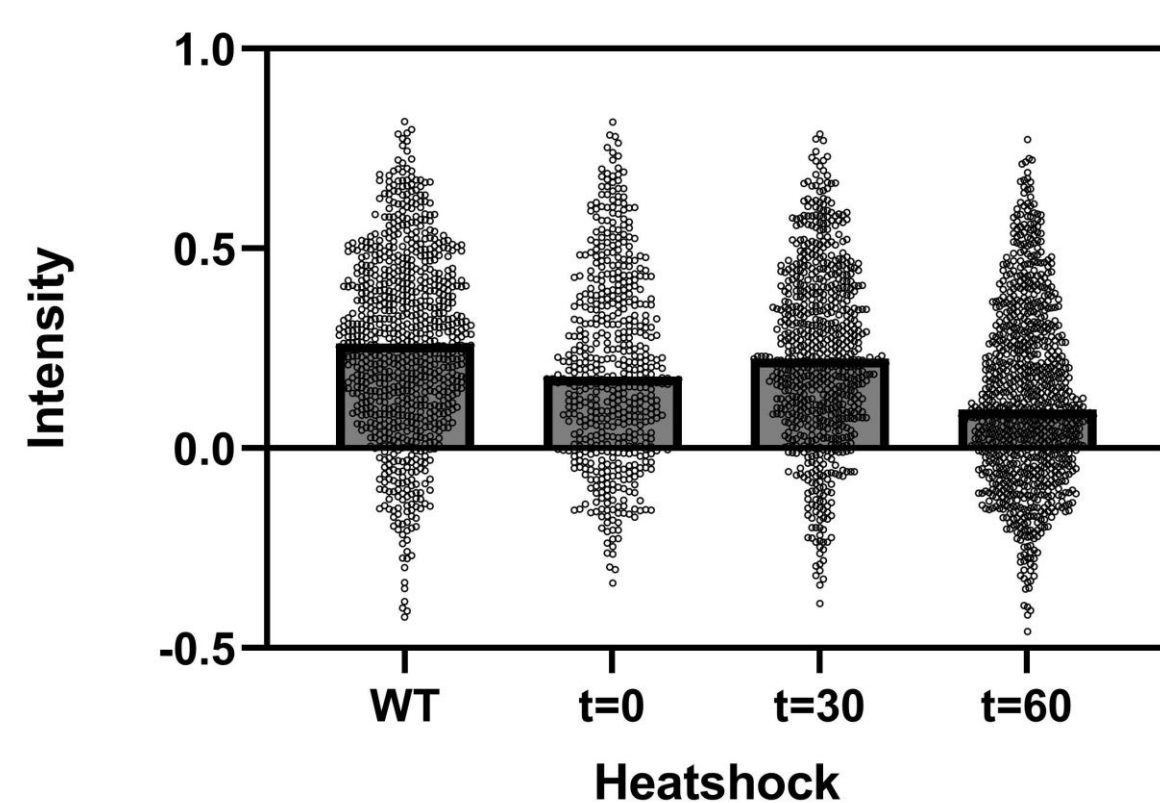


Heat shock (42°C, 15 min)

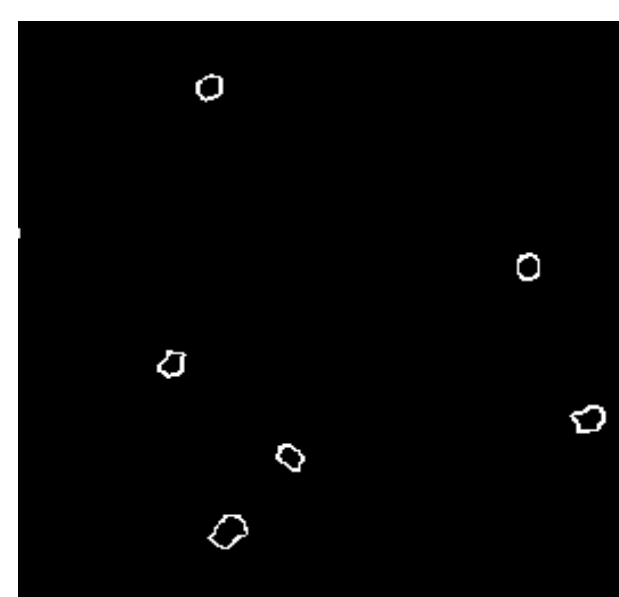
Osmotic stress (1M sorbitol, 15 min)



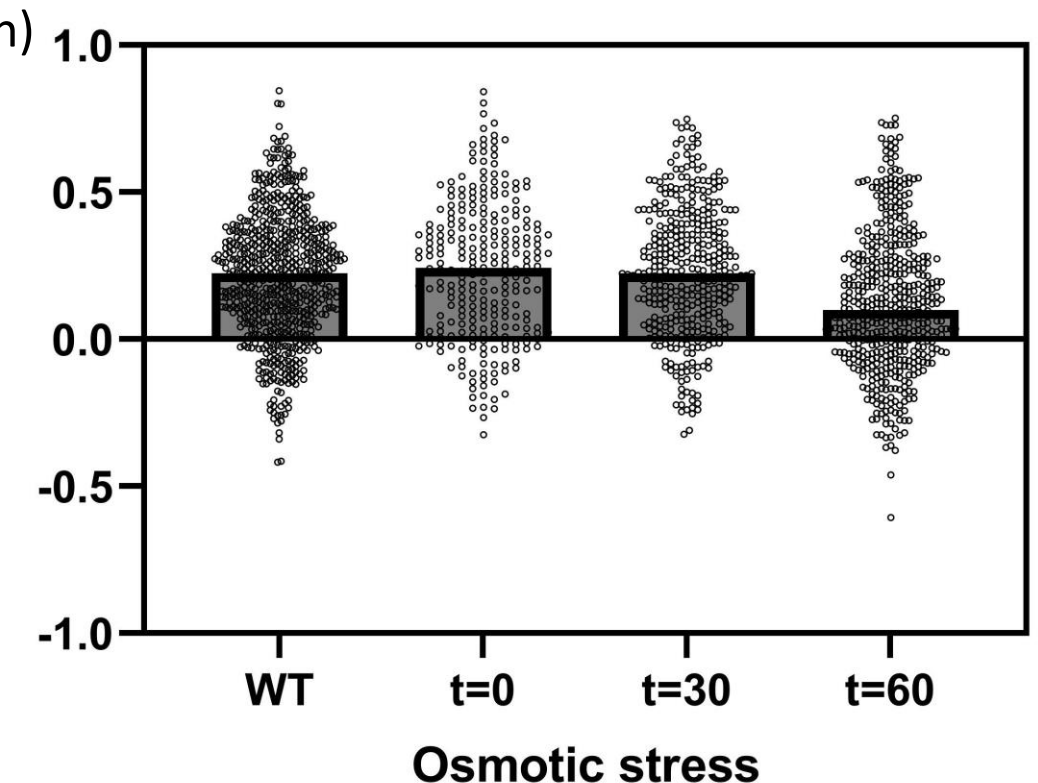
Pearson Coefficient



apply automated nuclear contour segmentation and quantify co-localization efficiency (Pearson correlation) between **Nup133** and **Mlp1**



Pearson Coefficient



Conclusions:

- Mlp1 mislocalizes from the nucleus both during induced heat shock and osmotic stress
- Mlp1 re-gains similar localization pattern in 1h after induced stress
- It can be said that Mlp1 has memory of its localization on the NPC

Sources:

1. Onishchenko E., et al Maturation Kinetics of a Multiprotein Complex Revealed by Metabolic Labeling. Cell. (2020)
2. Carmody SR., et al The Mitogen-Activated Protein Kinase Slk2 Regulates Nuclear Retention of Non-Heat Shock mRNAs during Heat Shock-Induced Stress, Mol Cell Biol. (2010)
3. Folz H., et al SUMOylation of the nuclear pore complex basket is involved in sensing cellular stresses. J Cell Sci (2019)



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