

Repo-Man as a chromatin organiser in the interphase nuclei

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Preparation of cells for the new interphase requires re-organisation of chromatin and re-formation of the nuclear envelope, a coordinated process that occurs during mitotic exit. Repo-Man plays a crucial role in both events. H3 phosphorylations by the mitotic kinases Aurora B and Haspin are timely dephosphorylated by the Repo-Man/PP1 complex. Repo-Man is involved in the recruitment of Importin β and its depletion leads to deformed nuclei. The lamina is an important repressive nuclear landmark, depleted from RNAPII and enriched for repressive chromatin markers, which by tethering chromatin provides one of the important clues for nuclear organisation. Here we show that Repo-Man is an essential component for interphase chromatin organisation and supports the repressive environment at the nuclear lamina. In interphase, Repo-Man is mainly nuclear with enrichment at the periphery. Here Repo-Man interacts directly with the nucleopore protein Nup153 which also represents Repo-Man docking site. Repo-Man localisation at the nuclear envelope is important for maintaining the peripheral positioning of Ch13q, as depletion of Repo-Man ejects it from the periphery. Repo-Man also contributes to the formation of heterochromatin as its depletion leads to deficient HP1 foci, H3K9me3 and H3K27me3 distributions. Interestingly, Repo-Man recruitment to engineered LacO sites in chicken cells drives a local enrichment of the same repressive histone marks suggesting it is sufficient to establish an heterochromatic environment. Through a histone peptide array screening we have shown that Repo-Man interactions with chromatin occur via modified H3K27. In conclusion, Repo-Man interactions with chromatin at the nuclear lamina, via the modified H3K27, shapes global chromatin organisation.