IN BRIEF

TELOMERES

A new level of protection

This study identifies a new way to maintain telomere integrity involving nucleostemin. Loss of nucleostemin increased the formation of telomere damage foci, and in telomerase-inactive cells (which instead use alternative lengthening of telomeres (ALT)), it decreased the number of ALT-associated PML bodies (APBs; which may have a role in damage repair by homologous recombination (HR)) and the percentage of telomeres associated with APBs. So how does nucleostemin protect telomeres? In ALT cells, nucleostemin increased the sumoylation of the telomere protein TRF1 (which is required for APB formation) and promoted its association with the PML body protein PML-IV. Furthermore, the sumoylated TRF1–PML-IV interaction was induced following DNA damage in a nucleostemin-dependent manner, and this was required for the recruitment of the HR protein RAD51 to damage sites. Importantly, this mechanism was conserved in telomerase-active cells.

ORIGINAL RESEARCH PAPER Hsu, J. K., Lin, T. & Tsai, R. Y. L. Nucleostemin prevents telomere damage by promoting PML-IV recruitment to sumoylated TRF1. *J. Cell Biol.* **197**, 613–624 (2012)

TECHNOLOGY

Computer programming with mammalian cells

In electronic circuits, interconnected transistors produce a binary output in response to one or more inputs. Here, the authors used genetically interconnected transcriptional and translational regulators to perform such logical functions in mammalian cells. Human embryonic kidney cells were transfected with combinations of three types of plasmids. One type encoded synthetic transcription factors (STFs), engineered so that specific exogenous molecules (inputs) could suppress STF promoter binding. The second type expressed RNA-binding proteins (RBPs) under the control of an STF promoter (so RBP expression could be repressed by an STF-specific input). The third type expressed fluorescent proteins, and this expression was regulated by two inputs, acting through an STF promoter and RBP-mediated translation inhibition, respectively. Depending on the plasmid combination, a binary output (presence or absence of fluorescence) was produced in response to specific inputs. As these synthetic genetic circuits perform complex logical functions, they could be used to generate biocomputers.

ORIGINAL RESEARCH PAPER Ausländer, S. *et al.* Programmable single-cell mammalian biocomputers. *Nature* 3 Jun 2012 (doi:10.1038/nature11149)

NUCLEAR ENVELOPE

The structure behind the force

Linker of nucleoskeleton and cytoskeleton (LINC) complexes couple the nucleus to the cytoplasm. Here, Sosa *et al.* describe how their components, SUN and KASH proteins, interact to build strong connections through the nuclear envelope. SUN proteins, which span the inner nuclear membrane, trimerize through their luminal SUN domains and the adjacent coiled-coil domains. The authors show that trimeric SUN domains can bind three KASH domains, which are found on the luminal end of the outer nuclear membrane-spanning KASH proteins. SUN–KASH binding is stabilized by extended SUN–KASH domain interactions and a disulphide bond. The resolved structures suggest that SUN trimerization may enable higher-order organization of SUN–KASH complexes to sustain the strong forces that are exerted between the nucleus and the cytoplasm.

ORIGINAL RESEARCH PAPER Sosa, B. A. *et al.* LINC complexes form by binding of three KASH peptides to domain interfaces of trimeric SUN proteins. *Cell* **149**, 1035–1047 (2012)