

Helping homologues to find their partners

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URLs**Entrez**

UNC84A

<http://www.ncbi.nlm.nih.gov/sites/entrez?Db=gene&C>[md=ShowDetailView&TermToSearch=77053](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=gene&C)

During meiotic prophase, chromosomes attach to the nuclear envelope through their telomeres, facilitating homologue pairing. Although the first description of this chromosome organization dates back more than a century, the molecular mechanisms are still largely unknown. Two groups now report that, in mice and *Caenorhabditis elegans*, nuclear inner membrane proteins have an important role in this process.

Min Han and colleagues showed that mice knockout for the nuclear envelope protein SUN1 (also known as **UNC84A**) develop normally, but both males and females



are sterile. SUN1 distribution in wild-type mice varies during the different stages of spermatogenesis, resembling the nuclear envelope localization of telomeres in primary spermatocytes, and fluorescence *in situ* hybridization (FISH) analysis confirmed that telomeres colocalize with SUN1 during meiotic prophase. Telomere attachment to the nuclear envelope is impaired in *Sun1*^{-/-} mice, resulting in defective pairing, synapsis and recombination between homologous chromosomes.

In a second study, using forward genetic screening in *C. elegans*, Verena Jantsch and colleagues identified a missense mutation in the *matefin* gene, *mtf-1/sun-1(jf18)*, that causes defects in meiotic chromosome segregation. Using FISH, the authors showed that in mutant gonads chromosomes are unable to find their homologous partners, and instead engage in non-homologous synapsis. Furthermore, these mutants fail to form nuclear envelope aggregates of the ZYG-12 protein, which normally form where

proteins of the pairing centre localize. The authors propose a model whereby chromosomes run through a homology check that takes place at SUN-1–ZYG-12 aggregates: if they find their partners, synapsis occurs; otherwise, they keep searching for their homologues. In *mtf-1/sun-1(jf18)* mutants, the homology check is impaired and non-homologous synapsis takes place.

Altogether, these studies provide an important addition to our understanding of the processes of chromosome dynamics during meiosis, which might ultimately provide clues about the origins of meiotic defects that impair human fertility.

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ORIGINAL RESEARCH PAPERS Ding, X. & Xu, R. *et al.* SUN1 is required for telomere attachment to nuclear envelope and gametogenesis in mice. *Dev. Cell* **12**, 863–872 (2007) | Penkner, A. *et al.* The nuclear envelope protein Matefin/SUN-1 is required for homologous pairing in *C. elegans* meiosis. *Dev. Cell* **12**, 873–885 (2007)

FURTHER READING Gerton, J. L. & Hawley, R. S. Homologous chromosome interactions in meiosis: diversity amidst conservation. *Nature Rev. Genet.* **6**, 477–487 (2005)