



Meiotic chromosome dynamics and checkpoint activation are coordinated at the nuclear envelope

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Meiosis is the special cell division required for sexual reproduction. Several mechanisms unique to meiosis, including homologous chromosome pairing, synapsis, and recombination, are required for faithful chromosome segregation and thus for the production of functional haploid gametes. These processes are controlled and coordinated by meiotic checkpoints that partly overlap with DNA damage and cell cycle checkpoints that govern chromosome behavior in proliferating cells. In most if not all eukaryotes, chromosome pairing and synapsis in are promoted by attachment of chromosomes to the nuclear envelope and active movement along the nuclear surface. Failures in chromosome synapsis trigger a “synapsis checkpoint,” the molecular basis of which has been enigmatic. Our recent work has deployed a new inducible dimerization system in *C. elegans* to investigate the mechanism by which meiotic cells detect failures in synapsis and target defective oocytes for apoptosis. This work has revealed an unexpected role for mechanosensitive Piezo ion channels at the nuclear envelope.



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