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LS-2-P-2208 DEB-1 localization and its dynamics in the gonads of C.elegans during meiosis

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C. elegans is a well-established model organism for the study of meiosis. In the adult C. elegans hermaphrodite, germline nuclei progress more proximally, away from the distal tip of the gonad arm, they exit the mitotic cell cycle and enter meiotic prophase I. Cytologically recognizable nuclei in the pachytene stage of meiotic prophase I are visible before the “loop”.
Vinculin is a conserved actin binding protein localized in focal adhesions and cell-cell junctions. Recently, it was found that vinculin can be localized to nuclei, binding especially to regions around nuclear pores and under nuclear lamina. In addition we localized vinculin for the first time in meiosis-specific structures – the synaptonemal complexes. Regarding our previous observation we suggest vinculin as a possible new actor in the mammal meiosis. To support this possibility we found ortholog protein of vinculin in C. elegans called DEB-1. DEB-1 is a muscle attachment protein found in dense bodies, and is required for attaching actin filaments to the basal sarcolemma.
First of all we localized DEB-1 in isolated gonad of hermaphrodite with specific monoclonal antibody. We detected specific diffused signal in the entire gonad and within rachis (the central part of gonad), where distal tip cell and sheet cell covering the gonad were marked more intensive. To determine the consequence of decreased presence of DEB-1 on meiosis in hermaphrodite gonads, we transformed worms with DEB-1 RNAi. Lack of DEB-1 (deb1-/-) disrupts the regular arrangement of germline nuclei. In detail, in comparison to mock transformed control, the anterior part of gonad contained a lot of apoptotic cells, also was missing the transition zone where chromosomes should form chromosomal bouquet. In closer view chromosomes we found, that chromosomes are not paired in the whole gonad.
We used immunolocalization for electron microscopy to confirm and characterize the appearance of DEB-1 in gonad of hermafrodite worm. TEM analysis can reveal changes in the morphology of germline nuclei within WT gonads and deb1-/-. We compared the DEB-1 localization changes via immunogold labeling on ultrathin sections of C.elegans and evaluated grouping of gold particles by spatial statistics with previously developed plugins to the Ellipse image processiong program.

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