

International Conference on

Histochemistry & Cell Biology

September 14-15, 2016 Phoenix, USA

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Comparative immunocytochemical analysis of nucleolus-like bodies of fully grown oocytes and nucleolar precursor bodies of zygotic embryos

Instead of typical tripartite nucleoli, mammalian germinal vesicle (GV) oocytes contain intranuclear entities called nucleolus-like bodies (NLBs), and zygotes contain the insertions named nucleolar precursor bodies (NPBs). Both entities are strikingly similar in morphology, but their biochemical composition and roles in early development remain poorly understood. In our work, we compare the composition of NLBs and NPBs in the mouse by exploring various protocols of cell fixation and post-fixation treatments followed by immunocytochemistry, fluorescence in situ hybridization (FISH) and high resolution confocal laser scanning microscopy. Our data show that NLBs of NSN-type oocytes, similar to normal nucleoli, contain all factors required for rDNA transcription (UBF), early rRNA processing (fibrillarin), late rRNA processing (NPM1/nucleophosmin/B23, nucleolin/C23), and pre-ribosome assembly (ribosomal proteins RPL26 and RPS10), as well as the primary 47S pre-rRNA transcripts, unprocessed rRNA, 18S and 28S rRNAs and U3 snoRNA. This evidences in their capability to make pre-ribosomes. Transformation of NSN-oocytes to more competent SN-oocytes leads to a cessation of rDNA transcription and to a partial losing of rRNAs, RPL26 and RPS10 from the NLB interior. Unlike NLBs, zygotic NPBs are almost completely impoverished for RNA and completely for UBF. Overall, our data support biochemical and hence functional divergences not only between NLBs in GV oocytes of NSN- and SN-types but also between NLBs and NPBs. These findings could shed light on the reasons of the inadequate developmental capacities between enucleolated mouse GV oocytes and zygotes known from the literature.

Biography

Olga V Zatsepina has completed her PhD and DrSci degrees from the Moscow State University (Moscow, Russia). Currently, she is the Head of Laboratory in the Shemyakin-Ovchinnikov Institute of Bioorganic Chemistry of the Russian Academy of Sciences in Moscow. She has been awarded several international fellowships in Cell Biology. She is a Co-author of about 150 papers in reputed journals and is serving as an Editorial Board Member of repute.