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Organization and rheological properties of hyaluronan rich matrix surrounding ovulated oocytes

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Somatic cells surrounding mammalian oocytes, named cumulus cells, dramatically upregulate hyaluronan synthase 2 expression before ovulation leading to the production of long hyaluronan (HA) strands (more than 2000 kDa) that are organized into a mesh-like network. This highly hydrated matrix is only temporarily deformed when subjected to shearing forces. We have provided evidence that assembly of such elastic matrix requires cooperation of several proteins in order to stably crosslink HA strands. Presently, three proteins meeting these criteria have been identified. Knock out mice of each of these proteins produce the same phenotype consisting defective HA-matrix formation around the ovulated oocyte, failure of fertilization and female sterility. Histochemical and immunological localization of matrix components together with the mechanical analyses of the matrix by colloidal-probe atomic force microscopy allowed us to make advances in understanding the molecular interactions and the rheological and functional properties of the HA-matrix, making the cumulus environment suitable for fertilization by the spermatozoa. These studies might be relevant for clinical purposes. Indeed, male infertility is increasing in the population and the knowledge of the cumulus HA-matrix constituting the natural selection sieve to sperm might help in developing an innovative method for selecting gold sperm in programs of assisted reproduction technology.

Biography

Antonietta Salustri PhD got a position as an Assistant Professor at the University of L'Aquila, Italy, in 1978, and in 1984 became Associate Professor at the University of Rome Tor Vergata. She served as a Visiting Associate at the Proteoglycan Chemistry Section, NIH, Bethesda, USA from 1988 to 1990. From 2001 she is a Full Professor of Histology and Embryology at the Department of Biomedicine and Prevention, University of Rome Tor Vergata. She is a Member of the International Society for Hyaluronan Sciences and American Society for Biochemistry and Molecular Biology. She has published more than 70 papers in reputed journals and several comprehensive reviews.

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