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Czech Journal of Animal Science

Expression and localization of nitric oxide synthase isoforms during porcine oocyte growth and acquisition of meiotic competence

Chmelíková E., Sedmíková M., Petr J., Kott T., Lánská V., Tůmová L., Tichovská H., Jeřeta M.:

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Reproduction biotechnologies depend on the use of fully meiotically competent oocytes. Growing oocytes without full meiotic competence are an interesting potential source due to their quantity, but

the mechanisms regulating the processes of acquisition of meiotic competence have not been clarified to date. Nitric oxide synthase (NOS) and its product, nitric oxide (NO), may possibly play a role. Understanding the precise NO regulatory mechanism is therefore important for the development of *in vitro* growth methods. The objective of this work was to detect changes in the expression of NOS isoforms and their mRNA expression and changes in the intracellular localization of separate NOS isoforms during the growth period of the porcine oocyte, and also to determine whether these changes are related to the process of meiotic competence acquisition. mRNA for all NOS isoforms was already detected in oocytes at the beginning of their growth and was present in them until they completed their growth period. mRNA for iNOS and eNOS was also observed in granulosa and cumulus cells from these oocytes. But nNOS mRNA was not demonstrated in these types of cells. Pig oocytes and their surrounding cells contained all NOS proteins. Their amounts increased and localization changed with the acquisition of meiotic

competence. nNOS was localized mainly in the cortex in meiotically incompetent oocytes, while meiotically competent oocytes contained nNOS in the nucleus as well. iNOS protein was distributed in the cytoplasm and nucleus in all oocytes, and meiotically incompetent oocytes contained iNOS in the nucleolus as well. eNOS protein was distributed in oocytes in the form of fine granules with a strong fluorescence signal. Protein was concentrated in the nuclear area in meiotically incompetent oocytes and also in the periphery in oocytes with partially and fully-developed meiotic competence. All these findings indicate that NOS isoforms may significantly influence the acquisition of meiotic competence in porcine oocytes.

Keywords:

pig; oocyte; growth; meiotic competence; NO-synthase

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