

An addition of nicotinamide mononucleotide (NMN) into oocyte maturation medium improves the developmental competence of bovine oocytes after IVF.

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Study question: Does an increase of NAD⁺ level in oocytes lead to an improvement of blastulation after IVF?

Summary answer: The addition of NAD⁺ precursor to the culture medium increased NAD levels in the oocytes, resulting in a decrease in ROS levels and an increase in ATP levels in oocytes, and an increase in blastocyst formation rate after IVF.

What is known already: With maternal ageing, the enzyme that degrades NAD⁺ (CD38) increases in cells and the amount of NAD⁺ in cells, including oocytes, decreases. The degradation of NAD⁺ is also increased when cells are isolated from tissues.

Study design, size, duration: This study is a prospective study using bovine oocytes retrieved from ovaries obtained from a local slaughterhouse in Osaka city. A total of 300 bovine oocytes were used in this study.

Participants/materials, setting, methods: Bovine cumulus-oocyte-complexes (COCs) were cultured for 21 h in IVM medium supplemented with FSH, estradiol-17 β , and 0-10 μ M NMN at 39°C under 5% CO₂ in air with high humidity. Matured oocytes were inseminated with the washed spermatozoa. Presumptive zygotes were cultured for 168 h. Matured oocytes were also examined its NAD⁺, reactive oxygen(ROS) and ATP levels

Main results and the role of chance: The addition of NMN to the culture medium increased intracellular NAD⁺ levels at 1 μ M and above, increased intracellular ATP levels at 10 μ M and above, decreased ROS levels, and increased blastocyst formation rates at 100 μ M.

Limitations, reasons for caution: This study was conducted in vitro using bovine oocytes. Thus, studies using human samples should be performed before clinical application

Wider implications of the findings:

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Trial registration number: None.