

Abstract Details

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★ Abstract title:

Human Sperm Aminopeptidase N is related to embryo development and viability during ART

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Study question:

to investigate the association between the levels of aminopeptidase N (APN) present in human spermatozoa with embryo development and viability.

Summary answer:

Semen samples with less number of Aminopeptidase N molecules per spermatozoon are related to higher-quality early-embryos, more evolved blastocysts and blastocyst viability during IVF procedures.

What is known already:

20%-30% of men with normal seminal-parameters have impaired fertility ability and inability to achieve pregnancy, suggesting that male infertility can be caused by different deficiencies not yet described. One of the major predictors of ART success is embryo quality, and abnormal embryos have been linked to poor sperm quality. Sperm molecular features, such as proteins, are involved in fertilization and embryo development. Aminopeptidase N can be a relevant biomarker due to its high concentration in spermatozoa and its role in human sperm motility, mussel acrosome reaction and several seminal pathologies. However, its role in embryo development is not completely understood.

Study design, size, duration:

This prospective cohorts study was conducted February 2014 to July 2015. Normal and/or pathologic semen samples of couples undergoing oocytes donation cycles, at Clínica IVI Bilbao, were used to determine the APN levels in human spermatozoa and to analyze the association between the APN and human embryo development and viability.

Participants/materials, setting, methods:

A total of 81 human semen samples and 611 embryos were examined. Sperm samples and embryo quality were examined following WHO and "Asociación Española para el Estudio de la Biología de la Reproducción" (ASEBIR) guidelines, respectively. APN levels were measured by semi-quantitative and quantitative flow cytometry assays, in the same processed sperm sample used for the *in vitro* techniques. Statistics: Spearman's rank correlation, Kruskal-Wallis and Mann-Whitney U-test.

Main results and the role of chance:

Sperm samples with higher percentages of APN-positive spermatozoa and lower levels of this enzyme per spermatozoon correlate to sperm samples with better motility. In regard to embryo quality, embryos with higher implantation potential came from semen samples with less APN molecules per spermatozoon in early human embryos, at day 2 and 3 of development. Similarly, in the later phase of *in vitro* development, blastocyst with higher implantation potential, such as fully expanded and hatching blastocyst, also came from semen samples with less APN molecules per spermatozoon. Furthermore, concerning embryo viability at day 5 and 6 of development, we observed similar results, viable human blastocysts came from semen samples with less number of APN molecules per spermatozoa than non viable blastocysts.

Limitations, reasons for caution:

duration of the study.

Wider implications of the findings:

APN levels can provide very valuable information for semen sample quality and embryo development in humans. In conclusion, the sperm APN could be a potential sperm biomarker to orient embryologist for embryo selection in IVF procedures in order to obtain a future embryos with higher implantation potential.

Trial registration number:

CEISH/61/2011.

Keywords:

Aminopeptidase N

human spermatozoa

male fertility

embryo development

Assisted reproduction techniques